The Effect of Electricity-Use Feedback on Residential Consumption: A Case Study of Customers with Smart Meters in Milton, Ontario

by

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A thesis
presented to the University of Waterloo
in fulfilment of the
thesis requirement for the degree of
Master of Environmental Studies
in
Environment and Resource Studies

Waterloo, Ontario, Canada, 2007

I hereby declare that I am the sole author of this thesis. This is a true copy of the thesis, including any required final revisions, as accepted by my examiners.

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Abstract

Faced with a looming electricity crisis, the provincial government is calling for Ontarians to adopt a "culture of conservation", and is planning to equip all residential dwellings with new metering infrastructure known as "smart meters" by 2010. In addition to providing residents with the ability to "shift" their electricity consumption from the most expensive "on-peak" times of the day, the data from these meters can be used to provide residents with detailed information, or feedback, regarding their consumption patterns. This research assessed whether electricity-use feedback affected households' electricity consumption behaviour, whether feedback effected pro-conservation attitude changes, and what types of feedback were most effective in these regards. An initial mail survey was sent to 1,257 smart metered Milton, Ontario homes to obtain information regarding residents' appliances and their consumption behaviour and attitudes. Of the 298 respondents, most of whom were living in homes that were less than seven years old, 106 were chosen to receive weekly household-specific feedback in various formats from July to October 2006. A follow-up survey was conducted to assess any changes in attitude as a result of the feedback, and weather-adjusted 2005 and 2006 consumption data were used to quantitatively discern any resulting consumption changes. While overall results revealed that the feedback made little difference in household consumption levels compared to the 2005 baseline period, there were some indications that it was effective in encouraging shifting, and had the opposite effect on overall conservation (i.e. it encouraged increased consumption). Also, while the comparison of "pre-" and "post-feedback" surveys revealed the feedback had no measured effect on encouraging pro-conservation attitudes, overall, customer acceptance of the feedback was high.

Acknowledgments

I am very much appreciative of the support and guidance that Dr. Ian H. Rowlands, my thesis advisor, has provided me throughout my time in the University of Waterloo's Master of Environmental Studies programme. While never controlling, his advice was always targeted, substantive, and delivered with humility and humour. He was also fantastic at providing me, as well as his other students, with great opportunities to showcase our research.

We could not have asked for better industry partners than Don Thorne, President and CEO, and Mary-Jo Corkum, Vice President of Finance at Milton Hydro Distribution Incorporated. The time and resources they dedicated to the project, not to mention their enthusiasm and support, made working with them a joy (at the risk of sounding effusive!). I would also like to acknowledge Andrew Peers and Drazen Prodanovic, who were always quick to respond to my multiple data requests. I owe a lot to Cathy Mandarino as well, who spent a substantial amount of time inputting survey data for me.

I am grateful for the funding I received from Canada's Social Sciences and Humanities Research Council, and I would like to acknowledge the Centre for Energy, one of the Ontario Centres of Excellence, which also funded this work and provided me with opportunities to present the research externally.

I am very appreciative of Bijan Alagheband and Stan But at Hydro One Networks Incorporated as well, who weather-adjusted all of our data, and always did so expeditiously.

Erin Harvey and her army of statistical consultants at the University of Waterloo's Statistical Consulting Service were also instrumental in helping me choose the appropriate statistical design and testing for this research. Mary Thompson of the Survey Research Centre gave fantastic advice regarding the design of my survey instruments. Both Erin and Mary were wonderful at always finding the time to fit me in to address my endless questions.

Megan Conway volunteered her editing skills and great advice during the final throes of my writing process, for which I am also very much appreciative.

Finally, a big thank you goes to all my family and friends who have been so supportive of me during my time at the University of Waterloo.

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1 Introduction

Ontario's power infrastructure is in a critical state. Approximately two-thirds of its current generation capacity, most of it nuclear, will reach the end of its planned operating life by 2025. Factoring in the growing economy, as well as the provincial government's commitment to phase out coal-fired generation in response to the growing public demand to reduce greenhouse gases and air pollution, the proportion of generation facilities that will need to be replaced or refurbished by 2025 climbs to 80% (Ontario Power Authority, 2005). Amidst this climate, business and industry, still haunted by the turbulent effects of the August 2003 blackout on the economy, are demanding reliability of supply and cost stability in order to maintain competitiveness.

Given the 40 billion Canadian dollar estimated cost of the required generation investments (Hamilton, 2007), it is widely recognized that less costly electricity conservation programs must play an essential role in the province's infrastructure development plans. In 2004, the province established a Conservation Bureau to lead the effort in developing a "culture of conservation" in Ontario (Government of Ontario, 2005).

While this definition remains unclear (Enbridge Gas Distribution, 2007), it is believed that the term "conservation", as used in the term "conservation culture", encompasses behaviours such as conservation (i.e. overall consumption reduction by using less), as well as "shifting" from "on-peak" times (i.e. using less electricity during the hours of the day when electricity demand is highest), and even energy efficiency (i.e. consumption reduction by using more highly efficient technologies). Also, the term "culture" implies behaviour as well as attitudes. For the purpose of this research, a conservation culture has been defined as an exhibition of both pro-electricity-conservation behaviour and attitudes. Furthermore, both conservation and shifting behaviours and attitudes will be examined.

It can be argued that households will be important contributors in the development of a conservation culture in Ontario. Average household electricity consumption in the province is only slightly lower than the Canadian average (Aydinalp, Fung, & Ugursal, 2000), and Canadian households are among the highest per-capita electricity consumers in the world (Energy Information Administration, 2006). Furthermore, Ontario households consume one-third of the province's electricity (Ontario Energy Board, 2005). As one means of providing the residential sector with the tools for electricity consumption reduction, the province plans to equip all households with "smart meters" by 2010. In Ontario, smart metering involves technology that will be capable of recording electricity consumption and the time at which it occurs, which will in turn allow regulators to set electricity prices that better reflect market prices that vary throughout the day. During the summer months, electricity demand and prices are the highest on weekdays during the day (i.e. during on-peak periods); on weekday evenings, both demand and price drop (i.e. during "mid-peak" and "off-peak" periods). During the winter months, on-peak demand occurs on weekdays in the morning and evening.

This dynamic pricing scheme is known as "time-of-use" pricing and it represents a significant departure from the conventional tiered pricing scheme, under which residents essentially pay a flat rate per unit of consumption up to a certain threshold level. Smart meters will thus ostensibly encourage electricity consumers to take advantage of price savings by shifting their usage from on-peak periods. This shifting will aid in "smoothing" the province's load profile and should result in lower on-peak capacity requirements, thus potentially reducing new generation investment requirements. This smoothing should lower electricity prices as well, as there will be less demand for electricity supplied during the costliest period of the day.

To further encourage residents to respond to time-of-use pricing, Ontario's infrastructure will also provide residents with the capability of viewing their own electricity consumption details within 24 hours of consumption. This information, which represents the consumers' past consumption behaviour, is a form of "feedback". This information will likely be made available via websites or over the phone (Smart Meter Ontario, 2007).

Feedback information pertaining to actual household electricity-use has been shown to be effective in inducing energy consumption behavioural change (Darby, 2000; Fischer, 2007; Seligman, Becker, & Darley, 1981; Wood & Newborough, 2003). Although a significant amount of research has been performed relating to electricity consumption feedback, some of it in conjunction with time-of-use pricing, much of this dates back to the late 1970s and early 1980s (e.g. Heberlein & Warriner, 1983). Although there is more recent work assessing the effectiveness of time-of-use (and other) pricing schemes in California (George & Faruqui, 2005), as well as some feedback-related research within the California context (Martinez & Geltz, 2005), it is not known how these findings will translate to the Ontario context, particularly due to the province's relatively low electricity price environment. An initial Ontario-based smart metering pilot assessment concentrated on the impact of time-of-use pricing, but not specifically on feedback (IBM, 2007).

As the Ontario smart meter deployment will be one of the largest in North America, it can be argued that there is a need to understand how the electricity-use information that it will make available can be used to encourage consumption behavioural change.

This research therefore aims to answer the question: "How are electricity consumption behaviour and attitudes of selected customers with smart meters influenced by residential electricity-use feedback information in Milton, Ontario?"

1.1 Research Contributions

From a practical perspective, this research provided insight into the type of feedback that would be successful in bringing about changes in consumption behaviour in an Ontario urban context. It also provided insight as to whether feedback affected consumers' attitudes towards electricity conservation issues, which may help to further motivate individuals to exhibit conservation behaviour.

From an academic perspective, this research contributed empirical evidence to the bodies of work describing various behavioural interventions, particularly as they relate to the use of feedback.

1.2 Target Audience

It was expected that this study would be of significance to program developers at local electricity distribution companies, community-based organizations and smart metering system developers servicing Ontario. The findings may also be useful in contributing to policy development at the provincial level in Ontario, as well as in other jurisdictions that may be considering smart metering technology. Lastly, the findings may also translate to other resource management sectors interested in consumption behaviour, such as those involved with water demand management strategies.

1.3 Study Site

The town of Milton, Ontario, situated approximately 55 kilometers west of Toronto (Figure 1), is currently undergoing a period of rapid growth. In 2006 its population was approximately 54,000, which was a 70% increase from 2001, the last census year.

Figure 1 – Location of Milton, Ontario, Canada

Source: Town of Milton, n.d.

It is partly due to this growth that Milton became one of the first jurisdictions in Ontario to have initiated significant smart meter installations, mainly in newly constructed homes. Milton Hydro Distribution Incorporated is recognized as a leader in conservation efforts province-wide, and their willingness to engage in progressive conservation research, coupled with the availability of some of the first detailed smart metering electricity consumption data in the province, were the key reasons for the selection of Milton as the research site. Led by Professor Ian Rowlands, the Faculty of Environmental Studies at University of Waterloo has developed a formal partnership with Milton Hydro that is funded with support from the Ontario Centres of Excellence.

Within Milton, the study focused on a sub-set of households that has been equipped with smart meters since at least May 2005, so that adequate baseline data was available for the study. The baseline period was August to October 2005, and the test period, when residents were provided with the feedback intervention, was from August to October 2006.

This introduction has sought to provide a rationale for the need for research relating to residential electricity-use feedback in the Ontario-specific context. Chapter 2 follows, which provides an overview of the academic literature from the past three decades relating to the relationships between attitudes and behaviour, and the experience with energy conservation intervention strategies, with a specific focus on the functions and effectiveness of feedback. The chapter ends with a discussion of some of the research gaps in the literature, and attempts to synthesize the findings with of a conceptual framework that can be used to understand the functions of feedback as explained by various attitudinal and behavioural theories. Chapter 3 then lays out the research design, and explains how the methodological instruments, a pre- and post-feedback survey, and the feedback instrument itself, were developed and used. Chapter 4 provides an overview of the results of the surveys, as well as the changes in consumption levels over the course of the test period relative to the baseline period. Various statistical tests are applied to these data as well, which are analyzed in detail in Chapter 5. Finally, Chapter 6

concludes the study by offering a summary of the results and their analysis, followed by their potential policy implications; related future work is also discussed.

2 Study Context: Residential Energy Use Behaviour

This research centres on electricity consumption feedback information, and its potential to effect behavioural and attitudinal change, and as such, this review considers the existing body of research that links these topic areas. It begins with a review of literature from the past three decades that explores the relationship between attitudes and behaviour, and presents various intervention strategies designed to encourage conservation behaviour. It then examines feedback, one specific energy conservation intervention strategy, in more detail by considering the mechanisms by which feedback works, the criteria for effective feedback, and the potential limitations of using feedback to promote conservation. Research gaps are highlighted, and the whole review is then summarized through the presentation of a conceptual framework that suggests a proposed relationship amongst the aforementioned topics and the relevant theories that have been used to underpin past research, and, indirectly, this research as well. A discussion of the interaction between attitudes and behaviour will now be presented.

2.1 Attitudes and Behaviour

A significant body of research has been dedicated to understanding the relationship between attitudes and behaviour, and specifically the degree to which the former may predict the latter. This predictive nature has long been recognized as being somewhat tenuous (Brandon & Lewis, 1999; Gatersleben, Steg, & Vlek, 2002; Hutton, Mauser, Filiatrault, & Ahtola, 1986; Kantola, Syme, & Campbell, 1984; Poortinga, Steg, & Vlek, 2004). Reasons for the low attitude-behaviour link can be related to knowledge and awareness levels. Gatersleben et al. (2002), through the results of two large-scale surveys of Dutch households, showed that, among other things, households with high pro-environmental attitudes were often not aware of the environmental impacts of their energy consumption, both directly and indirectly. Darby (2006) argues that behaviour that is not keeping up with increasingly pro-environmental attitudes may be due in part to an inability of individuals to link their specific actions to the overall impact. Another potential reason for the low attitude-behaviour link is that studies often fail to take into account external factors beyond the householders' control. Guagnano, Stern, and Dietz

(1995) report evidence that attitudes toward recycling can in fact predict recycling behaviour when external factors such as convenience levels are taken into account. Kaiser, Wolfing, and Fuhrer (1999) also argue the need to take into account contextual factors, and believe that the seemingly weak attitude-behaviour link supported by past studies may relate to differing definitions of attitudes.

Despite this, some research has shown that attitudes can in fact predict behaviour. Although Scott (1999) found that the attitudes of people who recycled were wide-ranging, he did note that those with the lowest pro-environmental attitudes tended to recycle less. Heberlein and Warriner (1983) found that the knowledge and the "conative" component of attitudes (defined as the intention to act) were stronger predictors of householders' shifting electricity use from on-peak times than were price incentives and appliance stocks. Rowlands, Scott, and Parker (2000) found a weak positive correlation between general pro-environmental attitudes and self-reported home energy conservation measures, with a slightly higher positive correlation between climate change attitudes and conservation measures. This corresponds with other research that argues that attitudes can better predict behaviour once they become more specific (e.g. Gatersleben et al., 2002; Kaiser, Wolfing, & Fuhrer, 1999). Wilson and Dowlatabadi (2007) and Gatersleben et al. (2002) reviewed past research that has found that attitudes can be useful in predicting behaviour relating to the curtailment of simple measures, or behaviour that does not have a high financial or psychological impact on people's daily lives such as energy use.

There are also cases where behaviour changes have resulted in attitude changes that can lead to longer-term or sustained behavioural change. One meta-analysis indicates that interventions aimed at attitude change may directly impact behaviour only weakly in the short term, but may be beneficial for longer-term change (e.g. in the form of building political support for change, etc.) (Wilson & Dowlatabadi, 2007). Dwyer, Leeming, Cobern, and Jackson (1993) also argue that attitude change is important for sustained behavioural change. Van Houwelingen and van Raaij (1989) propose that small

behaviour changes can eventually lead to habit formation and ultimately attitude change as individuals adjust their attitude to reflect their new behaviour.

Attitudes as well as behaviour were considered in this study as they were both considered to be requisite components of the "conservation culture" that Ontario is seeking. This is because, although ultimately behaviour change in terms of reductions in total and on-peak electricity consumption is important, there is literature that supports the need for attitudinal change as well to help encourage initial behaviour change, and perhaps more importantly, to sustain behaviour change over the long term.

The following section concentrates on the behavior component of the "conservation culture" by considering the relative success of the various behaviour intervention strategies that have been implemented over the years.

2.2 Energy Consumption Behaviour Interventions

The body of research considering the correlation between attitudes and behaviour discussed above also often includes empirical studies relating to the effectiveness of various interventions to encourage conservation behaviour at the household and individual levels. It should be noted that, while this study is concerned with conservation as well as the shifting of electricity use patterns, most of the intervention literature reviewed is concerned mainly with conservation. However, much of the past work is also relevant to the concept of shifting as well.

Energy conservation interventions can be categorized in various ways, and the taxonomy employed varies depending on the researchers (e.g. Abrahamse, Steg, Vlek, & Rothengatter, 2005; Dwyer et al., 1993; Guerin, Yust, & Coopet, 2000; Katzev & Johnson, 1987; Winett & Ester, 1983; Wood & Newborough, 2003). For the purpose of this review, the most frequently used categories of "antecedent" and "consequence" will be used. The following offers a summary of the different types of antecedent and consequence strategies and some of the results of their deployment.

2.2.1.1 Antecedent Interventions

Antecedent strategies refer to interventions designed to prevent (or encourage) specific future behaviours (i.e. they target behaviour before it occurs). They can include information campaigns (e.g. conservation campaigns, books, pamphlets, workshops, etc.); prompts, which are generally shorter and less detailed than information campaigns (e.g. cues to spark conservation behaviour, posters, flyers, etc.); and persuasion tactics (e.g. comprehensive marketing campaigns, messages stressing personal gain and societal benefit, letters to owners stating their conservation levels are not in line with their environmental values, etc.).

Overall, Katzev and Johnson (1987) suggest that antecedent strategies can be fairly limited in terms of conservation impact, and that an information approach alone is not effective in bringing about significant and sustained behaviour change. Other researchers assert that too often information campaigns have failed because not enough attention was paid to using psychological techniques to ensure the audience adequately receives the message (Stern, 1992). If done properly, some argue they can be beneficial, particularly in conjunction with other techniques (Abrahamse et al., 2005 citing van Houwelingen & van Raaij, 1989).

Although feedback, the intervention used in this particular study, is primarily considered a consequence intervention (described below), it can be regarded as a type of antecedent intervention as well, as it represents an opportunity to provide consumers with general information regarding energy conservation. Indeed, Darby states that "information *and* feedback are needed for maximum effectiveness" (2006, p. 2937, emphasis in original). Other reviews echo this finding (Fischer, 2007), and more about the types of information that have been found to be effective when offered with feedback will be discussed below. However, feedback is first and foremost a type of consequence intervention, and a review of the research relating to these types of interventions follows.

2.2.1.2 Consequence Interventions

Consequence strategies are designed to reward, penalize, or inform individuals based on their behaviour after it occurs so as to potentially influence future behaviour. As per Wood and Newborough, the strategy "relates directly to a consumer's behaviour, i.e. it is feedback that provides a user with information about the action he/she has carried out (or, more succinctly, knowledge of results)" (2003, p. 823). While this definition obviously includes feedback as a type of consequence strategy, other consequence strategies include incentives and commitment strategies.

Incentives are conservation-related monetary rewards or prizes, and disincentives are costs, penalties, or inconveniences. Examples of this latter point include traffic jams, slowing elevator times, and higher electricity prices during certain times of the day. Incentive research has reported a series of positive results (see Abrahamse et al., 2005 for a review), but conclusions regarding the overall effectiveness of incentives are not unanimous. When financial incentives were offered to a sample of similar households (i.e. from the same geographic area), the amount of investment that took place varied tenfold (Stern, Aronson, Darley, Hill, Hirst, Kempton, & Wilbanks, 1986). One explanation for this is that those who have made some sort of a commitment such as requesting an energy audit are more likely to make investment. Thus, incentives do little to overcome initial barriers such as requesting audits. There is also the concern of the "free rider" phenomenon of incentives predominantly being used by those who likely would have taken the conservation action anyway (Ontario Power Authority, 2006). In addition, incentives do not always lead to reduced consumption, and their effect can be reduced once the incentive has been removed (Abrahamse et al., 2005; Cook & Berrenberg, 1981; Katzev & Johnson, 1987). The programs can also be expensive, and they can be complicated by the fact that their appeal will vary depending on the target group, as well as by other factors such as "[a]dministrative effort, eligibility criteria, cash flow timing, the relevance of immediacy… and the requirement to take on debt" (Wilson & Dowlatabadi, 2007, p. 28). Regarding time-of-use pricing, which is a sort of incentive to encouraging consumption during off-peak times, Heberlein and Warriner (1983) found

that it was effective in encouraging shifting, but that attitudinal components actually had a much larger effect on shifting.

Broadly speaking, written or verbal commitment strategies can have "considerable" (Katzev & Johnson, 1987, p. 123) impact on motivating people to conserve energy. One study that distributed conservation information found that asking some residents to commit to filling out a small questionnaire or to making an explicit conservation commitment of 10% resulted in a higher overall savings compared to the control groups who also received the conservation information (Katzev & Johnson, 1983). Also, commitment interventions have been found to result in conservation even beyond the intervention period. One study found that the beneficial effects of making public commitments regarding gas and electricity conservation still existed six months after the intervention (Abrahamse et al., 2005 citing Pallak & Cummings, 1976). From a sample of households who took part in a conservation study, those who agreed to have their name published as having taken part in the study resulted in an electricity savings of 20% and a natural gas savings of 15%. Furthermore, this savings was still present one year later (McKenzie-Mohr, 1994). Goal-setting is an explicit form of commitment, and this has also been extensively studied in the context of household energy conservation. One meta-analysis cited a 20% energy savings when households were asked to take on an explicit conservation goal (Winett & Ester, 1983 citing Becker, 1978). As will be discussed further below, some feel that feedback is effective mainly if it is combined with some sort of explicit goal-setting function (Seligman et al., 1981).

A discussion of incentives and commitment strategies is relevant to this study for several reasons. In the case of incentives, all households in the study were being charged time-of-use rates during the test period, and as such were being provided with an incentive to shift their consumption from on-peak periods. (As will be described in Chapter 3, this in some ways confounds the effect of the feedback, but this was addressed through the use of appropriate control groups.) In the case of commitment and goal-setting strategies, the relevance to the study is more indirect: household consumption levels were reported

relative to a specific standard, the purpose of which was to provide a frame of reference and in some cases an indirect attainment goal.

The feedback itself, another consequence intervention strategy and the main focus of this study, will now be discussed in more detail.

2.3 Feedback

Feedback is defined as "[t]he modification, adjustment, or control of a process or system (as a social situation or a biological mechanism) by a result or effect of the process, esp. by a difference between a desired and an actual result; information about the result of a process, experiment, etc.; a response." (Oxford University Press, 1989). In the context of energy consumption research, it can be categorized as direct (e.g. in-home displays, consumption limiters, pre-payment schemes), indirect (e.g. utility bills and information) and inadvertent (e.g. energy audits) (Darby, 2000).

In the past, some researchers have stated that its use is over-prescribed (Katzev & Johnson, 1987). One study found that in-home displays offered no overall conservation savings, although they did slightly encourage shifting (Sexton, Johnson, & Konakayama, 1987). Winett, Kagel, Battalio, and Winkler (1978) found that feedback was not useful in encouraging air conditioning load reduction during summer periods, although high rebates were. Another feedback study reported an effect that was opposite to what was intended for low and medium consumers (i.e. those who received the feedback consumed more than those who did not) (Bittle, Valesano, & Thaler, 1979-1980).

However, a significant body of research exists that supports its utility as well. One oft-quoted meta-analysis reviewed 38 feedback studies covering various types of feedback, and concluded that, on average, these techniques could bring about consumption reduction in the order of 10% (Darby, 2000). Similarly, another individual study which compared identical homes found feedback resulted in a 10% decrease in electricity consumption (Guerin et al., 2000 citing Seligman & Darley, 1977). Comparative feedback on air conditioning consumption resulted in a 20 to 30% electricity reduction

(McKenzie-Mohr, 1994). In households that received daily reports on projected monthly energy consumption based on meter readings, consumption was reduced by approximately 10 to 15% (Stern, 1992 citing Seligman et al., 1981). Another meta-analysis cites feedback conservation studies resulting in consumption savings of 15%, and as high as 30% during seasonal peak-use periods (Winett & Ester, 1983 citing Seligman & Darley, 1977). A comparison study that pitted antecedent information against feedback displays on electric stoves demonstrated average electricity savings of 3 and 15% respectively (Wood & Newborough, 2003).

Explanations of the results of the empirical work are often as varied as the results themselves. In addition to pro-environmental or pro-conservation attitudes sometimes being found to be determinants of conservation effects as has already been discussed, demographic features such as household income have been studied as well. Some research has argued a positive correlation between income and household consumption levels (e.g. Gatersleben et al., 2002; Guerin et al., 2000 citing Heslop, Moran, & Cousineau, 1981, Hines, Hungerford, & Tomera, 1986, Morrison, Gladhart, Zuiches, Keith, Keefe, & Long, 1978, Newman & Day, 1975, and Ritchie, McDougall, & Claxton, 1981), although some has found that the link is not always clear (Brandon & Lewis, 1999). In terms of income and consumption level reductions as a result of feedback (or other) interventions, again, some have found a positive correlation to exist (e.g. Guerin et al., 2000 citing Eichner & Morris, 1984; Wilhite & Ling, 1995), while others have not (e.g. Brandon & Lewis, 1999; Guerin et al., 2000 citing Johnson-Carroll, Brandt, & Olson, 1987).

A discussion of feedback as a conservation intervention (and indeed this entire study) is relevant because, as previously discussed, the Ontario smart meter deployment will result in the unprecedented availability of detailed information for each consumer regarding their consumption levels and patterns. For the purpose of this research, the effect of providing indirect feedback in the form of weekly household-specific consumption information was studied, as it was hoped that the research would highlight the type of information that was most useful to the consumer, if any, and that resulted in the largest

consumption behaviour change. The body of research which examines the effects of various types of feedback on electricity conservation efforts will now be reviewed in more detail.

2.3.1 Feedback Mechanisms

The majority of feedback-related conservation research has spanned the last three decades, dating back to the first oil embargo of the early 1970s. Since this time, different explanations of the feedback effect as it relates to energy consumption behaviour have been suggested.

Seligman et al. (1981) provide an excellent overview of a range of concepts or approaches that attempt to describe how feedback may work. They dismiss the human factor approach, which regards feedback as "primarily the teaching of new, skilled responses" (Seligman et al., 1981, p. 100), as they argue that individuals generally know how to reduce electricity consumption (e.g. turning off lights will reduce electricity consumption; raising the temperature on the air conditioner will reduce electricity consumption, etc.). Which appliances have the potential to produce the greatest savings, and whether the motivation exists to conserve are of course important, but these are not explained with the human factor approach.

The reinforcement approach considers feedback as a type of reward (or punishment) in and of itself. Seligman et al. (1981) argue that this may not necessarily apply either, and use empirical evidence that suggests individuals acted to save energy with the help of a specific prompt (a light flashing when their air conditioning was on, but temperatures outside were cool enough to not warrant the use of the air conditioning), and that subsequent feedback (in the form of a hard copy of their actual consumption levels) was effectively ignored. While this supporting evidence can be disputed on the basis of various confounding effects (i.e. the flashing light, also a type of feedback, occurred in real-time whereas the paper feedback only occurred three times a week; the validity of the paper feedback was questioned by the individuals), the point remains valid: the feedback itself, numbers or charts on a piece of paper, may not be a significant reward,

save in cases where it can lead to feelings of happiness for achieving a goal. While it is true that feedback can highlight electricity savings and therefore monetary savings, the feedback is the "messenger", not the reward itself.

The motivational approach suggests that feedback acts to motivate individuals to conserve. Seligman et al. (1981) argue that it is "highly unlikely that feedback in itself is motivating in the sense of supplying a person with the drive to conserve energy" (p. 104). Further to this explanation, it can be argued that feedback may serve to expose pre-existing motivations, even those that an individual may not know exist. Such motivations may include a desire to save money, a desire to behave in accordance with an individual's strong conservation ethic, a desire to achieve a goal, a desire to be perceived socially as a conserver, etc.

Seligman et al. (1981) end their descriptions of how feedback can potentially lead to increased conservation efforts by explaining the approach which they feel best explains the phenomenon: feedback works by "showing that actual conservation is below the level the person wants to achieve" (p. 105). In other words, individuals who have a conservation goal will use feedback to assess their performance with respect to that goal. Seligman et al. (1981) further explain this theory by using empirical examples whereby households were asked to take on explicit conservation goals whose attainability varied from easy to difficult. Those that were given the most difficult goals conserved the most electricity, whereas those that were given easy or no goals had insignificant electricity savings. While Seligman et al.'s (1981) examples imply explicit goal-setting should be involved to obtain a conservation effect from feedback, they also cite Locke, Cartledge, and Koeppel (1968) who suggest that "feedback has a motivational effect because it leads people *implicitly or explicitly* to set goals for themselves that they then try to achieve" (Seligman et al., 1981, p. 104, emphasis added). Given the above discussion disputing the use of motivation as an explanation for why feedback works, this assertion may seem contradictory. However, Seligman et al.'s (1981) citation does not include an examination of why people would want to set goals or improve in the first place, and it can be argued that it is the answer to these questions that Seligman et al. (1981) consider

to be true motivation. Because it is suggested that goals may be implicit as well as explicit, it can be argued that even if an individual does not expressly set a goal, by expressing their consumption with respect to some standard that is meaningful to them (e.g. a comparison to their historic consumption, to their neighbours' consumption, etc.) this can essentially act as a goal that they may try to obtain, providing they have the motivation to do so as explained above.

As will be explained in the next section, some argue that feedback is effective in contributing to sustained behaviour change over time.

2.3.2 Feedback and Habit Formation

Some research suggests that an intervention may facilitate behaviour change initially, but its effectiveness will dwindle with time as the novelty of the information wears off. This phenomenon, known as the "fallback effect", is described by Wilhite and Ling as "the phenomena [sic] in which newness of a change causes people to react, but then that reaction diminishes as the newness wears off" (1995, p.147). Wood and Newborough (2003) argue that this effect is more of a concern with antecedent intervention strategies, and cite research that found that a poster including energy conservation tips was effective when it was initially displayed, but lost its effect over the weeks (Hayes & Cone, 1977). While Wood and Newborough (2003) do not go on to explicitly suggest that feedback or consequences strategies are less susceptible to this effect, they do cite the functions of feedback to be learning, habit formation, and eventually internalization of behaviour, which means a change in attitude (these functions are described in more detail below). This could be interpreted to mean that if feedback can change habits quickly enough then perhaps the fallback effect may be less of a concern.

Another argument made regarding some intervention strategies is that their effects could diminish once the intervention is removed (Cook & Berrenberg, 1981; van Houwelingen & van Raaij, 1989). Some research has found this to be true of monetary incentive strategies (Darby, 2000; Katzev & Johnson, 1987). The empirical work of van Houwelingen and van Raaij (1989) has suggested this can be an issue with feedback

strategies as well, although they provide an excellent theoretical description of how feedback can result in sustained behaviour change.

They outline the three main functions of feedback as learning, habit formation, and internalization of behaviour. The learning process occurs as consumers are made aware of their energy consumption habits with respect to some standard that is meaningful to them. Over time they will begin to see the effects, or consequences, of their consumption behaviour in the feedback, making the information that much more salient to them. The information could be presented as electricity consumption levels, related costs, or other variables. Van Houwelingen and van Raaij defined habits as "routinely performed strings of acts" (1989, p. 99), and suggested that as consumers make small changes in their behaviour, these will become engrained in their actions as habits. The authors do not explain what would cause individuals to make those changes in the first place, although a discussion of this can be found in Section 2.3.1 above. They suggest that "[h]abits formed with feedback should remain after withdrawal of the feedback" (p. 99), although their experimental results did not support this suggestion. Lastly, the third function of feedback as described by van Houwelingen and van Raaij (1989) is that of the internalization of behaviour leading to the development of a pro-conservation attitude. The authors explain this through the use of Bem's theory of self-perception: "Through feedback, energy-conserving behaviors are elicited, and after a while, people adapt their attitudes to their new behavior" (p. 99). This relates closely to cognitive dissonance theory which will be discussed further below. The authors again state that this change in attitude will allow the behaviour to remain once the feedback has been discontinued.

But to begin this supposed process of behaviour and attitude change, the feedback must first be designed such that it is salient to individuals. The following section considers the characteristics of effective feedback.

2.3.3 Criteria for Effective Feedback

Although researchers still continue to question the types of feedback that are most effective in encouraging conservation, some trends have emerged in this regard. Midden,

Meter, Weenig, and Zieverink (1983) suggest that feedback must meet three characteristics to optimize its effectiveness: it must be received as quickly as possible from the time the consumption event occurred; it must be related to some standard; and it must be clearly presented in such a way that it is meaningful to the consumer. In addition, Darby (2000) also suggests that, where possible, it should also be customized for individual households, and the notion of targeted, personalized information is echoed by McMakin, Malone, and Lundgren (2002). Fischer (2007) adds that, in addition to it being provided frequently, it should be provided over a prolonged period of time, it should provide appliance-specific breakdown of consumption use, and it should make use of computerized or interactive tools. Seligman et al. (1981) suggest that the intervention must be credible to the individuals, meaning that "homeowners should see a rough relationship between their feedback scores and their conservation behaviours" (p. 109).

There exists as well a somewhat smaller body of research that has explored the detailed specifics of what should be included in feedback, which will now be reviewed. While much can be learned from this particular past research, as Fischer (2007) points out, the findings regarding such specific features may not always be generalizable across demographic groupings or cultures.

2.3.3.1 Comparison Standards

As previously mentioned, a meaningful comparison standard is an important feedback feature. As per Fischer (2007, p. 1877):

> Comparisons are said to stimulate energy conservation, first, by stimulating competition and ambition (motivational aspect), and secondly, by making transparent if consumption (e.g. in a certain period or of a certain household) is 'out of the norm', activating the search for reasons and redress (consciousness and problem awareness aspect).

The two main types of comparisons that have been investigated in the literature are "historic" and "normative" (which for this study will be called "comparative"). Historic feedback refers to consumption reported relative to the consumption of the same household from a similar time period in the past. Comparative feedback refers to

consumption of a household reported in comparison to the consumption of some other similar group of households.

Historic Standards

Customers are familiar with historic feedback, as it has long been used in many jurisdictions on utility bills as a means of providing residents with some frame of reference for their consumption levels. It is generally perceived to be effective in this regard, and in one Norwegian case where it was implemented for the first time (in addition to more frequent billing), the treatments groups exhibited a 10% decrease in their consumption levels, and were able to maintain this for at least a three-year period (Wilhite, Hoivik, & Olsen, 1999). Other UK-based focus group research found that this frame of reference was very much preferred by residents, especially compared to the comparative standard, although it was recognized by most that some form of weather-adjustment should be identified in order to make the comparison more fair (Roberts, Humphries, & Hyldon, 2004). Indeed, this reference appears to be useful to residents: Eide, Lord, and Kempton (1996) cite a 1995 study that found the historic reference was the most readily recalled piece of information on their bill, and was used by customers to try to understand their consumption patterns. While not a direct comparison, this contrasts slightly with Kempton and Layne's (1994) findings where only 41% paid attention to the historic comparison, which at the time was a new addition to the bill. Overall, historic feedback seems to be understandable, salient, and effective with consumers. Indeed, Fischer (2007) cites a historic reference as at least one of the main features that often existed in the feedback studies she deemed to be the "best" in terms of overall conservation levels.

Comparative Standards

The effectiveness of comparative feedback is not as clear. The idea behind comparing a household's consumption to the consumption of others is that it may invoke some sort of social pressure to understand why consumption levels may differ, as it is generally accepted that "social norms not only spur but also guide action in direct and meaningful ways…" and that "…individuals use their perceptions of peer norms as a standard against

which to compare their own behaviors" (Schultz, Nolan, Cialdini, Goldstein, & Griskevicius, 2007, p.429). Indeed, there are reports in which consumers have indicated that this sort of comparison would be of interest to them (e.g. Egan, Kempton, Eide, Lord, & Payne, 1996; Wilhite et al., 1999). Kempton and Layne (1994) had found that 70% of their interviewees had at some time discussed their bills with other people, including their neighbours. Another study supports that notion that neighbour-based comparisons may be meaningful, given findings that neighbours, or proximate individuals, tended to report similar behaviours and attitudes (Iyer, Kempton, & Payne, 2006, citing Beaman & Vaske, 1995). Other research has shown that consumers would prefer a comparison based on house size and occupancy levels (Egan et al., 1996). Indeed, Iyer, Kempton, and Payne (2006) suggest that the highest quality comparison involves combining various household attributes, but suggest also that, practically, street name is a good basis for geographical comparison groups, dividing into groups of 30 for streets with more than 30 addresses. Another general benefit of comparative feedback is that no weather-adjusting is required.

Not everyone is fond of a comparative standard, though: Roberts, Humphries, and Hyldon (2004) report findings from their UK-based focus groups that suggested a comparative standard was very much disliked, whether it was to similar homes, or to homes in the same neighbourhood. However, as Fischer (2007) points out, that preference may be cultural: a Japanese study indicated residents liked this comparison, which is in line with some of the other American and Norwegian studies already mentioned (e.g. Egan et al., 1996, and Wilhite, et al., 1999, respectively). Regardless of customer preference, however, the effect of comparative feedback on actual conservation is less clear. Fischer (2007) found that none of the 10 studies she reviewed indicated a savings benefit with feedback that used a comparative standard, and suggested that this was because, while it may have encourage relatively high users to conserve, it may have inadvertently encouraged low users to use more, and as such the conservation effect may been canceled out. The study by Schultz et al. (2007) may also explain the mixed results: in this study, all households received comparative electricity-use feedback in which they were compared to their neighbours, but one group also received an "injunctive" message

in the form of a hand-written "happy-face" for households whose consumption was below the average level, and a "sad-face" for those whose consumption was above the average level. The results indicated that those who were consuming less than the average, but did not receive the injunctive message, increase their consumption, whereas those who were consuming below average and received encouragement regarding their behaviour through a happy-face injunctive message continued to keep their consumption low. Schultz et al. (2007) reported that the "boomerang" effect of comparative information inadvertently encouraging "bad" behaviour has been seen in other studies (notably relating to university campus anti-binge-drinking campaigns), and believe it can be mediated by not only providing "descriptive norms" (i.e. information reporting what is commonly done, or, in the case of electricity-use, the households' consumption levels), but also by including injunctive norms, that somehow indicate what is commonly socially acceptable (or unacceptable) within a certain culture.

2.3.3.2 Delivery Medium

While the results of research regarding appropriate feedback delivery media vary, one meta-analysis indicated that interactivity, in a computerized format, was a common feature in the "best" of 10 studies that were reviewed (Fischer, 2007), and it can be argued that feedback delivery via email is an extension of this. Email delivery allows for a feedback "push" (i.e. the consumer does not need to take it upon themselves to go to a website, etc., as the feedback is sent to them), and it can easily be linked to websites (where they exist) that are perhaps more interactive than the email feedback alone. Fischer (2007) also suggests that effective feedback allows for multiple options that the user can choose interactively (e.g. different time periods or comparison types, environmental impacts of electricity use, conservation tips), which is possible with internet-based feedback.

Large-scale email and internet-based feedback deployment is generally more feasible for utilities (Martinez & Geltz, 2005), and some reports have indicated that mail/paper-based feedback could be perceived as wasteful by customers (Roberts & Baker, 2003). However, factors such as the level of connectivity in a community, particularly with

different age and income demographics must be considered as well. A 2005 study of 400 residential customers in California found that two-thirds preferred mail as the medium of choice for the feedback, with a similar percentage of commercial customers indicating the same thing (Martinez & Geltz, 2005).

2.3.3.3 Consumption Metrics

The metric in which electricity consumption is reported is also an important consideration. Some suggest that reporting consumption in terms of dollar values is more salient. As per Brandon and Lewis (1999, p. 76):

> In their review of feedback experiments, Farhar and Fitzpatrick (1989) concluded that cost-based energy feedback consistently resulted in reductions, and that people liked to receive breakdowns of their consumption in this way, although Hutton et al. (1986) found that feedback emphasizing financial values did not have positive results across all their samples.

Also, many propose that feedback alone is not enough motivation for conservation. By providing consumption values in terms of dollar values, this may be more salient to those whose main motivation for conservation would be saving money. Furthermore, Fischer (2007) indicates that people want a clear breakdown of the components of the electricity price.

Few researchers have chosen to provide households with some sort of environmental metric regarding the impact of their electricity consumption. Fischer's (2007) recent meta-analysis cites only two studies that test environmental metrics. Displaying consumption in terms of environmental metrics could be one way of activating personal norms with regard to environmental concern. Some argue that, especially given climate change concerns that have come to the fore in the last decade, it is important to clearly make the link between consumption (both directly in household energy use terms and indirectly in terms of embodied energy in food, consumer products, etc.) and impacts, as this may not be obvious even to pro-environmental households (Gatersleben et al., 2002). Also, Brandon and Lewis (1999) cite studies that have suggested that individuals' perceptions towards their contribution to overall energy issues relates to their

conservation. However, in their study, with an admittedly small sample size, Brandon and Lewis (1999) found no significant impact of their feedback containing environmental metrics on electricity conservation.

2.3.3.4 Other Information

Feedback indicates a household's specific consumption performance on an on-going basis. However, in order to empower individuals with the knowledge of how to improve their performance, other research has highlighted the importance of providing additional information along with the feedback.

Appliance Usage Charts

It has been demonstrated that consumers often believe that the appliances that consume the most electricity are those that are most "visible" to them, including lights, dishwashers, etc. (Wilhite et al., 1999). For example, people are often surprised to learn that furnace fans can consume a significant amount of electricity in the winter because these systems are "invisible" to most individuals. As such, some research has indicated that providing information regarding the electricity consumption of a home's unique appliance mix is beneficial. Fischer (2007) found that some of the most effective studies reviewed often contained this level of detail, and other researchers have argued that this information is useful to customers as well (Martinez & Geltz, 2005).

Conservation Tips

Again, customization appears to be important for the tips to be viewed as effective. Roberts, Humphries, and Hyldon (2004) found that focus groups did not like a generic leaflet that would have been provided as an insert, and indicated it would have been something they would have discarded. Martinez and Geltz (2005) distributed a customized newsletter including conservation tips, and they found that of all the information in the newsletter, presumably including customized consumption information, the tips were the most useful to customers in helping them shift or conserve.

2.3.3.5 Layout

Appearance

In terms of general findings regarding preferred feedback layouts, Roberts and Baker (2003) found from a literature review that it should include a combination of text, diagrams and tables, as opposed to using a single format only.

Specifically considering graphical displays for comparative standards, Egan et al. (1996) found that customers preferred a horizontal "sliding scale" bar chart that indicates where the home's consumption lies on the scale with an arrow. This was preferred over a distribution chart mimicking a bell curve. In general, they found that the comprehension of the graphics was relatively low, but that adding end-point labels to the charts helped. Iyer et al.'s (2006) findings were opposite to those of Egan et al. (1996) in that the distribution chart was most easily understood, and Wilhite et al. (1999) found their focus group participants were divided over the preference for a distribution chart versus a linear representation of the households.

Roberts, Humphries, and Hyldon (2004) suggest that vertical bar graphs were preferred for reporting consumption relative to a historic standard, and Fischer (2007) summarizes this and other findings by suggesting that, for historical comparisons, vertical bar charts were preferred; for comparative comparisons, the single bar graph is preferred.

For information displays in general, Roberts and Baker (2003) indicate that graphical displays such as pie charts were preferred, and that they required text labels for improved clarity. It also appears that appliance usage information, discussed below, is best represented in pie chart format (Martinez & Geltz, 2005; Wilhite et al., 1999).

Appropriate Level of Detail

Seligman et al. (1981) argue that feedback is most effective when residents can see the relationship between their actions in their daily lives and the consumption reports provided in the feedback. This is certainly one benefit of instantaneous feedback

delivered through in-home displays, but in feedback that is provided less frequently, the impacts of daily actions may be harder to discern.

Providing too much detail runs the risk of overcomplicating the feedback, but the downfall of oversimplification is that the feedback may be construed as being less credible. Roberts and Baker (2003, p. 19) state that "[t]he information should be simple but not simplistic, with a robust and credible basis (i.e. consumers can be distrustful of information presented simplistically unless it is explained)".

The above review has highlighted a substantial amount of literature covering the debate over the effectiveness of different feedback criteria with respect to overall conservation levels and customer acceptance. In the process of performing this review, some research gaps have been uncovered, which will now be discussed.

2.4 Research Gaps

The main area that is not adequately covered in the academic residential electricity consumption feedback literature is the effect of providing residential feedback within a relatively low-price price environment with a time-of-use rate structure, as is the case in Ontario.

Much of the existing Ontario-specific residential conservation information is in the form of professional reports (e.g. Electricity Conservation and Supply Task Force, 2004; ICF, 2005; Ontario Energy Board, 2004; Ontario Power Authority, 2005), and does not relate specifically to the subject of feedback, and how it may be used with the new metering infrastructure. One report offers an excellent review of the impact of time-of-use (and other) pricing structures in the jurisdiction of Ottawa, but still includes little information regarding the effectiveness of the feedback that households received (IBM, 2007). Although there has been pilot project activity in various jurisdictions in California (George & Faruqui, 2005), electricity prices there are more expensive than in Ontario. (For example, peak and off-peak prices in the California Statewide Pricing Pilot in 2003/2004 were 0.260 and 0.103 US dollar per kWh respectively (Energetics Inc., n.d.),

or approximately 0.337 and 0.134 Canadian dollars per kWh using a 2004 exchange rate of 1.297. By contrast, the time-of-use rates charged during this study, including the commodity charge and all other per-kWh charges, were 0.146, 0.115, and 0.073 Canadian dollars per kWh for on-peak, mid-peak, and off-peak times respectively.) Some of the past research deals with time-of-use pricing in a relatively low price environment, but this is US-based and rather dated (Kasulis, Huettner, & Dikeman, 1981).

Furthermore, this study will also assess the relative value of providing customers with household-specific appliance consumption breakdown charts, as well as electricity consumption values expressed in terms of environmental metrics, as there are few studies that investigate the effects of these two items (Fischer, 2007).

Lastly, some of the key variables investigated in this study were conducted under statistical design, and as such attempt to provide results that are statistically significant, a feature that is often lacking in other studies (Fischer, 2007).

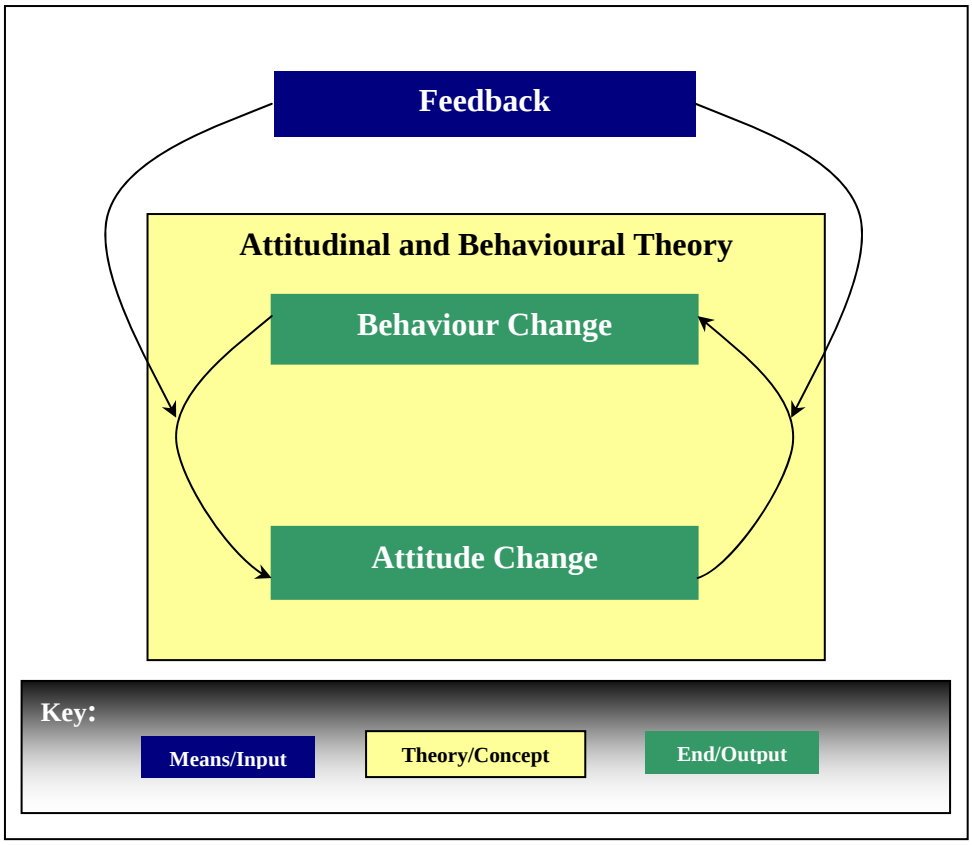
2.5 Research Conceptual Framework

The literature presented thus far has itself been based on various theories that have been used to describe the relationship between attitudes and behaviour, and the role of feedback in bringing about behaviour change. As the literature was used to inform this research design, the theories that underpin the literature have thus indirectly contributed to this research as well.

Based on the above literature findings, a conceptual framework has been developed (Figure 2). It summarizes the hypothesized workings of feedback and links in relevant theory to explain these workings. Its purpose is to synthesize the broader literature findings, and introduce the theory used in above literature that has also been used in the development of this research design, specifically the methodological instruments. The framework and the theories will also be referenced again as a "lens" through which to consider the overall results of this research.

The framework proposes that the feedback can help to foster an increased awareness regarding a household's specific consumption levels, which might contribute to pro-conservation attitude changes or pro-conservation behaviour changes. Attitudinal and behavioural theory can describe how these changes can in turn lead to pro-conservation behaviour changes or more entrenched pro-conservation attitudes (respectively) via a number of different mechanisms. The cycle could continue as the behaviour or strengthened attitude could result in more attitudinal or behaviour change, or the behaviours or attitudes could at least be sustained over a period of time long enough for habit formation and behaviour internalization to occur.

Figure 2 – Electricity Consumption Feedback Conceptual Framework



This framework assumes that individuals view the feedback information, that there exists in the individuals some form of motivation to reduce or shift electricity consumption, and that the feedback information is salient enough that it engages this motivation and effects

behaviour or attitudinal change. The framework also assumes that individuals have a level of control over their consumption patterns that allows for behaviour change. In other words, their consumption behaviour is such that they have the ability to conserve or shift, and that they are not already "doing all they can" in these regards.

In reviewing the literature, various theories were used to describe relationships between attitudes and behaviour and the mechanisms by which feedback works. Four theories in particular are described here either because they were mentioned more than others in the literature, or they are useful in explaining various criteria of feedback that have been found to be beneficial in the literature. These theories are the rational-economic model, cognitive dissonance theory, the theory of planned behaviour, and the norm-activation model of altruism.

The rational-economic model states that people will methodically evaluate the options available to them, and make their purchase decisions according to the option that is in their best economic self-interest (as described by McKenzie-Mohr, 1994). This model was used in the design of the feedback to ensure that cost information was prominently displayed. It should be stated that many believe this to be a naïve model on which conventional policy development too readily relies, thus ignoring important information relating to social and cultural factors.

Cognitive dissonance theory explains that when behaviour is not in line with one's beliefs or attitudes, an individual will feel "psychological discomfort" and will be motivated to take action to bring his behaviour back in line with his attitudes (Fishbein & Ajzen, 1975). This can be accomplished through either a change in behaviour or a change in attitude or beliefs, although the usual method is through attitude change if a certain attitude is not highly central to an individual (Kantola et al., 1984). Some researchers maintain that small conservation improvements can help to bring about a change of attitude regarding the importance of conservation practices. Cognitive dissonance predicts that through a positive feedback process, these small attitudinal changes will gradually lead to larger changes as the individual continually shifts his behaviour to bring

it into line with his continually changing attitude (McKenzie-Mohr, 1994). This theory was used to consider the ways in which continuous feedback could have gradually affected individuals' attitudes towards electricity conservation.

The theory of planned behaviour (TPB) is a prominent socio-psychological action theory in the field of social sciences (Weber, 1999). According to Wilson and Dowlatabadi (2007, p. 23), the theory states that:

> …attitudes are formed from an individual's beliefs about a behavior as well as an evaluation of its outcomes. Together with normative beliefs about what valued peers might think of the behavior, these attitudes lead to an intention to act which in turn predicts behavior. To address decision contexts in which action is constrained or individuals do not otherwise have full control over volition, 'perceived behavioral control' was incorporated as a third precursor of intention to act as well as a direct precursor of behaviour.

Aspects of this theory were used in the design of the feedback instrument, as some customers were compared to others with the hopes that social norms would pressure higher than average consumers to conserve.

The norm-activation model (of altruism), which is also often cited in energy behaviour research (e.g. Guagnano, Stern, & Dietz, 1995), states that an individual is more likely to engage in altruistic behaviour if that person believes that some harm may come to someone else by not doing so. As per this model, for a person to take action, she needs to be aware of the potentially harmful consequences of not taking the action and she must also ascribe responsibility to herself for the harm (Stern, 2000). This model is also often used as an explanation when weak links between environmental attitudes and behaviour are found (Schultz, Gouveia, Cameron, Tankha, Schmuck, & Franěk, 2005). In this research, environmental metrics of households' energy consumption were used to assess whether these were effective in activating potential norms regarding environmental concern.

The above four theories are related in that they each attempt to describe the links between attitude and behaviour, although some are more specific than others. The rational economic model and cognitive dissonance are perhaps the least detailed (as they are described here). The rational economic model is perhaps the most different than the others as it stems from utility maximization theory and behavourial economics, whereas the others stem mainly from socio-psychological theory. Cognitive dissonance centres on the "strength" or "centredness" of an attitude or behaviour resulting in a behaviour or attitude change, and does not account for contextual barriers to change. The theory of planned behaviour does take this into account, and another difference is that it describes the role of social pressure as well. The norm-activation model also takes into account the existence of others, not relating to peer pressure, but relating more to a perceived responsibility for not harming others.

Overall, this literature review has attempted to provide an overview of the body of research that exists relating to pro-conservation attitudes and their relationship with behaviour, a background on energy consumption behaviour and the types of interventions that have been deployed to encourage consumption reduction, and a more detailed review of the intervention category of feedback, specifically how it works, and the main criteria that it should include. It has also highlighted research gaps that this study has attempted to address. Furthermore, the literature reviewed was used to create a conceptual framework to introduce theories that were tested in past research, the results of which were used to help develop the methodological instruments for this research. The overall methodology, including the research instruments developed, will now be presented.

3 Methodology

This research involved the assessment of the effectiveness of various forms of feedback in bringing about changes in consumers' attitudes and behaviour in order to achieve on-peak electricity consumption reductions and total electricity consumption reductions.

The aforementioned literature sources were used to inform and develop the methodological instruments used to answer the research question: "How are electricity consumption behaviour and attitudes of selected customers with smart meters influenced by residential electricity-use feedback information in Milton, Ontario?"

The primary units of analysis in this research were residential dwellings including townhouses, semi-detached houses and single-detached houses. The physical boundary was a subset of 1,422 households in the town of Milton who had been using smart meters since June 2005, the majority of whom had been charged time-of-use rates since October 2005. The temporal boundary of this research was from May 2006 to November 2006, although baseline data from August 2005 to October 2005 were also used.

The methods employed to answer the above research question can be summarized as follows:

1. First Survey: In May 2006, an initial mail survey was deployed to assess the attitudes towards electricity conservation of a sub-set of Milton Hydro's customers, certain aspects of their current behaviour, structural details regarding their houses (e.g. the number of people and appliances in the house, type of space and water heating, etc.), and demographic information.
2. Feedback Testing: From July to October 2006, a subset of the first survey respondents received feedback regarding their homes' specific electricity consumption in the form of a one-page document delivered by mail or email.
3. Second Survey: In November 2006, a follow-up mail survey was sent to all respondents of the first survey, regardless of whether they received feedback, to assess any changes in attitudes that may have occurred since the first survey. In

the case of the feedback recipients, this survey was also used to obtain opinions regarding the utility of the feedback.

The following sections describe the survey and feedback instruments in more detail.

3.1 First Survey (May 2006)

The purpose of the first survey was to assess the structural (e.g. house size, number and type of appliances, number of occupants), attitudinal, behavioural and demographic information about the sub-set of Milton Hydro's residential customers with smart meters. This information was used to determine appropriately comparable treatment and control groups for the feedback testing phase, as well as to assess general knowledge and attitudes towards electricity conservation issues.

In May 2006, 1,257 surveys were sent to those customers from the group of 1,422 that had smart meter data available from June 2005 (not all 1,422 were sent the survey as some households were kept for potential control groups, some had recently answered a previous survey, and some appeared to be small businesses). Customers who were paying both time-of-use and standard rates were surveyed. The latter group was included for the sake of interest, and the total number of non-time-of-use respondents was unfortunately too small to include them in the feedback research.

The survey was designed with input from the University of Waterloo Survey Research Centre. It was eight pages in length (the non-time-of-use survey was seven and a half pages), including the last page, which explained the next phase of the research, and requested consent from customers who were interested in receiving feedback. A copy of the time-of-use version of the first survey can be found in Appendix I.

The 43-item survey requested information regarding housing and appliance details (19 items), attitudes and awareness regarding electricity conservation (11 items), attitudes and awareness regarding time-of-use pricing (7 items, sent only to customer who were being charged time-of-use rates), and demographic characteristics (6 items). To

encourage participation, consenting respondents were entered into a draw for a $100 dollar gift certificate to a restaurant of the winner's choice. In the case of questions regarding the house and appliance details, many questions were based on an Ontario Energy Board-designed survey that each utility in Ontario was responsible for deploying to aid in load forecasting. The Ontario Energy Board survey was deployed in Milton in April 2006 via telephone. Respondents to the Ontario Energy Board survey were not sent the mail survey for this research.

The survey was tested initially by sending it to five homeowners and obtaining their feedback on the clarity of questions, its succinctness, etc. The finalized survey was sent through Canada Post on May 11th and 12th, 2006, along with a cover letter from Don Thorne, the President and CEO of Milton Hydro, which explained the purpose of the research, including the feedback phase. The cover letter and survey were sent using Milton Hydro letterhead and envelopes, but it was made clear that the study was being performed in partnership with researchers from the University of Waterloo. In addition to ensuring transparency for ethics purposes, this was also done to potentially increase response rates given that most Ontarians generally trust information coming from academic organizations over other types of organizations (Environics, 2007). In total, 298 residents responded to the first survey for a response rate of 24%.

3.2 Feedback Testing (July to October 2006)

Respondents from the first survey who indicated they would be interested were chosen for the feedback phase of the research, and were divided into four treatment groups (more below). In addition, control groups were developed, two of which were from the survey respondent base, and one of which was previously determined randomly from the original sample of 1,422 households with smart meters (The original intention was that a fifth treatment group would also receive feedback via an in-home display unit, but due to timing constraints, this was not possible. As a result, this "fifth" treatment group was therefore made into one of the two control groups made up of survey respondents).

A feedback template was developed for each treatment group household, and each week, consumption data were sent via email from Milton Hydro, and were inserted into the template to create a unique feedback sheet for each household.

Half of the feedback was sent to the customers by mail (discussed further below), and the feedback sheets that were generated for the mail recipients each week were sent in soft copy to Milton Hydro, who would then print and send them via Canada Post to the customers. For the email feedback recipients, an email account was set up through the Milton Hydro server, and although it could be accessed through the University of Waterloo server so that the email feedback could be sent directly from the university, it appeared to its recipients that it was coming from Milton Hydro.

The first feedback sheet was sent during the week of July 24th, 2006, and the last was sent the week of October 26th. A total of 15 feedback sheets were delivered during this time. It was the intention that the feedback be delivered weekly throughout the feedback period, but data availability problems during the first half of the feedback testing period, and a slow turnaround in changing the feedback template in the latter half of the period resulted in delays such that two sheets were sent together five times during the testing period, meaning households would have received the two sheets every two weeks (instead of one sheet every week).

The specific details of the feedback sheet design, including the independent variables that were tested, as well as the treatment and control group development process will now be explained in further detail.

3.2.1 Feedback Instrument Design Overview

The main criteria that have been found to be effective in feedback design, as outlined in Section 2.3.3, were used to inform the feedback design. Some criteria were kept constant throughout the testing period, whereas others were varied in order to assess their relative impacts on overall electricity consumption and shifting levels as well as customer

acceptance. In other words, the criteria that were varied were treated as independent variables.

The criteria that were kept constant included the delivery frequency (weekly, although as mentioned above it was not always possible to ensure the feedback was delivered weekly), the inclusion of seven charts representing hourly household consumption for each day of the feedback week, and a "Notes" section that households were encouraged to use to identify any interesting or suspect peaks and valleys in their consumption. These two latter items represent a fairly detailed level of information, and they were included on the back of each feedback sheet so as to appeal to those who wanted more detail, but not overwhelm those who did not. The fronts were kept fairly simple as per the literature's suggestions. This approach was taken so as to try to make the feedback appealing to different types of people, as related experience with residential conservation information has indicated the level of detail preferred will naturally vary across individuals (Mary Jane Patterson, Executive Director, REEP Waterloo Region, personal communication, April 2006).

The independent variables that were tested through the feedback are again based on the literature review findings of Chapter 2. Table 1 below provides a summary of these findings, as well as the related theory that can be used to understand why the variables may be important.

As studies with statistically significant results are limited as described in Section 2.4, it was decided to assess the effectiveness of various feedback criteria under statistical design, using the change in total and ration of on-peak consumption as the dependent variables (as will be described below in Section 3.4). Given that it would have been too complicated to test all of these variables in Table 1 through statistically designed methods, only two independent variables were chosen: the comparison standard and the delivery format.

Table 1 – Literature Rationale for Testing Independent Variables with Feedback

Criterion	General Findings	References	How Theory Relates
Comparison Standard	- Required for meaningful feedback	Fischer (2007); Midden et al. (1983); Darby (2000)	Cognitive dissonance: people may react to their consumption if it is higher than historic value (previous behaviour)
	- Historic is generally well-received with evidence of encouraging conservation	Eide, Lord, & Kempton (1996); Fischer (2007); Roberts, Humphries, & Hyldon (2004); Wilhite et al. (1999)	
	- Comparative, the consumer reaction varies with little evidence of its efficacy	Schultz et al., 2007; Egan et al., 1996; Fischer, 2007; Wilhite et al. (1999); Roberts, Humphries, & Hyldon (2004)	Theory of planned behaviour: people may react to comparison to neighbours
Delivery Medium	- Mail accessible by more; can be regarded as wasteful	Martinez & Geltz, 2005; Roberts & Baker, 2003	
	- Email lends well to interactivity which has been found to be beneficial in encouraging consumption; more feasible for large-scale deployment	Fischer, 2007; Martinez & Geltz, 2005	
Consumption Metric	- Dollar value: mixed reviews; some like opportunity for cost breakdown	Brandon & Lewis (1999) citing Farhar & Fitzpatrick (1989) and Hutton et al. (1986)	Rational-economic model: people may react to price incentives to keep prices low
	- Environmental metric: little research; link between electricity and environmental impact may not be obvious	Brandon & Lewis (1999); Fischer (2007); Gatersleben et al., 2002)	Norm-activation model: people may react to feedback that indicates their consumption is having an environmental impact Theory of planned behaviour: may react if environmental impact is larger than others'
Other Information	- Appliance usage charts: generally argued to be beneficial	Fischer (2007); (Martinez & Geltz, 2005); Wilhite et al. (1999)	
	- Conservation tips: needed to explain how to react to feedback; as specific as possible the better	Martinez & Geltz, (2005); Roberts, Humphries, & Hyldon (2004)	

Criterion	General Findings	References	How Theory Relates
Layout	- Combination of text, diagrams, and tables - Vertical bar charts for historic; horizontal bar or distribution charts for comparative; pie charts for appliance usage	Roberts & Baker (2003); Roberts, Humphries, & Hyldon (2004); Egan et al. (1996); Fischer (2007); Iyer, Kempton, & Payne (2006); Martinez & Geltz (2005); Wilhite et al. (1999)	

The comparison standard was chosen as an independent variable to investigate given the debate over the utility of the comparative standard. Furthermore, in the spring of 2006, Milton Hydro was contemplating purchasing a software module that would provide this information for their customers, so it was deemed beneficial to obtain some information as to the utility of such comparisons.

The delivery medium was chosen mainly for practical reasons: while it was hypothesized that a hard copy mail format would be more conducive to encouraging household discussions about the feedback, realistically an email based feedback program is more cost effective to deploy at a larger-scale.

Furthermore, while the other independent variables would be interesting to test under statistical design, it was feared that they would be more likely to have a negligible effect on consumption levels than the above two variables. Information regarding their effectiveness was still obtained, but through self-reported opinion information obtained from the second (post-feedback) survey.

The comparison standard and the delivery medium were incorporated into a 2^2 factorial experimental design, with the two "levels" of each independent variable being "historical" and "comparative", and "email" and "mail" respectively. This 2^2 design resulted in four treatment groups. The method by which treatment groups were developed is described in Section 3.2.2 below.

For the historic standard, the same time period in the previous year was chosen for this research, as i) the data were available, and ii) it is a standard that people are familiar with and can easily accept as being relevant (if their week's consumption in the summer was compared to that in the winter, it would be less meaningful). Unfortunately, at the time it was not known how to weather-adjust the data, but the average daily temperature for the feedback week was provided for both the 2005 and the 2006 year so people could try to make the comparison themselves.

For the comparative standard, it was decided to compare the customer's consumption with nine randomly selected households on the customer's street. While it would have been preferred to ensure that these homes were of similar size, had a similar number of occupants, etc., this would have involved using other survey respondents for the comparison homes, and there were not enough respondents to make this possible. It was hoped that by using a comparison households from the target household's same street, the comparison would be more meaningful to the customer. Also, assuming residents know their neighbours, it was hoped that this approach would spark conversation and perhaps even some friendly competition, thus incorporating a community approach and raising individuals' awareness regarding energy conservation.

Appendix II contains samples of the historic and comparative feedback sheets that the customers were provided. The mail recipients received these sheets as a one-page document, with printing on both sides. The email recipients received these sheets as Acrobat Abode Reader "portable document format" file attachments (i.e. pdf files).

The historic feedback sheets contained a large, simple bar chart on the front page which illustrated the home's total and on-peak average daily consumption for the week. Below the chart, the total and on-peak average daily consumption values were tabulated in kWh as well as equivalent cost. The comparative feedback sheets contained a large, simple bar chart on the front page which illustrated the subject home's total and on-peak average daily consumption for the week, along with the total and on-peak average daily consumption for nine other randomly chosen homes from the subject home's street. The

same table listing the subject home's consumption in kWh and equivalent cost is also included.

The appliance usage bar chart included was a representation of the average summer electricity usage of appliances in homes "similar to the consumers'". While each consumer's actual appliance electricity consumption depends heavily on their unique usage levels and patterns, the feedback sheets explained that the chart was intended to provide general guidance regarding "typical" appliance consumption levels only. The appliance usage bar charts were developed based on i) the customer-specific appliance details that were identified in the first survey, and ii) publicly available data on average consumption levels based on appliance type (i.e. Energy Star or not) and vintage. In the case of air conditioning consumption levels, each home's actual AC-related consumption was calculated using the home's data from the summer of 2005, and correlating it to average daily temperature. A description of the procedure used to do this can be found in Appendix III.

From July 27 until August 30, 2006 (i.e. seven weeks' worth of feedback), each feedback sheet included the appliance bar chart, along with simple conservation tips that, where possible, were customized for each home depending on their appliances, etc.

On September 18, 2006, two weeks' worth of feedback sheets were sent together: one weeks' worth included the appliance chart and conservation tip as described above, and the other replaced these with a graph indicating each household's electricity-related CO_2 emissions reported for the summer of 2006 compared to the summer of 2005.

From September 22 until October 10, 2006 (i.e. three weeks' worth of feedback), instead of the appliance chart and tip, households received feedback with their previous week's electricity-related emissions (both air pollution and greenhouse gas related) compared to the current week (all comparative and historic customers received this type of emission comparison). These sheets also contained a graph of Ontario's electricity related CO_2 emissions over a 24-hour period.

Finally, from October 20 until October 26, 2006 (i.e. three weeks' worth of feedback), instead of the appliance chart and tip, households received feedback with their previous week's electricity-related emissions compared to a sub-set of other Milton Hydro customers with smart meters (the comparison number varied based on who had electric hot water heating and who did not). All comparative and historic customers received this type of emission comparison. Again, these sheets also contained a graph of Ontario's electricity related CO_2 emissions over a 24-hour period. Examples of the environmental metric graphics can be found in Appendix IV.

The process used to assign households to the treatment and control groups will now be described.

3.2.2 Treatment and Control Group Development

The 2^2 factorial design described above consisted of four treatment groups. In addition, three control groups were chosen: Control Group 1 (CG1) consisted of 26 survey respondents (regardless of whether they had indicated in the first survey that they wanted to receive feedback); Control Group 2 (CG2) consisted of the 26 residents who were initially scheduled to receive feedback through in-home displays but were not able to; and Control Group 3 (CG3) consisted of 45 homes chosen randomly from a sub-set of smart metered homes for which the required data were available, and that had not been sent the initial survey. CG3 consisted of 45 households as it came from much larger pool of residents, and as such, it was possible to make this group larger. Table 2 outlines the group characteristics and original sizes.

3.2.2.1 Control Group Rationale

CG1 was created to provide a group against which the treatment groups could be compared when the consumption data analysis was performed. Households were chosen for this group based on various criteria (outlined below), and regardless of whether they volunteered to be a part of the feedback phase. The purpose of the control groups was that, if there were changes in consumption patterns in the treatment groups during the test

period as compared to the baseline period, by comparing these changes to those of a group of households that received no feedback at all, it can be said with more confidence that the changes observed in the treatment groups were a result of the feedback.

Table 2 – Feedback Testing Design Variables and Sample Sizes

Treatment or Control Group	Number of Households	Received/ Responded to First Survey?	Volunteered to Receive Weekly Feedback?	Feedback Comparison Standard	Feedback Delivery Method
TG1	26 (+2)*	Yes	Yes	Historic	Email
TG2	26	Yes	Yes	Historic	Mail
TG3	26	Yes	Yes	Comparative	Email
TG4	26	Yes	Yes	Comparative	Mail
CG1	26	Yes	Some	--	--
CG2	26	Yes	Some	--	--
CG3	45	No	--	--	--

* TG1 had two additional households added half way through the feedback testing as these households were Milton Hydro board members, and were added to obtain their feedback regarding the overall study.

As explained above, CG2 was originally supposed to comprise a group of households who were to receive in-home displays, so that the effectiveness of these devices could be compared to that of the weekly feedback. However, due to timing constraints, it was not possible to include this in the research, and as such, this group was transformed into another control group.

CG1 and CG2 are very similar in the sense that they would have received and responded to the first survey, and some of them would have volunteered to receive the weekly feedback. These control groups are therefore very similar to the treatment groups as well, with the main difference being that some of the CG1 and CG2 households indicated they did not want to be part of the weekly feedback phase of the research. (It would have been preferable that all these control households consistently volunteered to be a part of the feedback research, but for the purpose of making the group sizes as large as possible, a mix was used, and this limitation was noted.)

It was hypothesized that, because CG1, CG2, and all treatment groups responded to the initial survey, they may be more likely to exhibit some pro-conservation behaviour to

begin with. This may make the comparison of CG1/CG2 to the treatment groups useful in terms of being able to compare two similar groups (the only difference being the feedback intervention).

However, it could be detrimental if CG1/CG2 and the treatment groups are too similar: if, for example, all households in these groups already exhibit pro-conservation behaviour, they may have little capacity to do more, and the role of the feedback may be negligible. The benefit of comparing the treatment groups to CG1/2, however, is if the feedback is shown to significantly affect the treatment groups' consumption compared to the control groups, then the fact that all the groups were similar and "pro-conservation" to begin with would mean that these findings would be fairly conservative.

Because of the hypothesized pro-conservation nature of CG1/CG2 and the treatment groups, CG3 was created to provide a different perspective. Because CG3 consists of a random selection of smart metered households (who were not even sent the initial survey), it is hypothesized that CG3 may better represent a group of "typical" Milton residents. Comparing the treatment groups to CG3 may therefore involve comparing a group of people who may not have the capacity to do much more in terms of conserving or shifting, but likely have the will/attitude to do more (i.e. the treatment groups), to a group of people, who, on average likely have a greater capacity to conserve/shift more, but their attitudes on average may be less conservation-oriented (i.e. CG3). In this sense, any significant results from this type of comparison are also important, as it represents one of the more conservative comparisons that can be made.

3.2.2.2 Treatment and Control Group Assignment

After screening the survey respondents who volunteered to receive the feedback, the number of eligible households left was such that each group (with the exception of CG3) consisted of 26 households. One of the groups had two additional households added half way through the feedback testing as these households were Milton Hydro board members, and were added to obtain their feedback regarding the overall study.

Table 3 outlines the screening criteria that were applied to the survey respondents to ensure that the groups were as similar as possible, and to take into account constraints such as the householders' preferences regarding feedback delivery medium, etc. Due to these constraints, a straightforward random assignment of households to each group was not possible, although once the constraints were accounted for, the assignment was performed randomly. However, once the groups were assigned taking into account the factors in Table 3, they were assessed for their "similarity" by ensuring there was a relatively equal distribution in each group of house type (semi-detached; single detached; and rowhouses); house sizes; electric hot water heating prevalence. This was done manually, and where necessary, some homes were switched between groups. Once these variables were evenly distributed within each group, the average daily electricity consumption of each home (from June to August 2005) was calculated, and this metric was used to again assess the similarity of each group through a univariate analysis of variance test (ANOVA – described in more detail in Section 4.2.4 below). The result indicated that no group was significantly dissimilar from any other ($p = 0.383$ is greater than 0.05) with regard to electricity consumption. The results of this test can be found in Appendix V.

However, this group similarity testing was essentially a precaution: as will be described in the next section, the consumption data analysis involved calculating the change in each household's 2006 consumption compared to its 2005 consumption. This means that each household was essentially compared to itself before its result was averaged with its groups, in order to keep the within group variation lower.

As described above, once the groups were determined and the feedback templates created, each home received feedback until late October, 2006. At this time, a second survey was deployed, and this will now be discussed.

Table 3 – Survey Respondent Screening Criteria

Criterion	Rationale
Only households who had been in their home since May 2005 and had interval meter data starting from at least June 2005	Needed to ensure people had not just moved in as of June/July 2005, as this would have affected their baseline consumption. Needed to compare the difference in 2005 and 2006 levels to discern any consumption effects of receiving the feedback.
Only those respondents who indicated they wanted feedback could go in treatment groups 1 to 4	Ethics requirements were such that households needed to consent to receiving the feedback. To keep the numbers as high as possible, those households who did not want feedback were still eligible to be placed in either CG1 or CG2.
Only time-of-use users	Very small number of non-time-of-use users responded, making their even distribution throughout the groups difficult.
Only users with central AC	Very few respondents did not have central AC making their even distribution throughout the groups difficult; also central AC is largest electricity user in summer months, so central AC households represent an interesting group to study
Constraint: Only those who indicated no major changes from summer of 2005 to May 2006 that would have affected electricity consumption	To attempt to ensure that, beyond the receipt of feedback through the summer of 2006, 2005 and 2006 summer consumption conditions were otherwise as similar as possible. NOTE: It was still necessary to include nine households who had indicated changes per group, but these nine were not included in the consumption data analysis. Discussed further below.
Constraint: For comparative feedback recipients, there had to be at least 15 homes on the recipient's street	It was feared that for smaller streets, recipients might somehow be able to discern whose homes were represented on their feedback. Therefore, to ensure no privacy issues arose, comparative feedback recipients needed to be on a street with a minimum of 15 other households.
Constraint: Certain people indicated a preference of mail or email	This was taken into account to ensure everyone received the feedback via their preferred delivery method.

3.3 Second Survey (November 2006)

The purpose of the second survey was to assess attitudes regarding energy conservation, in order that this could be compared against the information obtained from the first survey to assess any changes that may have occurred that could be attributed to the feedback testing. This survey also sought out information as to whether an increased awareness of electricity conservation led to other forms of conservation and/or environmental behaviour as well.

All participants who received feedback information throughout the testing period, as well as all other who responded to the first survey received the second survey, which was distributed in November 2006.

Those households that did not receive the feedback were sent a simple survey that asked many of the same attitudinal questions as in the first survey, so that attitude changes in the absence of receiving the feedback could be gauged (time-of-use households were sent a 17-item survey, and non-time-of-use households were sent an 11-item survey). The households that received the feedback, all of which were time-of-use customers, received a 56-item survey that included the duplicate attitudinal questions from the first survey, and were also asked more detailed questions regarding the utility of the feedback they received. In addition, these households were sent a mock feedback sheet so as to draw their attention to and obtain their options regarding specific aspects of the feedback. A copy of the survey sent to feedback recipients can be found in Appendix VI.

Those who responded to the second survey represented two groups: the feedback recipients and the non-recipients. The changes in the self-reported attitudinal and behavioural questions between the first and second survey were determined, and then the average changes between the feedback recipients and the non-recipients were compared to assess any differences in attitudinal or self-reported behavioural changes that were potentially attributable to the feedback.

The non-recipients therefore comprised yet another control group for self-reported attitudes and behaviour, and the recipients another treatment group (i.e. those who received the feedback and returned the second survey). However, it should be noted that these control group and treatment groups were necessarily different from those described above in Section 3.2.2, as their constituents were comprised solely of those who responded to the second survey.

As with the first survey, the second was sent through Canada Post, and another opportunity to win a $100 restaurant gift certificate was offered to encourage participation. Of the 106 and 189 surveys sent to feedback recipients and non-recipients respectively, 48 and 86 were returned for respective response rates of 45% and 46% (45% overall).

3.4 Overall Research Metrics – The Dependent Variables

This research design generated data that, in addition to the electricity consumption data that were provided by Milton Hydro, were used to assess the effect of the feedback in two ways: through changes in the households' electricity consumption data between the testing period and the baseline periods, as well as the changes between the first and second survey responses. The former is more complicated, and thus warrants a more detailed discussion regarding its methodology.

The monthly consumption of each household in the treatment and control groups was assessed for the period from August to October 2006 (as well as the three-month average for this period), and was compared to each household's consumption in the baseline period from August to October 2005 (as well as the three-month average). For each of these months, the dependent variables were calculated as the change in total monthly consumption relative to 2005, as well as the change in the monthly on-peak-to-total ratio relative to 2005.

However, before these two years' worth of data could be compared, they were first "weather-adjusted". A proprietary econometric model from Hydro One Incorporated was used to weather-adjust both 2005 and 2006 data for the households of interest. Weather-adjustment is required to remove, or normalize for, weather-dependent electricity consumption variations so that differences between two (or more) years of data can be assumed to be a result of non-weather-related causes.

The Hydro One model calculates household-specific daily adjustment factors based on their historic consumption levels, and takes into account daily average temperatures, humidity and cloud cover. This daily adjustment factor, when multiplied by the home's daily consumption value, normalizes its consumption to a "standard weather day" value. This "standard weather day" value is determined by calculating the average weather conditions for that day based on 30 years of historical data. Weather-adjusted consumption levels were calculated in this manner for each hour and day in the months of August, September, and October for both 2005 and 2006. The year 2005 was taken as

the baseline year, as the homes had smart meter data from this time period, but were not receiving any weekly feedback. The year 2006 was taken as the test year, as it was throughout August, September, and October of 2006 that the homes received the feedback.

By combining the hourly weather-adjusted consumption values for each household, total monthly consumption and monthly on-peak-to-total ratios were calculated for August, September, and October for both 2005 and 2006, as well as the 3-month average value for both years. Care was taken to ensure the same number of weekdays, weekends, and holidays were included in the 2005 and 2006 comparison months, which are outlined in Table 4.

Table 4 – Baseline and Test Periods

Month	**2005 (Baseline Year)**	**2006 (Test Year)**
August	Sunday, July 31 to Saturday, August 27	Sunday, July 30 to Saturday, August 26
September	Sunday, August 28 to Saturday, September 24	Sunday, August 27 to Saturday, September 23
October	Sunday, September 25 to Saturday, October 22	Sunday, September 24 to Saturday, October 21

In order to compare the household-specific consumption differences between 2006 and 2005, the Total Consumption Deltas and the On-Peak Ratio Deltas were calculated for each month and the 3-month average as per Equation 1 and Equation 3.

Equation 1 – Monthly Total Consumption Delta

$$\frac{(\text{MonthX Total Consumption 2006} - \text{MonthX Total Consumption 2005})}{\text{MonthX Total Consumption 2005}} \times 100$$

Equation 2 – Monthly On-Peak Ratio

$$\frac{\text{MonthX On-peak Consumption YearX}}{\text{MonthX Total Consumption YearX}}$$

Equation 3 – Monthly On-Peak Ratio Delta

$$(\text{MonthX On-peak Ratio 2006} - \text{MonthX On-peak Ratio 2005}) \;/\; \text{MonthX On-peak Ratio 2005} \times 100$$

For each household, these equations were used to calculate eight percentage changes, which are summarized in Table 5. These eight values were taken as the main dependent variables for the consumption data portion of the analysis. The Total Consumption Delta values for each household and each month are the variables that assess whether there was any change in total consumption between the two time periods. In other words, this variable measures the level of conservation that may or may not have occurred. The On-peak Ratio Delta measures a household's change in on-peak monthly usage relative to their total monthly usage, and as such is a measure of the amount of consumption shifting from on-peak times that may or may not have occurred.

Given this calculation methodology, it should be noted that increased conservation and increased shifting in the test year of 2006 compared to the baseline year of 2005 will result in negative values for the dependent variables.

Given that there are three time-of-use time bands (on-peak, mid-peak, and off-peak), shifting from on-peak hours means the shifted consumption could occur during mid- or off-peak times. The shifting metric could have been chosen such that it was a measure of the amount of shifting to off-peak hours, so that it would have captured the sum total of any shifting from on-peak to off-peak and from mid-peak to off-peak, but would not have captured shifting from on-peak to mid-peak. This "off-peak-centred" metric would have been the most appropriate if the goal of the analysis was to determine the maximum potential customer savings, as the off-peak hours are the cheapest period.

The "on-peak-centred" approach used in this analysis captured the sum total of any shifting from on-peak to mid-peak and from on-peak to off-peak, but did not capture any shifting from mid-peak to off-peak. This approach was chosen as on-peak demand

reduction is a key goal of the province of Ontario, and it has targeted a 6,300 MW reduction in on-peak demand by 2025 (Ontario Power Authority, 2007).

The analysis could of course be performed using both metrics in parallel, but for the purpose of simplicity, only one was chosen.

Table 5 – Consumption Data Analysis Dependent Variables

Dependent Variable Name	Description	Measure of What?
AugTotDelta	Measures the percentage change of a household's total consumption in August 2006 compared to August 2005.	Conservation
AugPeakRatioDelta	Measures the percentage change in the ratio of a household's on-peak-to-total consumption in August 2006 compared to August 2005.	Shifting
SeptTotDelta	Measures the percentage change of a household's total consumption in September 2006 compared to September 2005.	Conservation
SeptPeakRatioDelta	Measures the percentage change in the ratio of a household's on-peak-to-total consumption in September 2006 compared to September 2005.	Shifting
OctTotDelta	Measures the percentage change of a household's total consumption in October 2006 compared to October 2005.	Conservation
OctPeakRatioDelta	Measures the percentage change in the ratio of a household's on-peak-to-total consumption in October 2006 compared to October 2005.	Shifting
ThreeMonthAveTotDelta	The total monthly consumptions for August, September, and October 2006 are averaged, and the same is done for 2005. This dependent variable measures the percentage change between the 2006 and the 2005 averaged values is then calculated.	Conservation
ThreeMonthAvePeakRatioDelta	The ratios of a household's on-peak-to-total consumption for August, September, and October 2006 are averaged, and the same is done for 2005. This dependent variable measures the percentage change between the 2006 and 2005 averaged values is then calculated.	Shifting

Although care was taken to ensure a robust design, it did of course have its limitations which will now be discussed.

3.5 Overall Research Design Limitations

A significant limitation of this design is the fact that the pricing structure changed between the baseline period in 2005 and the test period in 2006: on October 7, 2005, the test and control homes began paying time-of-use rates. Thus this change will confound any potential effects of the different types of feedback. However, the control groups were also charged time-of-use rates during the same periods, so the overall effect of the feedback (with no resolution on the specific type of feedback) should be able to be discerned.

Another major limitation is the fact that the study involved relatively small sample sizes, a limitation that has been cited in past research as well (Fischer, 2007). Related to this is the fact that it was not possible to stratify each of the treatment and control groups based on factors such as consumption levels, house type, house size, or prevalence of hot water heaters. This would have been preferred in case certain types of homes are better able to conserve or shift compared to others. Instead, care was taken to ensure each group had equal distributions of each variant of these categories, but this led to a relatively large consumption range within each group. However, given that the consumption data analysis involved calculating the change in each household's 2006 consumption with respect to 2005, each household was compared to itself before its result was averaged with its groups, in order to reduce the within group variation.

Also, as will be explained in Section 4.2 below, in the interest of keeping the group sizes as large as possible, 11 respondents to the second survey who indicated that there had been a consumption-affecting change in their homes between the periods of May 2006 and November 2006 were still kept in the consumption data portion of the analysis. While there were other households who did not respond to the second survey that were kept in this part of the analysis, which therefore could have also had consumption-affecting changes during this time period, the fact that the 11 who indicated a change were retained could affect the results by introducing more non-feedback related variation.

With the exception of the CG3 members, all participants in this study were volunteers in some sense, whether by volunteering to receive the feedback, or by responding to the surveys. As such, self-selection bias is an issue, meaning that it is likely the study attracted those already exhibiting pro-conservation behaviour or attitudes. This must be kept in mind when considering the generalizablity of the study's results to the larger Milton and Ontario populations.

Similarly, generalizability of the results is also limited given that the majority of the smart meters, and thus this study's participants, were in new houses. Furthermore, the participants represent a specific demographic that is not representative of Milton or Ontario (discussed below in Section 4.1.1).

The fact that one portion of the analysis, that relating to the changes in attitudes, relies on self-reported behaviour is another limitation of the design. Past research has found that self-reports for socially desirable behaviours can be exaggerated (Scott, 1999 citing Barker, Fong, Grossman, Quin, & Reid, 1994), and Kantola et al. (1984) argue that this is the case for electricity conservation self-reported information as well.

Also, this design attempts to measure attitudes at the individual levels, but consumption is obviously occurring at the household level, and thus, for example, statements about conservation commitment levels may not necessary translate to household consumption levels.

Another minor limitation relates to the operationalization of the methodologies: although templates and macros were created to streamline the feedback generation process, it was not a completely automated process, and there was some risk of human error, which could have possibly affected Milton Hydro's customer satisfaction levels. This issue did not prove to be a significant problem, although there were some instances of people not receiving the feedback that was sent to them. There were four such cases, and these were therefore removed from the analysis.

Given this description of the overall research design, the results that were obtained will now be presented.

4 Results

The results of each of the three phases of the research discussed above are now presented. It should be noted that this chapter makes no attempt to analyze the results, as this will be performed in Chapter 5.

Within this chapter, Section 4.1 contains the results from the first survey to give both the context for the study, as well as provide information on the baseline conservation attitudes and behaviours of the Milton residents who participated in the study. Data from the town of Milton and the province of Ontario are also presented to understand how the data obtained through this research compares at the town and provincial levels.

Section 4.2 contains the electricity consumption data for the treatment and control groups for the baseline and test periods, as well as the results of applying Equation 1 through Equation 3 to these data. These "Delta" results (i.e. the percent change in 2006 relative to 2005) were then used in a series of statistical tests, the results of which are also presented. These tests include: Shapiro-Wilks tests to assess whether the data are normally distributed; Mann-Whitney nonparametric tests to discern the overall differences between the treatment and control groups; two-way univariate analysis of variance (ANOVA) tests to discern the relative effects of the different types of feedback provided; and Kruskal-Wallis nonparametric tests, also to discern the relative effects of the types of feedback in cases where the data are not normally distributed.

Finally, Section 4.3 contains the results of the comparison in attitudinal questions between the first and second surveys, as well as the second survey findings regarding opinions about the feedback.

4.1 Survey #1 Results: Context for the Study

The following overview of the initial survey conducted in May 2006 provides details of the residential sample under investigation, thus providing context for the study. As mentioned above, 1,257 surveys were sent out and 298 were returned, which equates to a

24% response rate. This falls within the expected range of 10% to 40% for standard mail-out surveys (Palys, 2003). This is also the same response rate as was obtained for the aforementioned telephone survey performed for the Ontario Energy Board (Milton Hydro, 2006). For the complete data set from the survey, please refer to Appendix VII.

4.1.1 Demographic and Structural Traits

As previously discussed, this was not a random survey, so it is not expected that the results can be simply generalized to the entire population of Milton, or for that matter, Ontario. Table 6 has therefore been included in order to understand how the survey respondent population compares to those of these larger jurisdictions.

As Milton Hydro is installing smart meters in Milton's new homes as they are built, the vast majority of survey recipients live in new homes: 96% percent of respondents live in homes that are less than seven years old. In addition, close to 50% of the homes were in the 1,500 to 1,999 square foot range, and over 80% used natural gas as the main fuel for space and water heating.

Household heads or those responsible for the electricity bill were asked to answer the survey, and slightly more females than males responded. Approximately 50% of respondents were born in the 1970s, and the median age of the respondents was 34 as of May 2006, which is slightly younger than the median ages for Milton and Ontario on the whole. Approximately 40% of homes had children less than 10 years old, indicating a respondent base that is comprised of several young families. Households with college and university education levels were 31% and 63% respectively. Whereas the percentage with a college degree is typical for the town of Milton as per Table 6, the percentage of those with a university degree (or some university education) is substantially higher. Close to 80% of the households had income levels over $60,000, including 35% with levels over $100,000. The median household income was in the $80,000 to $100,000 range, which is higher than the Milton town median of $74,279 (2000 $), and higher still than the province median.

Table 6 – Demographic and Structural Comparisons of the First Survey Respondent Base to the Greater Town of Milton and the Province of Ontario

Demographic	Ontario (2001 Census)*	Milton (2001 Census)*	Survey #1 Respondents
Population	11,410,046 (12,160,282 from preliminary 2006 census data)	31,471 (53,939 in 2006)	298
Female/Male Mix	51.1%/48.9%	49.8%/50.2%	56.4%/43.6% (household head respondents)
Median Age	37.2	38.3	34 (as of May 2006)
Percentage of Owned Dwellings	68% (of 4,219,410 private dwellings)	79% (of 10,680 private dwellings)	98% (of 298 private dwellings)
Average Family Size	3.2 (married couple families)	3.2 (married couple families)	3.0 (no distinction based on lone or couple-headed households)
Median Household Income	53,626 (2000 $)	74,279 (2000 $)	80,000 - 99,999 (2006 $)
Highest Education Level in Household	University – 24% College – 29% ("college" includes trade and college diplomas)	University – 22% College – 33% ("college" includes trade and college diplomas)	University – 63% (includes "some university" option) College – 33%
House Type	Single detached – 57% Single attached – 14% **	Single detached – 72% Semi-detached – 10% Town or rowhouse – 15% ****	Single detached – 55% Semi-detached – 22% Town or rowhouse – 23%
Average House Size	1,200 sq ft ***	1,500 to 1,999 sq ft ****	1,500 to 1,999 sq ft
Median House Vintage	1961 to 1977 **	1982 ****	1999 or later
Central Air Conditioning Penetration	67% **	77% ****	88%
Gas Water Heating Penetration	76% **	71% ****	84%
Gas Space Heating Penetration	75% **	73% ****	82%
High-speed Internet Penetration	33% *****	N/A	80%

Sources: * Statistics Canada, 2007 (2001 data);
** Natural Resources Canada, 2006 (2004 data);
*** Ministry of Energy, 2007;
**** Milton Hydro, 2006;
***** Statistics Canada, 2006a and 2006b (2005 data).

4.1.2 Conservation Attitudes and Awareness

Figure 3 through Figure 9 below outline the main results of the questions relating to respondents' attitudes, awareness, and knowledge about conservation issues. Unless otherwise noted, the charts indicate the percentages of those who responded to the specific questions only (i.e. those who gave no response are not included in the denominator).

Forty-eight percent rated their awareness of their homes' electricity usage as "high" or "very high", with 45% indicating an "average" awareness (Figure 3). Over two-thirds believed they knew enough to be able to most effectively conserve electricity (Figure 4), and close to 90% reported being satisfied with their electricity bill layout and the information provided (Figure 5). Seventy-five percent reported that they were either "committed" or "very committed" to conserving electricity (Figure 6).

Respondent awareness of existing conservation and/or efficiency programs and products varied (Figure 7). The most known were the ENERGY STAR appliances, with 91% indicating they had heard of these. At 10%, the Milton Hydro "Energy Drill" program was the least known. Seventy percent of respondents indicated that they had heard of smart meters, which contrasts with the 86% of respondents who actually had a smart meter and were being charged time-of-use prices.

Figure 3 – "How would you rate your awareness of your home's specific electricity consumption levels?" (N = 294)

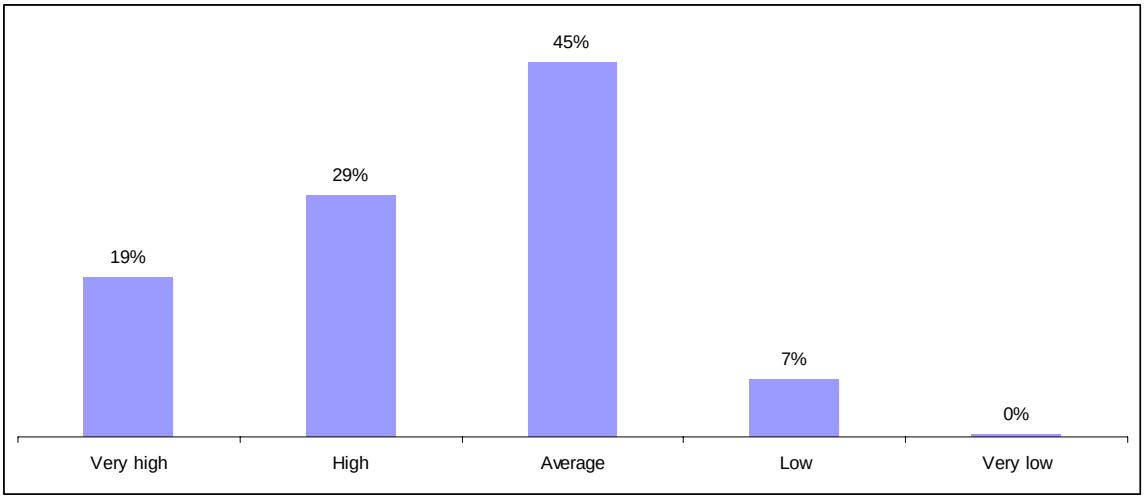


Figure 4 – "Do you feel that you know enough about your home's electricity consumption to decide how to best conserve electricity?" (N = 294)

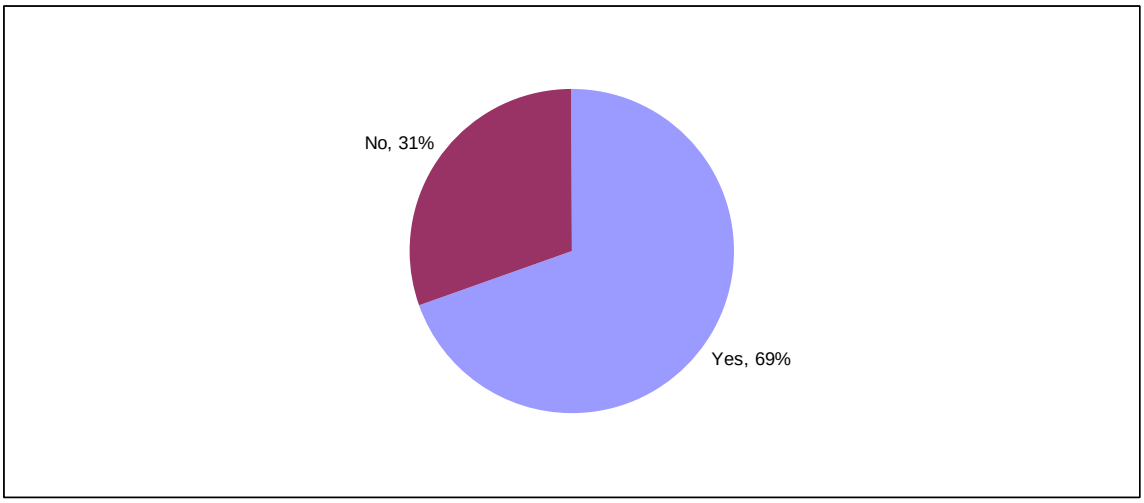


Figure 5 – "Are you satisfied with the layout and information provided on your electricity bill?" (N = 293)

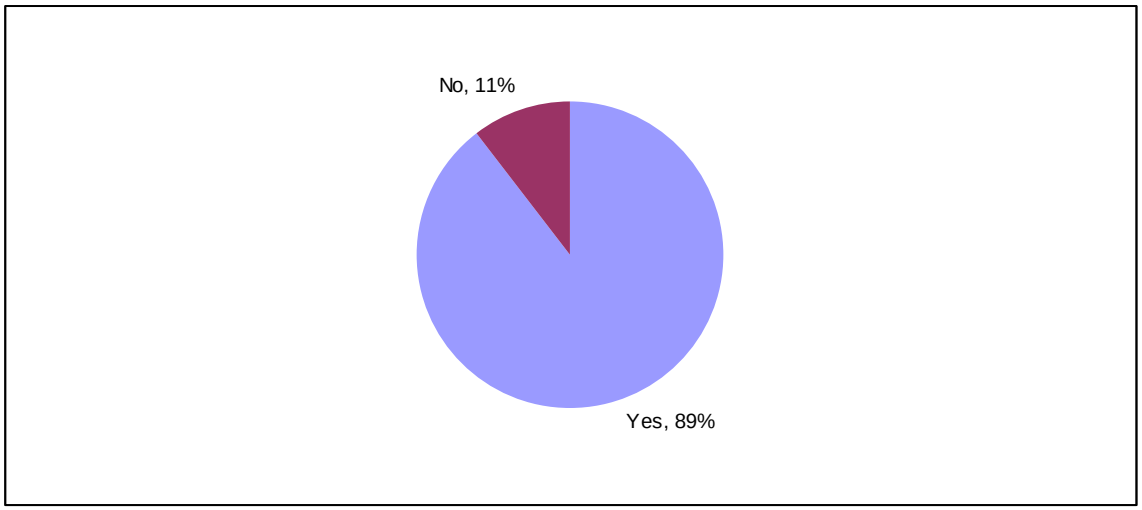


Figure 6 – "Please indicate your household's commitment to conserving electricity." (N = 297)

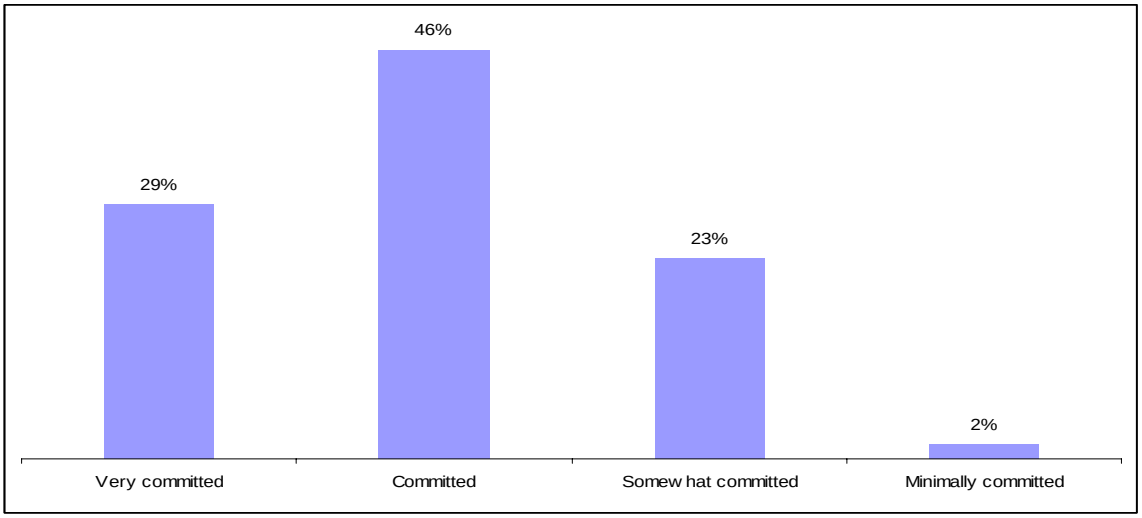
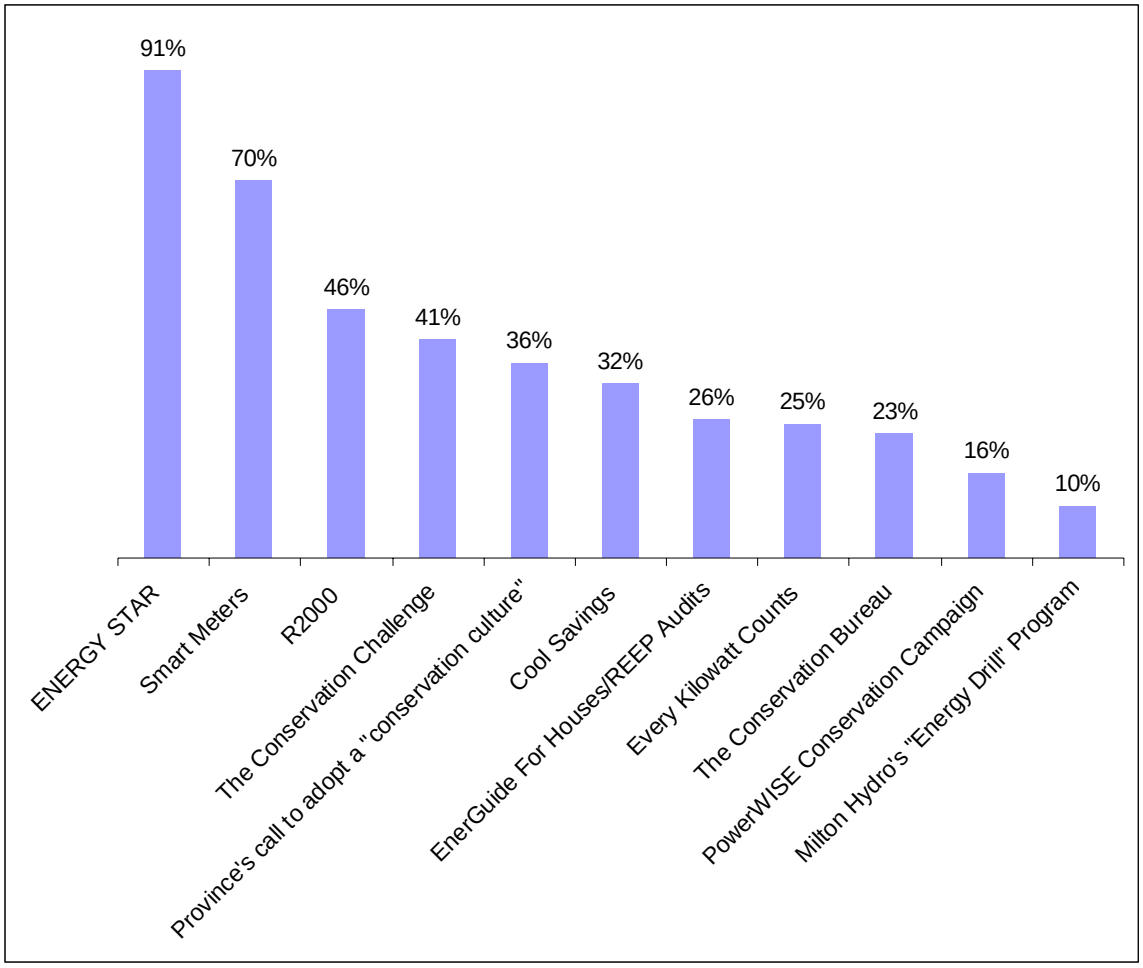


Figure 7 – "Have you heard of any of the following?" (N varies from 290 to 295)



Although only 36% said they had heard of the province's call for Ontarians to adopt a culture of conservation, 71% of the respondents (N = 212) attempted to answer the question "What does a 'conservation culture' mean to you?". Of that 212, nine percent indicated they did not know what a conservation culture was, or that it meant nothing to them, and one percent indicated they had never heard of it. The general themes of the remaining respondents are tabulated in Table 7 below. The values add up to more than 100% as some respondents included multiple themes in their definitions. The theme mentioned by the most respondents (43%) essentially reiterated that the term related to conserving electricity, energy, and/or resources, or wisely using only what is required. Beyond that, 22% cited the idea of a common mindset or common action, evoking the

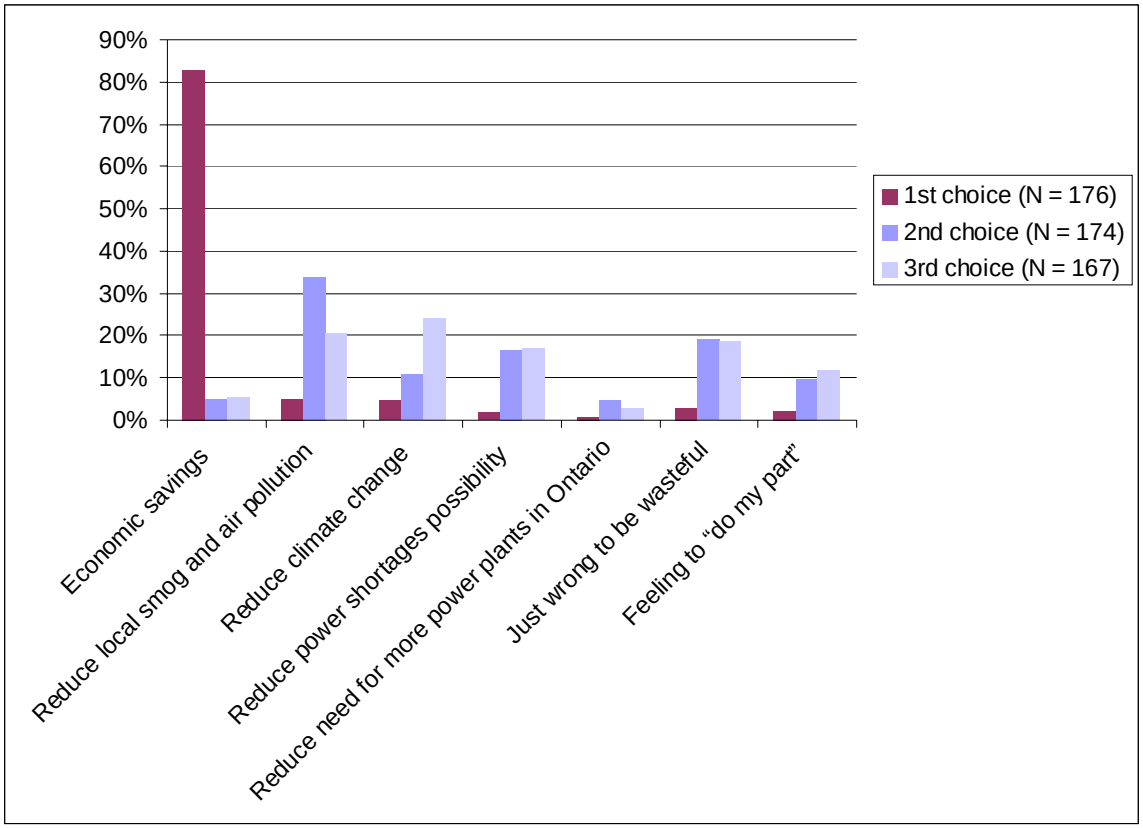
notion of a necessary societal responsibility, and 16% expressed the need for awareness and/or education regarding conservation.

Table 7 – "What does a 'conservation culture' mean to you?" (N = 212)

Theme	Percent	Sample Responses
Conserve / don't waste / use wisely / efficiently / use what is necessary	43%	"Using the least possible amount of energy in everyday life"
Common mindset / attitude / action	22%	"A change on how we view and use electricity"
Awareness / education about conservation	16%	"Well - knowledge of and practice of conservation techniques to the point where it becomes the standard or minimum acceptable"
Lifestyle choice / overall way of life	7%	"A lifestyle practice that is constantly monitoring energy consumption, and adapting techniques to reduce energy consumption"
Shifting use from on-peak	5%	"Using energy in off hours"
Protect environment	4%	"Learn how to protect our environment and don't waste money."
Conservation as a habit / naturally / unconsciously	4%	"People who conserve energy without thinking of it - just comes natural without a second thought"
Future needs / generations	3%	"People who care about the next generation & consider the repercussions of over using our energy" "New generation to save energy, and try to make it about common knowledge in every household"
Recycling	2%	"A community that makes conservation a priority like recycling."
Sacrifice or use less	2%	"Sacrifice comforts to save energy"
Energy efficient appliances / technologies	2%	"Eco friendly alternatives; off peak power usage (smart metering systems); efficient alternatives (compact fluorescent bulbs)"
Individual mindset / attitude / action	1%	"Behaviour, attitude of an individual in regards to energy conservation or money savings initiatives"
Conservation consciously	2%	"Use only what you need; be conscious of energy usage"
Save money	2%	"Learn how to protect our environment and don't waste money."
Avoid another blackout	1%	"Society conserves electricity so we do not have to have another black out"
Other sectors mentioned (i.e. commercial, industrial)	1%	"All households and industry (commercial) participating together to conserve"
Other (utility targets; "self-evident"; "group testing regarding conserving")	1%	"Practices in consuming energy to set new measures in conserving utilities, / energy, rate structure, target to decrease demand"
No sacrifice should need to be made	1%	"Being aware of consumption per appliance. Finding a balance between consumption/saving that meets out needs without being wasteful"

Respondents were also asked "what motivates you to conserve electricity in your home?", and were provided a list of options which they were to rank if they were at all applicable to them. The "top three" ranked motivations were considered (N = 176), and economics savings was by far the largest motivation, with 83% of the respondents choosing it as their first choice (Figure 8).

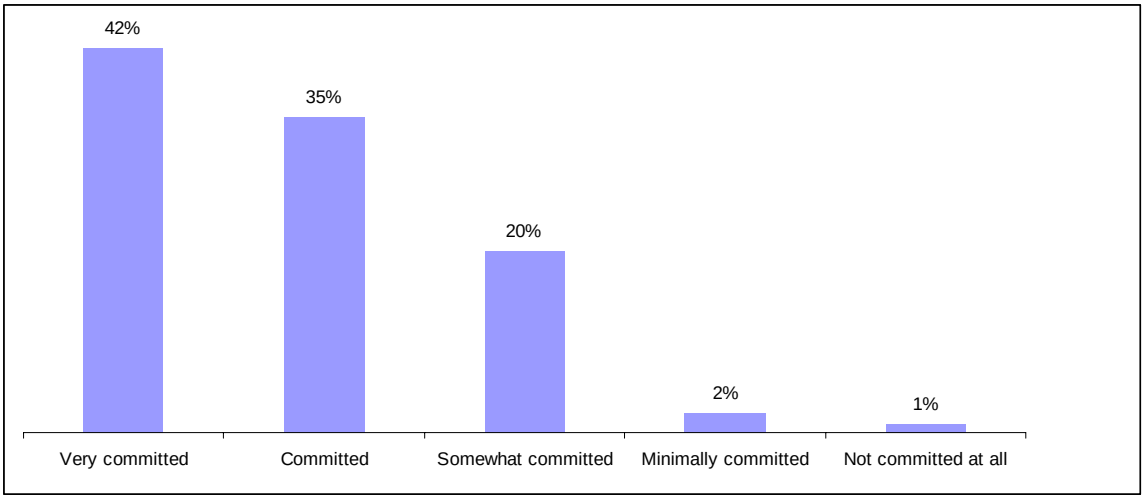
Figure 8 – "What motivates you to conserve electricity in your home?" (ranking question with 7 choices)



In terms of the time-of-use rate-payers (N = 257), 90% of these respondents were aware that they were paying time-of-use rates. Of those respondents (N = 231), 90% felt that their household was more aware of their electricity usage because of time-of-use pricing.

Of those respondents who knew they were being charged time-of-use pricing in May 2006, 77% said they were "very committed" or "committed" to reducing their on-peak consumption levels, and 20% said they were "somewhat committed" (Figure 9).

Figure 9 – "Please indicate your household's level of commitment to reducing your 'on-peak' electricity use." (N = 225)



Of the 222 respondents who knew they were being charged time-of-use rates and who answered the question "Do you know the electricity rate that Milton Hydro charges during the most expensive 'on-peak' hours?", 63% answered that they did. At the time of the first survey, it had just been announced that on-peak rates would change from 9.3 cents per kilowatt-hour to 10.5 cents per kilowatt hour. For the purpose of this analysis, the "correct" rate is therefore considered 9.3 or 10.5 cents per kilowatt-hour. Considering only those respondents who answered that they did know the on-peak rate, when they were asked in an open-ended question what the actual rate was, 62% answered correctly (i.e. either 9.3 or 10.5 cents per kilowatt-hour), although if those who answered in the 9.0 to 10.5 range are included, this number increases to 93%.

Of the 219 respondents who knew they were being charged time-of-use rates and who answered the question "Do you know what the 'on-peak' hours are in the summertime?", 56% answered "yes". Fifty-three percent of those who answered "yes" correctly identified the correct on-peak summer hours in an open-ended question (i.e. 11am to 5pm), and this number increases to 62% for those whose answers were in the correct approximate range (i.e. beginning between 10am and 12pm, and ending between 4pm and 6pm).

4.1.3 Conservation Behaviour

Several questions asked for the respondents' accounts of their current and planned behaviour relating to household conservation measures.

Over 40% indicated they used compact fluorescent lights (CFLs) in most or all of their light fixtures, and another 29% reported using at least "1 or 2" (Figure 10). Respondents were also asked to indicate any energy conservation/efficiency plans they had for their home (Figure 11).

Figure 10 – "Do you use compact fluorescent light bulbs?" (N = 296)

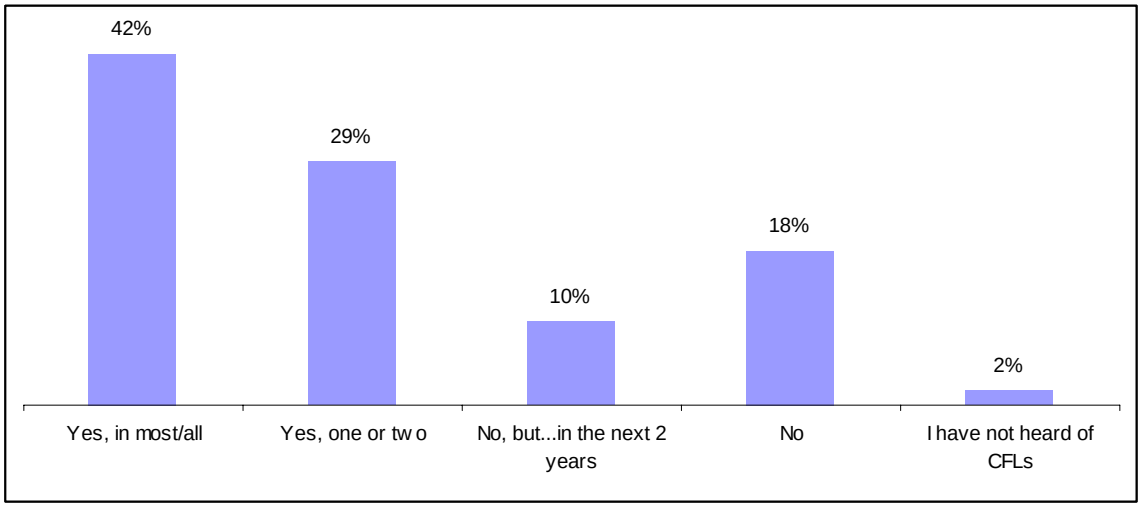
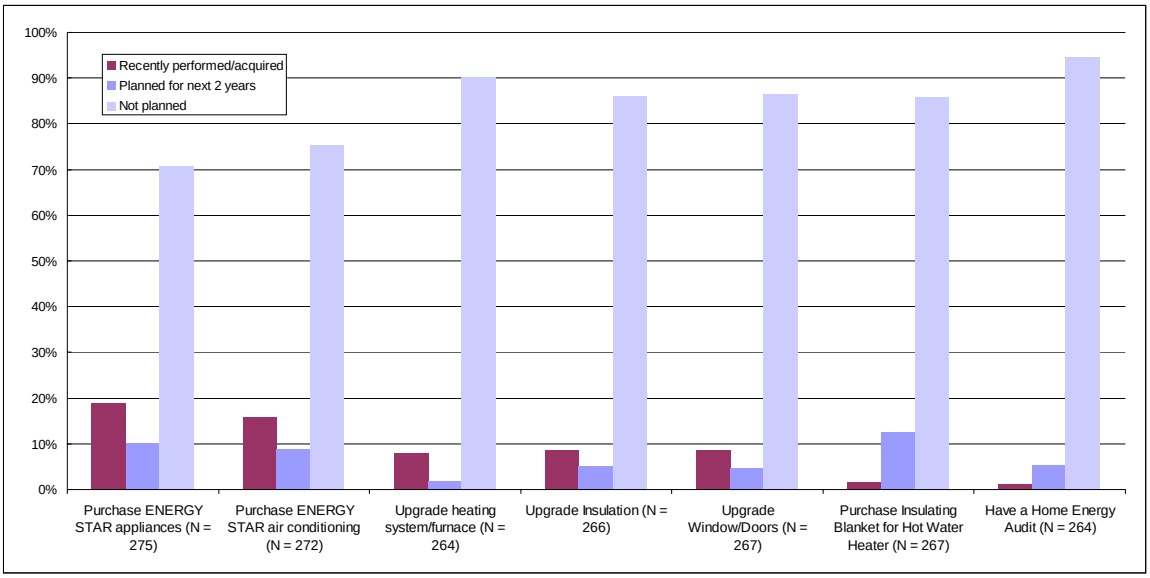


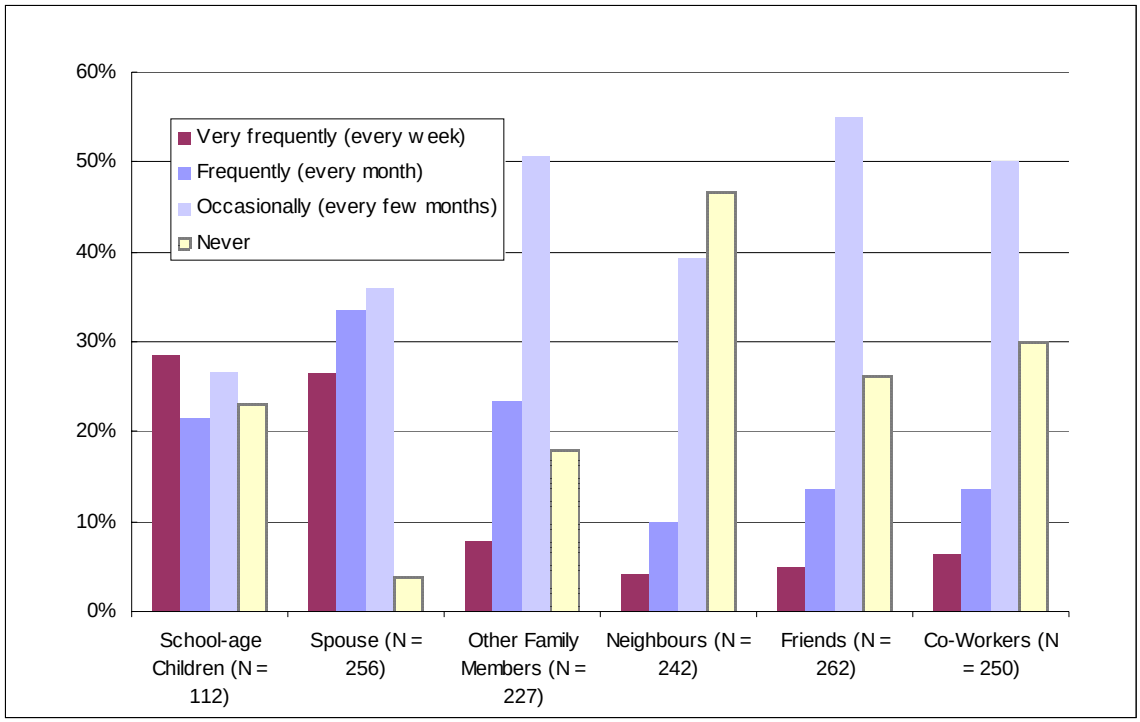
Figure 11 – "Do you have plans to do any of the following in the next 2 years?"



Considering the act of discussing energy conservation as a type of behaviour, spouses were the most likely candidates to have such conversations together, with 60% of eligible respondents indicating they would discuss energy conservation with their spouses "very frequently" or "frequently". This was followed closely by conversations with the households' school-age children (50% of eligible respondents indicated they would have such conversations "very frequently" or "frequently"). Conversations with other family members, friends, co-workers and neighbours were less frequent (Figure 12).

Of the respondents who were aware that they were paying time-of-use rates (N = 231), 90% indicated they shifted their consumption from on-peak times. The majority of these respondents who shifted their use (N=209) shifted their washer (93%), dryer (89%), and dishwasher usage (85%). Fewer people indicated that they shifted their AC usage (54%), but this should be considered against the fact that none of the customers would have had time-of-use rates for a summer season yet, as time-of-use pricing started in October 2005. Few people indicated that they shifted their oven usage (10%).

Figure 12 – "How often do you have conversations about energy conservation with the following people?"



Lastly, the willingness to be part of on-going conservation initiatives can be considered to be another type of behaviour. Seventy-one percent indicated they would be interested in a small in-home display that would show their real-time electricity consumption, and 76% specified they were willing to be included in the feedback phase of this study.

4.2 Electricity Consumption Data – Pre- and Post-Feedback Results

4.2.1 Consumption and Shifting Delta Calculation Results

As was discussed in Chapter 3, with the exception of CG3, given the number of survey respondents and grouping strategies, the number of eligible households was such that each group could be comprised of a maximum of 26 households.

As the goal of the consumption data portion of the analysis was to try to discern the effect of the feedback on consumption in 2006 relative to 2005, those homes that reported

changes in the first survey that would have affected their electricity consumption patterns between May 2005 and May 2006 were accounted for when developing the groups. Only 17 of the 26 households per group indicated no change during this time period, and these 17 per group were the only households whose data were used for the consumption data analysis portion of the work.

The same question about possible consumption-affecting changes between May and November 2006 was also asked in the second survey, and ideally only the households that reported no change would have been used in the analysis (i.e. the 17 homes per group would have been further pared down accordingly). However, as only 45% of the respondents of the first survey responded to the second survey, this information was not consistently available for all of the 17 households per group. As such, it was decided to forgo further paring down of the households available for consumption data analysis based on the criteria of any changes between May and November 2006, and accept as a limitation of the study that some of the 17 households in each of the treatment and control groups may have had some changes between May and November 2006. (In the end, 11 homes indicated there had been changes between May and November 2006, and these were included in the consumption analysis.)

Furthermore, there were five households that moved between the periods of May and November 2006, and these were removed from the consumption data portion of the analysis.

Lastly, it is suspected that the email feedback was not received by four households based on the answers they provided in the second survey. In one case, it was obvious that the household did not receive the feedback; in the other three, it is only suspected, but these households were removed from the consumption data portion of the analysis as a precaution.

These factors left some group sizes slightly smaller than 17, and the adjusted group sizes can be found in Table 8.

Equation 1 through Equation 3 from Section 3.4 were applied to all the households in the above groups using their total and on-peak consumption values for the months of August to October in 2005 and 2006. The detailed summary that contains the results for each household can be found in Appendix VIII, and these results form the basis of all the statistical analysis of this research. Table 9 contains a summary of the treatment and control group averages. It should be noted that the average Delta values in the two right-most columns are calculated not using the 2006 and 2005 group averages as displayed in the table, as they are averages of the deltas calculated for each household within each group.

Table 8 – Adjusted Control and Treatment Group Sizes

Group	Description	# Households
CG1	Responded to survey #1; did not receive feedback	16
CG2	Responded to survey #1; did not receive feedback (similar to CG1)	16
CG3	Randomly chosen from interval meter homes; did not receive survey #1; did not receive feedback	45
TG1	Responded to survey #1; email feedback; historic standard	16
TG2	Responded to survey #1; mail feedback; historic standard	16
TG3	Responded to survey #1; email feedback; comparative standard	15
TG4	Responded to survey #1; mail feedback; comparative standard	17

Table 9 – Weather-adjusted Consumption Values – Group Averages

		2006			2005			Delta: Change Relative to 2005 (Averages)	
Month	Group	Monthly Total (kWh)	Monthly On-peak (kWh)	Ratio: On-peak to Total	Monthly Total (kWh)	Monthly On-peak (kWh)	Ratio: On-peak to Total	Monthly Total	Ratio: On-peak to Total
August	CG1	546	90	0.17	545	100	0.18	8%	-8%
	CG2	564	91	0.16	549	114	0.21	6%	-21%
	CG3	691	129	0.18	689	135	0.19	2%	1%
	TG1	785	119	0.15	675	124	0.18	19%	-2%
	TG2	710	131	0.18	690	145	0.21	6%	-13%
	TG3	730	123	0.17	681	140	0.20	4%	-14%
	TG4	686	109	0.15	664	114	0.17	3%	-8%
September	CG1	413	61	0.15	427	71	0.16	6%	1%
	CG2	448	67	0.14	516	92	0.17	-6%	-12%
	CG3	561	91	0.16	555	100	0.18	4%	2%
	TG1	708	101	0.14	589	88	0.14	26%	13%
	TG2	620	106	0.16	555	106	0.18	15%	-8%
	TG3	572	86	0.15	570	111	0.19	3%	-15%
	TG4	603	78	0.13	523	87	0.16	18%	-12%
October	CG1	369	55	0.15	374	56	0.15	6%	1%
	CG2	436	71	0.16	457	74	0.16	0%	6%
	CG3	533	88	0.16	511	87	0.16	9%	2%
	TG1	624	97	0.15	595	90	0.15	8%	4%
	TG2	606	101	0.16	519	98	0.19	17%	-8%
	TG3	467	75	0.16	505	89	0.17	-6%	-8%
	TG4	505	75	0.14	485	79	0.16	8%	-8%
3-month Average	CG1	443	69	0.16	449	76	0.17	6%	-3%
	CG2	483	76	0.15	507	94	0.18	-1%	-11%
	CG3	595	103	0.17	585	107	0.18	4%	-1%
	TG1	706	106	0.15	620	101	0.16	15%	1%
	TG2	645	113	0.17	588	116	0.19	11%	-11%
	TG3	590	95	0.16	585	113	0.19	0%	-14%
	TG4	598	87	0.14	557	93	0.16	8%	-11%

4.2.2 Dependent Variable Distributions

As discussed in Section 3.4 and outlined in Table 5, eight dependent variables were used to attempt to discern the consumption and shifting effects potentially attributable to the feedback. It was the intention to use these variables to run two specific statistical tests on the data. In order to assess the differences between the households who received the feedback, regardless of the type, and those who did not receive it, it was intended that a parametric test known as a t-test be used. This test determines whether two independent groups of data are significantly different from one another. Considering those who received the feedback alone, in order to determine whether some types of feedback were more effective than others with regards to the amount of conservation and/or shifting that occurred, it was intended that a parametric test known as a two-way, univariate analysis of variance (ANOVA) be used. This is a statistical test that can determine the impact of the independent variables on the dependent variable (i.e. the conservation or shifting variable), including any "synergistic" effects of the independent variables when there is

more than one (in this case there are two: the comparison standard and the delivery medium).

However, these tests are only appropriate if the dependent variables of interest are normally distributed, and testing was therefore required to assess this. The Shapiro-Wilk test was used, and when considering data that include all the treatment groups and all the control groups, the tests revealed that none of the eight dependent variables were normally distributed. Shifting, logarithmic, and square root transformations were applied to the data to attenuate the effects of potential outliers, and some transformed dependent variables were then found to be normally distributed (the complete results of these test are listed in Appendix IX). This means that some parametric tests could be applied only to these few transformed variables, but as will be seen in Section 4.2.3, rather than working with more complicated transformed data, for the sake of simplicity, nonparametric tests were used to assess the differences between the control and treatment groups.

To assess the type of feedback that was most effective in encouraging conservation or shifting, the control group data were not required. Therefore, testing the normality of the data from the treatment groups alone, it can be seen in Table 10 that one dependent variable, as well as transformed versions of some dependent variables, were found to be normal (the complete Shapiro-Wilk test results are again listed in Appendix IX). This means that parametric tests could be used only on these dependent variables.

To analyze the non-normal data, nonparametric tests, or tests that do not presuppose any data distribution, are required. Nonparametric tests generally use medians as opposed to means for various calculations, and as such are less sensitive to the effect of data outliers. However, the main downfall of nonparametric testing is that the power of the tests is generally lower than that of the equivalent parametric test. (The power refers to the probability that a test will reject a null hypothesis when it is indeed false, so a lower power means the risk is greater of failing to reject a null hypothesis when it is actually false, or concluding that an effect is not significant when in fact it is.) However, this

reduced power is a minimal concern, as the nonparametric equivalent of the t-test is the Mann-Whitney test, which retains approximately 95% of the power of a t-test, the most powerful of parametric tests (Siegel & Castellan Jr., 1988).

Unfortunately, there is no appropriate nonparametric test equivalent for a two-way ANOVA when the samples are independent, as in this case. This test would be required to assess the effects of altering two independent variables to view their main and interaction (i.e. "synergistic") effects on the dependent variables. However, the nonparametric equivalent of the one-way ANOVA is the Kruskal-Wallis test, which allows for the assessment of the main effects of the independent variables. Potential interaction effects can be assessed by applying the Kruskal-Wallis test to one independent variable at each level of the other independent variable, and then combining the two significance values obtained. The Kruskal-Wallis test has approximately 95.5% of the power of the most powerful of parametric tests, the F-test (Siegel & Castellan Jr., 1988).

Table 10 – Dependent Variables Found to be Normal, All Treatment Groups (no CGs)

Dependent Variable	Shapiro-Wilk		
	Statistic	df	Significance.*
OctTotDelta	0.974	64	0.193
LogShiftAugTotDelta	0.979	64	0.361
LogShiftSeptPeakRatioDelta	0.974	64	0.204
LogShiftOctPeakRatioDelta	0.970	64	0.116
LogShiftThreeMonthTotDelta	0.968	64	0.096
SqRtShiftAugTotDelta	0.969	64	0.102
SqRtShiftOctTotDelta	0.970	64	0.126

* The null hypothesis that the data are normal is not rejected if the significance is greater than 0.05 (i.e. for normality, the significance level must be greater than 0.05).

4.2.3 The Effect of the Feedback: Comparing Treatment and Control Groups

4.2.3.1 All Treatment Groups Compared to Control Group 3

This section compares all households in the treatment groups who received the feedback (N = 64) to the households in CG3 who did not (N = 45) with regard to their level of conservation and shifting (if any). This analysis makes no attempt to control based on the

type of feedback received, but rather considers all treatment groups together as one group.

In addition to performing this test for each of the eight dependent variables as previously outlined in Table 5, each of the variables was further categorized into "high" and "low" consumer groups for both the treatment and control group households based on their 2005 monthly consumption level for the month of interest. For example, for approximately half (55) of the households with the highest September 2005 monthly consumption levels, their September dependent variables were re-categorized as "SeptTotDelta – High Consumers" and "SeptPeakRatioDelta – High Consumers". Analogous "Low Consumers" dependent variables were created for the lower consumer households (i.e. the other 54). For the dependent variables from the other months, the 2005 consumption level for the relevant month was used to divide the groups into the high and low consumption groups (e.g. October 2005 consumption levels were used to further subdivide the OctTotDelta and OctPeakRatioDelta groups).

This was performed as it was believed it was plausible that higher consumers may stand to represent greater potential for conservation and shifting. Other empirical work has supported this hypothesis as well (e.g. Brandon & Lewis, 1999; Guerin et al., 2000 citing Hirst & Goeltz, 1984). This could be due to the fact that larger consumers may have more discretionary loads that can be curbed compared to lower consumers. This could be based on the idea that consumption varies with electrical appliance ownership, and homes with more appliances tend to be able to better shift consumption as indicated by Baladi, Herriges, and Sweeney (1998). If the higher consumers are better able to conserve, then it is hypothesized that feedback will be of greater use to this group, which is how this delineation between high and low consumers ties in with the overall research relating to the effectiveness of the feedback.

Sub-dividing each of the eight dependent variables into high and low consumer groups makes 16 additional dependent variables, for a total of 24 dependent variables. All of these variables were used to test for significant differences between the treatment and

control groups. Table 11 below lists the one significant finding (out of the possible 24) as well as the treatment and control group median values (all the test results can be found in Appendix X).

Table 11 – Mann-Whitney Testing for Consumption Changes Comparing All Treatment Groups and Control Group 3 – Significant Results Only

Dependent Variable	Mann-Whitney Statistic	Significance (2-tailed)*	Medians for Treatment and Control Groups
OctPeakRatioDelta	1117	0.047	TGs' Median = -0.12; CG3 Median = -0.04

* The null hypothesis that the two groups are the same is not rejected if the significance is greater than 0.05 (i.e. for a significant difference between the treatment and control groups to exist, the significance level must be less than 0.05).

4.2.3.2 All Treatment Groups Compared to Control Groups 1 and 2 (Combined)

This section compares all households in the treatment groups who received the feedback (N = 64) to the households in CG1 and CG2 who did not (N = 32) with regard to their level of conservation and shifting (if any).

Similar to the results presented above, an analysis of the dependent variables further sub-divided into "High Consumer" and "Low Consumer" groups was also performed. Table 12 below lists the significant findings (five out of a possible 24), and all the test results can be found in Appendix X.

Table 12 – Mann-Whitney Test Results For Consumption Changes Comparing All Treatment Groups to Control Groups 1 and 2 – Significant Results Only

Dependent Variable	Mann-Whitney Statistic	Significance (2-tailed)*	Medians for Treatment and Control Groups
SeptTotDelta	733	0.024	TGs' Median = 0.08; CG1/2 Median = -0.06
OctPeakRatioDelta	743	0.029	TGs' Median = -0.12; CG1/2 Median = 0.01
Subdividing into "High" and "Low" Consumer Groups			
SeptTotDelta – High Consumers	107	0.009	TGs' Median = 0.01; CG1/2 Median = -0.16
OctPeakRatioDelta – Low Consumers	184	0.039	TGs' Median = -0.12; CG1/2 Median = 0.08
ThreeMonthAveTotDelta – High Consumers	132	0.046	TGs' Median = 0.03; CG1/2 Median = -0.11

* The null hypothesis that the two groups are the same is not rejected if the significance is greater than 0.05 (i.e. for a significant difference between the treatment and control groups to exist, the significance level must be less than 0.05).

4.2.3.3 All Treatment Groups Compared to All Control Groups

This section compares all households in the treatment groups who received the feedback (N = 64) to the households in all the control groups who did not (N = 77). The control groups are combined for this comparison merely to view any other effect which may emerge from the comparison.

Similar to the results presented above, an analysis of the dependent variables further sub-divided into "High Consumer" and "Low Consumer" groups was also performed. Table 13 below lists the significant findings (three out of a possible 24), and all the test results can be found in Appendix X.

Table 13 – Mann-Whitney Test Results For Consumption Changes Comparing All Treatment Groups and All Control Groups – Significant Results Only

Dependent Variable	Mann-Whitney Statistic	Significance (2-tailed)*	Medians for Treatment and Control Groups
SeptTotDelta	1964	0.038	TGs' Median = 0.08; CGs' Median = -0.02
OctPeakRatioDelta	1860	0.012	TGs' Median = -0.12; CGs' Median = -0.01
Subdividing into "High" and "Low" Consumer Groups			
OctTotDelta – High Consumers	458	0.049	TGs' Median = 0.03; CGs' Median = -0.04

* The null hypothesis that the two groups are the same is not rejected if the significance is greater than 0.05 (i.e. for a significant difference between the treatment and control groups to exist, the significance level must be less than 0.05).

4.2.4 Considering Feedback Recipients Only: What Feedback Variables Were the Most Effective?

As previously described in Section 3.2.1, there were four main types of feedback that were distributed to the households on a weekly basis from July to October 2006. These four groups represent two independent variables, each with two levels, making a 2^2 factorial design. One independent variable was the comparison standard, the levels of which were "historic" and "comparative". The other independent variable was the delivery medium, the levels of which were "mail" and "email".

Considering the feedback recipients only, this section reports the findings from statistical tests that assess the variation in the dependent variables that can be attributable to the different levels of the independent variables. In other words, these results will be used to determine whether some types of feedback were more effective than others.

For normally distributed data, a two-way univariate ANOVA test was performed to assess the individual and interaction (i.e. "synergistic") effects of the independent variables. In cases where the data were not normally distributed, the nonparametric equivalent of the one-way univariate ANOVA, the Kruskal-Wallis test, was used.

As with the results reported in Section 4.2.3, the main dependent variables that were used to discern the effects of the independent variables were the "Delta"-based variables as outlined in Table 5.

Considering the normally distributed dependent variables only (as listed in Table 10), Table 14 lists the significant results from the two-way ANOVA testing that was used to investigate for both main and interaction effects. These are the independent variables that were found to be significant in explaining a portion of dependent variable variance, and the complete test results can be found in Appendix XI.

Table 14 – Two-Way Univariate ANOVA Testing – Significant Results Only

Dependent Variable	Independent Variable Found to Significantly Affect DV	Significance Level*	Mean of each Level
OctTotDelta	Delivery Medium (MailVsEmail)	0.044	Mail = 0.13; Email = 0.01
LogShiftSeptPeakRatioDelta	Comparison Standard (HistVsComp)	0.029	Historic = -0.03; Comparative = -0.19 (transformation removed)
SqRtShiftOctTotDelta	Delivery Medium (MailVsEmail)	0.041	Mail = 0.11; Email = -0.01 (transformation removed)

* The null hypothesis that the independent variable does not explain any portion of the dependent variable's variation is accepted if the significance is greater than 0.05 (i.e. for the independent variable to have a significant affect on the dependent variable, the significance level must be less than 0.05).

Considering all the eight dependent variables regardless of their distribution, Table 15 lists the one significant finding from the Kruskal-Wallis tests (which were applied to assess for main and interaction effects). All test results can be found in Appendix XII.

Table 15 – Kruskal-Wallis Test Results for Independent Variable Effects – Significant Results Only

Dependent Variable	Independent Variable Found to Significantly Affect DV	Significance Level*	Median of each Level
OctTotDelta	Delivery Medium (MailVsEmail)	0.043	Mail = 0.08; Email = 0.02

* The null hypothesis that the independent variable does not explain any portion of the dependent variable's variation is accepted if the significance is greater than 0.05 (i.e. for the independent variable to have a significant affect on the dependent variable, the significance level must be less than 0.05).

4.3 Survey #2 Results

The second survey was sent to 295 households, all of whom had responded to the first survey, and 106 of whom were the feedback recipients. The response rate for the feedback recipients and the non-recipients was 45% and 46% respectively (45% overall). Approximately 97% of the respondents in the second survey claimed they were the same person who completed the first survey, making comparisons between the two groups more meaningful. Appendix XIII contains the full details of the results of the survey.

Again, note that the feedback "recipients" and "non-recipients" here do not correspond to any specific treatment or control group as outlined in Section 3.3, but generally represent those who responded to the second survey, and who did, and did not, receive feedback, respectively.

As previously mentioned, one of the key purposes of the second survey was to revisit the original attitudinal and behavioural questions that were asked in the first survey, to see if there were any changes that may be attributable to the feedback. Section 4.3.1 below contains a summary of these questions, the median changes in responses between the two surveys of the feedback recipients and non-recipients, as well as the results of the Mann-Whitney tests that were applied to assess for significant differences between these two groups. Given the relatively small number in the recipient group, no attempt was made to try to correlate the type of feedback (i.e. historic versus comparative; mail versus email) to any reported attitude or behaviour change.

Sections 4.3.2 and 4.3.3 contain a summary of the feedback recipients' opinions regarding the general utility of the feedback, as well as the salience of its specific features.

4.3.1 Attitudinal and Behavioural Changes Between the First and Second Surveys (Pre- and Post-feedback)

Table 16 outlines the attitudinal and behavioural questions from the first and second surveys. All of these questions used Likert-scale responses, and a numerical value was

assigned to each response, with a lower value indicating more "conservation-oriented" response. The change in attitude or behaviour for each pair of questions between the first and second surveys was calculated by subtracting the first survey response from the second. A negative delta value thus indicates a "pro-conservation" change.

Given that this calculation is comprised of the difference of ordinal data, nonparametric Mann-Whitney testing was used. Table 17 contains the median delta values for each group as well as the Mann-Whitney results.

As with the consumption data results presented in Section 4.2, the recipient and non-recipients group sizes presented below were adjusted for people who moved during the test period and for recipients who did not actually receive the feedback but were supposed to. In addition, they were adjusted for households where different occupants completed the first and second survey, as well as for the relevance of the questions (e.g. only those with children could respond to the question regarding conversations with children).

Table 16 – Attitudinal Question (From First and Second Survey) and Ranking Value

Question	Response Ratings
Attitudinal/Awareness Questions	
How would you rate your awareness of your home's specific electricity consumption levels?	1 – Very high 2 – High 3 – Average 4 – Low 5 – Very low
Please indicate your household's commitment to conserving electricity.	1 – Very committed 2 – Committed 3 – Somewhat committed 4 – Minimally committed 5 – Not committed at all
Please indicate your household's level of commitment to reducing your "on-peak" electricity use. *(time-of-use customers only)*	1 – Very committed 2 – Committed 3 – Somewhat committed 4 – Minimally committed 5 – Not committed at all
Behavioural Questions	
Do you use compact fluorescent light bulbs (a high efficiency replacement for traditional incandescent light bulbs)?	1 – Yes, in most/all of our light fixtures 2 – Yes, we have one or two installed 3 – No, but we will purchase these in the next 2 years 4 – No 5 – I have not heard of compact fluorescent light bulbs
How often do you have conversations about energy conservation with the following people? (children, spouse, family, friends, neighbours, co-workers)	For each person/group: 1 – Very frequently (every week) 2 – Frequently (every month) 3 – Occasionally (every few months) 4 – Never 5 – Not applicable

Table 17 – Mann-Whitney Test Results for Self-Reported Changes Comparing Feedback Recipients and Non-Recipients

Question	N (Feedback Recipient)	N (Feedback Non-recipient)	Significance (two tailed)*	Significant Difference?
Household use awareness	31	88	0.613	No
Commitment to conservation	32	90	0.538	No
Commitment to reducing on-peak use	30	68	0.159	No
Compact Fluorescent light use	32	88	0.488	No
Conversation – children	9	22	0.058	No
Conversation – spouse	28	72	0.697	No
Conversation – family	17	64	0.658	No
Conversation – friends	28	70	0.871	No
Conversation – neighbors	24	66	0.742	No
Conversation – coworkers	24	62	0.898	No

* The null hypothesis that the two groups are the same is not rejected if the significance is greater than 0.05 (i.e. for a significant difference between the recipients and the non-recipients to exist, the significance level must be less than 0.05).

4.3.2 General Opinions Regarding the Feedback

The results reported in this section include only information from the feedback recipients. Of the 44 respondents that received the feedback, 89% said they found it useful, and 91% said the information was presented clearly and was easy to understand. Two-thirds of respondents said they took action because of the feedback, and 81% said the feedback has made them more likely to try to conserve electricity. Close to 48% said they thought the feedback was useful in helping them reduce their electricity bill, 27% said they weren't sure, and 25% said the feedback was not helpful in this regard.

When asked if they were surprised at their homes' consumption level and patterns, 43% said they were because they thought they consumed less, 36% said they were not, and 18% said they thought they consumed more.

Of the 27 respondents who received their feedback via mail, 81% claimed they showed the feedback to their family members, and 82% of the 17 respondents who received their feedback via email made this same claim.

Of the 32 households with children, 84% said they felt the feedback was useful in educating their children and/or other family members.

Initially, 10 and 29 respondents (23% and 66%) indicated they looked at the feedback "more than once a week" and "once a week" respectively. By the end of October, they indicated that these rates were 14% and 70% respectively. One respondent indicated they never looked at the feedback by October, but this same respondent indicated s/he never looked at them initially, either.

Thirty-nine respondents (89%) said they would be interested in continuing to receive the feedback. In terms of the preferred medium, the vast majority of people indicated they would prefer to continue to receiving the feedback the same way they had received it during the test period (i.e. by mail or email), which is not surprising, as each household was provided feedback via the medium they indicated they preferred in the first survey. When asked if they would prefer an in-home display as compared to the weekly feedback, 45% indicated they thought both types of feedback would be useful, 34% said they would prefer the in-home display, and 18% said they would prefer the weekly feedback.

4.3.3 Opinions Regarding Specific Features of the Feedback

Information was also obtained regarding the salience of the feedback in the format it was presented. Of the 44 respondents, 55% received historic feedback and 45% received comparative feedback. Of those who received their feedback compared to a historic standard, 84% answered yes to the question "If you saw your home's average daily consumption was different than it was for the same period in 2005, did it make you think about why that might be?"

For the 20 households that received the comparative standard, 65% said the comparison made them think about what the difference might be between their home and the other homes. Also, 70% were surprised at their consumption compared to their neighbours: 50% thought they consumed less than their neighbours, and 20% thought they consumed

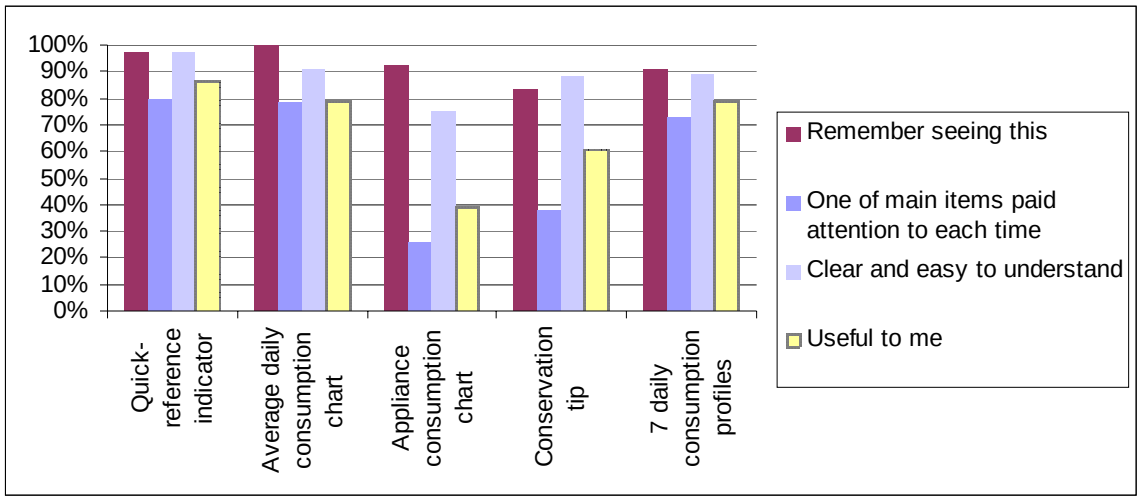
more. However, only 35% said the comparison motivated them to change their consumption habits. This could be because only 50% of the households thought that comparing their home to nine other randomly chosen homes on their street was a good comparison. For the 45% who thought it was not a good comparison, some cited reasons such as the fact that home sizes and the number of children could be different across the 10 homes, that some people are not home during the day whereas others are, that the appliances would vary, and generally, that there are "too many variables to make [the comparison] meaningful or relevant".

The other main features of the feedback that were included throughout the entire testing period were the quick-reference consumption indicator in the top right hand corner of the feedback sheet (this reported the average daily consumption levels for that week in kWh and dollar values), the graphical display of the average daily consumption for the week compared to the historic or comparative standard, and, on the back of the feedback sheet, the breakout of the home's hourly consumption for each of the seven days of the feedback week.

As previously discussed, the first eight weeks of feedback provided households with an appliance consumption break-down chart, which was created uniquely for each household, as well as tips about how households could conserve electricity. Whereas the appliances chart remained the same for each of the eight weeks, the tip varied weekly, although in some cases, due to data problems in the previous week, two feedback sheets went out at the same time, and in those cases the tip was the same on each of the two feedback sheets. Also, in some cases the tips were customized such that they reflected each household's unique appliance and consumption situation.

Figure 13 illustrates the effective salience of each of the aforementioned features. Also, regarding the conservation tip, 54% indicated that the tip did not provide them with any new information.

Figure 13 – Salience of Feedback Features (N varies from 30 to 40)

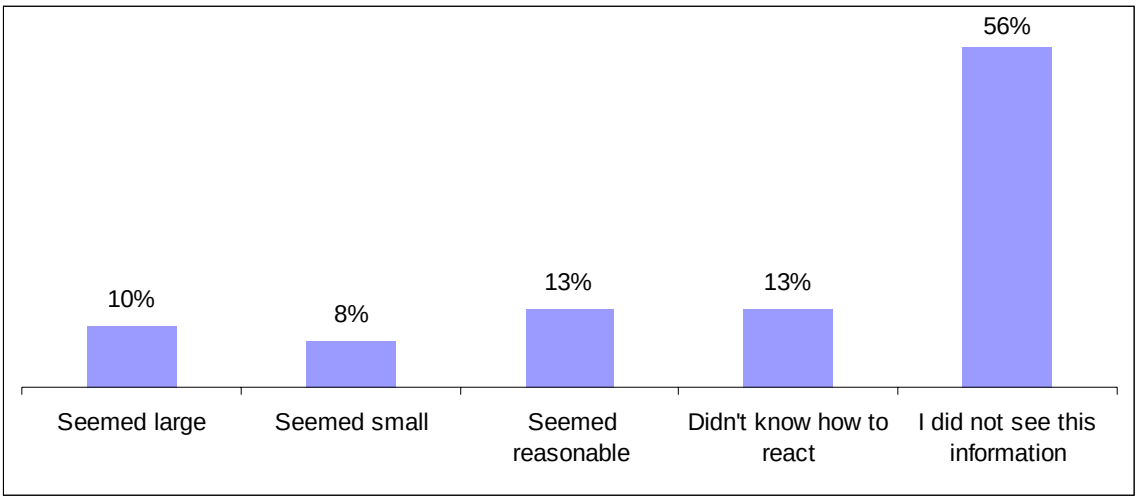


As discussed in Chapter 3, starting in September, the feedback was changed so that the tip was replaced with information about each household's electricity-related air pollution and greenhouse gas emissions. The first time this metric was used, each household's emissions for the summer of 2006 were listed and compared to their emissions from the summer of 2005. In addition, the delta (savings or additional emissions as compared to 2005) was presented in terms of the number of car trips to Toronto saved (or additional trips required) (Toronto is a city approximately 55 kilometers from Milton). Approximately 48% of the 44 respondents remembered seeing this, but only 18% said they paid attention to it that week. Furthermore, when asked for their reaction to the number of car trips saved (or additional trips required), more than half said they did not see that information, 13% said they were not sure how to react, 13% said they thought the number seemed reasonable, 10% said they thought the number seemed large, and 8% thought it seemed small (Figure 14).

After the initial week of summer-related emissions, the three subsequent feedback sheets included weekly electricity-related emissions of the household compared to what would have been the emissions of the home from the previous week (this was the case for households receiving both comparative and historic feedback). Seventy-five percent of 36 households remembered seeing these charts, but only 17% of 30 households who

responded indicated that it was one of the main items they paid attention to each time. Furthermore, 48% (of 29 respondents) thought the charts were not clear and easy to understand, and 74% (of 31 respondents) indicated they were not useful or meaningful to them.

Figure 14 – "What was your reaction to knowing how much CO_2 you saved/increased compared to the previous summer *in terms of the equivalent number of car trips to Toronto*?" (N = 39)

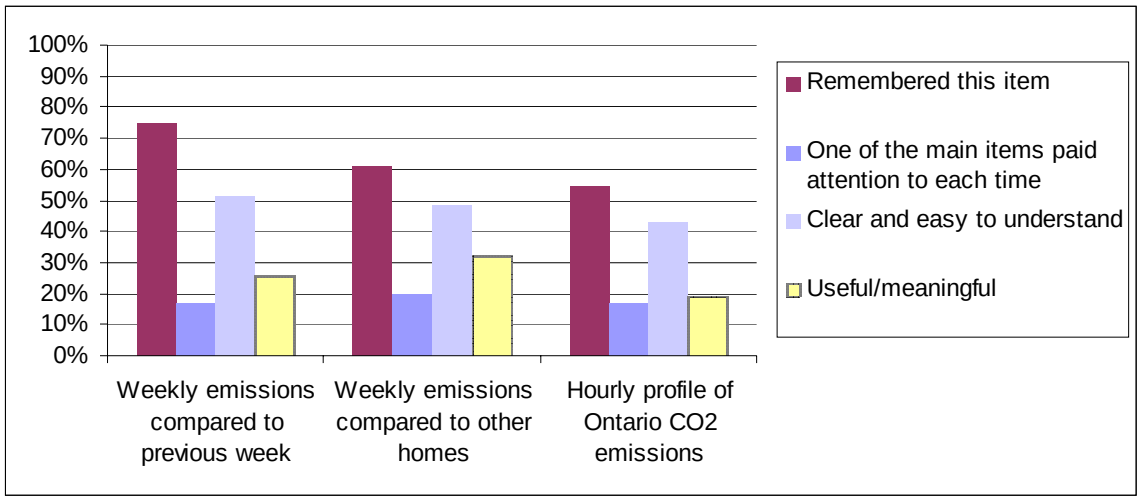


The last three weeks of feedback charted each household's emissions as compared to the average, maximum, and minimum of 257 homes for which there were data (again, this was the case for households receiving both comparative and historic feedback). Although 61% of the 36 households who responded indicated that they remembered seeing this chart, only 20% (of 30 respondents) indicated it was something they paid attention to each time, 52% (of 33 respondents) indicated the information was not clear or easy to understand, and 66% (of 31 respondents) indicated it was not something that was meaningful or useful to them.

Other emissions-related information that was provided was a chart of the province's hourly CO_2 emissions, which was calculated based on the average fuel mix used by the province the previous week, and by knowing average emission factors for these fuels. Fifty-four percent of the 35 households who responded remembered seeing this, 17% (of

30 respondents) indicated it was something they paid attention to each week, 57% (of 30 respondents) thought it was not clear and easy to understand, and approximately 81% (of 31 respondents) said the information provided was not meaningful or useful to them. Some of these findings are summarized in Figure 15.

Figure 15 – Various Opinions on the Emissions-related Information Provided (N varies from 29 to 36)



Despite the seemingly low salience of the emissions-related information provided, when asked if, overall, the information presented in the feedback sheets made households more aware of climate change and/or air quality issues relating to electricity consumption, of the 36 respondents to this question, 67% indicated that they did.

This chapter has presented the results from the three sections of the research: the first pre-feedback survey, the electricity consumption data from the baseline and test periods and its relative change, and the results of the second post-feedback survey. The following chapter will now attempt to analyze these results and discuss their implications.

5 Analysis

Chapter 4 outlined the results from the initial mail survey for which there were 298 respondents; the change in the electricity consumption data, ostensibly as a result of the feedback provided, which included 77 control households and 64 treatment households; and the second follow-up survey, for which there were 134 respondents. These results will now be analyzed in this chapter.

This chapter begins with Section 5.1, which considers the results of the statistical tests (presented in Sections 4.2.3 and 4.2.4) that were applied to the changes in the electricity consumption data for the treatment and control households, and attempts to provide reasons and evidence for the fact that there were not many significant findings, as well as for the few findings that were found to be significant. Section 5.2 considers the results of the statistical tests (presented in Section 4.3.1) that were applied to the differences between the findings in the first and second survey, and assesses the potential feedback-related changes in attitudes and behaviour.

5.1 Pre- and Post-Feedback Consumption Data Analyses

5.1.1 The Effect of the Feedback: Comparing Feedback Recipients and Non-Recipients

5.1.1.1 The Significance of the Lack of Significant Findings

It was hypothesized that those receiving feedback would conserve (or shift) more electricity compared to those who did not receive feedback. As per the results presented in Section 4.2.3, there were not many instances where the feedback recipients conserved or shifted more than the non-recipients. Some possible explanations for the lack of the feedback's impact are now offered. The results that were found to be significant, whether in the direction of the hypothesis or not, will be discussed in the next section.

Comparison Group Appropriateness

As previously mentioned, there was a concern that the treatment groups and Control Groups 1 and 2 may have been too pro-conservation to begin with, and if all groups already exhibited pro-conservation attitudes and behaviour, then the role of the feedback may be negligible, and it may be difficult to discern differences between the treatment and control groups. Comparing attitude and behaviour-related responses from the first survey of the treatment and control groups one and two (Table 18), it can be seen that the control and treatment groups generally have similar proportions of highly pro-conservation attitudes, and that the control groups have exhibited slightly more pro-conservation behaviour (in the form of the number of CFLs they have installed). This could imply there is more potential for change with the treatment groups.

Table 18 – Comparison of Conservation-related Attitudes and Behaviours of the Treatment and Control Groups

Attitude or Behaviour	CG1/2	TGs
Proportion who rate their consumption awareness as high	22% (N = 32)	19% (N = 63)
Proportion who are very committed to conserving electricity	31% (N = 32)	34% (N = 64)
Proportion who are very committed to reducing their "on-peak" electricity use	37% (N = 30)	41% (N = 61)
Proportion who use CFLs in all or most of their lights	53% (N = 32)	44% (N = 64)

Regardless, for the purpose of providing a different comparison perspective, CG3 was added, as it was hypothesized that it would better represent "typical" households than CG1/2. However, when the treatment groups were compared to CG3 alone, there was only one significant difference (out of a possible 24), which is actually less than what the other combinations yielded. As will be discussed below, this significant finding was at least in agreement with the hypothesized results (i.e. the treatment groups shifted more than CG3. This is compared to the treatment group versus CG1/2 comparison where, in some cases, the control groups conserved more than the treatment groups).

Time-of-use Pricing Enough of a Motivator that it Makes the Need for Feedback Negligible

Another explanation is that it may be possible that many people in Milton are doing a lot to conserve already. A common denominator of all the households was the existence of a smart meter, and the subsequent implementation of time-of-use rates in October 2005 could have been much more of an incentive for consumers to shift/conserve than the feedback was (as we saw in Chapter 2, Seligman et al. [1981] believe that feedback itself is not a motivation, but rather provides information so that consumers may act on motivations that already exist, such as a potential cost savings). Indeed, time-of-use pricing has been shown to be effective. A study considering a smart metering pilot in Ottawa, Ontario, where the pricing environment would have been similar to that in Milton, indicates that time-of-use pricing encouraged shifting from on-peak times as well as overall conservation (IBM, 2007). Other empirical studies also support the effectiveness of time-of-use pricing in encouraging shifting (Heberlein & Warriner, 1983; Sexton et al., 1987), although generally critical peak pricing schemes have been found to be more effective overall (IBM, 2007; George & Faruqui, 2005). (Critical peak pricing is when customers are charged much higher rates during specified critical periods. They are usually given prior warning before the onset of the period.)

As was reported in Section 4.1.2 above, over 80% of eligible respondents to the first survey in this study indicated that cost savings was their first motivator for conserving electricity. In the case of these research subjects, perhaps the magnitude of the savings motivation was large enough that additional feedback information was not required in order to further educate consumers on the cost benefits. Indeed, referring to Table 8, it can be see that seven out of eight groups showed an average shift from on-peak times over the 3-month period (i.e. the on-peak-to-total ratio deltas for the 3-month average values are negative), indicating that most treatment and all control groups shifted in 2006 when they were on time-of-use pricing as compared to 2005 when they were not.

All Homes, Including CG3 Homes, are Efficient to Begin With

Another common denominator is that the majority of the homes are new (96% were built in 1999 or later) and have relatively new appliances, which would likely be more energy efficient than the Ontario average, as housing efficiency has generally increased each decade since the 1970s (Parker, Rowlands, & Scott, 2001). If one examines the three-month average total monthly consumption values of all the homes as outlined in Table 8, it can be seen that the monthly averages for each group (which are in turn averages of each household in each group) are substantially lower than the reported average electricity consumption level for Ontario residences of 1,000 kWh (Ministry of Energy, 2006). Indeed, using the three-month average monthly value, the average of all 141 households in the study was 556 kWh. (While this average is calculated over three months in 2005 as compared to the full year [as is likely the case for the 1,000 kWh value], the majority of the homes use natural gas heating and as such, the average taken over a 12-month period is not likely to increase much taking into account the colder months. Of course, some households may be away on vacation during the summer months, and others may use more electricity for lighting and other uses in the winter, but it is still likely that the average consumption of 556 kWh is less than the Ontario average of 1,000 kWh). Again, this could be indicative of the fact that the households used in this study are already relatively efficient, and therefore have little capacity to conserve more, thus rendering the potential effect of the feedback minimal. This hypothesis is supported by the findings of Uitdenbogerd, Egmond, Jonkers, and Kok (2007) who state that more highly efficient homes have a lower potential for savings.

Appropriateness of the Feedback

Another possibility is that the feedback itself was just not informative enough, or did not provide enough household-specific information about how residents could conserve. Indeed, 62% of the feedback recipients who responded to the second survey thought that the conservation tip provided to them did not tell them anything new. This contrasts with the 88% who said that, overall, they found the feedback useful. Acknowledging that this may simply be a case of respondents providing general responses that they think are expected, it may also highlight the difference between having concrete tips that could be

acted upon to conserve, and merely having interesting information about a home's consumption. As mentioned in Chapter 2, feedback that provides information on how a householder should act, what specifically they should do, is more effective than general information (Fischer, 2007; Martinez & Geltz, 2005). While attempts were made to make the tips as household-specific as possible (usually based on the specific appliances in the homes), it was challenging to make them meaningful, and beyond the standard "motherhood" statements (i.e. beyond statements such as "Turn off the lights when you leave the room to save electricity."). This possibility is in line with that mentioned by Fischer (2007): if a knowledge base already exists amongst individuals, providing additional information that is not new may begin to be perceived as superfluous, and may be ignored. Similarities may be taken from mass media information campaign experience, in which failure occurred due to the fact that the target audience was already familiar with the information (Abrahamse et al., 2005).

Furthermore, the frequency at which the feedback was provided could have been a limitation. As we saw in the review of the past literature, one characteristic of effective feedback is the speed at which it is provided after a behaviour of interest occurs (e.g. Midden et al., 1983). The fact that this feedback was delivered on a weekly basis was highlighted as a potential limitation from the beginning. However, data delivery problems, and in one case, a delay in sending out the feedback because the feedback template was being redesigned, were such that, in some weeks, some households did not receive any feedback. When the data became available (or the new template was ready), they were usually sent two feedback sheets at the same time (the current sheet as well as the belated sheet). However, it would likely be difficult to interpret the belated sheet, or remember the specific occurrences that may, or may not, have contributed to that week's consumption levels, therefore significantly reducing the salience of the feedback. Furthermore, in cases where the data were delayed for all recipients, they eventually received two sheets at once, and the conservation tip included was often the same on both sheets. This prompted some respondents to the second survey (5 out of 44, or 11%) to indicate that the tips were not useful as they did not change frequently enough. This

impression may have exacerbated any negative impressions regarding the usefulness of the tips.

Non-feedback-related Variation

As previously mentioned, the main dependent variables used in this analysis were percentage changes of each individual household in 2006 as compared to 2005 (weather-adjusted), both in terms of monthly consumption, and monthly on-peak to total ratios. The purpose of this was to keep the non-feedback-related variation as low as possible in order to be able to better discern the effect of the feedback. In other words, by comparing one household's 2006 consumption to the same household's 2005 consumption, there are likely fewer sources of variation than if the percentage change was calculated by taking the average of a group of homes' 2006 consumption and comparing it to that group's average 2005 consumption. However, there will of course be variations in each household between the two years (e.g. if the number of people living in the household changed, if there were new appliances installed, etc.). These sorts of variations could overshadow feedback-induced effects, and it is possible that this is another reason for the lack of significant effects observed. Although the initial and final surveys asked householders whether there had been any changes that may have affected their consumption (between May 2005 and May 2006 in the first survey; from May 2006 to November 2006 in the second survey), in order to keep the number of households in each group as high as possible, it was necessary to include some households that had indicated a change between May 2006 and November 2006. This, of course, would add to the non-feedback-related variation.

Furthermore, when assessing the feedback homes' summer 2006 consumption compared to 2005, some households who had indicated that there had been no consumption-related change in their home between May 2005 and November 2006 nonetheless had relatively large increases or decreases (in one case, one such household had used 60% more electricity in 2006 as compared to 2005). This large magnitude of change was likely due to something other than the just feedback (especially since the feedback did not begin until July 2006), and as such illustrates the sort of changes that can occur. It also may

illustrate the fallibility of using self-reported data: it may be likely that the "60% household" mentioned above did not realize or forgot to report a major change that had affected his/her household consumption levels. (The limitations of self-reported data are discussed in Section 3.5.)

In addition to the "within-household" variation described above, there is also the effect of "within-group" variation, meaning the spread of the "…Delta" data points for each household within the treatment and control group. Appendix XIV contains the plots of the dependent variables that were found to have significant Mann-Whitney test results. It can be seen that the variation (i.e. the spread) within each group is rather large, and as such, may be masking some of the feedback-related effects. The fact that there were significant results at all given such variation is telling, and reinforces the meaningfulness of the findings. High "within group" non-feedback-related variation is cited by Brandon and Lewis (1999) and Martinez and Geltz (2005) as a likely reason for the lack of observed significant results as well. The high variation could indicate that the treatment groups should have been stratified based on factors such as such as house size, consumption levels, etc., instead of just ensuring these different variations were distributed evenly throughout the groups. However, given the small sample sizes in the study, this would have not been possible. Studies with relatively low sample sizes, such as this one, are more susceptible to high variation potentially masking significant effects, and Fischer (2007) believes that many feedback studies do not report significant findings because of this.

5.1.1.2 Findings That Were Significant

Where there were significant differences identified, in some cases the effects were opposite to what was hypothesized as indicated by the group median values presented in Section 4.2.3. Table 19 summarizes all nine significant results (out of a possible total of 72).

Recall that the "…TotDelta" dependent variables represent decreased (or increased) monthly consumption in 2006 compared to 2005, and a negative median value represents

a decrease in consumption. The "…PeakRatioDelta" dependent variables represent increased (or decreased) shifting from on-peak in 2006 compared to 2005, and a negative median value represents more shifting from on-peak (to mid- or off-peak times). In cases where both the treatment and control group values are of the same sign, the smaller of the two values indicates a relatively higher amount of conservation or shifting.

Table 19 – Treatment and Control Group Comparisons – All Significant Findings

Dependent Variable	Comparison Groups	Medians for Treatment and Control Groups	Consistent with Hypothesis?
OctPeakRatioDelta	TGs & CG3	TGs' Median = -0.12; CG3 Median = -0.04	Yes
SeptTotDelta	TGs & CG1/2	TGs' Median = 0.08; CG1/2 Median = -0.06	No
OctPeakRatioDelta	TGs & CG1/2	TGs' Median = -0.12; CG1/2 Median = 0.01	Yes
SeptTotDelta – High Consumers	TGs & CG1/2	TGs' Median = 0.01; CG1/2 Median = -0.16	No
OctPeakRatioDelta – Low Consumers	TGs & CG1/2	TGs' Median = -0.12; CG1/2 Median = 0.08	Yes
ThreeMonthAveTotDelta – High Consumers	TGs & CG1/2	TGs' Median = 0.03; CG1/2 Median = -0.11	No
SeptTotDelta	TGs & All CGs	TGs' Median = 0.08; CGs' Median = -0.02	No
OctPeakRatioDelta	TGs & All CGs	TGs' Median = -0.12; CGs' Median = -0.01	Yes
OctTotDelta – High Consumers	TGs & All CGs	TGs' Median = 0.03; CGs' Median = -0.04	No

Reliability of the Results

The purpose of performing statistical tests is to be able to assign a degree of confidence to a finding to indicate that it is not merely a coincidence or an anomaly. In addition to the fact that the above results were found to be statistically significant, these results were found using nonparametric testing which makes use of rankings rather than means, meaning the risk of major outliers disproportionately skewing the results and thus causing an erroneous significance is low. Appendix XIV contains the plots of the dependent variables that were found to be significant. There are some outliers in the plots, but not enough to affect the ranking (Erin Harvey, Statistical Consultant, University of Waterloo Statistical Consulting Service, personal communication, July 2007). Overall there appears to be no major distinct patterns of individual groupings that could indicate

anomalous data. This observation of the data is of course secondary to the statistical testing, but offers another perspective, albeit a subjective one, that the results of the statistical tests are sound. It is also reassuring that the dependent variables OctPeakRatioDelta and SeptTotDelta show up in different comparisons, which may indicate a certain consistency of the results.

Treatment Groups Compared to CG3

This sub-section compares the treatment groups, all the households who received and participated in the initial survey and volunteered to become a feedback recipient, to a randomly chosen group of households (from the pool of smart meter/time-of-use customers) who were not sent the initial survey (and therefore did not participate in the subsequent feedback and final survey phases).

As previously explained, the treatment group/CG3 comparison was made as it was thought that CG3 would better represent "typical" householders. Therefore, this comparison involves the treatment groups, who were hypothesized to be a group of people who may not have the capacity to do much more in terms of conserving or shifting, but likely had the will/attitude to do more, to the CG3, a group of people, who, on average likely would have had a greater capacity to conserve/shift more, but their attitudes on average may have been less conservation-oriented. In this sense, any significant results from this type of comparison are indeed important, as it represents one of the more conservative comparisons that can be made. It is therefore perhaps reassuring that the significant finding, although only one, was in accordance with the hypothesis that the feedback would encourage shifting.

Despite this reassurance, the reason that a significant effect was found for only one of 24 possible dependent variables (i.e. OctPeakRatioDelta) should be explored. One explanation may be as simple as it took people until October to become used to seeing the feedback sheets. This is unlikely, however, as 89% of the feedback recipients who responded to the second survey indicated they viewed the sheets at least once a week when they first began receiving them in late July, and they indicated that this dropped

(albeit slightly) to 84% by October. Another perspective relates to the time required for habit formation and behaviour internalization. As discussed in Chapter 2, it is theorized that feedback functions through learning, followed by habit formation and eventual internalization of behaviour (van Houwelingen & van Raaij, 1989). These two latter processes take time, which may be why the hypothesized shifting effect was not seen until October. It is for this reason that Fischer (2007) states that feedback should be provided for an extended period of time, although she indicates there is no clear indication from the studies analyzed that longer-term projects resulted in high initial energy savings.

Another explanation for the fact that the significant effect was not observed until October might be that, in early September, changes were made to the feedback sheets: the weekly tip was removed, and replaced with information about each home's electricity-related greenhouse gas emissions, as well as a chart that indicated the province's carbon dioxide profile throughout a typical weekday. As the significant dependent variable was shifting-related in October (as opposed to conservation-related), it is plausible that the hourly emissions profile brought a new salience to the feedback, especially given that few people learned anything new from the tip. However, as reported in Section 4.3.3, most people did not pay attention to the emissions-related information, and as such, this explanation may not be plausible.

Yet another explanation for the OctPeakRatioDelta being the only dependent variable that resulted in a significant finding could be related to air conditioning load. In October, when air conditioning would no longer have been necessary, perhaps it was easier to discern the effects of other shifting action that occurred. This would imply that feedback recipients did not shift their air conditioning load during August and possibly September, and as such this lack of shifting of the larger load dwarfed any other shifting effects. This finding would be in line with that of Winett et al. (1978) who draw attention to the finding that feedback was not effective at encouraging reduced air conditioning loads, or other actions, in summer months.

In this study, for the air conditioning-related effect proposed to be true, it may have been that the residents felt they already shifted their air conditioning load enough. Considering only the 33 feedback recipients who responded to the second survey and who were included in the consumption data analysis, from the first survey, 52% indicated they shifted their air conditioning use from on-peak times, and from the second survey, 76% indicated they always adjusted their AC to use less during on-peak times (automatically or manually). However, this difference between the two surveys was likely due more to the implementation of time-of-use rates than the feedback, which is why no major difference between the treatment groups and the control groups emerged in August. This is because, at the time of the first survey in May 2006, there had not yet been a cooling season in which time-of-use rates were in effect (they came into effect in October 2005). Indeed, of the 33 recipients, only 3 households (9%) mentioned adjusting their thermostat as part of the action they took as a result of having received the feedback. To summarize, AC load shifting did likely occur in August of 2006 compared to 2005, but not as a result of the feedback. Regardless of the reason, it is beneficial that it did occur, as according to the May 2006 survey, the average thermostat set point of the feedback recipients was 21^{o}C, indicating more room for shifting (e.g. the Ontario Power Authority recommends regular set points of 24^{o}C or 25^{o}C, comfort permitting, Ministry of Energy, 2006).

There were perhaps other changes that occurred in October 2006 that resulted in the significant finding. It would seem at first that factors like the children returning to school in September might be an explanation, but given the "…PeakRatioDelta" metric compared the 2006 consumption relative to the 2005, this should account for any such changes, as the same circumstances would have occurred in 2005 as in 2006 (unless, of course, a greater number of children became school-aged in 2006 compared to 2005, but it is not possible to know this level of detail about all the households).

Treatment Groups Compared to CG1/2

These results compare the same treatment groups as described above to the control households who also received and participated in the initial survey. These control households may or may not have volunteered to participate in the feedback phase of the

research, but regardless, none of the control households were included in the feedback phase.

As previously explained, the purpose for this comparison was that it was likely it compared two more similar "types" of people (that is, people who were interested enough in conservation issues to respond to the initial survey). From Table 18, it can be seen that this conclusion about the similarity can perhaps be made with regard to attitudes, but not necessarily with respect to behaviour (in this case, CFL-usage behaviour).

Using these groups as the basis for comparison, there were five dependent variables that were found to be significant with this group comparison. OctPeakRatioDelta and its "Low Consumers" variant were both found to be significant, with the medians in accordance to the hypothesis that those who received feedback shifted more. The fact that OctPeakRatioDelta was found to be significant in the CG3 comparison may reinforce the consistency of this finding.

The other interesting finding is that when the OctPeakRatioDelta is broken into "High Consumers" and "Low Consumers", the former group is no longer significant, but the latter group is. This result may seem counterintuitive if lower consumption corresponds to a lower number of appliances, as some research has shown that those households with fewer appliances generally tend to have less potential to take advantage of time-of-use pricing by shifting use from on-peak hours (Baladi, Herriges, & Sweeney, 1998).

Another explanation of the OctPeakRatioDelta finding for the Low Consumers may relate to household income. With the households in this comparison there is a small positive correlation between income and October 2005 consumption (2-tailed $p = 0.018$, Spearman correlation = 0.241). This may be in line with findings from Gatersleben et al. (2002) that suggest a link between income and consumption levels, although the same correlation was not shown to be significant for August or September, or even the average of the three months in 2005. Thus, as with Brandon and Lewis's (1999) findings, the link

between income and consumption levels with this group of households is not always clear.

Despite this, if there is a link between incomes and consumption levels, it may be possible that the lower consumers represent lower income households, and a plausible explanation for the significance of the OctPeakRatioDelta – Low Consumers findings is that lower income households may attribute more value to the cost savings achievable through shifting consumption from on-peak times. In other words, an explanation for the fact that the Low Consumers appeared to have responded more to the feedback by shifting their consumption more, at least in the month of October, is that their motivation to save money may have been higher.

Despite the above results which indicated that the feedback may have been useful in promoting consumption shifting in the month of October, the remaining three significant results in this comparison group were opposite to what was expected. It is not known why the dependent variables SeptTotDelta, its High Consumer variant, and 3MoAveTotDelta – High Consumers were such that the treatment groups actually consumed more than the control groups, but it is interesting to note that all of these results involve dependent variables measuring consumption (as opposed to shifting).

In the case of those who received the feedback with the comparative standard, 47% of second survey respondents (nine people) who were asked if they were surprised about their consumption relative to their neighbours' said they thought they consumed more, or that they were not surprised by the comparison (53% said they thought they consumed less than their neighbours). Although the respondent base to this question is small, an explanation for the feedback having the opposite effect as was expected could be that it inadvertently allowed some recipients who were consuming relatively little to become more lax about their conservation habits, or perhaps even provide them with a "licence to consume", which may be in line with the findings of Fischer (2007) and Schultz et al. (2007).

As for why this occurred in the month of September, it is possible that the change in feedback at the beginning of September may provide some explanation (i.e. the tip was removed, and was replaced with electricity-related air pollution and greenhouse gas information). As previously explained, the first week the emissions information was provided, each household was provided with a summary of their home's 2006 summer performance in terms of their equivalent CO_2 emissions compared to the summer of 2005. An analysis of that week's sheets reveals that 73% of the 106 sheets reported that the households consumed less or same amount in the summer of 2006 than they did in the summer of 2005. This high number was likely due to the fact that, on average, the summer of 2006 was cooler than that of 2005, and all feedback households had air conditioning (the data had not been weather-adjusted). Similar to the above hypothesis, this perhaps provided a signal that inadvertently encouraged more consumption in these households in September. However, further analysis using a Mann-Whitney comparison of those who received the signal that they consumed less or the same amount compared to those who were told they consumed more indicates that those who received the former signal actually had a significantly lower SeptTotDelta median value than those who received the latter signal, thus negating the theory that being told they consumed less over the summer might encourage increased consumption ($p < 0.001$; median of former group = 0.04; median of latter group = 0.37). This is opposite to the findings of Schultz et al. (2007), although it is possible that the car emblems (representing the number of return trips to Toronto saved) acted as a sort of "injunctive message" encouraging the positive behaviour. If this is the case, these findings could be construed as being in line with those of Schultz et al. (2007).

There were two High Consumer dependent variables that were also found to be significant, but with an opposite effect to what was expected: SeptTotDelta – High Consumers and ThreeMonthAveTotDelta – High Consumers. This means that for the month of September, and for the three-month average, the higher consumers who received feedback actually conserved less than those who did not. The "licence to consume" argument could again be proposed to try to explain the fact that two High Consumer groups reacted in the opposite manner to what was expected with the

feedback. If there is a relationship between those who thought the daily cost breakdown provided in the feedback made their electricity seem inexpensive, and those who are the higher consumers, then perhaps this would again provide this "licence". In this case however, the "licence" may be the perception that their electricity use is inexpensive and the reduced motivation to conserve that may arise because of that (as opposed to a reduced motivation due to lack of social pressure as described by Schultz et al., [2007]). Unfortunately, there were not enough responses to consider this correlation, but looking at the reactions to the reported cost alone provides some insight. There were six respondents (18%) who thought the dollar value reported seemed large, only one (3%) who thought it seemed small, and 16 (48%) who thought it seemed reasonable (out of 33 responses, with the remainder not knowing or not noticing the dollar value). The fact that only 18% thought the reported cost seemed large, and just over 50% did not think it seemed large could indicate that the price was too small to be an effective signal to motivate the consumers to conserve. A reduced motivation to conserve does not necessarily equate to a "licence to consume", but it does raise a question regarding the effectiveness of presenting a price that might be perceived as negligible or low to most consumers.

Treatment Groups Compared to All Control Groups

These results compare the same treatment groups to the combination of control groups. This comparison was performed merely as a third "lens" through which to view the data in case some interesting effects emerged.

It is not surprising that OctPeakRatioDelta was in this group, as it was in the other two comparison groups as well. The same applies to SeptTotDelta, as it was in the CG1/2 comparison. Now, however, OctTotDelta – High Consumers was significant, and not in accordance with the feedback hypothesis. The same reasons cited for the SeptTotDelta – High Consumers effect above may likely apply to this finding as well.

Collective Results of All Comparison Groups

One common emergence is the fact that OctPeakRatioDelta was found to be significant regardless of the control group used. In all cases it was also in accordance with the hypothesis, i.e., those who received the feedback appear to have shifted more than those who did not receive the feedback in October 2006 compared to 2005.

Indeed, the OctPeakRatioDelta was the only shifting dependent variable found to be significant, although in the CG1/2 comparison, the Low Consumers variant was also significant.

All other significant findings were based on dependent variables that measure conservation. Another common emergence was that all the conservation dependent variables found to be significant were never in accordance with the original hypothesis. In other words, for the months these variables represent, those who did not receive feedback conserved more than those who did.

Yet another common emergence is the fact that, when subdivided into high and low consumer groups, it is the High Consumers groups for which the conservation dependent variables were significant, and the Low Consumer group for which the OctPeakRatioDelta, the shifting dependent variable, was significant. And, again, even with the high and low delineation of these variables, it was always the conservation dependent variables that were not in accordance with the feedback hypothesis, and the shifting dependent variable that was in accordance with it. These trends are summarized in Table 20.

Table 20 – Comparison Significant Finding Summary

Type of Finding	Type of Dependent Variable
Findings ***not*** consistent with hypothesis	Tot* Tot* – High Consumers
Findings consistent with hypothesis	PeakRatio** PeakRatio** – Low Consumers

* measures conservation
** measures shifting

Looking broadly at these results, they may indicate that the feedback was effective for the purpose of encouraging shifting, but not for encouraging conservation, which would be in line with the findings of Sexton et al. (1987) who found that in-home displays used in conjunction with time-of-use pricing encouraged shifting from on-peak times, but also led to an overall increase in electricity consumption.

Another trend in the overall results could indicate that high consumers are more susceptible to increasing their consumption as a result of receiving the feedback, and that low consumers may be more likely to shift because of it. In cases where consumption correlates positively with income, the former point could be due to the fact that electricity prices are construed as being inexpensive, and are thus indirectly encouraging additional consumption. With respect to the low consumers, this group may be more sensitive to pricing issues, and as such be more likely to respond to the feedback by shifting use from the more expensive on-peak times.

None of the significant dependent variables were from August, but were instead from the later months of the study (September and October, and in one case the three-month average). This could be because the feedback was not effective in encouraging behaviour change with regard to the use of air conditioning, which would have dominated most homes' load during August, or because it took some time for people to get used to receiving, and thus reacting to, the feedback, or both. This later point could support Fischer's (2007) assertion that feedback is required for a prolonged period of time in order for habit formation to occur, one of the ostensible functions of feedback as per Seligman et al. (1981).

This analysis was undertaken by considering all treatment groups together, and comparing them to the control groups. The next section will consider the individual treatment groups compared to each other to understand the relative effects of the different types of feedback that were tested.

5.1.2 Considering Feedback Recipients Only: What Feedback Variables are Most Effective?

Considering Table 14 and Table 15 in Section 4.2.4, there were only two specific instances where some types of feedback were more significantly effective than others in encouraging a conservation or shifting effect.

It is important to keep in mind that the feedback was not shown to be effective in encouraging conservation as per the above analysis, and that in some cases, the feedback appeared to encourage consumption. The feedback was only effective in encouraging shifting in some specific cases. Therefore, this analysis provides only the relative effectiveness of the types of feedback, not a statement of the overall effectiveness of the feedback.

The significant findings involved OctTotDelta and SeptPeakRatioDelta. It should be noted that, despite the significance of the findings, all models developed through the ANOVA testing had low R-squared values (0.12 was the highest – all details can be found in Appendix XI). This indicates that there are other factors affecting the differences between 2005 and 2006 than just the types of feedback. Indeed, a low R-squared value is to be expected, as there are obviously many other factors that would have affected the consumption differences in the households between these two years.

Considering OctTotDelta from Table 14 and Table 15, the delivery medium was found to be significant (i.e. the "MailversusEmail" significance level was less than 0.05), meaning it is likely the delivery medium had a significant effect on the variation in consumption percentage change between October 2006 and 2005. This finding emerged three times through the different analyses used (i.e. through OctTotDelta, its square root transformation, and through the nonparametric Kruskal-Wallis test).

In two of the three cases involving the OctTotDelta, the mean/median was positive for both the email and the mail variable, and the former was lower than the latter. This indicates that there was actually an average increase in consumption for both the email

and mail households in October 2006 compared to 2005. However, because the "MailversusEmail" independent variable is significant, this implies that email customers had a significantly lower average increase than did the mail customers. In the third case involving OctTotDelta, the email households' mean is negative, indicating a small level of conservation in October 2006 as compared to October 2005. The slight variation in means for the same dependent variable is likely due to rounding error associated with the transformation. However, the net result is consistent: the email customers appear to have increased their consumption less, or saved more, relative to the mail customers for the month of October.

While not a strong proof of the effectiveness of the delivery medium of email versus mail, the results for conservation in the month of October imply that email may in fact be more effective (note that for this month, the feedback was found to be ineffectual with regard to encouraging conservation compared to the control groups, as outlined in Section 5.1.1; it was effective in encouraging shifting, though).

It is plausible that the mail delivery method, which entailed the households receiving a one-page document in the mail each week, became too much of an annoyance over time. This "annoyance" argument could be related to a finding of Roberts, Humphries, and Hyldon (2004), who indicated that additional paper could be perceived as wasteful. An analysis of the five recipients who adamantly disliked receiving the feedback revealed that all of these people were receiving it via mail, which may support this claim (these were the only five who indicated they would not want to continue receiving the feedback). Also, 23% (of 22 people) who received the mail feedback indicated they would prefer to switch to email if they continued to receive it, but only 5% of the email recipients (one of 17 people) indicated they would like to switch to mail feedback.

While not web-based per se, email-based feedback would be more compatible with such interactive systems, which Fischer (2007) and Brandon and Lewis (1999) say is key in the success of feedback projects. At the same time, other research has indicated that the residential sector may not be ready for email based information, at least not initially

(Martinez & Geltz, 2005). Their finding should be kept in mind when scaling to a larger sample size, as it may be that the email feedback recipients in this study may exhibit a fairly high level of comfort with technology, as well as represent a highly "connected" demographic.

Beyond the consumption data results, other factors were also examined, such as the ease with which the mail versus email feedback could be referred back to or be discussed with family members. As can be seen by Table 21, those who received the email kept their feedback (either in soft or hard copy), and referred back to it slightly more than did those who received the mail feedback. The frequency with which both types were shown to family members was similar. Although the sample sizes are rather small, this may support the above finding that email was relatively more effective than mail in encouraging conservation in some cases.

Table 21 – Mail versus Email Behaviour

	Print-off	**Keep**	**Refer Back**	**Show Family**
Mail (N = 27)	--	85%	74%	81%
Email (N = 17)	59%	94%*	82%*	82%*

* includes hard and soft copies

Considering LogShiftSeptPeakRatioDelta from Table 14 in Section 4.2.4, the comparison standard (i.e. the "HistversusComp" independent variable) was found to be significant, meaning that it is likely the comparison standard had a significant effect on the amount of shifting from on-peak that occurred in September 2006 relative to 2005. Again, the R-squared value is low (0.10), so although the effect was significant, it should be kept in mind that it was only a mild effect. Also, the results of the Kruskal-Wallis testing revealed that the SeptPeakRatioDelta dependent variable was not significant for the HistVersusComp independent variable (although it was close, see Appendix XII for these results), indicating again that this effect was likely weak. These findings thus offer no new clarification regarding the question of the efficacy of comparative feedback (as per Fischer, [2007]). The fact that the comparative standard was not found to be significant more often could be related to the fact that there was no injunctive message provided

with the comparative feedback, which could have inadvertently encouraged low consumers to increase their consumption, thus canceling any potentially positive conservation effects with the higher consumers, as suggested by Schultz et al. (2007).

In the case of the one significant finding, however, the comparative standard encouraged more shifting than did the historic standard for the month of September. This contrasts with the finding that only 68% of 19 comparative feedback recipients indicated that the comparison made them think about what the differences might be between their homes and the nine other homes against which they were compared (compared to 95% of 22 historic feedback recipients who indicated that they gave some thought as to why their 2006 consumption may have been different from the 2005 consumption when they saw the feedback). Furthermore, only 50% of the 20 comparative feedback recipients indicated they thought the comparison to nine randomly chosen homes was a good one. As to how this relates to the fact that the ANOVA analysis indicated that the comparative standard may have been better at encouraging shifting in the month of September, it could be that people taking issues with the new comparative standard may have inadvertently caused them to pay more attention to the feedback overall, which may have been effective, for example, in helping them remember the time-of-use hours which were listed on each feedback sheet. Indeed, the comparative standard would be different than what they were used to seeing: although the feedback with the historic standard was new to them also, customers would have been familiar with the idea of a historic standard, as each regular monthly bill provides such information. Thus, the novelty of the comparative standard was perhaps helpful in making the feedback more salient to the customers.

As for why a significant effect was apparent only in September, and only for shifting, one possibility is that the effect may be "artificial" in that perhaps there were more children in the comparative households than in the historic households, and thus on-peak consumption would have decreased when they returned to school. However, as we saw above, the fact that the dependent variable used is the relative difference of each household in 2006 relative to 2005, differences such as the number of children per

household in each group should be controlled for. Overall, it is difficult to say why there were significant effects regarding the relative effectiveness of the feedback types in September and October only, and for the "PeakRatio" and "Tot" variables respectively, but some of the ideas already presented in Section 5.1.1.2 would still apply.

Lastly, it should be noted that no interaction effects were found to be significant through either the ANOVA or Kruskal-Wallis testing, meaning there were no "synergistic" effects that either of the comparison standards had on either of the delivery mediums.

5.2 Pre- and Post-Feedback Survey Analyses

From the results presented in Section 4.3.1, the feedback did very little in terms of encouraging an attitude shift with the consumers. It is likely that the main explanation for this is the fact that, as was outlined in Section 4.1, the attitudes of most of the feedback recipients were fairly pro-conservation to begin with, and as such, the feedback may have made little difference in changing their attitudes about conservation. Hutton et al. (1986) had a similar finding with regard to a pre- and post-test assessment of conservation-related knowledge.

It is surprising, however, that there was not a reported increase in conversations about conservation with the feedback recipients, particularly with spouses and children, as 84% of the respondents to the second survey indicated that they thought the feedback was useful in discussing conservation with their family members. The "conversations with children" result listed in Table 16 above was the closest to being significant (i.e. closest to being less than 0.05), but the medians of the treatment and control groups are actually 0.33 and -0.27 respectively, indicating that the control groups reported an increase in the frequency with which they spoke about conservation with their children, as compared to the treatment groups. As with many of the results in Section 5.1.1, this is opposite to what was expected. While this difference was not statistically significant, an analysis of the difference is likely moot, but it may point to some non-feedback related issues that could have affected the overall results. For example, increased coverage of energy, conservation, and environmental issues in the media, may have affected the control

groups. Indeed, in the autumn of 2006, media coverage relating to climate change started to become more prevalent, perhaps due in part to the growing popularity of the documentary An Inconvenient Truth, and events such as the release of the Stern Review in late October 2006 (HM Treasury, n.d.). As for why this would have affected the control groups differently than the treatment groups, it may be a matter of coincidence given the small sample size: there were only nine treatment group households with school-aged children who answered that question on both surveys.

Comparing the results outlined in Table 19 to the opinions expressed in the second survey regarding the utility of the feedback itself, the contrast is apparent. As reported in Section 4.3.2, 89% of the respondents thought the feedback was useful, 81% thought it made them more likely to try to conserve, and 64% said they took action to conserve because of it. While this may not be indicative of an attitude change, it does appear that the feedback did at least have some value, at the very least in terms of customer satisfaction. Indeed, other feedback studies have shown this is one peripheral benefit of feedback (e.g. Wilhite & Ling, 1995). Whether such benefits would justify the cost of such a program would need to be assessed.

5.3 Other Findings from Survey #2

This research attempted to discern the effect of various feedback features. As has already been extensively discussed, the most prominent variables assessed through a factorial design were the comparison standard and the delivery medium, but in addition to these, other features, such the utility of the appliance breakdown chart and the environmental metrics, were also assessed through opinions expressed by the second survey respondents. Indeed, as discussed in the review of the literature, these features were identified as potentially being useful (e.g. Fischer, 2007; Martinez & Geltz, 2005; Wilhite et al., 1999), although there is not an extensive body of literature to support this as of yet.

With regard to the household-specific appliance breakdown charts, although most remember seeing this, only 26% paid attention to it on a regular basis, and only 39% indicated that they found it useful to them. It is possible that this was because it was

something that did not change from week to week unlike the other information. This finding contrasts with the aforementioned sources that argue that appliance specific information is necessary.

As discussed in Section 4.3.3, the environmental metrics used were not particularly striking to most survey respondents. Again, these metrics were displayed in an attempt to activate potential personal norms about environmental concern. It could be that the charts were not clear enough to be meaningful, as only about 50% responded positively regarding their clarity as per Figure 15. However, it could be that few households were concerned about the environment: Figure 8 indicates few respondents chose concern about local air pollution and climate change as their first choice for their motivation to conserve electricity, although concern about local air pollution was the largest second choice (behind an overwhelming first choice of cost savings). Also, as previously discussed, despite the low salience of the emissions-related information provided, 67% of the respondents indicated the information made them more aware of climate change and/or air quality issues relating to electricity consumption, which could indicate low prior knowledge levels about electricity-related emissions. Indeed, an Ontario-wide survey found that most Ontarians did not automatically relate electricity use and environmental issues (Environics, 2007). If this is the case, this would reinforce the argument made by Gatersleben et al. (2002) and Darby (2006) that individuals, even those with pro-environmental attitudes, often do not know or can not make the link between their energy consumption and its environmental impact.

This chapter has attempted to explain the results presented in Chapter 4. While it is difficult to explain with certainty the reason for the significant findings, or in this case, the lack of significant findings, the potential explanations provided could be further tested in future work. This discussion, as well as an overall summary of the research and its implications for policy, will now be presented in Chapter 6.

6 Conclusions

The original question that this research sought to answer was: "How are electricity consumption behaviour and attitudes of selected customers with smart meters influenced by residential electricity-use feedback information in Milton, Ontario?" Table 22 outlines the answers to this question as well as the main messages from the findings of this research. While overall there were few instances of significant findings, there are still implications that can be drawn from them in terms of how they contribute to the support base for various theories, and how they may contribute to policy formulation in Ontario and elsewhere.

6.1 Comments on Relevant Theories

Some of this study's results lend support to the significant theories that have underpinned past feedback research. It can be argued that the rationale-economic model could explain the fact that the first motivation for conservation for the majority of first survey respondents was cost-savings. Also, the fact that the feedback may have been effective in encouraging shifting, which has a cost implication associated with it, may also support the rational-economic theory.

The theory of cognitive dissonance was originally intended to be tested by observing if the feedback had a gradual effect over time. The fact that it appeared to have taken until October for beneficial shifting effects to be observed may be evidence to support the cognitive dissonance theory, although the results presented here do not prove that conclusively.

The theory of planned behaviour encompasses several concepts, one of which is the influence of social pressure on the behaviour of individuals. The results and analysis presented here may provide some support of this aspect of the theory in that there was one instance where comparative feedback appeared to be more effective than historic on relative shifting levels. However, this support is tenuous, especially considering that only

50% of the comparative feedback recipients thought the comparison to their neighbours was a good or fair one.

Table 22 – Summary of Study Findings

Assessment	Overall Findings
The effect of feedback on consumption behaviour	*Consumption Data Analysis* - For overall conservation and shifting, feedback was not effective - For conservation, in some cases the opposite effect was found; this seemed to be the case especially with higher consumers - For shifting, in some cases the feedback may have been effective to help encourage/remind about shifting; this effect seems to be the case with lower consumers
The effect of feedback on attitudes	*Survey Analysis* - Overall, the feedback had no measurable effect in making attitudes more pro-conservation - Acceptance levels of the feedback were high
The effectiveness of different types of feedback	*Consumption Data Analysis* - Overall, little evidence that the comparison standards or the delivery media tested had an effect on conservation or shifting - One case (October, conservation) indicated that email had a significantly higher effect upon encouraging conservation than did mail - One case (September, shifting) indicated that comparative feedback had a significantly higher effect upon encouraging shifting than did historic *Survey Analysis* - Acceptance of the historic standard was higher than the comparative standard - Customer understanding of the main consumption graph on the front page was relatively high, and this item received the most attention - Customers paid relatively little attention to the appliance consumption charts, the conservation tips, and the environmental metrics

The norm activation model describes that people must believe they are responsible for behaviour that could potentially harm another individual. Aspects of this theory were used to consider the effectiveness of using environmental metrics. Given that environmental motivations for conservation were lower than cost-saving motivations, it is possible that individuals did not attribute enough responsibility to themselves with regard to behaving environmentally, which could explain the relatively low salience of the environmental metrics to the individuals.

6.2 Broader Study Implications and Recommendations

While this study's population consisted of a fairly specific demographic living in mainly new homes, its findings can still be used to understand more about how this project could be scaled-up to a broader utility-level pilot (for Milton Hydro or other utilities).

One lesson is that it might be useful to target low consuming households with information that pertains more to the time-of-use hours and pricing schemes, as opposed to providing information about overall conservation. This finding is useful in that it may seem counterintuitive to concentrate on the lower consumers: some might think it is more beneficial to concentrate on higher consumers as they may have a greater ability to shift and conserve. While some cost-benefit analysis on the actual value of targeting campaigns to low consumer groups would be warranted, from an equity standpoint alone it may beneficial to target these groups as they may include low income groups, and thus could stand to benefit more from any shifting behaviour change that can occur.

However, it would obviously be important to consider other means of achieving the same effect that may be more cost-effective. Given that the results appear to have been most beneficial with shifting, it may be that simple reminders of the time-of-use hours and pricing are all that are required. As one study found: "never underestimate the value of a refrigerator magnet" (George & Faruqui, 2005, p.15).

A corollary of the above recommendation could be that it would be beneficial to target higher consumer groups with information to help them conserve (as well as time-of-use-related information). However, the results presented were not able to prove that this will be effective, as there was no indication of conservation in any of the groups; in fact, the opposite occurred in some cases.

The study's findings may also indicate that feedback does need to be provided for an extended period of time. As we saw, there were no significant results in the initial month of the study (August) and it was not until the last month, October, that significant effects in the desired direction were observed. Due to the provincial stress on the grid in the

summer months, it may make sense to concentrate the study again during this period. This time, however, the feedback should begin earlier.

Ontario is unique amongst other jurisdictions outside of Canada that are charging time-of-use pricing in that the prices are still relatively low, thus calling into question whether the price signal is enough to encourage shifting. Although it was not proven conclusively with this research, there are indications that the pricing reported was not considered to be expensive enough to warrant close attention being paid to it. For scaled-up feedback programs, the pricing should perhaps be less upfront until the time when rates are higher, and reporting consumption, or even possible savings, in terms of dollar values actually has some salience for the consumers.

Regarding the type of feedback that may be most effective, it should be kept in mind that the findings reported here are limited. However, one lesson that could be taken is that email may be the preferred medium of delivery. This is likely good news for utilities, as this would be a less expensive way to implement a feedback program. In addition, it would also lend well to interactivity, so that different customers could choose to obtain information as per their own preferences, and it could easily be compatible with already-existing websites: an email could be sent at a set frequency which could simply contain a link to the website. This is of course not adequate for those who do no have web or email access, and these individuals would need to be considered. For example, the province of Ontario is considering developing a system whereby residents can access their feedback information via telephone (Smart Meter Ontario, 2007).

The limited findings also provide some evidence that a comparative standard may be more salient to consumers than a historic standard. Implementing this at a larger scale would require more organization, and the appropriate comparison grouping would need to be assessed. Given that the relative benefit of comparative feedback compared to historic feedback is not unequivocal, it would be better to concentrate on the lower cost option of the two.

6.3 Future Work

The study has shed light on additional work that may be useful. Given the indication that email-based feedback may be preferred, and that interactivity is beneficial as per the literature findings, the findings of this study support the need for future work that is already on-going related to the use of in-home displays as a means of providing feedback (CNW Group, 2007). If possible, sample sizes should be larger and participation should not rely on volunteers exclusively.

Other work more closely related to this study could include a brief assessment of the feedback and control group homes' consumption levels from November 2006 onwards, or even for the period from August to October 2007, to assess the hypothesis that it took some time for habit formation, and the beneficial shifting effect that was seen in October was related to due to gradual habit formation, and was not just a coincidence.

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Appendix I Survey #1

Residential Customer Survey

This survey was developed by Milton Hydro and researchers at the University of Waterloo. All information you provide will be considered confidential and will be used for research purposes only.

This survey should be completed by the person who takes care of your electricity bill, or a household head. If you require additional space or would like to provide us with some additional comments about the survey, please do so on a separate piece of paper and include it with your reply.

*To be eligible for the draw for the **$100 restaurant gift certificate,** please mail the completed survey by **Friday May 26, 2006**. We appreciate your participation!*

Section A – Your Home

These questions are intended to learn more about your home and its electricity use.

A1. Please specify your house type. **Check only one.**

☐ Single detached house ☐ Townhouse or rowhouse
☐ Semi-detached house ☐ Apartment or condominium
☐ Other (please specify) _____

A2. Do you own your home? ☐ Yes ☐ No

If no, do you pay your own electricity bill? ☐ Yes ☐ No

A3. When was your home built? **Check only one.**

☐ Before 1965 ☐ 1994 – 1998
☐ 1965 – 1986 ☐ 1999 or later
☐ 1987 – 1993 ☐ Don't know

A4. How long have you lived in your home?

Since _____ (please specify month and year)

A5. What is the approximate size of your home in square feet, **excluding** the garage, attic, and basement? **Check only one.**

☐ Less than 1,000 ☐ 2,000 – 2,499 ☐ 4,000 or more
☐ 1,000 – 1,499 ☐ 2,500 – 2,999 ☐ Don't know
☐ 1,500 – 1,999 ☐ 3,000 – 3,999

If you don't know, please specify the number of bedrooms _____

A6. Located on many thermostats is a furnace fan setting. What setting do you mainly use for your furnace fan? **Check only one.**

☐ On ☐ Auto ☐ I don't have this setting

A7. Do you usually adjust your home's temperature (either manually or through a programmable thermostat) depending on the time of day, whether anyone is home, etc?

☐ Yes ☐ No

A8. Do you have a programmable thermostat? **Check only one.**

☐ Yes
☐ No
☐ No, but I plan to purchase one in the next 2 years

A9. At what temperature do you normally set your thermostat during the winter and summer? **If you do not adjust your home's temperature, leave that column blank.**

	Regular Temp (e.g. when home)	**Adjusted Temp** (e.g. night time / no one home)	**Don't Know**
Winter	___ ^{0}C	___ ^{0}C	☐
Summer	___ ^{0}C	___ ^{0}C	☐

☐ Not Applicable – We don't have AC

A10. **If your home uses air conditioning**, what type of air conditioning does your home use? **Check only those that apply.**

Air Conditioning Equipment	**Age (years)**			**ENERGY STAR?***		
	Less than 0.5	**0.5 to 7**	**More than 7**	**Yes**	**No**	**Don't know**
Central	☐	☐	☐	☐	☐	☐
Heat Pump	☐	☐	☐	☐	☐	☐
Window AC #1	☐	☐	☐	☐	☐	☐
Window AC #2	☐	☐	☐	☐	☐	☐
Window AC #3	☐	☐	☐	☐	☐	☐

* ENERGY STAR is a qualification for high efficiency appliances/equipment.

If you have one or more window/portable air conditioner(s), what percentage (%) of your home is air-conditioned this way? **Check only one.**

☐ 0% to 25%
☐ 26% to 50%
☐ 51% to 75%
☐ 76% to 100%

A11. What is the **main** type of heating used in your home? **Check only one.**

☐ Electric (baseboard)
☐ Electric (furnace)
☐ Electric (portable)
☐ Natural Gas
☐ Oil
☐ Heat pump
☐ Propane
☐ Wood
☐ Other_____

A12. Do you use electricity for additional heating requirements? ☐ Yes ☐ No

If yes, what type and approximately how much? **Check only those that apply.**

Electric Heating Type	**Additional System** (area of the house heated by this type)	
	Less than 25%	**25% to 50%**
Electric (baseboard)	☐	☐
Electric (furnace)	☐	☐
Electric (portable)	☐	☐
Other (please specify) _____	☐	☐

A13. Do you have a heat recovery ventilator (HRV)?

☐ Yes
☐ No
☐ Don't know

A14. What type of water heating does your home use? **Check all that apply.**

☐ Electric
☐ Oil
☐ Natural Gas
☐ Propane
☐ Other_____
☐ None

A15. Please provide information about your appliances. If you have more than one (or two) of any of the appliances specified, please indicate that under "Additional". **Check only those that apply.**

Appliance	Age (years)				ENERGY STAR?*		
	Less than 2	2 to 9	10 to 20	More than 20	Yes	No	Don't know
Full size fridge #1	☐	☐	☐	☐	☐	☐	☐
Full size fridge #2	☐	☐	☐	☐	☐	☐	☐
Freezer #1	☐	☐	☐	☐	☐	☐	☐
Freezer #2	☐	☐	☐	☐	☐	☐	☐
Mini/bar fridge #1	☐	☐	☐	☐	☐	☐	☐
Mini/bar fridge #2	☐	☐	☐	☐	☐	☐	☐
Range/oven	☐	☐	☐	☐	Not applicable**		
Dishwasher	☐	☐	☐	☐	☐	☐	☐
Top loading washing machine	☐	☐	☐	☐	☐	☐	☐
Front loading washing machine	☐	☐	☐	☐	☐	☐	☐
Clothes dryer	☐	☐	☐	☐	Not applicable**		
Dehumidifier	☐	☐	☐	☐	☐	☐	☐
Additional _____	☐	☐	☐	☐	☐	☐	☐
Additional _____	☐	☐	☐	☐	☐	☐	☐

* ENERGY STAR is a qualification for high efficiency appliances/equipment.

** ENERGY STAR does not currently qualify ranges, ovens or clothes dryers, although certain appliance options result in lower consumption (e.g. higher insulation self-cleaning ovens, clothes dryers with moisture sensors, compact sizes, etc.).

If you have a range/oven, please specify the type (e.g. electric, gas, propane)

_____

If you have a clothes dryer, please specify the type (e.g. electric, gas, propane)

_____

A16. Please provide information about some other appliances in your household.

Appliance	Number of Appliances			
	0	1	2	More than 2
Personal computer (including laptops)	☐	☐	☐	☐
Television	☐	☐	☐	☐
Microwave oven	☐	☐	☐	☐
Whirlpool bathtub	☐	☐	☐	☐
Electric air filter	☐	☐	☐	☐
Electric sauna	☐	☐	☐	☐
Electric pool heater	☐	☐	☐	☐
Pool pump	☐	☐	☐	☐
Hot tub	☐	☐	☐	☐

A17. Do you use compact fluorescent light bulbs (a high efficiency replacement for traditional incandescent light bulbs)? **Check only one.**

☐ Yes, in most/all of our light fixtures
☐ Yes, we have one or two installed
☐ No, but we will purchase these in the next 2 years
☐ No
☐ I have not heard of compact fluorescent light bulbs

A18. Do you have plans to do any of the following in the next 2 years? **Check all that apply.**

Measure	Planned for next 2 Years	Recently performed or acquired	Not planned
Purchase ENERGY STAR appliances	☐	☐	☐
Purchase ENERGY STAR air conditioner	☐	☐	☐
Upgrade heating system/furnace	☐	☐	☐
Upgrade attic/roof/ceiling insulation	☐	☐	☐
Upgrade windows/doors	☐	☐	☐
Purchase insulating blanket for water heater	☐	☐	☐
Have a home energy audit	☐	☐	☐

A19. What type of internet connection do you have in your home? **Check only one.**

☐ High speed ☐ None
☐ Dial-up ☐ Don't know

Section B – Your Thoughts and Opinions Regarding Electricity Use

B1. How would you rate your awareness of your home's specific electricity consumption levels? **Check only one.**

Very high	High	Average	Low	Very low
☐	☐	☐	☐	☐

B2. Do you feel that you know enough about your home's electricity consumption to decide how to best conserve electricity? ☐ Yes ☐ No

B3. Is there any other information you'd like to have that you feel could help you better conserve?

_____
_____
_____
_____

B4. Would it interest you to have a small in-home monitor that displays your real-time electricity usage?

☐ Yes ☐ No

B5. Do you pay attention to the electricity consumption level on your bill when it arrives?

☐ Yes ☐ No

B6. Are you satisfied with the layout and information provided on your electricity bill?

☐ Yes ☐ No

If no, please explain:

_____
_____
_____
_____

B7. Have you heard of any of the following? **Check Yes or No for each.**

Y	N	Conservation/Efficiency Initiative
☐	☐	ENERGY STAR appliances or home building standard (other than in this survey)
☐	☐	R-2000 home building standard
☐	☐	Cool Savings Rebate (provincial rebate for energy efficient air conditioners)
☐	☐	Every Kilowatt Counts (includes Cool Savings and other efficiency offers & tips)
☐	☐	The Conservation Bureau (part of the Ontario Power Authority)
☐	☐	The Conservation Challenge (for Ontarians to reduce energy use by 10% by 2007)
☐	☐	Smart Meters
☐	☐	EnerGuide for Houses/REEP energy efficiency audits and grants
☐	☐	The PowerWISE conservation campaign
☐	☐	Milton Hydro's "Energy Drill" program
☐	☐	The province's call for Ontarians to adopt a "conservation culture"
☐	☐	Other (please specify) _____

B8. What does a "conservation culture" mean to you?

_____
_____
_____
_____

B9. Please indicate your household's commitment to conserving electricity. **Check only one.**

Very committed	Committed	Somewhat committed	Minimally committed	Not committed at all
☐	☐	☐	☐	☐

B10. What motivates you to conserve electricity in your home? Rank the following as 1, 2, 3, etc., with 1 being most important. **Only rank options that you feel apply to you.**

Rank	Motivation to Conserve Electricity
_____	Economic savings on electricity bills
_____	Reduce emissions from power generation, thus reducing local smog and air pollution
_____	Reduce emissions from power generation, thus reducing greenhouse gases and global climate change
_____	Reduce the possibility of power shortages by reducing the burden on the province's electricity generation infrastructure
_____	Reduce the need to build more power plants in Ontario
_____	Feeling that it is just wrong to be wasteful
_____	Feeling that I need to "do my part"
_____	Other (please specify) _____ _____
_____	Other (please specify) _____ _____
_____	I do not feel motivated to conserve electricity

B10. ***Continued***

If you do not feel motivated to conserve electricity, why?

_____
_____
_____
_____

If you do not feel motivated to conserve electricity, what might motivate you?

_____
_____
_____
_____

B11. How often do you have conversations about energy conservation with the following people? **Check all that apply.**

	Very frequently (every week)	**Frequently (every month)**	**Occasionally (every few months)**	**Never**	**Not applicable**
Your school-age children	☐	☐	☐	☐	☐
Spouse	☐	☐	☐	☐	☐
Other family members	☐	☐	☐	☐	☐
Neighbours	☐	☐	☐	☐	☐
Friends	☐	☐	☐	☐	☐
Co-workers	☐	☐	☐	☐	☐

Section C – Time-of-Use Electricity Pricing

These questions are to help us understand your thoughts and reactions to time-of-use electricity pricing, which refers to electricity pricing based on the time of the day that it is consumed.

C1. Do you know that the rate you are charged by Milton Hydro for your electricity varies based on the time of day it is consumed? ☐ Yes ☐ No

If no, skip to question C5.

C2. Do you feel that your household is more aware of your electricity usage now because of time-of-use pricing? ☐ Yes ☐ No

C3. Does your household ever shift electricity consuming activities to periods of the day when the electricity price is cheaper? ☐ Yes ☐ No

If yes, what activities do you mainly shift/alter? **Check all that apply.**

☐ Using the clothes washer
☐ Using the clothes dryer
☐ Using the range/oven
☐ Using the dishwasher
☐ Adjust AC (in summer)
☐ Adjust electric heat (in winter)
☐ Other (please specify) _____

C4. Please indicate your household's level of commitment to reducing your "on-peak" electricity use ("on-peak" refers to the time of day when electricity is the most expensive). **Check only one.**

Very committed	Committed	Somewhat committed	Minimally committed	Not committed at all
☐	☐	☐	☐	☐

C5. Do you know the electricity rate that Milton Hydro charges during the most expensive "on-peak" hours?
☐ Yes, _____ cents per kilowatt-hour ☐ No

C6. Do you know what the "on-peak" hours are in the summertime?
☐ Yes, from _____ (am/pm) to _____ (am/pm) ☐ No

C7. How often do you use Milton Hydro's on-line inquiry system to view your electricity consumption patterns (https://www.miltonhydro.com/ecare/login.asp)? **Check only one.**
☐ Weekly ☐ I know of it but don't use it
☐ Monthly ☐ I use it to view my bill only
☐ 1 to 2 times a year ☐ I was not aware of this system

Section D – General Demographic Information

These final questions will help us in analyzing the overall results of the survey. ***Again, this information will be kept in strict confidence.*** *Although we encourage participants to answer all questions, you may skip questions you prefer not to answer.*

D1. Are you: ☐ Female ☐ Male ?

D2. Please specify the year you were born: 19_____

D3. Including yourself, please indicate the number of people in each of the following age groups that live in your home.
_____ 10 years or younger _____ 21 to 30 years _____ 51 to 65 years
_____ 11 to 20 years _____ 31 to 50 years _____ more than 65 years

D4. Please indicate the highest level of education obtained by any member of your household.
☐ Some grade or high school ☐ Some university
☐ Completed high school ☐ University (Bachelor's) degree
☐ College or technical diploma ☐ Second or graduate degree (Master's, Ph.D.)

D5. What is the approximately annual income of your household (before taxes)?
☐ Less than $20,000 ☐ $60,000 - $79,000
☐ $20,000 - $39,999 ☐ $80,000 - $99,999
☐ $40,000 - $59,999 ☐ Over $100,000

D6. Have there been any changes in your home in the last year that would have affected your electricity consumption (e.g. new major appliances, change in number of people in household, started working from home, etc.)? ☐ Yes ☐ No

If yes, please specify the changes and approximately when they occurred (month and year).
_____
_____
_____

Thank you very much for taking part in this survey!

Please use the postage-paid envelope provided to mail the completed survey to us by **Friday May 26, 2006**, and you will be entered into a draw to receive a **$100 gift certificate to a restaurant of the winner's choice!** If you wish to be entered, please provide your name, address, and phone number below so that we may contact the winner.

☐ **Enter my name in the draw for a $100 gift certificate**

Name: _____
Address: _____
_____
Phone: _____

The Purpose of this Survey

This survey is the initial phase of a study to assess the level of information that is most useful in helping Milton Hydro's customers conserve electricity and save money.

Customers who wish to participate in the second phase of this study will simply receive a one-page easy-to-read description of their home's unique electricity usage levels on a weekly basis. This will be provided between June and September 2006, although participants can withdraw from the study at any time. In October 2006, participants will be asked to complete a short voluntary survey so that we can assess their opinions on the usefulness of the information they received. Preliminary results will be made available to interested participants in early 2007.

Will you help us with this study by allowing us to send you weekly information about your home's electricity usage?

☐ **Yes, you may send me the information.**
☐ **No, I do not want you to send me the information.**

If yes, would you prefer to receive the information by mail or email?
☐ Mail (please provide address unless specified above) _____
_____
_____

☐ Email (please provide address) _____
☐ Either (please provide both addresses above)

NOTE: If you provide an email address it will be kept confidentially by Milton Hydro and will be used for the purpose of this study only.

Although we will attempt to accommodate everyone, we can only include a limited number of customers for this study, so specifying "Yes" does not guarantee that you will receive the information.

Again, please feel free to contact Mary-Jo Corkum at Milton Hydro (905-878-3483 ext. 236) or Dr. Ian Rowlands at the University of Waterloo (519-888-4567 ext. 2574) if you have any questions about this research.

Thank you!

MILTON HYDRO

University of Waterloo

Appendix II Feedback Examples

Historic (front page)

MILTON HYDRO DISTRIBUTION INC.

86 THOMPSON ROAD SOUTH, MILTON ON L9T 6P7
PHONE (905) 876-4611 FAX (905) 876-2044

Weekly Household Electricity Consumption Report

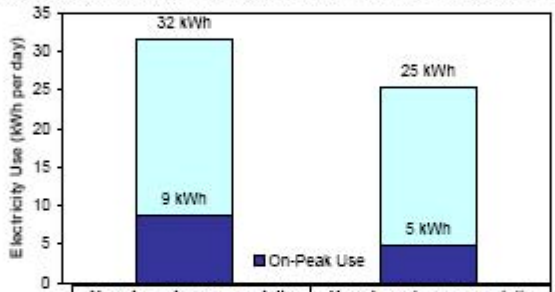
For: Sunday 23/07/2006 to Saturday 29/07/2006

Your Home's Average Daily Electricity Use This Week	
32	kWh per day
Your Home's Electricity Use and Cost This Week	
221 kWh	*$ 23.80

NAME & NAME NAMEOVITCH
123 STREET ST
MILTON ON A1B 2C3

Your Home's Average Daily Electricity Use

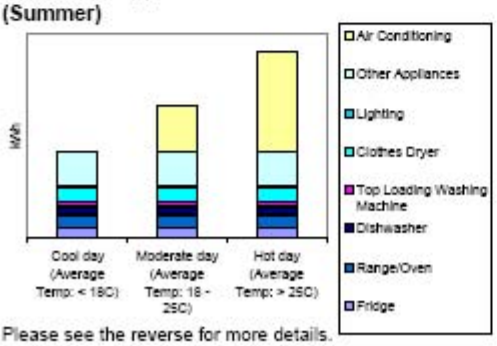
This information represents your household's average daily electricity use for the week. It is compared to your 2005 levels to provide you with a frame of reference. In the summertime, "On-Peak" refers to the electricity consumed on weekdays between 11am and 5pm. More information on your daily electricity use patterns can be found on the reverse.



	Your home's average daily use this week			Your home's average daily use for this week in 2005**		
Total Use	32 kWh	-	$3.40	25 kWh	-	$2.51 *
On-Peak Use Only	9 kWh	-	$1.29	5 kWh	-	$0.72 *
Week's Average Temp.	24 degrees Celsius			22 degrees Celsius		

* This cost includes all per kWh charges but does not include monthly fixed charges.
** 2005 costs use prices as of May 1, 2006 for comparison purposes.

Average Daily Consumption Breakdown in a Home with Appliances Similar to Yours (Summer)



Please see the reverse for more details.

Something Simple to Try ...

Try the following and watch for the difference in next week's information sheet...

As indicated in last week's tip, increasing the setpoint of your air conditioning by 1C can result in a 3 to 5% electricity cost savings, and possibly more on very hot days. This is generally true for each degree the thermostat is raised.

Fans can complement your efforts to save on AC costs -- and they are also much cheaper to operate. A ceiling fan can cost in the range of $1 per month to operate. Using fans exclusively could result in a 25% savings in your electricity costs.

Also, take advantage of cheaper electricity prices by shifting the use of heat-producing appliances to off-peak times. This saves on both appliance and AC electricity costs. When possible, use microwaves ovens for cooking as they give off less heat than conventional ovens and can consume up to 50% less electricity.

Comparative (front page)

MILTON HYDRO DISTRIBUTION INC.

86 THOMPSON ROAD SOUTH, MILTON ON L9T 6P7
PHONE (905) 876-4611 FAX (905) 876-2044

Weekly Household Electricity Consumption Report

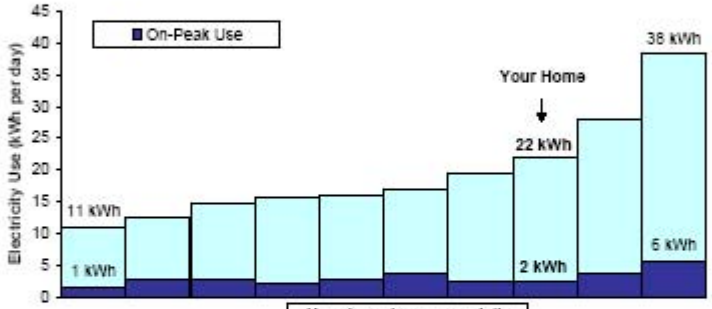
For: Sunday 13/08/2006 to Saturday 19/08/2006

Your Home's Average Daily Electricity Use This Week	
22	kWh per day
Your Home's Electricity Use and Cost This Week	
154 kWh	*$ 14.38

NAME & NAME NAMEOVITCH
123 STREET ST
MILTON ON A1B 2C3

Your Home's Average Daily Electricity Use

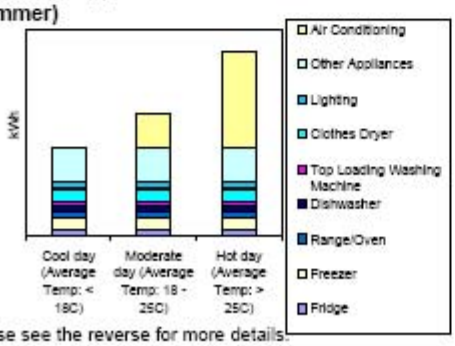
This information represents your household's average daily electricity use for the week compared to 9 other randomly chosen homes on your street. In the summertime, "On-Peak" refers to the electricity consumed on weekdays between 11am and 5pm. More information on your daily electricity use patterns can be found on the reverse.



	Your home's average daily use this week		
Total Use	22 kWh	-	$2.05 *
On-Peak Use Only	2 kWh	-	$0.35 *

* This cost includes all per kWh charges but does not include monthly fixed charges.

Average Daily Consumption Breakdown in a Home with Appliances Similar to Yours (Summer)



Please see the reverse for more details.

Something Simple to Try ...

Every little bit counts! There are many small things that can be done together to help to conserve electricity. Try the following and watch for the difference in next week's information sheet...

Everyone knows that turning off the lights, TV, etc., when you are finished with them can conserve electricity -- but did you know that this can reduce electricity use by approximately 5%?

Always waiting until the dishwasher is full to run it can save up to 5%.

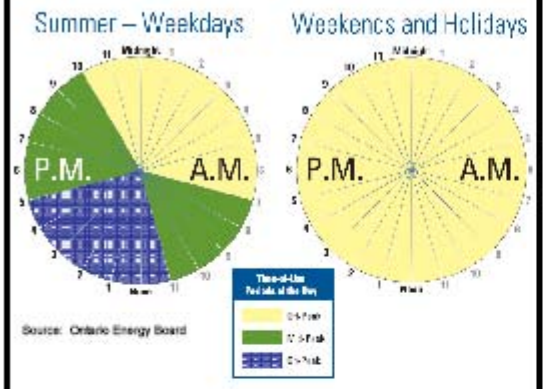
Using a clothesline to dry your clothes instead of the dryer can also save about 5%.

You indicated in the survey that your home already uses a few compact fluorescent light bulbs -- great! Did you know that if you install 6 of these bulbs, you'll reduce your electricity use by approximately 3%?

Back sheets (historic and comparative)

Weekly Household Electricity Consumption Report, NAME & NAME NAMEOVITCH, *Continued*

Time of Use Electricity Rates for Summer (May 1st to October 31st)



Time of Use Electricity Prices (as of May 1, 2006)

Off-Peak:	3.5 cents per kWh
Mid-Peak:	7.5 cents per kWh
On-Peak:	10.5 cents per kWh

Some Questions You May Have ...

Why do you show my home's consumption compared to that of other people on my street?
This is a method to provide you with a point of reference for your consumption levels. Although some attributes will be different in the comparison households, by comparing your consumption to other homes on your street, you can get a feel for the consumption ranges that can exist across households.

How is the appliance use breakdown calculated?
This is calculated based on the appliance type and age information you supplied in the initial survey. The breakdown provided is an estimate only, as actual appliance consumption depends heavily on individual household usage behaviour.

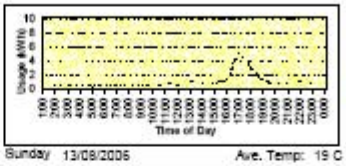
Only the central air conditioning value is based on your actual usage. Although your air conditioner consumption was not measured directly, its value was estimated by observing how your home's total consumption changed with the daily average temperature in the summer of 2005.

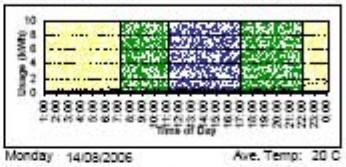
The "Other Appliances" category includes items such as computers, TVs, microwaves, as well as an estimation of other small appliances commonly found in households, such as kettles, toasters, fans, etc.

Other questions or comments?
If you have any questions about this feedback, please email feedbackstudy@miltonhydro.com, or contact our Customer Service Department at 905-876-4611.

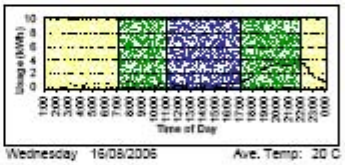
Daily Electricity Use

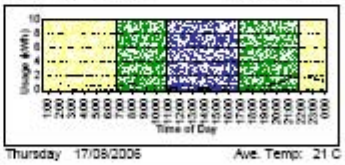
The graphs below show your home's electricity use on an hourly basis for each day of the past week. Feel free to note reasons for observed peaks, and be sure to check for the effect of any changes that you may have made last week.

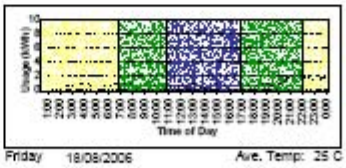

Sunday 13/08/2006 Ave. Temp: 19 C

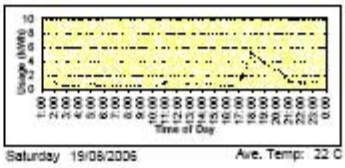

Monday 14/08/2006 Ave. Temp: 20 C


Tuesday 15/08/2006 Ave. Temp: 21 C


Wednesday 16/08/2006 Ave. Temp: 20 C


Thursday 17/08/2006 Ave. Temp: 21 C


Friday 18/08/2006 Ave. Temp: 25 C


Saturday 19/08/2006 Ave. Temp: 22 C

NOTES

Summertime emissions (delivered one time)

MILTON HYDRO DISTRIBUTION INC.

86 THOMPSON ROAD SOUTH, MILTON ON L9T 6P7
PHONE (905) 876-4611 FAX (905) 876-2044

Weekly Household Electricity Consumption Report

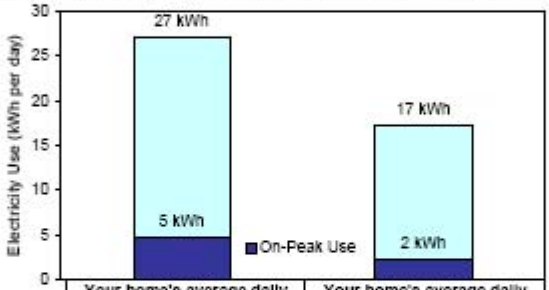
For: Sunday 27/08/2006 to Saturday 2/09/2006

Your Home's Average Daily Electricity Use This Week	
27	kWh per day
Your Home's Electricity Use and Cost This Week	
190 kWh	*$ 18.53

NAME & NAME NAMEOVITCH
123 ADDRESS STREET
MILTON ON L9T 123

Your Home's Average Daily Electricity Use

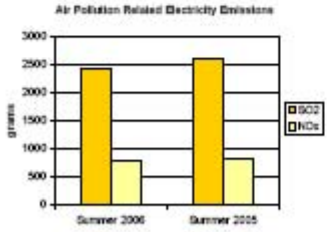
This information represents your household's average daily electricity use for the week. It is compared to your 2005 levels to provide you with a frame of reference. In the summertime, "On-Peak" refers to the electricity consumed on weekdays between 11am and 5pm. More information on your daily electricity use patterns can be found on the reverse.

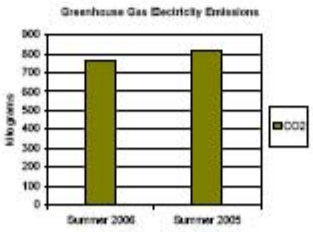


	Your home's average daily use this week			Your home's average daily use for this week in 2005**		
Total Use	27 kWh	-	$2.65	17 kWh	-	$1.64 *
On-Peak Use Only	5 kWh	-	$0.70	2 kWh	-	$0.32 *
Week's Average Temp.	19 degrees Celsius			22 degrees Celsius		

* This cost includes all per kWh charges but does not include monthly fixed charges.
** 2005 costs use prices as of May 1, 2006 for comparison purposes.

Your Home's Electricity-Related Emissions for this Summer (June to August) Compared to 2005...



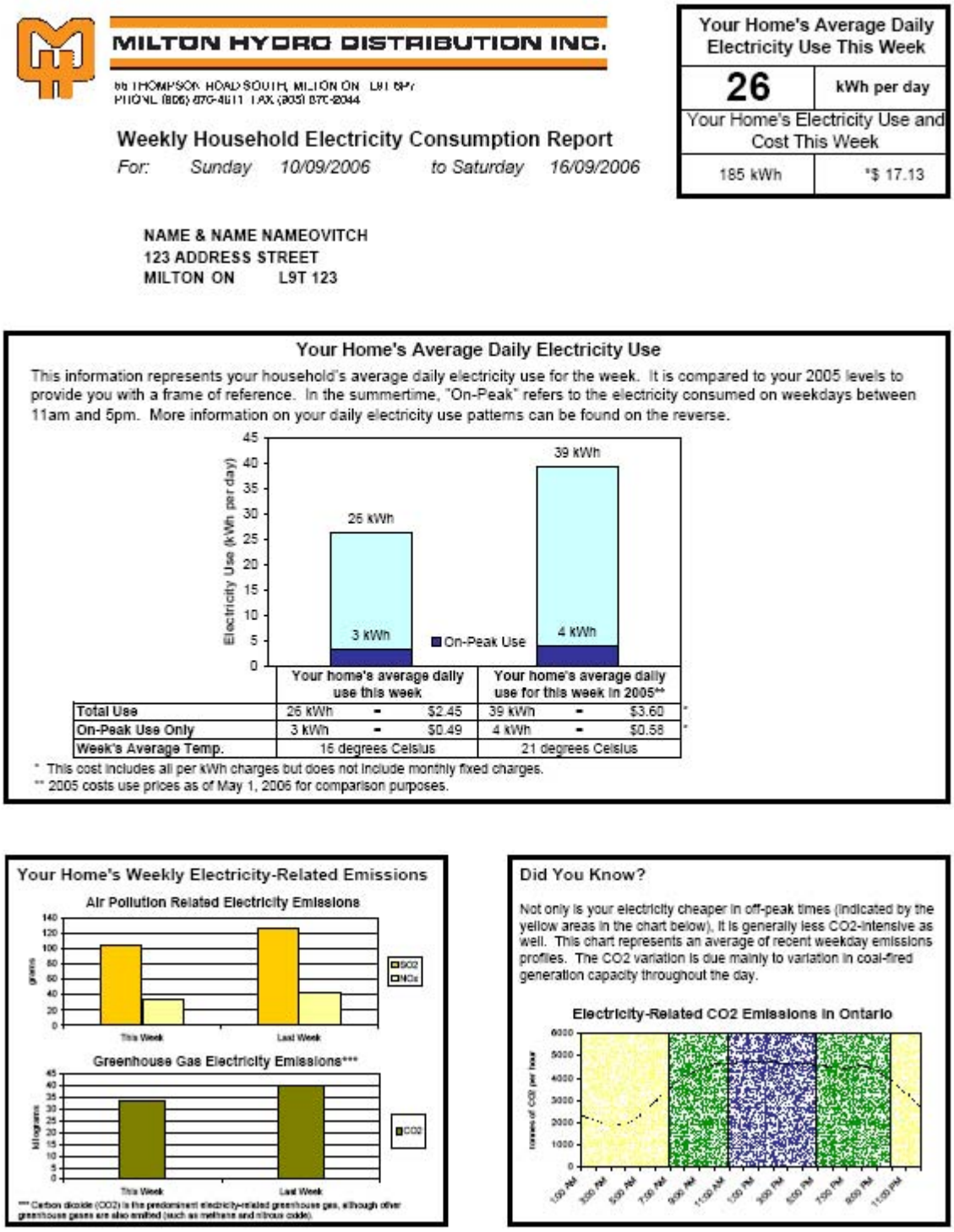


You used about 7% less electricity this summer compared to 2005. This equates to a savings of approximately 58 kg of CO2, which is equivalent to saving 5 car trips to Toronto...

Sulphur dioxide (SO2) is a gas which contributes to acid rain, and reacts to form airborne particles which create smog. Nitrogen oxides (NOx) are key components in the creation of ground-level ozone as well as airborne particles, both major components of smog. NOx also contributes to acid rain formation. Carbon dioxide is a major greenhouse gas that contributes to climate change.

SO2, NOx, and CO2 are emitted from fossil fuel-powered electricity generation, particularly from coal-powered generation.

Weekly Emissions Example



MILTON HYDRO DISTRIBUTION INC.

88 THOMPSON ROAD SOUTH, MILTON ON L9T 6P7
PHONE (905) 876-4611 FAX (905) 876-2044

Weekly Household Electricity Consumption Report

For: Sunday 10/09/2006 to Saturday 16/09/2006

Your Home's Average Daily Electricity Use This Week	
26	kWh per day
Your Home's Electricity Use and Cost This Week	
185 kWh	*$ 17.13

NAME & NAME NAMEOVITCH
123 ADDRESS STREET
MILTON ON L9T 123

Your Home's Average Daily Electricity Use

This information represents your household's average daily electricity use for the week. It is compared to your 2005 levels to provide you with a frame of reference. In the summertime, "On-Peak" refers to the electricity consumed on weekdays between 11am and 5pm. More information on your daily electricity use patterns can be found on the reverse.

	Your home's average daily use this week			Your home's average daily use for this week in 2005**		
Total Use	26 kWh	-	$2.45	39 kWh	-	$3.60 *
On-Peak Use Only	3 kWh	-	$0.49	4 kWh	-	$0.58 *
Week's Average Temp.	16 degrees Celsius			21 degrees Celsius		

* This cost includes all per kWh charges but does not include monthly fixed charges.
** 2005 costs use prices as of May 1, 2006 for comparison purposes.

Your Home's Weekly Electricity-Related Emissions

Air Pollution Related Electricity Emissions

Greenhouse Gas Electricity Emissions***

*** Carbon dioxide (CO2) is the predominant electricity-related greenhouse gas, although other greenhouse gases are also emitted (such as methane and nitrous oxide).

Did You Know?

Not only is your electricity cheaper in off-peak times (indicated by the yellow areas in the chart below), it is generally less CO2-intensive as well. This chart represents an average of recent weekday emissions profiles. The CO2 variation is due mainly to variation in coal-fired generation capacity throughout the day.

Electricity-Related CO2 Emissions in Ontario

Appendix III AC Usage Calculation Methodology

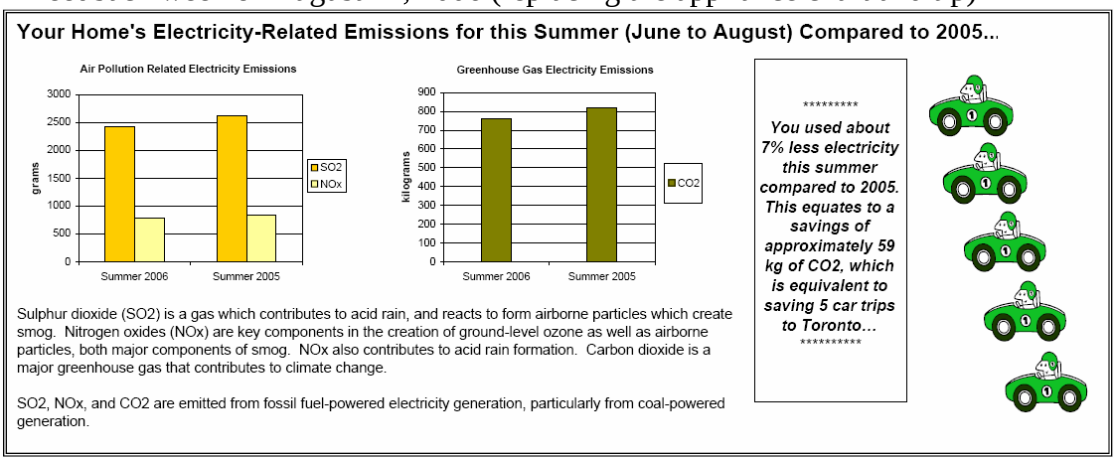
Each household was given an appliance consumption breakdown chart for homes with appliances similar to their own. The appliance type and vintage from the first survey data was used to calculate this chart. Consumption data from various databases were used to determine typical consumption levels for each appliance in the household.
As such, it was made clear that the appliance consumption levels illustrated in the chart were estimates only and were not based on measurements.

In the case of the air conditioning, however, the actual consumption shown in the charts was based on each household's measured data. The following describes how these AC consumption levels were determined for each household.

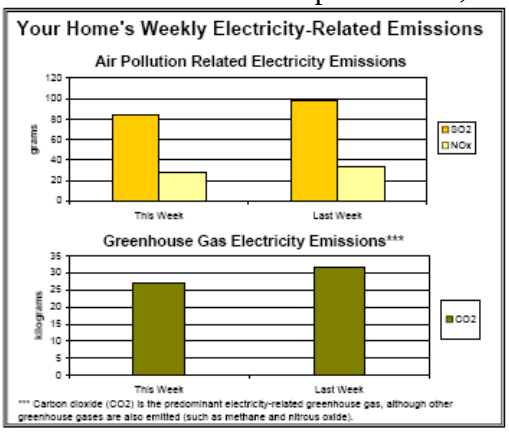
1. Each household's total consumption was obtained for each day from June 1 to September 30, 2005.
2. For each day, the daily mean temperature was obtained from Environment Canada's Weather Office using the Lester B. Pearson International Airport location in Toronto, Ontario, which was the closest site to Milton with reliable data collection (B. Mills, personal communication, June 2006).
3. The data was then sorted based on mean daily temperature, and the average daily consumption for three temperature ranges was determined (less than 18C; 18 to 25C; and greater than 25C). Eighteen degrees Celsius was chosen as the baseline mean temperature above which AC would be used based on the fact that cooling-degree-day calculations use this figure. Twenty-five degrees Celsius was chosen arbitrarily as the high end of the mid-temperature range.
4. The low-temperature range, <18C, was taken as the baseline average daily consumption when no AC was being used. This figure was then used to normalize the average daily consumption that was estimated for each home using the appliance type, vintage, and consumption information described above.
5. For the mid-temperature range (18 – 25C), the same appliance consumption breakdown was used as for the low-temperature range, but now an AC contribution was added on, which was calculated as the difference between the measured average consumption value for a mid-temperature day and the measured average value for the low-temperature day.
6. Similar to the above, for the high-temperature range (>18C), the same appliance consumption breakdown was used as for the low-temperature range, but now an AC contribution was added on, which was calculated as the difference between the measured average consumption value for a high-temperature day and the measured average value for the low-temperature day.
7. The final appliance consumption breakdown chart for each household thus included three vertical bar charts: one for a typical "cool day"; one for a typical "moderate day"; and one for a typical "hot day". The only difference between the three bars was the AC contribution.

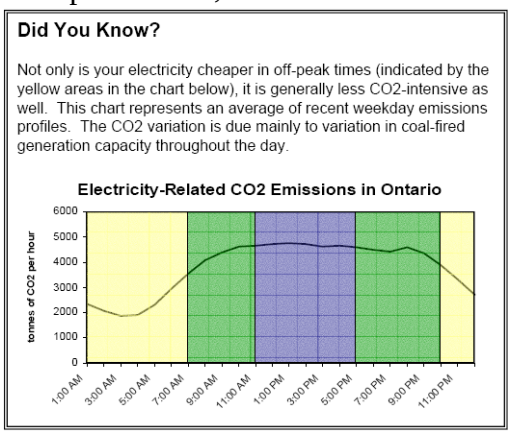
Appendix IV Environmental Metric Examples

In feedback week of August 27, 2006 (replacing the appliance chart and tip)

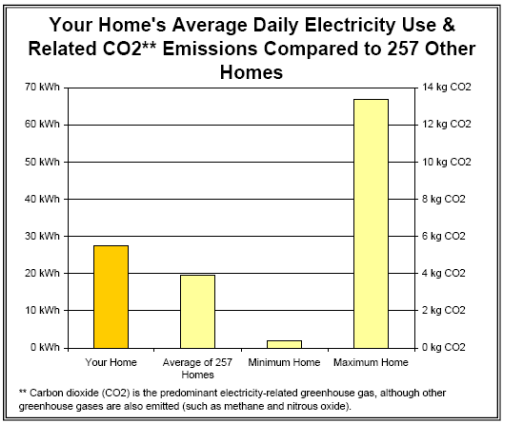


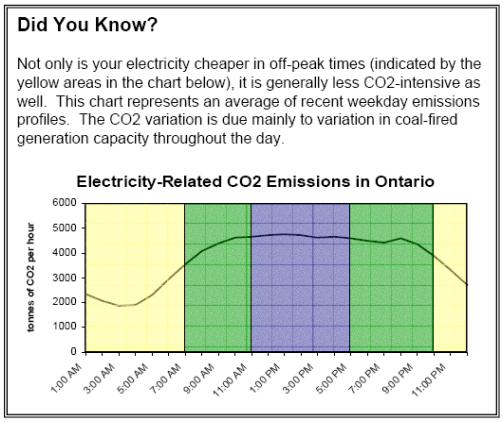
In feedback weeks of September 10, 2006 to September 30, 2006





In feedback weeks of October 1, 2006 to October 16, 2006





Appendix V Group Similarity Testing

Between-Subjects Factors

		N
Group	CG1	17
	CG2	17
	TG1	17
	TG2	17
	TG3	17
	TG4	17

Tests of Between-Subjects Effects

Dependent Variable: SumDailAve

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	682.343(a)	5	136.469	1.068	.383
Intercept	80475.544	1	80475.544	629.742	.000
Group	682.343	5	136.469	1.068	.383
Error	12267.967	96	127.791		
Total	93425.853	102			
Corrected Total	12950.310	101			

a R Squared = .053 (Adjusted R Squared = .003)

Appendix VI Survey #2

MILTON HYDRO

University of Waterloo

Residential Customer Survey

This survey was developed by Milton Hydro and researchers at the University of Waterloo. All information you provide will be considered confidential and will be used for research purposes only. It is preferable that this survey be completed by the person who completed the first survey in May 2006. If that is not possible, it is preferable that it be completed by the person who takes care of the electricity bill and/or is a household head.

*To be eligible for the draw for the **$100 restaurant gift certificate,** please mail the completed survey by **Friday December 1, 2006**. We appreciate your participation!*

Section A – Your Home

These questions are intended to learn more about your home and its electricity use. Some questions are repeats from the initial survey to capture any changes that may have occurred over the summer.

A1. Were you the person who filled out the initial survey in May 2006? ☐ Yes ☐ No

A2. Have there been any changes in your home since May 2006 that would have affected your electricity consumption (e.g. new major appliances, change in number of people in household, started working from home, etc.)? ☐ Yes ☐ No

If yes, please specify the changes and approximately when they occurred.

_____

_____

A3. On weekdays, is there usually someone at home during the day? ☐ Yes ☐ No

A4. Do you use compact fluorescent light bulbs (a high efficiency replacement for traditional incandescent light bulbs)? **Check only one.**

☐ Yes, in most/all of our light fixtures
☐ Yes, we have one or two installed
☐ No, but we will purchase these in the next 2 years
☐ No
☐ I have not heard of compact fluorescent light bulbs

A5. Roughly speaking, do you know your home's average daily electricity consumption?

☐ Yes, it's about _____ kilowatt-hours (kWh) per day
☐ No

A6. Do you have any plans to make any energy efficiency improvements to your home in the future? **Check all that apply.**

Measure	Planned for Next 2 Years
Purchase ENERGY STAR appliances	☐
Purchase ENERGY STAR air conditioner	☐
Upgrade heating system/furnace	☐
Upgrade attic/roof/ceiling insulation	☐
Upgrade windows/doors	☐
Have a home energy audit	☐

Section B – Your Thoughts and Opinions Regarding Your Electricity Use
These questions are similar to those you received in the first survey in May so that any change in your opinion since that time can be gauged.

B1. How would you rate your awareness of your home's specific electricity consumption levels? **Check only one.**

Very high	High	Average	Low	Very low
☐	☐	☐	☐	☐

B2. How often do you have conversations about energy conservation with the following people? **Check all that apply.**

	Very frequently (every week)	Frequently (every month)	Occasionally (every few months)	Never	Not applicable
Your school-age children	☐	☐	☐	☐	☐
Spouse	☐	☐	☐	☐	☐
Other family members	☐	☐	☐	☐	☐
Neighbours	☐	☐	☐	☐	☐
Friends	☐	☐	☐	☐	☐
Co-workers	☐	☐	☐	☐	☐

B3. Please indicate your household's commitment to conserving electricity. **Check only one.**

Very committed	Committed	Somewhat committed	Minimally committed	Not committed at all
☐	☐	☐	☐	☐

Section C – Time-of-Use Electricity Pricing
These questions relate to time-of-use electricity pricing, which refers to electricity pricing based on the time of the day that it is consumed. Some questions are similar to those from the survey this past May.

C1. How often did you adjust your AC to use less during "on-peak" times this summer? ("On-peak" refers to the time of day when electricity is the most expensive.) **Check only one.**
☐ Always (Programmed my thermostat to use less AC during "on-peak" times)
☐ Always (Manually adjusted the AC to use less during "on-peak" times)
☐ Only when there are provincial appeals for residents to reduce their electricity use
☐ Frequently (1 or 2 times a week)
☐ Occasionally
☐ Never
☐ I do not know when the "on-peak" times are
☐ Not applicable – I do not have AC

C2. Please indicate your household's level of commitment to reducing your "on-peak" electricity use. **Check only one.**

Very committed	Committed	Somewhat committed	Minimally committed	Not committed at all
☐	☐	☐	☐	☐

C3. Do you feel that you have the ability to have more control over your consumption patterns and resulting costs because of time-of-use pricing?
☐ Yes ☐ No ☐ I did not know about time of use pricing

C4. Do you know off-hand the electricity rate that Milton Hydro charged during the most expensive "on-peak" hours this past summer?
☐ Yes, _____ cents per kilowatt-hour ☐ No

C5. Do you know off-hand the "on-peak" hours in the summertime?
☐ Yes, from _____ (am/pm) to _____ (am/pm) ☐ No

C6. Do you feel that it is easy to remember when the "on-peak", "mid-peak", and "off-peak" hours are? **Check only one.**
☐ Yes
☐ Somewhat
☐ No
☐ I've never really tried to remember
☐ I did not know about the different hours

Section D – General Opinions on the Weekly Consumption Reports (WCRs) you Received
These questions are to help us understand your general thoughts and reactions regarding the usefulness of the Weekly Consumption Reports (WCRs) that you received from July to October 2006.

D1. Overall, did you find the WCRs useful?
☐ Yes ☐ No

D2. In general, did you find the information in the WCRs clear and easy to understand?
☐ Yes ☐ No

If no, please specify your concerns _____
_____
_____
_____

D3. Was there any other information that you would have found useful to receive in the WCRs?
☐ Yes ☐ No

If yes, please explain _____
_____
_____
_____

D4. Were you surprised at your home's electricity consumption patterns and levels? **Check only one.**
☐ Yes, I thought we consumed more
☐ Yes, I thought we consumed less
☐ No

D5. Did you take any actions as a result of the WCRs?
☐ Yes ☐ No

If yes, what did you do? _____
_____
_____
_____

D6. Were the WCRs useful in helping you to reduce your electricity bill?
☐ Yes ☐ No ☐ I do not know

D7. Please indicate how you received the WCRs: ☐ Mail ☐ Email

If you received the WCRs by mail:

Did you keep your weekly WCRs?	☐ Yes	☐ No
Did you use the folder that was provided?	☐ Yes	☐ No
Did you ever refer back to past WCRs?	☐ Yes	☐ No
Did you ever show them to other members of your household?	☐ Yes	☐ No

If yes, to whom? _____
_____

If you received the WCRs by email:

Did you ever print out the WCRs?		☐ Yes	☐ No
Did you keep your weekly WCRs?	☐ Yes (emails)	☐ Yes (printouts)	☐ No
Did you ever refer back to past WCRs?	☐ Yes (emails)	☐ Yes (printouts)	☐ No
Did you ever show them to other members of your household?	☐ Yes (emails)	☐ Yes (printouts)	☐ No

If yes, to whom? _____
_____

D8. Do you feel that the WCRs were useful in helping to educate your children and/or other family members about electricity conservation? **Check only one.**
☐ Yes ☐ No ☐ Not applicable

D9. Has receiving the WCRs made you more likely to try to conserve electricity?
☐ Yes ☐ No

D10. When you **first** started receiving the WCRs, how often did you pay attention to them? **Check only one.**
☐ More than once a week
☐ Once a week when I received it in the mail or email
☐ Not as often as once a week, but fairly regularly
☐ Once I knew what the envelope or email was, I only occasionally opened it
☐ Once I knew what the envelope or email was, I never opened the WCR
☐ Other (please specify) _____

D11. **By October**, how often did you pay attention to the WCRs? **Check only one.**
☐ More than once a week
☐ Once a week when I received it in the mail or email
☐ Not as often as once a week, but fairly regularly
☐ Once I knew what the envelope or email was, I only occasionally opened it
☐ Once I knew what the envelope or email was, I never opened the WCR
☐ Other (please specify) _____

D12. If the WCRs (or a variation of them) became a standard offering of Milton Hydro, would you be interested in continuing to receive this type of information?
☐ Yes ☐ No

If yes, what would be the preferred format?
☐ Mail ☐ Email
☐ Other (please specify) _____

If yes, how frequently should this sort of information be provided? **Check only one.**
☐ Daily ☐ Monthly, with my bill
☐ Weekly ☐ Every 6 months
☐ Every 2 weeks ☐ Annually
☐ Monthly

D13. Would you prefer an in-home display (a small monitor that indicates real-time and cumulative household electricity use) **rather than** a Consumption Report?
☐ Yes ☐ No ☐ I think both would be useful ☐ I would not want either

D14. How much would you be willing to pay for an in-home display? **Check only one.**
☐ $200 - $400 ☐ $20 - $49
☐ $100 - $199 ☐ Less than $20
☐ $50 - $99 ☐ $0
☐ I would not pay for an in-home display because I am not interested in having one

D15. Have the electricity WCRs in any way led you to think more about broader conservation issues in general (e.g. heating fuel conservation, transportation-use patterns, water conservation, waste reduction and recycling, etc.)?
☐ Yes ☐ No

If yes, which issues_____
_____
_____
_____

Section E – Specific Opinions on the Information Provided in the WCRs
These questions are to help us understand the specific items on the WCRs that you found most useful, if any. ***Please refer to the 3-page Sample WCR provided for the corresponding Item Numbers.***

Feel free to mark any comments/questions/suggestions directly onto the Sample WCR and include it in the return envelope. *You may also use the margins or the back page of this survey.*

E1.

Item i) Numerical consumption values ***(numbers in top right box on the first page of the Sample WCR – provided in all WCRs throughout the testing period).***	**Y**	**N**
I remember seeing this item	☐	☐
This item is one of the main things I paid attention to when I received the WCRs	☐	☐
This item was clear and easy to understand	☐	☐
This item was useful to me	☐	☐

E2.

Item ii) Daily average consumption chart compared to 2005 *(main graph on the first page of the Sample WCR – provided in all WCRs throughout the testing period)*.	**Y**	**N**
I remember seeing this item	☐	☐
This item is one of the main things I paid attention to when I received the WCRs	☐	☐
This item was clear and easy to understand	☐	☐
This item was useful to me	☐	☐

E3. If you saw your home's average daily consumption was different than it was for the same period in 2005, did it make you think about why that might be?
☐ Yes ☐ No

E4. Which consumption values did you pay more attention to? **Check only one.**
☐ KWh ☐ Dollars ☐ Both the same ☐ I did not notice the difference

E5. In general, what was your reaction to your average daily consumption **expressed in dollar values**? **Check only one.**
☐ I thought the value seemed large
☐ I thought the value seemed small
☐ I thought the value seemed reasonable
☐ I did not know how to react to the value
☐ I did not see this information

E6. Did you find the distinction between the "on-peak" and total consumption useful?
☐ Yes ☐ No ☐ I did not notice the difference

E7.

Item iii) The appliance consumption chart *(bottom left box on the first page of the Sample WCR – provided in the July and August WCRs)*.	**Y**	**N**
I remember seeing this item	☐	☐
This item is one of the main things I paid attention to when I received the WCRs	☐	☐
This item was clear and easy to understand	☐	☐
This item was useful to me	☐	☐

E8. What do you think consumes the most electricity in your home in the summer?
_____

E9.

Item iv) The conservation tip *(bottom right box on the first page of the Sample WCR – provided in the July and August WCRs)*.	Y	N
I remember seeing this item	☐	☐
This item is one of the main things I paid attention to when I received the WCRs	☐	☐
This item was clear and easy to understand	☐	☐
This item was useful to me	☐	☐

E10. Did the conservation tips tell you anything new?
☐ Yes ☐ No

E11. What conservation tip(s) did you find most useful? _____
_____
_____
_____

E12.

Item v) The daily consumption charts *(right column of 7 charts on the second page of the Sample WCR – provided in all WCRs throughout the testing period).*	**Y**	**N**
I remember seeing this item	☐	☐
This item is one of the main things I paid attention to when I received the WCRs	☐	☐
This item was clear and easy to understand	☐	☐
This item was useful to me	☐	☐

E13. Did you ever look at the peaks and valleys on the daily consumption charts and try to remember what activities/actions may have caused them?
☐ Yes ☐ No

E14. Did you ever consult the daily consumption charts to look for the effect of any electricity-related changes you may have made?
☐ Yes ☐ No

E15. Did you ever use the "notes" section beside the daily consumption charts?
☐ Yes ☐ No

E16.

Item vi) The summary of your home's electricity-related emissions for the summer *(top box on the third page of the Sample WCR – provided once in an early Sept WCR).*	**Y**	**N**
I remember seeing this item	☐	☐
This item is one of the main things I paid attention to when I received that WCR	☐	☐
This item was clear and easy to understand	☐	☐
This item was useful/meaningful to me	☐	☐

E17. Was the description of nitrogen oxides and sulphur dioxide (NO_x and SO_2, some air pollution-related emissions) and carbon dioxide (CO_2, a greenhouse gas) adequate?
☐ Yes ☐ No ☐ I did not see this description at the time

E18. What was your reaction to knowing how much CO_2 you saved/increased compared to the previous summer **in terms of the equivalent number of car trips to Toronto**? **Check only one.**
☐ I thought the number of trips seemed large
☐ I thought the number of trips seemed small
☐ I thought the number of trips seemed reasonable
☐ I did not know how to react to the number of trips
☐ I did not see this information

E19.

Item vii) Your home's weekly electricity-related emissions *(middle left box on the third page of the Sample WCR – provided in the September WCRs).*	**Y**	**N**
I remember seeing this item	☐	☐
This item is one of the main things I paid attention to when I received the WCRs	☐	☐
This item was clear and easy to understand	☐	☐
This item was useful/meaningful to me	☐	☐

E20. Did you understand the explanation of how, from week to week, your electricity-related emissions may not always vary directly with your electricity consumption? **Check all that apply.**
☐ Yes
☐ No
☐ I did not notice this variation discrepancy
☐ I did not read the explanation

E21.

Item viii) The graph of Ontario's electricity-related CO2 emissions throughout the day *(middle right box on the third page of the Sample WCR – provided in the September and October WCRs)*.	**Y**	**N**
I remember seeing this item	☐	☐
This item is one of the main things I paid attention to when I received the WCRs	☐	☐
This item was clear and easy to understand	☐	☐
This item was useful/meaningful to me	☐	☐

E22.

Item ix) Your home's weekly electricity use and related CO2 emissions compared to others *(bottom left box on the third page of the Sample WCR – provided in the October WCRs)*.	**Y**	**N**
I remember seeing this item	☐	☐
This item is one of the main things I paid attention to when I received the WCRs	☐	☐
This item was clear and easy to understand	☐	☐
This item was useful/meaningful to me	☐	☐

E23. Were you surprised at how your consumption/CO2 emissions compared to others? **Check only one.**

☐ Yes, on average, I thought we consumed more compared to others
☐ Yes, on average, I thought we consumed less compared to others
☐ No
☐ Other _____

E24. Did this comparison make you think about what the difference might be between your home and the other homes?

☐ Yes ☐ No

E25. Did seeing this comparison to others motivate you in any way to change your consumption habits?

☐ Yes ☐ No

E26. Overall, has the information in the WCRs made you more aware of climate change and/or air quality issues relating to electricity consumption?

☐ Yes ☐ No

Please use the back page of this survey to provide any other comments you have regarding this study that were not adequately captured above.

Thank you very much for taking part in this survey!

Please use the postage-paid envelope provided to mail the completed survey to us by **Friday December 1, 2006**, and you will be entered into a draw to receive a **$100 gift certificate to a restaurant of the winner's choice!** If you wish to be entered, please provide your name and phone number below so that we may contact the winner.

☐ **Enter my name in the draw for a $100 gift certificate**

Name: _____
Phone: _____

Don't forget to include the Sample WCR in the return envelope if you have written on it!

The Purpose of this Survey

This is the wrap-up survey for the Feedback Study that has been ongoing since May 2006.

As the data are analyzed from all phases of this study throughout late 2006 and early 2007, we may find it beneficial to solicit further, final, information from some participants regarding the thoughts and opinions they expressed. If this is the case, would you be willing to be contacted via telephone by a Research Team member for a brief (~20 minutes) telephone interview? All interview information would be considered confidential, and would be used for research purposes only. **As a token of our appreciation, telephone interviewees would be paid $10 for their participation.** The telephone interview would be arranged to suit the participants' schedules. Alternatively, face-to-face interviews at Milton Public Library could be arranged if that is preferable.

Would you be willing to be contacted for a brief final interview by a Research Team member?
☐ Yes
☐ No

Please note that specifying "Yes" does not guarantee that you will be contacted for an interview.

If yes, please specify the preferred time of day and telephone number. **Check any that apply.**
☐ Weekday, during the day (9am to 5pm) Phone _____
☐ Weekday, evening (7pm to 9pm) Phone _____
☐ Weekend, during the day (9am to 5pm) Phone _____
☐ Weekend, evening (7pm to 9pm) Phone _____
Please specify if there is a time when you should NOT be contacted _____

Preliminary results of the overall study will be made available on the Milton Hydro web site by early 2007 (www.miltonhydro.com).

Again, please feel free to contact Mary-Jo Corkum at Milton Hydro (905-878-3483 ext. 236) or Dr. Ian Rowlands at the University of Waterloo (519-888-4567 ext. 32574) if you have any questions about this research.

Thank you!

MILTON HYDRO

University of Waterloo

Additional Comments and Feedback about this Study

Please provide any other comments you have regarding this study that were not adequately captured in this survey.

Appendix VII Survey #1 Results Tables

HomeReceivedFeedback?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	106	35.6	35.6	35.6
	No	192	64.4	64.4	100.0
	Total	298	100.0	100.0	

Responded to S2?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	129	43.3	43.3	43.3
	No	169	56.7	56.7	100.0
	Total	298	100.0	100.0	

House Type

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Single detached house	164	55.0	55.0	55.0
	Semi-detached house	66	22.1	22.1	77.2
	Townhouse or rowhouse	68	22.8	22.8	100.0
	Total	298	100.0	100.0	

Other House Type

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		297	99.7	99.7	99.7
	2 Bedroom Bungalow	1	.3	.3	100.0
	Total	298	100.0	100.0	

Own Home?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	291	97.7	98.0	98.0
	No	6	2.0	2.0	100.0
	Total	297	99.7	100.0	
Missing	No response	1	.3		
Total		298	100.0		

Pay your Electricity Bill?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		107	35.9	35.9	35.9
	Yes	10	3.4	3.4	39.3
	Not applicable, no response	181	60.7	60.7	100.0
	Total	298	100.0	100.0	

When Home was Built

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Before 1965	6	2.0	2.0	2.0
	1965 - 1986	6	2.0	2.0	4.1
	1987 - 1993	1	.3	.3	4.4
	1999 or later	283	95.0	95.6	100.0
	Total	296	99.3	100.0	
Missing	No response	2	.7		
Total		298	100.0		

When Customer Moved into their Home

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	JUN 1971	1	.3	.3	.3
	DEC 1979	1	.3	.3	.7
	JUL 1983	1	.3	.3	1.0
	FEB 1984	1	.3	.3	1.4
	AUG 1985	1	.3	.3	1.7
	SEP 1986	1	.3	.3	2.1
	OCT 1986	1	.3	.3	2.4
	APR 1991	1	.3	.3	2.7
	MAY 1991	1	.3	.3	3.1
	SEP 1993	1	.3	.3	3.4
	JUN 1997	1	.3	.3	3.8
	JUL 2001	1	.3	.3	4.1
	JUL 2002	1	.3	.3	4.5
	JAN 2003	1	.3	.3	4.8
	FEB 2003	1	.3	.3	5.1
	MAR 2003	1	.3	.3	5.5
	APR 2003	1	.3	.3	5.8
	JUN 2003	3	1.0	1.0	6.8
	SEP 2003	1	.3	.3	7.2
	OCT 2003	1	.3	.3	7.5
	NOV 2003	2	.7	.7	8.2

	DEC 2003	4	1.3	1.4	9.6
	JAN 2004	8	2.7	2.7	12.3
	FEB 2004	11	3.7	3.8	16.1
	MAR 2004	16	5.4	5.5	21.6
	APR 2004	12	4.0	4.1	25.7
	MAY 2004	18	6.0	6.2	31.8
	JUN 2004	25	8.4	8.6	40.4
	JUL 2004	20	6.7	6.8	47.3
	AUG 2004	15	5.0	5.1	52.4
	SEP 2004	22	7.4	7.5	59.9
	OCT 2004	24	8.1	8.2	68.2
	NOV 2004	7	2.3	2.4	70.5
	DEC 2004	15	5.0	5.1	75.7
	JAN 2005	5	1.7	1.7	77.4
	FEB 2005	9	3.0	3.1	80.5
	MAR 2005	9	3.0	3.1	83.6
	APR 2005	13	4.4	4.5	88.0
	MAY 2005	17	5.7	5.8	93.8
	JUN 2005	6	2.0	2.1	95.9
	JUL 2005	2	.7	.7	96.6
	AUG 2005	1	.3	.3	96.9
	SEP 2005	1	.3	.3	97.3
	NOV 2005	2	.7	.7	97.9
	DEC 2005	1	.3	.3	98.3
	FEB 2006	1	.3	.3	98.6
	MAR 2006	1	.3	.3	99.0
	APR 2006	3	1.0	1.0	100.0
	Total	292	98.0	100.0	
Missing	System	6	2.0		
Total		298	100.0		

Size of home in square feet

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Less than 1,000	2	.7	.7	.7
	1,000 – 1,499	61	20.5	20.5	21.2
	1,500 – 1,999	141	47.3	47.5	68.7
	2,000 – 2,499	61	20.5	20.5	89.2
	2,500 – 2,999	19	6.4	6.4	95.6
	3,000 – 3,999	12	4.0	4.0	99.7
	4,000 or more	1	.3	.3	100.0
	Total	297	99.7	100.0	
Missing	No response	1	.3		
Total		298	100.0		

A5.NumberRooms

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	2	1	.3	.5	.5
	4	2	.7	1.1	1.6
	Not applicable, no response	184	61.7	98.4	100.0
	Total	187	62.8	100.0	
Missing	System	111	37.2		
Total		298	100.0		

A6.FuranceFanSetting

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	On	50	16.8	17.0	17.0
	Auto	237	79.5	80.6	97.6
	I don't have this setting	7	2.3	2.4	100.0
	Total	294	98.7	100.0	
Missing	No response	4	1.3		
Total		298	100.0		

A7.AdjustTemp

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	250	83.9	84.5	84.5
	No	46	15.4	15.5	100.0
	Total	296	99.3	100.0	
Missing	No response	2	.7		
Total		298	100.0		

A8.ProgTherm

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	204	68.5	68.7	68.7
	No	51	17.1	17.2	85.9
	20	1	.3	.3	86.2
	No, but in 2 years...	41	13.8	13.8	100.0
	Total	297	99.7	100.0	
Missing	No response	1	.3		
Total		298	100.0		

A9.RegTempWinter

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Don't know	5	1.7	1.9	1.9
	15.0	1	.3	.4	2.2
	17.0	1	.3	.4	2.6
	17.2	1	.3	.4	3.0
	18.0	11	3.7	4.1	7.0
	19.0	8	2.7	3.0	10.0
	19.5	3	1.0	1.1	11.1
	20.0	58	19.5	21.5	32.6
	20.6	3	1.0	1.1	33.7
	21.0	70	23.5	25.9	59.6
	21.1	4	1.3	1.5	61.1
	21.5	2	.7	.7	61.9
	21.6	1	.3	.4	62.2
	22.0	53	17.8	19.6	81.9
	22.2	1	.3	.4	82.2
	22.8	1	.3	.4	82.6
	23.0	27	9.1	10.0	92.6
	23.3	3	1.0	1.1	93.7
	24.0	9	3.0	3.3	97.0
	24.4	1	.3	.4	97.4
	25.0	5	1.7	1.9	99.3
	28.0	2	.7	.7	100.0
	Total	270	90.6	100.0	
Missing	No response	26	8.7		
	System	2	.7		
	Total	28	9.4		
Total		298	100.0		

A9.RegTempSummer

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	.0	3	1.0	1.2	1.2
	Don't know	8	2.7	3.2	4.4
	Not applicable, no AC	17	5.7	6.8	11.2
	10.0	1	.3	.4	11.6
	12.0	1	.3	.4	12.0
	14.0	1	.3	.4	12.4
	15.0	5	1.7	2.0	14.5
	17.0	4	1.3	1.6	16.1
	18.0	11	3.7	4.4	20.5
	18.8	1	.3	.4	20.9
	19.0	11	3.7	4.4	25.3
	20.0	39	13.1	15.7	41.0
	21.0	22	7.4	8.8	49.8

	21.1	1	.3	.4	50.2
	21.5	2	.7	.8	51.0
	21.6	2	.7	.8	51.8
	22.0	29	9.7	11.6	63.5
	22.2	4	1.3	1.6	65.1
	23.0	31	10.4	12.4	77.5
	23.3	1	.3	.4	77.9
	23.5	1	.3	.4	78.3
	24.0	19	6.4	7.6	85.9
	24.4	1	.3	.4	86.3
	25.0	20	6.7	8.0	94.4
	25.5	2	.7	.8	95.2
	25.6	1	.3	.4	95.6
	26.0	7	2.3	2.8	98.4
	27.0	2	.7	.8	99.2
	27.8	1	.3	.4	99.6
	29.0	1	.3	.4	100.0
	Total	249	83.6	100.0	
Missing	No response	45	15.1		
	System	4	1.3		
	Total	49	16.4		
Total		298	100.0		

A9.AdjTempWinter

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Don't know	5	1.7	2.1	2.1
	10.0	1	.3	.4	2.5
	12.0	1	.3	.4	2.9
	13.3	1	.3	.4	3.4
	15.0	8	2.7	3.4	6.7
	16.0	16	5.4	6.7	13.4
	16.5	2	.7	.8	14.3
	17.0	26	8.7	10.9	25.2
	17.2	1	.3	.4	25.6
	17.5	1	.3	.4	26.1
	18.0	47	15.8	19.7	45.8
	18.3	3	1.0	1.3	47.1
	18.5	1	.3	.4	47.5
	18.8	1	.3	.4	47.9
	19.0	35	11.7	14.7	62.6
	19.4	3	1.0	1.3	63.9
	19.5	2	.7	.8	64.7
	20.0	36	12.1	15.1	79.8
	21.0	15	5.0	6.3	86.1
	21.1	3	1.0	1.3	87.4

	21.5	2	.7	.8	88.2
	22.0	13	4.4	5.5	93.7
	22.2	1	.3	.4	94.1
	23.0	6	2.0	2.5	96.6
	24.0	2	.7	.8	97.5
	25.0	1	.3	.4	97.9
	Not applicable, no response	5	1.7	2.1	100.0
	Total	238	79.9	100.0	
Missing	No response	58	19.5		
	System	2	.7		
	Total	60	20.1		
Total		298	100.0		

A9.AdjTempSummer

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	.0	5	1.7	2.0	2.0
	Don't know	8	2.7	3.3	5.3
	Not applicable, no AC	15	5.0	6.1	11.4
	10.0	3	1.0	1.2	12.6
	14.0	1	.3	.4	13.0
	15.0	1	.3	.4	13.4
	16.0	2	.7	.8	14.2
	16.5	1	.3	.4	14.6
	17.0	5	1.7	2.0	16.7
	18.0	8	2.7	3.3	19.9
	18.3	1	.3	.4	20.3
	19.0	12	4.0	4.9	25.2
	20.0	21	7.0	8.5	33.7
	21.0	13	4.4	5.3	39.0
	21.5	1	.3	.4	39.4
	21.7	1	.3	.4	39.8
	22.0	20	6.7	8.1	48.0
	22.2	1	.3	.4	48.4
	23.0	15	5.0	6.1	54.5
	23.3	1	.3	.4	54.9
	23.9	1	.3	.4	55.3
	24.0	18	6.0	7.3	62.6
	24.4	3	1.0	1.2	63.8
	25.0	27	9.1	11.0	74.8
	26.0	16	5.4	6.5	81.3
	27.0	7	2.3	2.8	84.1
	28.0	2	.7	.8	85.0
	29.4	1	.3	.4	85.4
	30.0	1	.3	.4	85.8

	32.0	1	.3	.4	86.2
	Not applicable, no response	34	11.4	13.8	100.0
	Total	246	82.6	100.0	
Missing	No response	47	15.8		
	System	5	1.7		
	Total	52	17.4		
Total		298	100.0		

A10.CentralACAge

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		14	4.7	4.9	4.9
	Less than 0.5	42	14.1	14.8	19.7
	0.5 to 7	215	72.1	75.7	95.4
	More than 7	5	1.7	1.8	97.2
	Not applicable, no response	8	2.7	2.8	100.0
	Total	284	95.3	100.0	
Missing	No response	14	4.7		
Total		298	100.0		

A10.CentralACES

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		12	4.0	4.4	4.4
	Yes	125	41.9	46.3	50.7
	No	21	7.0	7.8	58.5
	Don't know	95	31.9	35.2	93.7
	Not applicable, no response	17	5.7	6.3	100.0
	Total	270	90.6	100.0	
Missing	No response	28	9.4		
Total		298	100.0		

A10.HeatPumpAge

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		108	36.2	37.1	37.1
	0.5 to 7	3	1.0	1.0	38.1
	More than 7	1	.3	.3	38.5
	Not applicable, no response	179	60.1	61.5	100.0
	Total	291	97.7	100.0	

Missing	No response	7	2.3		
Total		298	100.0		

A10.HeatPumpES

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		107	35.9	36.8	36.8
	Yes	1	.3	.3	37.1
	Don't know	1	.3	.3	37.5
	Not applicable, no response	182	61.1	62.5	100.0
	Total	291	97.7	100.0	
Missing	No response	7	2.3		
Total		298	100.0		

A10.WindowAC#1Age

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		106	35.6	36.4	36.4
	Less than 0.5	1	.3	.3	36.8
	0.5 to 7	4	1.3	1.4	38.1
	More than 7	1	.3	.3	38.5
	Not applicable, no response	179	60.1	61.5	100.0
	Total	291	97.7	100.0	
Missing	No response	7	2.3		
Total		298	100.0		

A10.WindowAC#1ES

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		106	35.6	36.7	36.7
	Yes	1	.3	.3	37.0
	No	1	.3	.3	37.4
	Don't know	1	.3	.3	37.7
	Not applicable, no response	180	60.4	62.3	100.0
	Total	289	97.0	100.0	
Missing	No response	9	3.0		
Total		298	100.0		

A10.WindowAC#2Age

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		107	35.9	36.8	36.8
	0.5 to 7	1	.3	.3	37.1
	More than 7	1	.3	.3	37.5
	Not applicable, no response	182	61.1	62.5	100.0
	Total	291	97.7	100.0	
Missing	No response	7	2.3		
Total		298	100.0		

A10.WindowAC#2ES

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		108	36.2	37.2	37.2
	Not applicable, no response	182	61.1	62.8	100.0
	Total	290	97.3	100.0	
Missing	No response	8	2.7		
Total		298	100.0		

A10.WindowAC#3Age

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		108	36.2	37.1	37.1
	0.5 to 7	1	.3	.3	37.5
	Not applicable, no response	182	61.1	62.5	100.0
	Total	291	97.7	100.0	
Missing	No response	7	2.3		
Total		298	100.0		

A10.WindowAC#3ES

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		108	36.2	37.1	37.1
	Not applicable, no response	183	61.4	62.9	100.0
	Total	291	97.7	100.0	
Missing	No response	7	2.3		
Total		298	100.0		

A10.AreaPortableAC

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		105	35.2	36.1	36.1
	0% to 25%	3	1.0	1.0	37.1
	26% to 50%	2	.7	.7	37.8
	51%-75%	1	.3	.3	38.1
	Not applicable, no response	180	60.4	61.9	100.0
	Total	291	97.7	100.0	
Missing	No response	7	2.3		
Total		298	100.0		

A11.Heat

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Electric (baseboard)	2	.7	.7	.7
	Electric (furnace)	43	14.4	14.5	15.2
	Electric (portable)	1	.3	.3	15.5
	Natural Gas	242	81.2	81.5	97.0
	Oil	5	1.7	1.7	98.7
	Propane	3	1.0	1.0	99.7
	Other	1	.3	.3	100.0
	Total	297	99.7	100.0	
Missing	No response	1	.3		
Total		298	100.0		

A12.AddElectricHeat

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	33	11.1	11.3	11.3
	No	259	86.9	88.7	100.0
	Total	292	98.0	100.0	
Missing	No response	6	2.0		
Total		298	100.0		

A12.ElectricBaseboard

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		283	95.0	95.0	95.0
	Less than 25%	4	1.3	1.3	96.3
	Not applicable, no response	11	3.7	3.7	100.0
	Total	298	100.0	100.0	

A12.ElectricFurnace

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		283	95.0	95.0	95.0
	Less than 25%	2	.7	.7	95.6
	25% to 50%	2	.7	.7	96.3
	Not applicable, no response	11	3.7	3.7	100.0
	Total	298	100.0	100.0	

A12.ElectricPortable

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		266	89.3	89.3	89.3
	Less than 25%	21	7.0	7.0	96.3
	25% to 50%	1	.3	.3	96.6
	Not applicable, no response	10	3.4	3.4	100.0
	Total	298	100.0	100.0	

A12.ElectricOther

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		283	95.0	95.0	95.0
	Less than 25%	3	1.0	1.0	96.0
	25% to 50%	1	.3	.3	96.3
	Not applicable, no response	11	3.7	3.7	100.0
	Total	298	100.0	100.0	

A13.HRV

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	16	5.4	5.5	5.5
	No	123	41.3	42.1	47.6
	Don't know	153	51.3	52.4	100.0
	Total	292	98.0	100.0	
Missing	No response	6	2.0		
Total		298	100.0		

A14.WaterHeating

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Electric	41	13.8	14.0	14.0
	Oil	3	1.0	1.0	15.1
	Natural Gas	244	81.9	83.6	98.6
	None	2	.7	.7	99.3
	Other	2	.7	.7	100.0
	Total	292	98.0	100.0	
Missing	No response	6	2.0		
Total		298	100.0		

A15.Fridge#1Age

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		3	1.0	1.0	1.0
	Less than 2	177	59.4	60.0	61.0
	2 to 9	109	36.6	36.9	98.0
	10 to 20	3	1.0	1.0	99.0
	More than 20	2	.7	.7	99.7
	Not applicable, no response	1	.3	.3	100.0
	Total	295	99.0	100.0	
Missing	No response	3	1.0		
Total		298	100.0		

A15.Fridge#1ES

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		24	8.1	8.6	8.6
	Yes	194	65.1	69.8	78.4
	No	15	5.0	5.4	83.8
	Don't know	44	14.8	15.8	99.6
	Not applicable, no response	1	.3	.4	100.0
	Total	278	93.3	100.0	
Missing	No response	20	6.7		
Total		298	100.0		

A15.Fridge#2Age

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		252	84.6	85.1	85.1
	Less than 2	9	3.0	3.0	88.2
	2 to 9	8	2.7	2.7	90.9

	10 to 20	12	4.0	4.1	94.9
	More than 20	2	.7	.7	95.6
	Not applicable, no response	13	4.4	4.4	100.0
	Total	296	99.3	100.0	
Missing	No response	2	.7		
Total		298	100.0		

A15.Fridge#2ES

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		249	83.6	83.8	83.8
	Yes	13	4.4	4.4	88.2
	No	13	4.4	4.4	92.6
	Don't know	9	3.0	3.0	95.6
	Not applicable, no response	13	4.4	4.4	100.0
	Total	297	99.7	100.0	
Missing	No response	1	.3		
Total		298	100.0		

A15.Freezer#1Age

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		157	52.7	53.0	53.0
	Less than 2	48	16.1	16.2	69.3
	2 to 9	51	17.1	17.2	86.5
	10 to 20	25	8.4	8.4	94.9
	More than 20	9	3.0	3.0	98.0
	Not applicable, no response	6	2.0	2.0	100.0
	Total	296	99.3	100.0	
Missing	No response	2	.7		
Total		298	100.0		

A15.Freezer#1ES

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		165	55.4	57.9	57.9
	Yes	43	14.4	15.1	73.0
	No	41	13.8	14.4	87.4
	Don't know	30	10.1	10.5	97.9
	Not applicable, no response	6	2.0	2.1	100.0

	Total	285	95.6	100.0	
Missing	No response	13	4.4		
Total		298	100.0		

A15.Freezer#2Age

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		278	93.3	93.6	93.6
	Less than 2	1	.3	.3	93.9
	2 to 9	2	.7	.7	94.6
	10 to 20	2	.7	.7	95.3
	More than 20	1	.3	.3	95.6
	Not applicable, no response	13	4.4	4.4	100.0
	Total	297	99.7	100.0	
Missing	No response	1	.3		
Total		298	100.0		

A15.Freezer#2ES

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		280	94.0	94.9	94.9
	No	1	.3	.3	95.3
	Don't know	1	.3	.3	95.6
	Not applicable, no response	13	4.4	4.4	100.0
	Total	295	99.0	100.0	
Missing	No response	3	1.0		
Total		298	100.0		

A15.BarFridge#1Age

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		244	81.9	82.2	82.2
	Less than 2	18	6.0	6.1	88.2
	2 to 9	21	7.0	7.1	95.3
	10 to 20	1	.3	.3	95.6
	More than 20	2	.7	.7	96.3
	Not applicable, no response	11	3.7	3.7	100.0
	Total	297	99.7	100.0	
Missing	No response	1	.3		
Total		298	100.0		

A15.BarFridge#1ES

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		248	83.2	84.4	84.4
	Yes	12	4.0	4.1	88.4
	No	14	4.7	4.8	93.2
	Don't know	9	3.0	3.1	96.3
	Not applicable, no response	11	3.7	3.7	100.0
	Total	294	98.7	100.0	
Missing	No response	4	1.3		
Total		298	100.0		

A15.BarFridge#2Age

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		283	95.0	95.3	95.3
	Less than 2	1	.3	.3	95.6
	2 to 9	1	.3	.3	96.0
	Not applicable, no response	12	4.0	4.0	100.0
	Total	297	99.7	100.0	
Missing	No response	1	.3		
Total		298	100.0		

A15.BarFridge#2ES

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		283	95.0	95.3	95.3
	Yes	1	.3	.3	95.6
	Don't know	1	.3	.3	96.0
	Not applicable, no response	12	4.0	4.0	100.0
	Total	297	99.7	100.0	
Missing	No response	1	.3		
Total		298	100.0		

A15.RangeOvenAge

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		12	4.0	4.1	4.1
	Less than 2	168	56.4	56.9	61.0

	2 to 9	107	35.9	36.3	97.3
	10 to 20	5	1.7	1.7	99.0
	More than 20	3	1.0	1.0	100.0
	Total	295	99.0	100.0	
Missing	No response	3	1.0		
Total		298	100.0		

A15.DishAge

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		22	7.4	7.5	7.5
	Less than 2	168	56.4	57.3	64.8
	2 to 9	95	31.9	32.4	97.3
	10 to 20	7	2.3	2.4	99.7
	Not applicable, no response	1	.3	.3	100.0
	Total	293	98.3	100.0	
Missing	No response	5	1.7		
Total		298	100.0		

A15.DishES

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		44	14.8	16.1	16.1
	Yes	172	57.7	63.0	79.1
	No	19	6.4	7.0	86.1
	Don't know	38	12.8	13.9	100.0
	Total	273	91.6	100.0	
Missing	No response	25	8.4		
Total		298	100.0		

A15.TLWasherAge

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		132	44.3	44.9	44.9
	Less than 2	86	28.9	29.3	74.1
	2 to 9	62	20.8	21.1	95.2
	10 to 20	8	2.7	2.7	98.0
	Not applicable, no response	6	2.0	2.0	100.0
	Total	294	98.7	100.0	
Missing	No response	4	1.3		
Total		298	100.0		

A15.TLWasherES

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		151	50.7	54.9	54.9
	Yes	65	21.8	23.6	78.5
	No	18	6.0	6.5	85.1
	Don't know	35	11.7	12.7	97.8
	Not applicable, no response	6	2.0	2.2	100.0
	Total	275	92.3	100.0	
Missing	No response	23	7.7		
Total		298	100.0		

A15.FLWasherAge

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		156	52.3	52.9	52.9
	Less than 2	85	28.5	28.8	81.7
	2 to 9	45	15.1	15.3	96.9
	10 to 20	1	.3	.3	97.3
	Not applicable, no response	8	2.7	2.7	100.0
	Total	295	99.0	100.0	
Missing	No response	3	1.0		
Total		298	100.0		

A15.FLWasherES

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		164	55.0	56.4	56.4
	Yes	109	36.6	37.5	93.8
	No	2	.7	.7	94.5
	Don't know	10	3.4	3.4	97.9
	Not applicable, no response	6	2.0	2.1	100.0
	Total	291	97.7	100.0	
Missing	No response	7	2.3		
Total		298	100.0		

A15.DryerAge

	Frequency	Percent	Valid Percent	Cumulative Percent

Valid		16	5.4	5.4	5.4
	Less than 2	168	56.4	56.8	62.2
	2 to 9	100	33.6	33.8	95.9
	10 to 20	12	4.0	4.1	100.0
	Total	296	99.3	100.0	
Missing	No response	2	.7		
Total		298	100.0		

A15.DehumdAge

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		165	55.4	56.1	56.1
	Less than 2	62	20.8	21.1	77.2
	2 to 9	51	17.1	17.3	94.6
	10 to 20	5	1.7	1.7	96.3
	More than 20	2	.7	.7	96.9
	Not applicable, no response	9	3.0	3.1	100.0
	Total	294	98.7	100.0	
Missing	No response	4	1.3		
Total		298	100.0		

A15.DehumidES

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		185	62.1	65.6	65.6
	Yes	35	11.7	12.4	78.0
	No	26	8.7	9.2	87.2
	Don't know	26	8.7	9.2	96.5
	Not applicable, no response	10	3.4	3.5	100.0
	Total	282	94.6	100.0	
Missing	No response	16	5.4		
Total		298	100.0		

A15.AddAge

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		277	93.0	93.3	93.3
	Less than 2	6	2.0	2.0	95.3
	2 to 9	1	.3	.3	95.6
	Not applicable, no response	12	4.0	4.0	99.7
	Micro	1	.3	.3	100.0

	Total	297	99.7	100.0	
Missing	No response	1	.3		
Total		298	100.0		

A15.AddES

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		278	93.3	94.2	94.2
	Yes	1	.3	.3	94.6
	No	1	.3	.3	94.9
	Don't know	3	1.0	1.0	95.9
	Not applicable, no response	12	4.0	4.1	100.0
	Total	295	99.0	100.0	
Missing	No response	3	1.0		
Total		298	100.0		

A15.SpecifyRangeOvenFuel

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		4	1.3	1.3	1.3
	Electric	216	72.5	72.5	73.8
	Natural Gas	55	18.5	18.5	92.3
	Not applicable, no response	3	1.0	1.0	93.3
	No response	20	6.7	6.7	100.0
	Total	298	100.0	100.0	

A15.SpecifyDryerFuel

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Electric	261	87.6	87.6	87.6
	Natural Gas	22	7.4	7.4	95.0
	No response	15	5.0	5.0	100.0
	Total	298	100.0	100.0	

A16.PC#

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		6	2.0	2.0	2.0
	0	11	3.7	3.7	5.7
	1	164	55.0	55.0	60.7

	2	75	25.2	25.2	85.9
	More than 2	42	14.1	14.1	100.0
	Total	298	100.0	100.0	

A16.TV#

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		2	.7	.7	.7
	1	59	19.8	19.8	20.5
	2	125	41.9	41.9	62.4
	More than 2	112	37.6	37.6	100.0
	Total	298	100.0	100.0	

A16.Micro#

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		8	2.7	2.7	2.7
	0	6	2.0	2.0	4.7
	1	276	92.6	92.6	97.3
	2	6	2.0	2.0	99.3
	More than 2	2	.7	.7	100.0
	Total	298	100.0	100.0	

A16.Whrpl#

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		96	32.2	32.2	32.2
	0	153	51.3	51.3	83.6
	1	42	14.1	14.1	97.7
	2	1	.3	.3	98.0
	No response	6	2.0	2.0	100.0
	Total	298	100.0	100.0	

A16.AirFilter#

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		107	35.9	35.9	35.9
	0	160	53.7	53.7	89.6
	1	24	8.1	8.1	97.7
	2	1	.3	.3	98.0
	No response	6	2.0	2.0	100.0
	Total	298	100.0	100.0	

A16.Sauna#

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		111	37.2	37.2	37.2
	0	178	59.7	59.7	97.0
	1	2	.7	.7	97.7
	No response	7	2.3	2.3	100.0
	Total	298	100.0	100.0	

A16.PoolHeater#

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		113	37.9	37.9	37.9
	0	176	59.1	59.1	97.0
	1	2	.7	.7	97.7
	No response	7	2.3	2.3	100.0
	Total	298	100.0	100.0	

A16.PoolPump#

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		110	36.9	36.9	36.9
	0	173	58.1	58.1	95.0
	1	8	2.7	2.7	97.7
	No response	7	2.3	2.3	100.0
	Total	298	100.0	100.0	

A16.HotTub#

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		105	35.2	35.2	35.2
	0	174	58.4	58.4	93.6
	1	13	4.4	4.4	98.0
	No response	6	2.0	2.0	100.0
	Total	298	100.0	100.0	

A17.CFL

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes, in most/all	123	41.3	41.6	41.6

	Yes, one or two	85	28.5	28.7	70.3
	No, but...in the next 2 years	29	9.7	9.8	80.1
	No	54	18.1	18.2	98.3
	I have not heard of CFLs	5	1.7	1.7	100.0
	Total	296	99.3	100.0	
Missing	No response	2	.7		
Total		298	100.0		

A18.ESAppliance

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Planned for next 2 years	28	9.4	10.2	10.2
	Recently performed/acquired	52	17.4	18.9	29.1
	Not planned	195	65.4	70.9	100.0
	Total	275	92.3	100.0	
Missing	No response	23	7.7		
Total		298	100.0		

A18.ESAC

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Planned for next 2 years	24	8.1	8.7	8.7
	Recently performed/acquired	43	14.4	15.6	24.4
	Not planned	205	68.8	74.5	98.9
	Not applicable, no response	3	1.0	1.1	100.0
	Total	275	92.3	100.0	
Missing	No response	23	7.7		
Total		298	100.0		

A18.UpgradeFurnace

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Planned for next 2 years	5	1.7	1.9	1.9
	Recently performed/acquired	21	7.0	7.9	9.7
	Not planned	238	79.9	89.1	98.9
	Not applicable, no response	3	1.0	1.1	100.0
	Total	267	89.6	100.0	
Missing	No response	31	10.4		

Total		298	100.0		

A18.UpgradeInsulation

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Planned for next 2 years	14	4.7	5.2	5.2
	Recently performed/acquired	23	7.7	8.6	13.8
	Not planned	229	76.8	85.1	98.9
	Not applicable, no response	3	1.0	1.1	100.0
	Total	269	90.3	100.0	
Missing	No response	29	9.7		
Total		298	100.0		

A18.UpgradeWinDoors

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Planned for next 2 years	13	4.4	4.8	4.8
	Recently performed/acquired	23	7.7	8.6	13.4
	Not planned	231	77.5	85.9	99.3
	Not applicable, no response	2	.7	.7	100.0
	Total	269	90.3	100.0	
Missing	No response	29	9.7		
Total		298	100.0		

A18.WatHeaterBlanket

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Planned for next 2 years	34	11.4	12.6	12.6
	Recently performed/acquired	4	1.3	1.5	14.1
	Not planned	229	76.8	85.1	99.3
	Not applicable, no response	2	.7	.7	100.0
	Total	269	90.3	100.0	
Missing	No response	29	9.7		
Total		298	100.0		

A18.EnergyAudit

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Planned for next 2 years	14	4.7	5.3	5.3
	Recently performed/acquired	3	1.0	1.1	6.4
	Not planned	247	82.9	92.9	99.2
	Not applicable, no response	2	.7	.8	100.0
	Total	266	89.3	100.0	
Missing	No response	32	10.7		
Total		298	100.0		

A19.Internet

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		1	.3	.3	.3
	High speed	236	79.2	80.3	80.6
	Dial-up	31	10.4	10.5	91.2
	None	25	8.4	8.5	99.7
	Don't know	1	.3	.3	100.0
	Total	294	98.7	100.0	
Missing	No response	4	1.3		
Total		298	100.0		

B1.HomeUseAwareness

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very high	56	18.8	19.0	19.0
	High	85	28.5	28.9	48.0
	Average	132	44.3	44.9	92.9
	Low	20	6.7	6.8	99.7
	Very low	1	.3	.3	100.0
	Total	294	98.7	100.0	
Missing	No response	4	1.3		
Total		298	100.0		

B2.KnowEnoughToConserve

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	204	68.5	69.4	69.4
	No	90	30.2	30.6	100.0
	Total	294	98.7	100.0	
Missing	No response	4	1.3		

Total		298	100.0		

B4.IHDInterest

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	210	70.5	73.4	73.4
	No	76	25.5	26.6	100.0
	Total	286	96.0	100.0	
Missing	No response	12	4.0		
Total		298	100.0		

B5.ReadBillConsumption

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	274	91.9	92.9	92.9
	No	21	7.0	7.1	100.0
	Total	295	99.0	100.0	
Missing	No response	3	1.0		
Total		298	100.0		

B6.SatisfiedWithBill

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	262	87.9	89.4	89.4
	No	31	10.4	10.6	100.0
	Total	293	98.3	100.0	
Missing	No response	5	1.7		
Total		298	100.0		

B7.HeardOfES

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		3	1.0	1.0	1.0
	Yes	267	89.6	90.5	91.5
	No	24	8.1	8.1	99.7
	Yes	1	.3	.3	100.0
	Total	295	99.0	100.0	
Missing	No response	3	1.0		
Total		298	100.0		

B7.HeardOfR2000

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		6	2.0	2.0	2.0
	Yes	135	45.3	46.1	48.1
	No	152	51.0	51.9	100.0
	Total	293	98.3	100.0	
Missing	No response	5	1.7		
Total		298	100.0		

B7.HeardOfCoolSavings

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		8	2.7	2.7	2.7
	Yes	95	31.9	32.4	35.2
	No	190	63.8	64.8	100.0
	Total	293	98.3	100.0	
Missing	No response	5	1.7		
Total		298	100.0		

B7.HeardOfEveryKilowattCounts

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		9	3.0	3.1	3.1
	Yes	72	24.2	24.8	27.9
	No	209	70.1	72.1	100.0
	Total	290	97.3	100.0	
Missing	No response	8	2.7		
Total		298	100.0		

B7.HeardOfCB

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		7	2.3	2.4	2.4
	Yes	67	22.5	23.1	25.5
	No	216	72.5	74.5	100.0
	Total	290	97.3	100.0	
Missing	No response	8	2.7		
Total		298	100.0		

B7.HeardOfConsChllng

	Frequency	Percent	Valid Percent	Cumulative Percent

Valid		9	3.0	3.1	3.1
	Yes	118	39.6	40.5	43.6
	No	164	55.0	56.4	100.0
	Total	291	97.7	100.0	
Missing	No response	7	2.3		
Total		298	100.0		

B7.HeardOfSM

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		3	1.0	1.0	1.0
	Yes	206	69.1	70.1	71.1
	No	85	28.5	28.9	100.0
	Total	294	98.7	100.0	
Missing	No response	4	1.3		
Total		298	100.0		

B7.HeardOfEGHorREEP

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		9	3.0	3.1	3.1
	Yes	75	25.2	25.9	29.0
	No	206	69.1	71.0	100.0
	Total	290	97.3	100.0	
Missing	No response	8	2.7		
Total		298	100.0		

B7.HeardOfPowerWISE

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		8	2.7	2.7	2.7
	Yes	46	15.4	15.7	18.4
	No	239	80.2	81.6	100.0
	Total	293	98.3	100.0	
Missing	No response	5	1.7		
Total		298	100.0		

B7.HeardOfEnergyDrill

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		9	3.0	3.1	3.1
	Yes	28	9.4	9.6	12.6

	No	256	85.9	87.4	100.0
	Total	293	98.3	100.0	
Missing	No response	5	1.7		
Total		298	100.0		

B7.HeardOfConsCulture

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		8	2.7	2.7	2.7
	Yes	107	35.9	36.4	39.1
	No	179	60.1	60.9	100.0
	Total	294	98.7	100.0	
Missing	No response	4	1.3		
Total		298	100.0		

B7.HeardOfOther

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		193	64.8	64.8	64.8
	Yes	3	1.0	1.0	65.8
	No	54	18.1	18.1	83.9
	Not applicable, no response	48	16.1	16.1	100.0
	Total	298	100.0	100.0	

B8.ConsCultCode1

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Conserve / don't waste / use wisely / efficiently / use what is necessary	80	26.8	37.7	37.7
	Future	5	1.7	2.4	40.1
	Shifting use	2	.7	.9	41.0
	Sacrifice or use less	4	1.3	1.9	42.9
	Energy efficient appliances / technologies	1	.3	.5	43.4
	Other	3	1.0	1.4	44.8
	I don't know / nothing	19	6.4	9.0	53.8
	Awareness / education	29	9.7	13.7	67.5
	Never heard of it	2	.7	.9	68.4
	Common mindset / attitude / action	39	13.1	18.4	86.8
	Individual mindset / attitude / action	4	1.3	1.9	88.7

	Conservation as a habit / natural / unconsciously	7	2.3	3.3	92.0
	Conservation consciously	3	1.0	1.4	93.4
	Lifestyle choice / way of life	12	4.0	5.7	99.1
	Environment	2	.7	.9	100.0
	Total	212	71.1	100.0	
Missing	999	86	28.9		
Total		298	100.0		

B8.ConsCultCode2

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		238	79.9	79.9	79.9
	Conserve / don't waste / use wisely / efficiently / use what is necessary	11	3.7	3.7	83.6
	Future	1	.3	.3	83.9
	Shifting use	8	2.7	2.7	86.6
	No sacrifice	2	.7	.7	87.2
	Energy efficient appliances / technologies	3	1.0	1.0	88.3
	Blackout	3	1.0	1.0	89.3
	Recycling	5	1.7	1.7	90.9
	Other sectors mentioned	3	1.0	1.0	91.9
	Awareness / education	5	1.7	1.7	93.6
	Common mindset / attitude / action	6	2.0	2.0	95.6
	Conservation as a habit / natural / unconsciously	1	.3	.3	96.0
	Conservation consciously	1	.3	.3	96.3
	Lifestyle choice / way of life	2	.7	.7	97.0
	Money	3	1.0	1.0	98.0
	Environment	6	2.0	2.0	100.0
	Total	298	100.0	100.0	

B8.ConsCultCode3

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		295	99.0	99.0	99.0
	Conservation as a habit / natural / unconsciously	1	.3	.3	99.3
	Money	1	.3	.3	99.7
	Environment	1	.3	.3	100.0
	Total	298	100.0	100.0	

B9.ConsCommitment

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very committed	86	28.9	29.0	29.0
	Committed	138	46.3	46.5	75.4
	Somewhat committed	68	22.8	22.9	98.3
	Minimally committed	5	1.7	1.7	100.0
	Total	297	99.7	100.0	
Missing	No response	1	.3		
Total		298	100.0		

B11.TalkConsChildren

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very frequently (every week)	32	10.7	12.0	12.0
	Frequently (every month)	24	8.1	9.0	21.0
	Occasionally (every few months)	30	10.1	11.2	32.2
	Never	26	8.7	9.7	41.9
	Not applicable	155	52.0	58.1	100.0
	Total	267	89.6	100.0	
Missing	No response	31	10.4		
Total		298	100.0		

B11.TalkConsSpouse

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very frequently (every week)	68	22.8	24.3	24.3
	Frequently (every month)	86	28.9	30.7	55.0
	Occasionally (every few months)	92	30.9	32.9	87.9
	Never	10	3.4	3.6	91.4
	Not applicable	24	8.1	8.6	100.0
	Total	280	94.0	100.0	
Missing	No response	18	6.0		
Total		298	100.0		

B11.TalkConsOtherFam

	Frequency	Percent	Valid Percent	Cumulative Percent

Valid	Very frequently (every week)	18	6.0	6.5	6.5
	Frequently (every month)	53	17.8	19.1	25.5
	Occasionally (every few months)	115	38.6	41.4	66.9
	Never	41	13.8	14.7	81.7
	Not applicable	51	17.1	18.3	100.0
	Total	278	93.3	100.0	
Missing	No response	20	6.7		
Total		298	100.0		

B11.TalkConsNeighbours

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very frequently (every week)	10	3.4	3.7	3.7
	Frequently (every month)	24	8.1	8.9	12.6
	Occasionally (every few months)	95	31.9	35.3	48.0
	Never	113	37.9	42.0	90.0
	Not applicable	27	9.1	10.0	100.0
	Total	269	90.3	100.0	
Missing	No response	29	9.7		
Total		298	100.0		

B11.TalkConsFriends

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very frequently (every week)	13	4.4	4.7	4.7
	Frequently (every month)	36	12.1	13.1	17.8
	Occasionally (every few months)	144	48.3	52.4	70.2
	Never	69	23.2	25.1	95.3
	Not applicable	13	4.4	4.7	100.0
	Total	275	92.3	100.0	
Missing	No response	23	7.7		
Total		298	100.0		

B11.TalkConsCoWorkers

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very frequently (every week)	16	5.4	5.8	5.8

	Frequently (every month)	34	11.4	12.4	18.2
	Occasionally (every few months)	125	41.9	45.6	63.9
	Never	75	25.2	27.4	91.2
	Not applicable	24	8.1	8.8	100.0
	Total	274	91.9	100.0	
Missing	No response	24	8.1		
Total		298	100.0		

B12.KnowPriceThreshold

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	5	1.7	12.5	12.5
	No	35	11.7	87.5	100.0
	Total	40	13.4	100.0	
Missing	No response	2	.7		
	Question not in this survey	256	85.9		
	Total	258	86.6		
Total		298	100.0		

B13.KnowRate

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	3	1.0	7.5	7.5
	No	37	12.4	92.5	100.0
	Total	40	13.4	100.0	
Missing	No response	2	.7		
	Question not in this survey	256	85.9		
	Total	258	86.6		
Total		298	100.0		

C1.KnowTOURates

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	231	77.5	91.7	91.7
	No	21	7.0	8.3	100.0
	Total	252	84.6	100.0	
Missing	No response	5	1.7		
	Question not in this survey	41	13.8		
	Total	46	15.4		
Total		298	100.0		

C2.HHMoreAware

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	205	68.8	86.9	86.9
	No	28	9.4	11.9	98.7
	Not applicable, no response	3	1.0	1.3	100.0
	Total	236	79.2	100.0	
Missing	No response	21	7.0		
	Question not in this survey	41	13.8		
	Total	62	20.8		
Total		298	100.0		

C3.ShiftUsage

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	210	70.5	89.0	89.0
	No	23	7.7	9.7	98.7
	Not applicable, no response	3	1.0	1.3	100.0
	Total	236	79.2	100.0	
Missing	No response	21	7.0		
	Question not in this survey	41	13.8		
	Total	62	20.8		
Total		298	100.0		

C3.ShiftClothesWasher

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		38	12.8	15.9	15.9
	Yes	197	66.1	82.4	98.3
	Not applicable, no response	4	1.3	1.7	100.0
	Total	239	80.2	100.0	
Missing	No response	18	6.0		
	Question not in this survey	41	13.8		
	Total	59	19.8		
Total		298	100.0		

C3.ShiftClothesDryer

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		47	15.8	19.7	19.7
	Yes	187	62.8	78.2	97.9
	Not applicable, no response	5	1.7	2.1	100.0
	Total	239	80.2	100.0	
Missing	No response	18	6.0		
	Question not in this survey	41	13.8		
	Total	59	19.8		
Total		298	100.0		

C3.ShiftRangeOven

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		200	67.1	83.7	83.7
	Yes	22	7.4	9.2	92.9
	Not applicable, no response	17	5.7	7.1	100.0
	Total	239	80.2	100.0	
Missing	No response	18	6.0		
	Question not in this survey	41	13.8		
	Total	59	19.8		
Total		298	100.0		

C3.ShiftDishwasher

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		54	18.1	22.6	22.6
	Yes	179	60.1	74.9	97.5
	Not applicable, no response	6	2.0	2.5	100.0
	Total	239	80.2	100.0	
Missing	No response	18	6.0		
	Question not in this survey	41	13.8		
	Total	59	19.8		
Total		298	100.0		

C3.AdjustAC

	Frequency	Percent	Valid Percent	Cumulative Percent

Valid		113	37.9	47.3	47.3
	Yes	114	38.3	47.7	95.0
	Not applicable, no response	12	4.0	5.0	100.0
	Total	239	80.2	100.0	
Missing	No response	18	6.0		
	Question not in this survey	41	13.8		
	Total	59	19.8		
Total		298	100.0		

C3.AdjustElecHeat

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		147	49.3	61.5	61.5
	Yes	78	26.2	32.6	94.1
	Not applicable, no response	14	4.7	5.9	100.0
	Total	239	80.2	100.0	
Missing	No response	18	6.0		
	Question not in this survey	41	13.8		
	Total	59	19.8		
Total		298	100.0		

C3.Other1

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		216	72.5	88.5	88.5
	Yes	14	4.7	5.7	94.3
	Not applicable, no response	14	4.7	5.7	100.0
	Total	244	81.9	100.0	
Missing	No response	13	4.4		
	Question not in this survey	41	13.8		
	Total	54	18.1		
Total		298	100.0		

C4.ReducePeakCommitment

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very committed	96	32.2	40.7	40.7
	Committed	79	26.5	33.5	74.2

	Somewhat committed	48	16.1	20.3	94.5
	Minimally committed	5	1.7	2.1	96.6
	Not committed at all	5	1.7	2.1	98.7
	Not applicable, no response	3	1.0	1.3	100.0
	Total	236	79.2	100.0	
Missing	No response	21	7.0		
	Question not in this survey	41	13.8		
	Total	62	20.8		
Total		298	100.0		

C5.KnowPeakRate

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	140	47.0	57.9	57.9
	No	101	33.9	41.7	99.6
	3	1	.3	.4	100.0
	Total	242	81.2	100.0	
Missing	No response	15	5.0		
	Question not in this survey	41	13.8		
	Total	56	18.8		
Total		298	100.0		

C6.KnowPeakPeriod

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	123	41.3	51.0	51.0
	No	117	39.3	48.5	99.6
	3	1	.3	.4	100.0
	Total	241	80.9	100.0	
Missing	No response	16	5.4		
	Question not in this survey	41	13.8		
	Total	57	19.1		
Total		298	100.0		

C7.MHOnlineInquirySystem

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		1	.3	.4	.4
	Weekly	2	.7	.8	1.2
	Monthly	12	4.0	4.9	6.1

	1 to 2 times a year	11	3.7	4.5	10.6
	I know of it but don't use it	87	29.2	35.4	45.9
	I use it to view my bills only	5	1.7	2.0	48.0
	I was not aware of this system	128	43.0	52.0	100.0
	Total	246	82.6	100.0	
Missing	No response	11	3.7		
	Question not in this survey	41	13.8		
	Total	52	17.4		
Total		298	100.0		

D1.Gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Female	163	54.7	56.4	56.4
	Male	126	42.3	43.6	100.0
	Total	289	97.0	100.0	
Missing	No response	9	3.0		
Total		298	100.0		

D2.YearBorn

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1931	1	.3	.4	.4
	1933	1	.3	.4	.7
	1934	2	.7	.7	1.4
	1937	1	.3	.4	1.8
	1939	2	.7	.7	2.5
	1941	1	.3	.4	2.8
	1942	1	.3	.4	3.2
	1943	1	.3	.4	3.6
	1944	1	.3	.4	3.9
	1946	1	.3	.4	4.3
	1947	3	1.0	1.1	5.3
	1948	2	.7	.7	6.0
	1949	2	.7	.7	6.8
	1950	6	2.0	2.1	8.9
	1951	4	1.3	1.4	10.3
	1952	4	1.3	1.4	11.7
	1953	3	1.0	1.1	12.8
	1955	2	.7	.7	13.5
	1956	5	1.7	1.8	15.3
	1957	4	1.3	1.4	16.7

	1958	4	1.3	1.4	18.1
	1959	3	1.0	1.1	19.2
	1960	9	3.0	3.2	22.4
	1961	5	1.7	1.8	24.2
	1962	3	1.0	1.1	25.3
	1963	5	1.7	1.8	27.0
	1964	11	3.7	3.9	31.0
	1965	8	2.7	2.8	33.8
	1966	7	2.3	2.5	36.3
	1967	5	1.7	1.8	38.1
	1968	7	2.3	2.5	40.6
	1969	8	2.7	2.8	43.4
	1970	11	3.7	3.9	47.3
	1971	10	3.4	3.6	50.9
	1972	16	5.4	5.7	56.6
	1973	16	5.4	5.7	62.3
	1974	22	7.4	7.8	70.1
	1975	23	7.7	8.2	78.3
	1976	16	5.4	5.7	84.0
	1977	16	5.4	5.7	89.7
	1978	11	3.7	3.9	93.6
	1979	9	3.0	3.2	96.8
	1980	3	1.0	1.1	97.9
	1981	5	1.7	1.8	99.6
	1982	1	.3	.4	100.0
	Total	281	94.3	100.0	
Missing	No response	7	2.3		
	System	10	3.4		
	Total	17	5.7		
Total		298	100.0		

D3.NumberResidentsUnder10

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0	1	.3	.8	.8
	1	66	22.1	51.2	51.9
	2	46	15.4	35.7	87.6
	3	8	2.7	6.2	93.8
	Check mark	1	.3	.8	94.6
	Not applicable, 0	7	2.3	5.4	100.0
	Total	129	43.3	100.0	
Missing	No response	10	3.4		
	System	159	53.4		
	Total	169	56.7		
Total		298	100.0		

D3.NumberRes11to20

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0	1	.3	1.8	1.8
	1	23	7.7	41.1	42.9
	2	15	5.0	26.8	69.6
	3	2	.7	3.6	73.2
	Check mark	1	.3	1.8	75.0
	Not applicable, 0	14	4.7	25.0	100.0
	Total	56	18.8	100.0	
Missing	No response	10	3.4		
	System	232	77.9		
	Total	242	81.2		
Total		298	100.0		

D3.NumberRes21to30

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	54	18.1	47.4	47.4
	2	46	15.4	40.4	87.7
	3	1	.3	.9	88.6
	Check mark	2	.7	1.8	90.4
	Not applicable, 0	11	3.7	9.6	100.0
	Total	114	38.3	100.0	
Missing	No response	10	3.4		
	System	174	58.4		
	Total	184	61.7		
Total		298	100.0		

D3.NumberRes31to50

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	72	24.2	35.1	35.1
	2	124	41.6	60.5	95.6
	3	2	.7	1.0	96.6
	Check mark	3	1.0	1.5	98.0
	Not applicable, 0	4	1.3	2.0	100.0
	Total	205	68.8	100.0	
Missing	No response	10	3.4		
	System	83	27.9		
	Total	93	31.2		
Total		298	100.0		

D3.NumberRes51to65

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	18	6.0	37.5	37.5
	2	18	6.0	37.5	75.0
	Not applicable, 0	12	4.0	25.0	100.0
	Total	48	16.1	100.0	
Missing	No response	10	3.4		
	System	240	80.5		
	Total	250	83.9		
Total		298	100.0		

D3.NumberResOver65

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0	1	.3	3.0	3.0
	1	13	4.4	39.4	42.4
	2	2	.7	6.1	48.5
	Check mark	2	.7	6.1	54.5
	Not applicable, 0	15	5.0	45.5	100.0
	Total	33	11.1	100.0	
Missing	No response	10	3.4		
	System	255	85.6		
	Total	265	88.9		
Total		298	100.0		

D4.Education

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Some grade or high school	4	1.3	1.4	1.4
	Completed high school	12	4.0	4.2	5.5
	College or technical diploma	92	30.9	31.8	37.4
	Some university	34	11.4	11.8	49.1
	University (Bachelor's) degree	102	34.2	35.3	84.4
	Second or graduate degree (Master's, Ph.D.)	45	15.1	15.6	100.0
	Total	289	97.0	100.0	
Missing	No response	9	3.0		
Total		298	100.0		

IncomeCorrected

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Less than $20,000	2	.7	.8	.8
	$20,000 - $39,999	11	3.7	4.2	4.9
	$40,000 - $59,999	19	6.4	7.2	12.1
	$60,000 - $79,999	56	18.8	21.1	33.2
	$80,000 - $99,999	73	24.5	27.5	60.8
	$100,000 and over	104	34.9	39.2	100.0
	Total	265	88.9	100.0	
Missing	No response	33	11.1		
Total		298	100.0		

IncomeCorrectedRecoded

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	2	.7	.7	.7
	2	11	3.7	3.7	4.4
	3	19	6.4	6.4	10.7
	4	56	18.8	18.8	29.5
	5	73	24.5	24.5	54.0
	6	104	34.9	34.9	88.9
	999	33	11.1	11.1	100.0
	Total	298	100.0	100.0	

D6.ChangesInLastYear

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	83	27.9	29.1	29.1
	No	202	67.8	70.9	100.0
	Total	285	95.6	100.0	
Missing	No response	13	4.4		
Total		298	100.0		

X4.SendFeedback

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	225	75.5	80.1	80.1
	No	56	18.8	19.9	100.0
	Total	281	94.3	100.0	
Missing	No response	17	5.7		
Total		298	100.0		

X5.FeedbackMedium

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Mail	124	41.6	41.6	41.6
	Email	85	28.5	28.5	70.1
	Either mail or email	16	5.4	5.4	75.5
	Not applicable, no response	73	24.5	24.5	100.0
	Total	298	100.0	100.0	

Appendix VIII Weather-adjusted Consumption Results

		August							
		2006			2005			Delta: Change Relative to 2005	
Customer Number	Group	Monthly Total	Monthly On-peak	Ratio: On-peak to Total	Monthly Total	Monthly On-peak	Ratio: On-peak to Total	Monthly Total	Ratio: On-peak to Total
2	CG1	679	104	0.15	822	141	0.17	-17%	-11%
5	CG1	538	85	0.16	473	92	0.20	14%	-19%
6	CG1	401	74	0.18	406	100	0.25	-1%	-25%
7	CG1	159	23	0.15	81	13	0.16	95%	-10%
8	CG1	972	180	0.19	690	119	0.17	41%	7%
11	CG1	322	21	0.07	273	18	0.07	18%	-2%
12	CG1	398	66	0.17	478	79	0.17	-17%	0%
14	CG1	261	54	0.21	335	49	0.15	-22%	41%
15	CG1	762	67	0.09	1067	166	0.16	-29%	-43%
17	CG1	262	51	0.19	222	54	0.24	18%	-21%
18	CG1	679	114	0.17	682	130	0.19	0%	-12%
19	CG1	510	91	0.18	488	108	0.22	4%	-19%
20	CG1	424	83	0.19	332	74	0.22	28%	-13%
21	CG1	646	136	0.21	662	130	0.20	-2%	7%
25	CG1	641	171	0.27	776	220	0.28	-17%	-6%
26	CG1	1086	122	0.11	939	100	0.11	16%	5%
27	CG2	575	87	0.15	576	122	0.21	0%	-28%
28	CG2	378	60	0.16	373	76	0.20	1%	-23%
29	CG2	617	110	0.18	474	126	0.27	30%	-33%
30	CG2	283	38	0.13	467	81	0.17	-39%	-22%
31	CG2	661	94	0.14	771	120	0.16	-14%	-9%
32	CG2	802	144	0.18	1125	223	0.20	-29%	-9%
34	CG2	360	47	0.13	260	60	0.23	38%	-42%
35	CG2	1163	253	0.22	836	226	0.27	39%	-19%
37	CG2	415	63	0.15	432	80	0.18	-4%	-18%
39	CG2	523	83	0.16	402	50	0.12	30%	28%
40	CG2	635	89	0.14	669	170	0.25	-5%	-45%
43	CG2	727	88	0.12	642	128	0.20	13%	-39%
45	CG2	313	53	0.17	469	143	0.31	-33%	-45%
46	CG2	391	56	0.14	328	57	0.17	19%	-17%
47	CG2	591	67	0.11	516	66	0.13	14%	-11%
50	CG2	589	116	0.20	449	99	0.22	31%	-10%
53	CG3	969	196	0.20	1088	180	0.17	-11%	22%
54	CG3	556	86	0.16	570	96	0.17	-2%	-8%
55	CG3	462	85	0.18	668	116	0.17	-31%	6%
56	CG3	1291	268	0.21	886	165	0.19	46%	12%
57	CG3	255	45	0.18	265	46	0.17	-4%	2%
58	CG3	1258	317	0.25	1115	300	0.27	13%	-6%
59	CG3	615	100	0.16	628	165	0.26	-2%	-38%
60	CG3	1011	131	0.13	1254	238	0.19	-19%	-32%
61	CG3	492	66	0.13	480	49	0.10	2%	32%
62	CG3	807	117	0.14	1154	240	0.21	-30%	-31%
63	CG3	673	111	0.17	790	110	0.14	-15%	19%
64	CG3	657	74	0.11	733	120	0.16	-10%	-31%
65	CG3	354	68	0.19	378	94	0.25	-6%	-23%
66	CG3	678	171	0.25	651	159	0.24	4%	3%
67	CG3	339	62	0.18	336	84	0.25	1%	-27%
68	CG3	935	168	0.18	982	174	0.18	-5%	1%
69	CG3	257	57	0.22	175	17	0.10	47%	132%
70	CG3	696	150	0.22	833	179	0.21	-16%	0%

		August, cont'd							
		2006			2005			Delta: Change Relative to 2005	
Customer Number	Group	Monthly Total	Monthly On-peak	Ratio: On-peak to Total	Monthly Total	Monthly On-peak	Ratio: On-peak to Total	Monthly Total	Ratio: On-peak to Total
71	CG3	1082	321	0.30	933	258	0.28	16%	7%
72	CG3	603	44	0.07	584	18	0.03	3%	143%
73	CG3	978	127	0.13	905	95	0.10	8%	24%
74	CG3	768	161	0.21	750	172	0.23	2%	-9%
75	CG3	259	62	0.24	398	83	0.21	-35%	14%
76	CG3	391	58	0.15	505	116	0.23	-23%	-36%
77	CG3	337	77	0.23	310	69	0.22	9%	2%
78	CG3	889	148	0.17	751	136	0.18	18%	-8%
79	CG3	433	71	0.16	669	167	0.25	-35%	-34%
80	CG3	815	274	0.34	764	148	0.19	7%	74%
81	CG3	717	147	0.20	897	203	0.23	-20%	-10%
82	CG3	766	118	0.15	766	148	0.19	0%	-20%
83	CG3	725	152	0.21	681	183	0.27	6%	-22%
84	CG3	1040	250	0.24	836	167	0.20	24%	20%
85	CG3	283	42	0.15	197	40	0.20	44%	-27%
86	CG3	610	119	0.20	599	130	0.22	2%	-10%
87	CG3	629	62	0.10	640	67	0.10	-2%	-6%
88	CG3	527	91	0.17	446	89	0.20	18%	-14%
89	CG3	602	100	0.17	594	101	0.17	1%	-2%
90	CG3	857	161	0.19	957	189	0.20	-10%	-5%
91	CG3	850	181	0.21	824	233	0.28	3%	-25%
92	CG3	882	149	0.17	748	116	0.16	18%	8%
93	CG3	408	83	0.20	362	69	0.19	13%	7%
94	CG3	615	145	0.24	580	124	0.21	6%	10%
95	CG3	850	148	0.17	736	176	0.24	16%	-27%
96	CG3	758	68	0.09	562	73	0.13	35%	-31%
97	CG3	1098	161	0.15	1036	172	0.17	6%	-11%
98	TG1	1017	154	0.15	866	118	0.14	17%	12%
100	TG1	1188	247	0.21	663	168	0.25	79%	-18%
101	TG1	770	123	0.16	811	135	0.17	-5%	-4%
104	TG1	1012	171	0.17	665	122	0.18	52%	-8%
105	TG1	962	183	0.19	854	184	0.22	13%	-12%
106	TG1	539	86	0.16	444	122	0.27	21%	-42%
107	TG1	488	74	0.15	453	114	0.25	8%	-40%
108	TG1	124	16	0.13	191	24	0.12	-35%	6%
111	TG1	1015	103	0.10	1161	168	0.14	-13%	-30%
112	TG1	300	16	0.05	287	8	0.03	5%	89%
113	TG1	1133	260	0.23	792	178	0.22	43%	2%
114	TG1	1364	64	0.05	1252	243	0.19	9%	-76%
115	TG1	455	50	0.11	524	65	0.12	-13%	-12%
119	TG1	734	160	0.22	411	105	0.25	79%	-15%
120	TG1	605	104	0.17	933	213	0.23	-35%	-24%
122	TG1	861	87	0.10	487	21	0.04	77%	133%
125	TG2	844	136	0.16	907	191	0.21	-7%	-23%
127	TG2	474	76	0.16	747	134	0.18	-37%	-10%
129	TG2	563	110	0.20	675	166	0.25	-17%	-21%
130	TG2	655	114	0.17	422	93	0.22	55%	-21%

		August, cont'd							
		2006			2005			Delta: Change Relative to 2005	
Customer Number	Group	Monthly Total	Monthly On-peak	Ratio: On-peak to Total	Monthly Total	Monthly On-peak	Ratio: On-peak to Total	Monthly Total	Ratio: On-peak to Total
131	TG2	510	59	0.12	680	141	0.21	-25%	-44%
133	TG2	408	89	0.22	275	53	0.19	49%	13%
134	TG2	577	84	0.15	523	103	0.20	10%	-26%
136	TG2	593	135	0.23	551	125	0.23	8%	1%
137	TG2	1029	271	0.26	1008	277	0.28	2%	-4%
138	TG2	662	112	0.17	625	158	0.25	6%	-33%
139	TG2	1299	246	0.19	955	211	0.22	36%	-14%
141	TG2	698	109	0.16	783	109	0.14	-11%	12%
142	TG2	377	45	0.12	453	96	0.21	-17%	-44%
143	TG2	827	151	0.18	973	164	0.17	-15%	8%
145	TG2	929	137	0.15	585	123	0.21	59%	-30%
147	TG2	921	226	0.24	875	177	0.20	5%	21%
150	TG3	248	39	0.16	238	48	0.20	4%	-22%
152	TG3	649	162	0.25	726	144	0.20	-11%	26%
153	TG3	1072	181	0.17	880	183	0.21	22%	-19%
154	TG3	573	65	0.11	664	170	0.26	-14%	-56%
155	TG3	206	32	0.16	341	45	0.13	-40%	19%
156	TG3	643	128	0.20	555	125	0.23	16%	-12%
157	TG3	518	72	0.14	480	61	0.13	8%	9%
158	TG3	403	55	0.14	562	140	0.25	-28%	-45%
163	TG3	1856	267	0.14	1204	247	0.21	54%	-30%
164	TG3	981	193	0.20	1047	217	0.21	-6%	-5%
165	TG3	984	195	0.20	609	136	0.22	61%	-11%
167	TG3	830	106	0.13	846	145	0.17	-2%	-26%
170	TG3	569	113	0.20	509	115	0.23	12%	-12%
171	TG3	919	167	0.18	1045	231	0.22	-12%	-18%
173	TG3	504	76	0.15	513	91	0.18	-2%	-15%
176	TG4	324	23	0.07	404	62	0.15	-20%	-53%
179	TG4	693	98	0.14	863	135	0.16	-20%	-9%
181	TG4	1314	159	0.12	1351	211	0.16	-3%	-23%
182	TG4	341	45	0.13	317	41	0.13	8%	1%
183	TG4	506	74	0.15	552	50	0.09	-8%	61%
184	TG4	262	26	0.10	320	28	0.09	-18%	14%
185	TG4	466	50	0.11	730	85	0.12	-36%	-7%
188	TG4	745	165	0.22	596	134	0.22	25%	-1%
189	TG4	402	28	0.07	472	42	0.09	-15%	-21%
191	TG4	716	141	0.20	720	141	0.20	-1%	0%
193	TG4	817	161	0.20	601	161	0.27	36%	-26%
194	TG4	565	102	0.18	569	98	0.17	-1%	4%
195	TG4	717	136	0.19	534	156	0.29	34%	-35%
196	TG4	971	166	0.17	594	101	0.17	64%	0%
197	TG4	636	148	0.23	872	194	0.22	-27%	4%
199	TG4	1682	269	0.16	1309	220	0.17	28%	-5%
201	TG4	512	54	0.11	486	78	0.16	5%	-34%

		September							
		2006			2005			Delta: Change Relative to 2005	
Customer Number	Group	Monthly Total	Monthly Tot On-peak	Ratio On-peak (Monthly)	Monthly Total	Monthly Tot On-peak	Ratio On-peak (Monthly)	Monthly Total	Ratio On-peak (Monthly)
2	CG1	489	79	0.16	616	113	0.18	-21%	-12%
5	CG1	291	31	0.11	389	69	0.18	-25%	-39%
6	CG1	426	69	0.16	210	40	0.19	103%	-14%
7	CG1	76	13	0.18	71	11	0.16	6%	11%
8	CG1	614	69	0.11	337	33	0.10	82%	13%
11	CG1	251	26	0.10	205	16	0.08	22%	31%
12	CG1	250	34	0.13	296	40	0.14	-16%	-1%
14	CG1	363	58	0.16	351	25	0.07	4%	121%
15	CG1	619	87	0.14	859	125	0.15	-28%	-4%
17	CG1	162	29	0.18	173	42	0.24	-6%	-27%
18	CG1	576	87	0.15	648	131	0.20	-11%	-25%
19	CG1	357	62	0.17	378	69	0.18	-5%	-5%
20	CG1	351	66	0.19	260	48	0.18	35%	3%
21	CG1	530	86	0.16	500	90	0.18	6%	-10%
25	CG1	321	62	0.19	642	184	0.29	-50%	-32%
26	CG1	938	117	0.13	901	104	0.12	4%	8%
27	CG2	437	70	0.16	782	111	0.14	-44%	12%
28	CG2	275	35	0.13	392	73	0.19	-30%	-32%
29	CG2	526	55	0.10	348	53	0.15	51%	-31%
30	CG2	306	27	0.09	285	39	0.14	7%	-34%
31	CG2	604	76	0.13	671	95	0.14	-10%	-11%
32	CG2	693	126	0.18	1359	262	0.19	-49%	-6%
34	CG2	245	28	0.11	267	56	0.21	-8%	-46%
35	CG2	892	183	0.20	816	214	0.26	9%	-22%
37	CG2	306	28	0.09	241	42	0.17	27%	-48%
39	CG2	409	87	0.21	436	42	0.10	-6%	122%
40	CG2	475	73	0.15	618	171	0.28	-23%	-45%
43	CG2	586	86	0.15	540	69	0.13	9%	16%
45	CG2	275	34	0.12	334	77	0.23	-18%	-47%
46	CG2	250	33	0.13	346	56	0.16	-28%	-18%
47	CG2	471	51	0.11	354	42	0.12	33%	-8%
50	CG2	412	79	0.19	461	78	0.17	-11%	13%
53	CG3	622	74	0.12	651	93	0.14	-4%	-17%
54	CG3	522	68	0.13	586	104	0.18	-11%	-26%
55	CG3	437	61	0.14	566	87	0.15	-23%	-9%
56	CG3	1025	141	0.14	963	204	0.21	7%	-35%
57	CG3	164	21	0.13	191	36	0.19	-14%	-32%
58	CG3	854	253	0.30	922	257	0.28	-7%	6%
59	CG3	433	65	0.15	472	97	0.21	-8%	-28%
60	CG3	869	99	0.11	928	120	0.13	-6%	-11%
61	CG3	364	34	0.09	390	32	0.08	-7%	17%
62	CG3	544	79	0.15	941	185	0.20	-42%	-26%
63	CG3	545	60	0.11	646	77	0.12	-16%	-8%
64	CG3	540	99	0.18	659	68	0.10	-18%	77%
65	CG3	281	60	0.21	286	85	0.30	-2%	-28%
66	CG3	509	88	0.17	460	135	0.29	11%	-41%
67	CG3	243	55	0.23	308	72	0.23	-21%	-3%
68	CG3	823	104	0.13	750	144	0.19	10%	-34%
69	CG3	307	70	0.23	197	20	0.10	56%	127%
70	CG3	419	54	0.13	541	121	0.22	-22%	-43%

		September, cont'd							
		2006			2005			Delta: Change Relative to 2005	
Customer Number	Group	Monthly Total	Monthly Tot On-peak	Ratio On-peak (Monthly)	Monthly Total	Monthly Tot On-peak	Ratio On-peak (Monthly)	Monthly Total	Ratio On-peak (Monthly)
71	CG3	955	221	0.23	814	219	0.27	17%	-14%
72	CG3	486	46	0.09	498	15	0.03	-2%	206%
73	CG3	906	99	0.11	845	86	0.10	7%	8%
74	CG3	862	203	0.24	726	171	0.24	19%	0%
75	CG3	250	44	0.18	268	55	0.21	-7%	-14%
76	CG3	374	52	0.14	297	33	0.11	26%	28%
77	CG3	291	69	0.24	266	63	0.24	10%	0%
78	CG3	964	162	0.17	570	81	0.14	69%	18%
79	CG3	287	46	0.16	467	106	0.23	-39%	-29%
80	CG3	400	121	0.30	713	142	0.20	-44%	51%
81	CG3	774	175	0.23	773	201	0.26	0%	-13%
82	CG3	641	90	0.14	452	66	0.15	42%	-4%
83	CG3	519	79	0.15	425	82	0.19	22%	-21%
84	CG3	609	116	0.19	687	159	0.23	-11%	-17%
85	CG3	292	33	0.11	183	27	0.15	59%	-24%
86	CG3	626	104	0.17	494	90	0.18	27%	-10%
87	CG3	531	65	0.12	544	38	0.07	-2%	76%
88	CG3	401	54	0.13	325	39	0.12	24%	11%
89	CG3	424	45	0.11	432	75	0.17	-2%	-39%
90	CG3	1108	173	0.16	841	149	0.18	32%	-12%
91	CG3	496	93	0.19	582	153	0.26	-15%	-29%
92	CG3	550	96	0.17	499	61	0.12	10%	43%
93	CG3	298	39	0.13	252	31	0.12	18%	7%
94	CG3	470	90	0.19	434	102	0.24	8%	-18%
95	CG3	655	95	0.15	632	112	0.18	4%	-18%
96	CG3	643	82	0.13	507	45	0.09	27%	44%
97	CG3	913	135	0.15	980	149	0.15	-7%	-3%
98	TG1	945	92	0.10	827	103	0.12	14%	-22%
100	TG1	702	140	0.20	537	77	0.14	31%	39%
101	TG1	763	90	0.12	537	77	0.14	42%	-18%
104	TG1	1018	176	0.17	649	114	0.18	57%	-2%
105	TG1	1044	159	0.15	752	120	0.16	39%	-5%
106	TG1	606	105	0.17	283	50	0.18	114%	-2%
107	TG1	344	47	0.14	284	41	0.14	21%	-6%
108	TG1	126	18	0.14	119	17	0.14	7%	-3%
111	TG1	1267	169	0.13	1004	122	0.12	26%	10%
112	TG1	238	16	0.07	227	10	0.04	5%	54%
113	TG1	713	122	0.17	872	175	0.20	-18%	-15%
114	TG1	1063	109	0.10	1178	185	0.16	-10%	-35%
115	TG1	445	77	0.17	494	64	0.13	-10%	32%
119	TG1	455	89	0.20	542	81	0.15	-16%	30%
120	TG1	619	98	0.16	686	146	0.21	-10%	-25%
122	TG1	974	115	0.12	440	19	0.04	122%	180%
125	TG2	744	106	0.14	705	174	0.25	6%	-42%
127	TG2	650	118	0.18	632	128	0.20	3%	-10%
129	TG2	570	77	0.14	455	61	0.13	25%	1%
130	TG2	403	53	0.13	249	55	0.22	62%	-40%

		September, cont'd							
		2006			2005			Delta: Change Relative to 2005	
Customer Number	Group	Monthly Total	Monthly Tot On-peak	Ratio On-peak (Monthly)	Monthly Total	Monthly Tot On-peak	Ratio On-peak (Monthly)	Monthly Total	Ratio On-peak (Monthly)
131	TG2	392	44	0.11	450	60	0.13	-13%	-16%
133	TG2	467	66	0.14	280	40	0.14	67%	-1%
134	TG2	400	69	0.17	458	93	0.20	-13%	-14%
136	TG2	400	58	0.15	377	60	0.16	6%	-8%
137	TG2	1242	242	0.19	828	225	0.27	50%	-28%
138	TG2	562	102	0.18	639	148	0.23	-12%	-22%
139	TG2	1081	221	0.20	941	186	0.20	15%	4%
141	TG2	564	73	0.13	673	100	0.15	-16%	-13%
142	TG2	416	61	0.15	465	77	0.17	-10%	-12%
143	TG2	604	110	0.18	623	105	0.17	-3%	8%
145	TG2	586	98	0.17	387	46	0.12	51%	41%
147	TG2	830	199	0.24	721	131	0.18	15%	32%
150	TG3	197	24	0.12	187	28	0.15	5%	-17%
152	TG3	464	109	0.24	650	128	0.20	-29%	20%
153	TG3	631	69	0.11	674	133	0.20	-6%	-44%
154	TG3	592	85	0.14	826	222	0.27	-28%	-46%
155	TG3	185	24	0.13	185	19	0.10	0%	28%
156	TG3	525	71	0.13	487	133	0.27	8%	-51%
157	TG3	466	65	0.14	476	50	0.11	-2%	31%
158	TG3	266	27	0.10	339	71	0.21	-22%	-52%
163	TG3	1189	134	0.11	1022	144	0.14	16%	-20%
164	TG3	730	117	0.16	766	173	0.23	-5%	-29%
165	TG3	1103	206	0.19	489	80	0.16	125%	15%
167	TG3	746	95	0.13	805	129	0.16	-7%	-21%
170	TG3	343	68	0.20	393	94	0.24	-13%	-17%
171	TG3	632	117	0.19	839	198	0.24	-25%	-21%
173	TG3	509	82	0.16	412	65	0.16	24%	3%
176	TG4	294	21	0.07	266	34	0.13	10%	-44%
179	TG4	476	45	0.09	526	109	0.21	-10%	-54%
181	TG4	1628	133	0.08	1458	236	0.16	12%	-49%
182	TG4	246	36	0.14	210	21	0.10	17%	47%
183	TG4	570	64	0.11	504	46	0.09	13%	24%
184	TG4	277	35	0.13	240	29	0.12	15%	4%
185	TG4	363	56	0.16	427	71	0.17	-15%	-7%
188	TG4	545	64	0.12	384	37	0.10	42%	23%
189	TG4	319	34	0.11	298	32	0.11	7%	0%
191	TG4	572	90	0.16	675	155	0.23	-15%	-31%
193	TG4	605	91	0.15	495	98	0.20	22%	-24%
194	TG4	426	69	0.16	353	64	0.18	21%	-11%
195	TG4	825	113	0.14	364	92	0.25	127%	-46%
196	TG4	575	76	0.13	458	56	0.12	26%	8%
197	TG4	493	97	0.20	604	157	0.26	-18%	-25%
199	TG4	1514	234	0.15	1236	181	0.15	22%	6%
201	TG4	526	61	0.12	386	62	0.16	36%	-28%

		October							
		2006			2005			Delta: Change Relative to 2005	
Customer Number	Group	Monthly Total	Monthly Tot On-peak	Ratio On-peak (Monthly)	Monthly Total	Monthly Tot On-peak	Ratio On-peak (Monthly)	Monthly Total	Ratio On-peak (Monthly)
2	CG1	440	54	0.12	413	51	0.12	7%	-1%
5	CG1	254	28	0.11	233	24	0.10	9%	8%
6	CG1	334	56	0.17	310	51	0.17	8%	1%
7	CG1	171	29	0.17	75	13	0.17	129%	-3%
8	CG1	550	80	0.15	401	42	0.11	37%	38%
11	CG1	218	25	0.11	249	29	0.11	-12%	-1%
12	CG1	228	36	0.16	258	32	0.13	-12%	25%
14	CG1	317	45	0.14	379	45	0.12	-16%	20%
15	CG1	655	93	0.14	566	80	0.14	16%	1%
17	CG1	186	35	0.19	180	50	0.28	3%	-32%
18	CG1	487	83	0.17	519	80	0.15	-6%	10%
19	CG1	331	38	0.12	399	62	0.16	-17%	-25%
20	CG1	390	78	0.20	328	50	0.15	19%	30%
21	CG1	439	67	0.15	541	82	0.15	-19%	1%
25	CG1	251	22	0.09	431	94	0.22	-42%	-59%
26	CG1	650	111	0.17	708	113	0.16	-8%	8%
27	CG2	370	38	0.10	624	71	0.11	-41%	-8%
28	CG2	235	45	0.19	297	45	0.15	-21%	28%
29	CG2	593	79	0.13	510	80	0.16	16%	-15%
30	CG2	333	48	0.14	322	54	0.17	3%	-14%
31	CG2	470	64	0.14	597	92	0.15	-21%	-11%
32	CG2	660	111	0.17	1040	188	0.18	-37%	-7%
34	CG2	255	32	0.13	248	36	0.15	3%	-14%
35	CG2	718	127	0.18	647	146	0.23	11%	-22%
37	CG2	313	37	0.12	269	28	0.10	17%	13%
39	CG2	336	92	0.27	287	42	0.14	17%	89%
40	CG2	587	113	0.19	554	125	0.23	6%	-15%
43	CG2	595	102	0.17	574	78	0.14	4%	27%
45	CG2	291	40	0.14	279	36	0.13	4%	8%
46	CG2	214	42	0.20	257	39	0.15	-17%	28%
47	CG2	491	67	0.14	381	48	0.12	29%	9%
50	CG2	513	100	0.20	432	83	0.19	19%	2%
53	CG3	530	57	0.11	575	64	0.11	-8%	-4%
54	CG3	455	59	0.13	496	63	0.13	-8%	2%
55	CG3	457	67	0.15	443	73	0.16	3%	-11%
56	CG3	1393	213	0.15	886	117	0.13	57%	16%
57	CG3	154	20	0.13	169	27	0.16	-9%	-16%
58	CG3	514	122	0.24	778	214	0.27	-34%	-13%
59	CG3	385	50	0.13	341	70	0.20	13%	-37%
60	CG3	911	130	0.14	856	113	0.13	6%	8%
61	CG3	374	46	0.12	346	35	0.10	8%	23%
62	CG3	678	122	0.18	1085	188	0.17	-38%	4%
63	CG3	485	66	0.14	679	102	0.15	-29%	-10%
64	CG3	533	91	0.17	552	79	0.14	-3%	19%
65	CG3	278	56	0.20	186	39	0.21	49%	-4%
66	CG3	465	87	0.19	294	88	0.30	58%	-37%
67	CG3	399	89	0.22	361	74	0.21	11%	8%
68	CG3	890	147	0.17	882	184	0.21	1%	-21%
69	CG3	309	73	0.24	232	28	0.12	33%	92%
70	CG3	398	49	0.12	390	41	0.10	2%	19%

		October, cont'd							
		2006			2005			Delta: Change Relative to 2005	
Customer Number	Group	Monthly Total	Monthly Tot On-peak	Ratio On-peak (Monthly)	Monthly Total	Monthly Tot On-peak	Ratio On-peak (Monthly)	Monthly Total	Ratio On-peak (Monthly)
71	CG3	908	224	0.25	760	228	0.30	20%	-18%
72	CG3	444	40	0.09	416	36	0.09	7%	5%
73	CG3	752	94	0.13	776	95	0.12	-3%	3%
74	CG3	679	131	0.19	783	159	0.20	-13%	-5%
75	CG3	316	59	0.19	338	80	0.24	-7%	-21%
76	CG3	339	43	0.13	282	40	0.14	20%	-12%
77	CG3	265	59	0.22	257	59	0.23	3%	-3%
78	CG3	837	150	0.18	872	165	0.19	-4%	-5%
79	CG3	301	55	0.18	408	77	0.19	-26%	-3%
80	CG3	512	167	0.33	507	104	0.20	1%	60%
81	CG3	805	180	0.22	823	191	0.23	-2%	-4%
82	CG3	569	75	0.13	404	57	0.14	41%	-7%
83	CG3	421	49	0.12	353	42	0.12	19%	-3%
84	CG3	647	124	0.19	530	97	0.18	22%	5%
85	CG3	320	40	0.13	228	24	0.10	41%	22%
86	CG3	533	84	0.16	340	68	0.20	57%	-21%
87	CG3	372	26	0.07	365	34	0.09	2%	-24%
88	CG3	386	48	0.12	276	27	0.10	40%	28%
89	CG3	404	57	0.14	445	69	0.16	-9%	-9%
90	CG3	929	138	0.15	599	81	0.13	55%	10%
91	CG3	519	85	0.16	505	91	0.18	3%	-9%
92	CG3	687	135	0.20	640	85	0.13	7%	48%
93	CG3	353	52	0.15	211	21	0.10	67%	52%
94	CG3	324	45	0.14	337	50	0.15	-4%	-6%
95	CG3	478	76	0.16	537	91	0.17	-11%	-6%
96	CG3	485	56	0.12	533	56	0.10	-9%	11%
97	CG3	799	121	0.15	931	170	0.18	-14%	-17%
98	TG1	707	112	0.16	651	101	0.16	9%	2%
100	TG1	564	101	0.18	558	95	0.17	1%	4%
101	TG1	737	102	0.14	721	120	0.17	2%	-17%
104	TG1	791	125	0.16	460	65	0.14	72%	12%
105	TG1	955	160	0.17	854	142	0.17	12%	1%
106	TG1	599	98	0.16	516	63	0.12	16%	35%
107	TG1	368	56	0.15	285	56	0.20	29%	-22%
108	TG1	94	13	0.14	145	21	0.14	-35%	-4%
111	TG1	1215	198	0.16	1266	184	0.15	-4%	12%
112	TG1	262	23	0.09	172	20	0.11	52%	-22%
113	TG1	755	153	0.20	768	155	0.20	-2%	1%
114	TG1	829	87	0.10	1092	162	0.15	-24%	-30%
115	TG1	234	27	0.11	369	53	0.14	-37%	-20%
119	TG1	394	55	0.14	353	50	0.14	12%	-2%
120	TG1	650	111	0.17	628	102	0.16	3%	5%
122	TG1	829	129	0.16	679	52	0.08	22%	103%
125	TG2	692	101	0.15	672	170	0.25	3%	-42%
127	TG2	581	106	0.18	481	78	0.16	21%	13%
129	TG2	614	113	0.18	570	100	0.18	8%	5%
130	TG2	406	70	0.17	279	65	0.23	46%	-26%

		October, cont'd							
		2006			2005			Delta: Change Relative to 2005	
Customer Number	Group	Monthly Total	Monthly Tot On-peak	Ratio On-peak (Monthly)	Monthly Total	Monthly Tot On-peak	Ratio On-peak (Monthly)	Monthly Total	Ratio On-peak (Monthly)
131	TG2	407	59	0.15	401	62	0.15	2%	-6%
133	TG2	485	84	0.17	381	53	0.14	27%	24%
134	TG2	405	70	0.17	403	77	0.19	0%	-10%
136	TG2	428	54	0.13	422	67	0.16	1%	-21%
137	TG2	1200	201	0.17	758	182	0.24	58%	-30%
138	TG2	572	87	0.15	525	105	0.20	9%	-23%
139	TG2	946	171	0.18	799	145	0.18	18%	0%
141	TG2	600	100	0.17	620	139	0.22	-3%	-25%
142	TG2	382	50	0.13	376	72	0.19	2%	-32%
143	TG2	673	138	0.20	444	86	0.19	52%	5%
145	TG2	528	84	0.16	435	55	0.13	21%	25%
147	TG2	771	132	0.17	735	113	0.15	5%	12%
150	TG3	153	20	0.13	189	33	0.18	-19%	-25%
152	TG3	556	153	0.28	633	114	0.18	-12%	54%
153	TG3	635	67	0.11	632	87	0.14	0%	-22%
154	TG3	477	68	0.14	611	134	0.22	-22%	-35%
155	TG3	247	19	0.08	286	28	0.10	-14%	-19%
156	TG3	479	72	0.15	446	81	0.18	7%	-18%
157	TG3	426	49	0.11	512	78	0.15	-17%	-25%
158	TG3	250	57	0.23	232	34	0.15	8%	55%
163	TG3	934	114	0.12	972	182	0.19	-4%	-35%
164	TG3	315	45	0.14	601	128	0.21	-48%	-33%
165	TG3	710	129	0.18	564	128	0.23	26%	-20%
167	TG3	581	81	0.14	691	105	0.15	-16%	-9%
170	TG3	188	25	0.13	178	37	0.21	5%	-35%
171	TG3	638	152	0.24	626	110	0.18	2%	36%
173	TG3	423	73	0.17	401	64	0.16	6%	8%
176	TG4	265	21	0.08	194	22	0.12	36%	-31%
179	TG4	392	53	0.14	387	48	0.12	1%	9%
181	TG4	791	107	0.14	1292	229	0.18	-39%	-24%
182	TG4	290	37	0.13	249	41	0.16	17%	-23%
183	TG4	537	63	0.12	447	53	0.12	20%	-1%
184	TG4	276	25	0.09	282	31	0.11	-2%	-20%
185	TG4	327	59	0.18	337	53	0.16	-3%	15%
188	TG4	343	36	0.11	397	48	0.12	-14%	-11%
189	TG4	299	39	0.13	287	30	0.10	4%	26%
191	TG4	376	54	0.14	618	109	0.18	-39%	-18%
193	TG4	661	103	0.16	533	101	0.19	24%	-18%
194	TG4	409	69	0.17	437	83	0.19	-6%	-12%
195	TG4	826	117	0.14	549	96	0.18	51%	-19%
196	TG4	537	85	0.16	425	56	0.13	26%	20%
197	TG4	474	96	0.20	459	118	0.26	3%	-21%
199	TG4	1281	234	0.18	962	155	0.16	33%	14%
201	TG4	507	72	0.14	388	72	0.19	31%	-24%

		Three-month Average (Aug - Oct)							
		2006			2005			Delta: Change Relative to 2005	
Customer Number	Group	Monthly Total	Monthly Tot On-peak	Ratio On-peak (Monthly)	Monthly Total	Monthly Tot On-peak	Ratio On-peak (Monthly)	Monthly Total	Ratio On-peak (Monthly)
2	CG1	536	79	0.15	617	102	0.16	-13%	-9%
5	CG1	361	48	0.12	365	62	0.16	-1%	-21%
6	CG1	387	66	0.17	309	64	0.20	25%	-15%
7	CG1	135	22	0.16	76	13	0.17	78%	-1%
8	CG1	712	110	0.15	476	65	0.13	50%	17%
11	CG1	264	24	0.09	242	21	0.09	9%	8%
12	CG1	292	45	0.15	344	51	0.14	-15%	7%
14	CG1	314	52	0.17	355	40	0.11	-11%	51%
15	CG1	679	82	0.12	831	124	0.15	-18%	-16%
17	CG1	204	38	0.19	192	49	0.26	6%	-27%
18	CG1	581	95	0.16	617	114	0.18	-6%	-10%
19	CG1	399	64	0.16	422	80	0.19	-5%	-16%
20	CG1	388	75	0.19	307	57	0.19	26%	4%
21	CG1	538	96	0.18	568	101	0.18	-5%	-1%
25	CG1	404	85	0.18	617	166	0.26	-34%	-30%
26	CG1	891	117	0.14	849	106	0.13	5%	7%
27	CG2	461	65	0.14	661	101	0.16	-30%	-11%
28	CG2	296	47	0.16	354	65	0.18	-16%	-12%
29	CG2	579	81	0.14	444	86	0.19	30%	-28%
30	CG2	307	38	0.12	358	58	0.16	-14%	-23%
31	CG2	578	78	0.13	680	102	0.15	-15%	-10%
32	CG2	718	127	0.18	1175	224	0.19	-39%	-7%
34	CG2	286	36	0.12	258	51	0.20	11%	-36%
35	CG2	925	188	0.20	767	195	0.25	21%	-21%
37	CG2	345	43	0.12	314	50	0.15	10%	-22%
39	CG2	422	87	0.22	375	44	0.12	13%	77%
40	CG2	566	92	0.16	613	156	0.25	-8%	-36%
43	CG2	636	92	0.15	585	91	0.15	9%	-5%
45	CG2	293	42	0.14	361	85	0.22	-19%	-35%
46	CG2	285	43	0.16	310	51	0.16	-8%	-4%
47	CG2	518	62	0.12	417	52	0.12	24%	-3%
50	CG2	505	99	0.20	448	87	0.19	13%	1%
53	CG3	707	109	0.14	771	112	0.14	-8%	2%
54	CG3	511	71	0.14	550	88	0.16	-7%	-12%
55	CG3	452	71	0.16	559	92	0.16	-19%	-4%
56	CG3	1237	207	0.17	912	162	0.18	36%	-6%
57	CG3	191	29	0.15	208	36	0.17	-8%	-16%
58	CG3	875	231	0.26	938	257	0.27	-7%	-4%
59	CG3	478	71	0.15	480	111	0.22	-1%	-35%
60	CG3	930	120	0.13	1013	157	0.15	-8%	-14%
61	CG3	410	49	0.12	405	38	0.09	1%	25%
62	CG3	676	106	0.16	1060	205	0.19	-36%	-19%
63	CG3	568	79	0.14	705	96	0.14	-19%	1%
64	CG3	577	88	0.16	648	89	0.14	-11%	14%
65	CG3	304	61	0.20	283	72	0.25	7%	-20%
66	CG3	551	115	0.20	469	127	0.28	18%	-27%
67	CG3	327	68	0.21	335	77	0.23	-2%	-9%
68	CG3	883	140	0.16	871	168	0.19	1%	-18%
69	CG3	291	67	0.23	201	22	0.11	45%	115%
70	CG3	505	84	0.16	588	114	0.18	-14%	-14%

		Three-month Average (Aug - Oct) -- cont'd							
		2006			2005			Delta: Change Relative to 2005	
Customer Number	Group	Monthly Total	Monthly Tot On-peak	Ratio On-peak (Monthly)	Monthly Total	Monthly Tot On-peak	Ratio On-peak (Monthly)	Monthly Total	Ratio On-peak (Monthly)
71	CG3	982	255	0.26	836	235	0.28	17%	-8%
72	CG3	511	44	0.09	500	23	0.05	2%	76%
73	CG3	879	107	0.12	842	92	0.11	4%	11%
74	CG3	769	165	0.21	753	168	0.22	2%	-4%
75	CG3	275	55	0.20	335	73	0.22	-18%	-8%
76	CG3	368	51	0.14	362	63	0.16	2%	-14%
77	CG3	298	68	0.23	278	64	0.23	7%	0%
78	CG3	897	153	0.17	731	128	0.17	23%	0%
79	CG3	340	58	0.17	515	117	0.22	-34%	-23%
80	CG3	576	187	0.32	661	131	0.20	-13%	62%
81	CG3	766	167	0.22	831	198	0.24	-8%	-9%
82	CG3	659	94	0.14	541	91	0.16	22%	-12%
83	CG3	555	93	0.16	486	103	0.19	14%	-18%
84	CG3	765	163	0.21	684	141	0.20	12%	1%
85	CG3	298	38	0.13	202	30	0.15	47%	-15%
86	CG3	590	102	0.17	478	96	0.20	23%	-14%
87	CG3	511	51	0.10	516	46	0.09	-1%	9%
88	CG3	438	64	0.14	349	52	0.14	25%	3%
89	CG3	476	67	0.14	490	82	0.17	-3%	-17%
90	CG3	965	157	0.16	799	139	0.17	21%	-3%
91	CG3	622	120	0.19	637	159	0.24	-2%	-22%
92	CG3	706	127	0.18	629	87	0.14	12%	32%
93	CG3	353	58	0.16	275	40	0.14	28%	17%
94	CG3	470	94	0.19	450	92	0.20	4%	-5%
95	CG3	661	107	0.16	635	126	0.20	4%	-18%
96	CG3	629	69	0.11	534	58	0.11	18%	3%
97	CG3	937	139	0.15	983	164	0.17	-5%	-11%
98	TG1	890	120	0.14	781	107	0.14	14%	-2%
100	TG1	818	163	0.20	586	113	0.19	40%	3%
101	TG1	757	105	0.14	690	111	0.16	10%	-13%
104	TG1	940	158	0.17	592	101	0.17	59%	0%
105	TG1	987	167	0.17	820	149	0.18	20%	-6%
106	TG1	581	96	0.16	414	78	0.19	40%	-13%
107	TG1	400	59	0.15	341	70	0.20	17%	-26%
108	TG1	115	16	0.14	151	21	0.14	-24%	-1%
111	TG1	1166	156	0.13	1144	158	0.14	2%	-3%
112	TG1	267	18	0.07	229	12	0.06	17%	13%
113	TG1	867	179	0.20	811	169	0.21	7%	-4%
114	TG1	1085	86	0.08	1174	197	0.17	-8%	-49%
115	TG1	378	51	0.13	462	61	0.13	-18%	-1%
119	TG1	528	101	0.18	435	79	0.18	21%	1%
120	TG1	624	105	0.17	749	154	0.20	-17%	-17%
122	TG1	888	110	0.12	535	30	0.05	66%	131%
125	TG2	760	114	0.15	761	178	0.24	0%	-37%
127	TG2	568	100	0.18	620	113	0.18	-8%	-3%
129	TG2	582	100	0.17	567	109	0.19	3%	-8%
130	TG2	488	79	0.16	317	71	0.22	54%	-29%

		Three-month Average (Aug - Oct) -- cont'd							
		2006			2005			Delta: Change Relative to 2005	
Customer Number	Group	Monthly Total	Monthly Tot On-peak	Ratio On-peak (Monthly)	Monthly Total	Monthly Tot On-peak	Ratio On-peak (Monthly)	Monthly Total	Ratio On-peak (Monthly)
131	TG2	436	54	0.12	510	88	0.17	-14%	-24%
133	TG2	454	79	0.18	312	48	0.16	46%	12%
134	TG2	461	74	0.16	461	91	0.20	0%	-17%
136	TG2	474	82	0.17	450	84	0.18	5%	-8%
137	TG2	1157	238	0.21	865	228	0.26	34%	-21%
138	TG2	599	100	0.17	596	137	0.23	0%	-26%
139	TG2	1109	213	0.19	898	180	0.20	23%	-4%
141	TG2	621	94	0.15	692	116	0.17	-10%	-11%
142	TG2	392	52	0.13	431	82	0.19	-9%	-31%
143	TG2	702	133	0.19	680	119	0.18	3%	7%
145	TG2	681	106	0.16	469	75	0.15	45%	4%
147	TG2	841	186	0.22	777	140	0.18	8%	22%
150	TG3	200	28	0.14	205	36	0.17	-2%	-22%
152	TG3	556	141	0.25	670	128	0.19	-17%	33%
153	TG3	779	106	0.13	729	134	0.18	7%	-29%
154	TG3	547	73	0.13	700	175	0.25	-22%	-46%
155	TG3	213	25	0.12	271	31	0.11	-21%	11%
156	TG3	549	90	0.16	496	113	0.23	11%	-29%
157	TG3	470	62	0.13	489	63	0.13	-4%	2%
158	TG3	306	46	0.16	378	82	0.20	-19%	-23%
163	TG3	1326	172	0.13	1066	191	0.18	24%	-29%
164	TG3	675	118	0.17	805	173	0.22	-16%	-23%
165	TG3	933	177	0.19	554	115	0.20	68%	-8%
167	TG3	719	94	0.13	781	126	0.16	-8%	-19%
170	TG3	367	69	0.18	360	82	0.22	2%	-21%
171	TG3	730	145	0.20	837	179	0.21	-13%	-4%
173	TG3	479	77	0.16	442	73	0.16	8%	-2%
176	TG4	294	22	0.07	288	39	0.13	2%	-44%
179	TG4	520	65	0.12	592	97	0.16	-12%	-24%
181	TG4	1244	133	0.11	1367	225	0.16	-9%	-32%
182	TG4	292	39	0.13	259	34	0.13	13%	2%
183	TG4	538	67	0.13	501	50	0.10	7%	25%
184	TG4	272	29	0.10	281	30	0.11	-3%	-2%
185	TG4	386	55	0.15	498	70	0.15	-23%	1%
188	TG4	544	89	0.15	459	73	0.15	19%	1%
189	TG4	340	34	0.10	352	35	0.10	-4%	3%
191	TG4	555	95	0.17	671	135	0.20	-17%	-17%
193	TG4	694	118	0.17	543	120	0.22	28%	-23%
194	TG4	467	80	0.17	453	82	0.18	3%	-6%
195	TG4	789	122	0.16	482	115	0.24	64%	-35%
196	TG4	694	109	0.15	492	71	0.14	41%	9%
197	TG4	534	113	0.21	645	156	0.25	-17%	-15%
199	TG4	1493	246	0.17	1169	185	0.16	28%	5%
201	TG4	515	62	0.12	420	71	0.17	23%	-29%

Appendix IX Normality Results

Normality Testing Results for Dependent Variables, Treatment and Control Group #3 Only

Dependent Variable	Shapiro-Wilk		
	Statistic	df	Sig.*
AugTotDelta	0.946	109	0.000
AugPeakRationDelta	0.804	109	0.000
SeptTotDelta	0.874	109	0.000
SeptPeakRatioDelta	0.786	109	0.000
OctTotDelta	0.966	109	0.007
OctPeakRatioDelta	0.898	109	0.000
ThreeMonthTotDelta	0.952	109	0.001
ThreeMonthPeakRatioDelta	0.776	109	0.000
ShiftAugTotDelta	0.946	109	0.000
ShiftAugPeakRationDelta	0.804	109	0.000
ShiftSeptTotDelta	0.874	109	0.000
ShiftSeptPeakRatioDelta	0.786	109	0.000
ShiftOctTotDelta	0.966	109	0.007
ShiftOctPeakRatioDelta	0.898	109	0.000
ShiftThreeMonthTotDelta	0.952	109	0.001
ShiftThreeMonthPeakRatioDelta	0.776	109	0.000
LogShiftAugTotDelta	0.982	109	0.157
LogShiftAugPeakRationDelta	0.843	109	0.000
LogShiftSeptTotDelta	0.976	109	0.043
LogShiftSeptPeakRatioDelta	0.980	109	0.104
LogShiftOctTotDelta	0.959	109	0.002
LogShiftOctPeakRatioDelta	0.984	109	0.238
LogShiftThreeMonthTotDelta	0.989	109	0.483
LogShiftThreeMonthPeakRatioDelta	0.944	109	0.000
SqRtShiftAugTotDelta	0.974	109	0.030
SqRtShiftAugPeakRationDelta	0.906	109	0.000
SqRtShiftSeptTotDelta	0.940	109	0.000
SqRtShiftSeptPeakRatioDelta	0.914	109	0.000
SqRtShiftOctTotDelta	0.975	109	0.036
SqRtShiftOctPeakRatioDelta	0.953	109	0.001
SqRtShiftThreeMonthTotDelta	0.976	109	0.049
SqRtShiftThreeMonthPeakRatioDelta	0.881	109	0.000

* The null hypothesis that the data is normal is not rejected if the significance is greater than 0.05 (i.e. for normality, the significance level must be greater than 0.05).

Normality Testing Results for Dependent Variables, Treatment and Control Groups #1 & 2 Only

Dependent Variable	Shapiro-Wilk		
	Statistic	df	Sig.*
AugTotDelta	0.957	96	0.003
AugPeakRationDelta	0.858	96	0.000
SeptTotDelta	0.881	96	0.000
SeptPeakRatioDelta	0.826	96	0.000
OctTotDelta	0.926	96	0.000
OctPeakRatioDelta	0.923	96	0.000
ThreeMonthTotDelta	0.947	96	0.001
ThreeMonthPeakRatioDelta	0.811	96	0.000
ShiftAugTotDelta	0.957	96	0.003
ShiftAugPeakRationDelta	0.858	96	0.000
ShiftSeptTotDelta	0.881	96	0.000
ShiftSeptPeakRatioDelta	0.826	96	0.000
ShiftOctTotDelta	0.926	96	0.000
ShiftOctPeakRatioDelta	0.923	96	0.000
ShiftThreeMonthTotDelta	0.947	96	0.001
ShiftThreeMonthPeakRatioDelta	0.811	96	0.000
LogShiftAugTotDelta	0.990	96	0.691
LogShiftAugPeakRationDelta	0.826	96	0.000
LogShiftSeptTotDelta	0.975	96	0.061
LogShiftSeptPeakRatioDelta	0.979	96	0.124
LogShiftOctTotDelta	0.953	96	0.002
LogShiftOctPeakRatioDelta	0.974	96	0.050
LogShiftThreeMonthTotDelta	0.990	96	0.661
LogShiftThreeMonthPeakRatioDelta	0.961	96	0.006
SqRtShiftAugTotDelta	0.983	96	0.271
SqRtShiftAugPeakRationDelta	0.931	96	0.000
SqRtShiftSeptTotDelta	0.946	96	0.001
SqRtShiftSeptPeakRatioDelta	0.935	96	0.000
SqRtShiftOctTotDelta	0.962	96	0.006
SqRtShiftOctPeakRatioDelta	0.969	96	0.022
SqRtShiftThreeMonthTotDelta	0.975	96	0.066
SqRtShiftThreeMonthPeakRatioDelta	0.910	96	0.000

* The null hypothesis that the data is normal is not rejected if the significance is greater than 0.05 (i.e. for normality, the significance level must be greater than 0.05).

Normality Testing Results for Dependent Variables, Treatment and All Control Groups

Dependent Variable	Shapiro-Wilk		
	Statistic	df	Sig.*
AugTotDelta	0.957	141	0.000
AugPeakRationDelta	0.809	141	0.000
SeptTotDelta	0.895	141	0.000
SeptPeakRatioDelta	0.792	141	0.000
OctTotDelta	0.945	141	0.000
OctPeakRatioDelta	0.921	141	0.000
ThreeMonthTotDelta	0.957	141	0.000
ThreeMonthPeakRatioDelta	0.792	141	0.000
ShiftAugTotDelta	0.957	141	0.000
ShiftAugPeakRationDelta	0.809	141	0.000
ShiftSeptTotDelta	0.895	141	0.000
ShiftSeptPeakRatioDelta	0.792	141	0.000
ShiftOctTotDelta	0.945	141	0.000
ShiftOctPeakRatioDelta	0.921	141	0.000
ShiftThreeMonthTotDelta	0.957	141	0.000
ShiftThreeMonthPeakRatioDelta	0.792	141	0.000
LogShiftAugTotDelta	0.989	141	0.325
LogShiftAugPeakRationDelta	0.860	141	0.000
LogShiftSeptTotDelta	0.978	141	0.025
LogShiftSeptPeakRatioDelta	0.980	141	0.035
LogShiftOctTotDelta	0.968	141	0.002
LogShiftOctPeakRatioDelta	0.979	141	0.029
LogShiftThreeMonthTotDelta	0.991	141	0.548
LogShiftThreeMonthPeakRatioDelta	0.951	141	0.000
SqRtShiftAugTotDelta	0.983	141	0.081
SqRtShiftAugPeakRationDelta	0.912	141	0.000
SqRtShiftSeptTotDelta	0.956	141	0.000
SqRtShiftSeptPeakRatioDelta	0.915	141	0.000
SqRtShiftOctTotDelta	0.974	141	0.009
SqRtShiftOctPeakRatioDelta	0.969	141	0.003
SqRtShiftThreeMonthTotDelta	0.982	141	0.058
SqRtShiftThreeMonthPeakRatioDelta	0.891	141	0.000

* The null hypothesis that the data is normal is not rejected if the significance is greater than 0.05 (i.e. for normality, the significance level must be greater than 0.05).

Normality Testing Results for Dependent Variables, Treatment Groups Only

Dependent Variable	Shapiro-Wilk		
	Statistic	df	Sig.*
AugTotDelta	0.941	64	0.004
AugPeakRatioDelta	0.849	64	0.000
SeptTotDelta	0.837	64	0.000
SeptPeakRatioDelta	0.830	64	0.000
OctTotDelta	0.974	64	0.193
OctPeakRatioDelta	0.879	64	0.000
ThreeMonthAveTotDelta	0.928	64	0.001
ThreeMonthAvePeakRatioDelta	0.779	64	0.000
ShiftAugTotDelta	0.941	64	0.004
ShiftAugPeakRationDelta	0.849	64	0.000
ShiftSeptTotDelta	0.837	64	0.000
ShiftSeptPeakRatioDelta	0.830	64	0.000
ShiftOctTotDelta	0.974	64	0.193
ShiftOctPeakRatioDelta	0.879	64	0.000
ShiftThreeMonthTotDelta	0.928	64	0.001
ShiftThreeMonthPeakRatioDelta	0.779	64	0.000
LogShiftAugTotDelta	0.979	64	0.361
LogShiftAugPeakRationDelta	0.806	64	0.000
LogShiftSeptTotDelta	0.952	64	0.015
LogShiftSeptPeakRatioDelta	0.974	64	0.204
LogShiftOctTotDelta	0.940	64	0.004
LogShiftOctPeakRatioDelta	0.970	64	0.116
LogShiftThreeMonthTotDelta	0.968	64	0.096
LogShiftThreeMonthPeakRatioDelta	0.946	64	0.008
SqRtShiftAugTotDelta	0.969	64	0.102
SqRtShiftAugPeakRationDelta	0.925	64	0.001
SqRtShiftSeptTotDelta	0.904	64	0.000
SqRtShiftSeptPeakRatioDelta	0.941	64	0.004
SqRtShiftOctTotDelta	0.970	64	0.126
SqRtShiftOctPeakRatioDelta	0.936	64	0.002
SqRtShiftThreeMonthTotDelta	0.952	64	0.014
SqRtShiftThreeMonthPeakRatioDelta	0.893	64	0.000
AugTotDelta	0.941	64	0.004

* The null hypothesis that the data is normal is not rejected if the significance is greater than 0.05 (i.e. for normality, the significance level must be greater than 0.05).

Appendix X Mann-Whitney Results for Treatment and Control Groups

Mann-Whitney Significance Results for Consumption Changes Comparing All Feedback Recipients and All Non-Recipients

Dependent Variable	Mann-Whitney Statistic	Sig (2-tailed)*	Medians for Feedback and Non-Feedback Groups (Listed for Significant Findings Only)
AugTotDelta	2397	0.781	
AugPeakRatioDelta	2292	0.476	
SeptTotDelta	1964	0.038	Feedback Median = 0.08; No Feedback Median = -0.02
SeptPeakRatioDelta	2446	0.941	
OctTotDelta	2321	0.554	
OctPeakRatioDelta	1860	0.012	Feedback Median = -0.12; No Feedback Median = -0.01
ThreeMonthAveTotDelta	2228	0.328	
ThreeMonthAvePeakRatioDelta	2233	0.339	
Subdividing into "High" and "Low" Consumer Groups			
AugTotDelta – High Consumers	607	0.880	
AugTotDelta – Low Consumers	569	0.625	
AugPeakRatioDelta – High Consumers	565	0.524	
AugPeakRatioDelta – Low Consumers	579	0.711	
SeptTotDelta – High Consumers	494	0.133	
SeptTotDelta – Low Consumers	484	0.144	
SeptPeakRatioDelta – High Consumers	483	0.103	
SeptPeakRatioDelta – Low Consumers	504	0.220	
OctTotDelta – High Consumers	458	0.049	Feedback Median = 0.03; No Feedback Median = -0.04
OctTotDelta – Low Consumers	505	0.362	
OctPeakRatioDelta – High Consumers	490	0.110	
OctPeakRatioDelta – Low Consumers	422	0.056	
ThreeMonthAveTotDelta – High Consumers	479	0.084	
ThreeMonthAveTotDelta – Low Consumers	585	0.818	
ThreeMonthAvePeakRatioDelta – High Consumers	550	0.363	
ThreeMonthAvePeakRatioDelta – Low Consumers	590	0.864	

Mann-Whitney Test Results For Consumption Changes Comparing Feedback Recipients and CG1/CG2 Non-Recipients – Significant Results Only

Dependent Variable	Mann-Whitney Statistic	Sig (2-tailed)*	Medians for Feedback and Non-Feedback Groups (Listed for Significant Findings Only)
AugTotDelta	1013	0.932	
AugPeakRatioDelta	936	0.494	
SeptTotDelta	733	0.024	Feedback Median = 0.075; No Feedback Median = -0.06
SeptPeakRatioDelta	977	0.715	
OctTotDelta	899	0.331	
OctPeakRatioDelta	743	0.029	Feedback Median = -0.115; No Feedback Median = 0.01
ThreeMonthAveTotDelta	884	0.277	
ThreeMonthAvePeakRatioDelta	1014	0.938	
Subdividing into "High" and "Low" Consumer Groups			
AugTotDelta – High Consumers	186	0.475	
AugTotDelta – Low Consumers	253	0.572	
AugPeakRatioDelta – High Consumers	210	0.886	
AugPeakRatioDelta – Low Consumers	255	0.601	
SeptTotDelta – High Consumers	107	0.009	Feedback Median = 0.005; No Feedback Median = -0.16
SeptTotDelta – Low Consumers	209	0.138	
SeptPeakRatioDelta – High Consumers	204	0.775	
SeptPeakRatioDelta – Low Consumers	245	0.464	
OctTotDelta – High Consumers	144	0.144	
OctTotDelta – Low Consumers	274	0.843	
OctPeakRatioDelta – High Consumers	171	0.425	
OctPeakRatioDelta - Low Consumers	184	0.039	Feedback Median = -0.12; No Feedback Median = 0.08
ThreeMonthAveTotDelta – Low Consumers	272	0.867	
ThreeMonthAveTotDelta – High Consumers	132	0.046	Feedback Median = 0.025; No Feedback Median = -0.105
ThreeMonthAvePeakRatioDelta – Low Consumers	270	0.834	
ThreeMonthAvePeakRatioDelta – High Consumers	205	0.793	

Mann-Whitney Significance Results for Consumption Changes Comparing Feedback Recipients and Only CG3 Non-Recipients

Dependent Variable	Mann-Whitney Statistic	Sig (2-tailed)*	Medians for Feedback and Non-Feedback Groups (Listed for Significant Findings Only)
AugTotDelta	1362	0.631	
AugPeakRatioDelta	1180	0.110	
SeptTotDelta	1231	0.198	
SeptPeakRatioDelta	1375	0.689	
OctTotDelta	1422	0.912	
OctPeakRatioDelta	1117	0.047	Feedback Median = -0.12; No Feedback Median = -0.04
ThreeMonthAveTotDelta	1344	0.555	
ThreeMonthAvePeakRatioDelta	1219	0.174	
Subdividing into "High" and "Low" Consumer Groups			
AugTotDelta – High Consumers	350	0.673	
AugTotDelta – Low Consumers	271	0.216	
AugPeakRatioDelta – High Consumers	318	0.335	
AugPeakRatioDelta – Low Consumers	274	0.237	
SeptTotDelta – High Consumers	333	0.508	
SeptTotDelta – Low Consumers	296	0.370	
SeptPeakRatioDelta – High Consumers	297	0.203	
SeptPeakRatioDelta – Low Consumers	319	0.626	
OctTotDelta – High Consumers	291	0.216	
OctTotDelta – Low Consumers	288	0.231	
OctPeakRatioDelta – High Consumers	273	0.122	
OctPeakRatioDelta – Low Consumers	289	0.238	
ThreeMonthAveTotDelta – High Consumers	318	0.394	
ThreeMonthAveTotDelta – Low Consumers	343	0.874	
ThreeMonthAvePeakRatioDelta – High Consumers	259	0.063	
ThreeMonthAvePeakRatioDelta – Low Consumers	334	0.751	

Appendix XI Two-Way Univariate ANOVA Results

Tests of Between-Subjects Effects

Dependent Variable: OctTotDelta

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	.436(a)	3	.145	2.720	.052
Intercept	.286	1	.286	5.351	.024
HistVsComp	.211	1	.211	3.954	.051
MailVsEmail	.227	1	.227	4.242	.044
HistVsComp * MailVsEmail	.015	1	.015	.275	.602
Error	3.204	60	.053		
Total	3.946	64			
Corrected Total	3.640	63			

a R Squared = .120 (Adjusted R Squared = .076)

Tests of Between-Subjects Effects

Dependent Variable: LogShiftAugTotDelta

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	.043(a)	3	.014	.645	.589
Intercept	.408	1	.408	18.211	.000
HistVsComp	.022	1	.022	.991	.323
MailVsEmail	.013	1	.013	.565	.455
HistVsComp * MailVsEmail	.008	1	.008	.365	.548
Error	1.346	60	.022		
Total	1.799	64			
Corrected Total	1.389	63			

a R Squared = .031 (Adjusted R Squared = -.017)

Tests of Between-Subjects Effects

Dependent Variable: LogShiftSeptPeakRatioDelta

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	.229(a)	3	.076	2.278	.089
Intercept	1.783	1	1.783	53.282	.000
HistVsComp	.168	1	.168	5.018	.029
MailVsEmail	.019	1	.019	.581	.449
HistVsComp * MailVsEmail	.043	1	.043	1.274	.263
Error	2.008	60	.033		
Total	4.017	64			
Corrected Total	2.236	63			

a R Squared = .102 (Adjusted R Squared = .057)

Tests of Between-Subjects Effects

Dependent Variable: LogShiftOctPeakRatioDelta

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	.054(a)	3	.018	.991	.403
Intercept	1.407	1	1.407	76.808	.000
HistVsComp	.020	1	.020	1.094	.300
MailVsEmail	.007	1	.007	.378	.541
HistVsComp * MailVsEmail	.028	1	.028	1.538	.220
Error	1.099	60	.018		
Total	2.557	64			
Corrected Total	1.153	63			

a R Squared = .047 (Adjusted R Squared = .000)

Tests of Between-Subjects Effects

Dependent Variable: LogShiftThreeMonthTotDelta

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	.049(a)	3	.016	1.352	.266
Intercept	.281	1	.281	23.166	.000
HistVsComp	.034	1	.034	2.763	.102
MailVsEmail	.004	1	.004	.300	.586
HistVsComp * MailVsEmail	.014	1	.014	1.157	.286
Error	.728	60	.012		
Total	1.053	64			
Corrected Total	.777	63			

a R Squared = .063 (Adjusted R Squared = .016)

Tests of Between-Subjects Effects

Dependent Variable: SqRtShiftAugTotDelta

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	.060(a)	3	.020	.790	.504
Intercept	54.682	1	54.682	2155.434	.000
HistVsComp	.030	1	.030	1.201	.278
MailVsEmail	.018	1	.018	.691	.409
HistVsComp * MailVsEmail	.012	1	.012	.462	.499
Error	1.522	60	.025		
Total	56.360	64			
Corrected Total	1.582	63			

a R Squared = .038 (Adjusted R Squared = -.010)

Tests of Between-Subjects Effects

Dependent Variable: SqRtShiftOctTotDelta

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	.131(a)	3	.044	2.712	.053
Intercept	54.278	1	54.278	3365.184	.000
MailVsEmail	.071	1	.071	4.373	.041
HistVsComp	.063	1	.063	3.894	.053
MailVsEmail * HistVsComp	.003	1	.003	.169	.682
Error	.968	60	.016		
Total	55.630	64			
Corrected Total	1.099	63			

a R Squared = .119 (Adjusted R Squared = .075)

Appendix XII Kruskal-Wallis Results

Main Effect Tests

Test Statistics(a,b)

	AugTotDelta
Chi-Square	.987
df	1
Asymp. Sig.	.320

a Kruskal Wallis Test
b Grouping Variable: HistVsComp

	AugTotDelta
Chi-Square	1.029
df	1
Asymp. Sig.	.310

a Kruskal Wallis Test
b Grouping Variable: MailVsEmail

Test Statistics(a,b)

	AugPeakRatio Delta
Chi-Square	.022
df	1
Asymp. Sig.	.883

a Kruskal Wallis Test
b Grouping Variable: HistVsComp

	AugPeakRatio Delta
Chi-Square	.127
df	1
Asymp. Sig.	.722

a Kruskal Wallis Test
b Grouping Variable: MailVsEmail

Test Statistics(a,b)

	SeptTotDelta
Chi-Square	1.154
df	1
Asymp. Sig.	.283

a Kruskal Wallis Test
b Grouping Variable: HistVsComp

	SeptTotDelta
Chi-Square	.822
df	1
Asymp. Sig.	.365

a Kruskal Wallis Test
b Grouping Variable: MailVsEmail

Test Statistics(a,b)

	SeptPeakRatio Delta
Chi-Square	3.189
df	1
Asymp. Sig.	.074

a Kruskal Wallis Test
b Grouping Variable: HistVsComp

	SeptPeakRatio Delta
Chi-Square	.282
df	1
Asymp. Sig.	.596

a Kruskal Wallis Test
b Grouping Variable: MailVsEmail

Test Statistics(a,b)

	OctTotDelta
Chi-Square	3.237
df	1
Asymp. Sig.	.072

a Kruskal Wallis Test
b Grouping Variable: HistVsComp

	OctTotDelta
Chi-Square	4.088
df	1
Asymp. Sig.	.043

a Kruskal Wallis Test
b Grouping Variable: MailVsEmail

Test Statistics(a,b)

	OctPeakRatioDelta
Chi-Square	.961
df	1
Asymp. Sig.	.327

a Kruskal Wallis Test
b Grouping Variable: HistVsComp

	OctPeakRatioDelta
Chi-Square	.055
df	1
Asymp. Sig.	.814

a Kruskal Wallis Test
b Grouping Variable: MailVsEmail

Test Statistics(a,b)

	ThreeMonthAveTotDelta
Chi-Square	2.596
df	1
Asymp. Sig.	.107

a Kruskal Wallis Test
b Grouping Variable: HistVsComp

	ThreeMonthAveTotDelta
Chi-Square	.240
df	1
Asymp. Sig.	.624

a Kruskal Wallis Test
b Grouping Variable: MailVsEmail

Test Statistics(a,b)

	ThreeMonthAvePeakRatioDelta
Chi-Square	.858
df	1
Asymp. Sig.	.354

a Kruskal Wallis Test
b Grouping Variable: HistVsComp

	ThreeMonthAvePeakRatioDelta
Chi-Square	.038
df	1
Asymp. Sig.	.846

a Kruskal Wallis Test
b Grouping Variable: MailVsEmail

Interaction Effect Tests

Test Statistics(a,b)

	AugTot Delta	AugPeak RatioDelta	SeptTot Delta	SeptPeak RatioDelta	OctTot Delta	OctPeak RatioDelta	ThreeMonthAveTotDelta	ThreeMonthAvePeakRatioDelta
Chi-Square	.187	.292	.219	.187	.747	.130	.219	.032
df	1	1	1	1	1	1	1	1
Asymp. Sig.	.666	.589	.640	.666	.387	.719	.640	.857

a Kruskal Wallis Test
b Grouping Variable: HistVsComp with MailVsEmail held at “Mail”

Test Statistics(a,b)

	AugTot Delta	AugPeak RatioDelta	SeptTot Delta	SeptPeak RatioDelta	OctTot Delta	OctPeak RatioDelta	ThreeMonthAveTotDelta	ThreeMonthAvePeakRatioDelta
Chi-Square	1.225	.264	3.452	3.452	2.756	2.889	3.600	3.025
df	1	1	1	1	1	1	1	1
Asymp. Sig.	.268	.607	.063	.063	.097	.089	.058	.082

a Kruskal Wallis Test
b Grouping Variable: HistVsComp with MailVsEmail held at “Email”

For an interaction, the significances for each dependent variable at Mail and Email must add to less than 0.05.

Test Statistics(a,b)

	AugTot Delta	AugPeak RatioDelta	SeptTot Delta	SeptPeak RatioDelta	OctTot Delta	OctPeak RatioDelta	ThreeMonthAveTotDelta	ThreeMonthAvePeakRatioDelta
Chi-Square	1.365	.091	.460	1.278	.751	1.036	.411	1.455
df	1	1	1	1	1	1	1	1
Asymp. Sig.	.243	.763	.498	.258	.386	.309	.522	.228

a Kruskal Wallis Test
b Grouping Variable: MailVsEmail with HistVsComp held at “Hist”

Test Statistics(a,b)

	AugTot Delta	AugPeak RatioDelta	SeptTot Delta	SeptPeak RatioDelta	OctTot Delta	OctPeak RatioDelta	ThreeMonthAveTotDelta	ThreeMonthAvePeakRatioDelta
Chi-Square	.029	.788	4.715	.029	3.494	1.078	1.506	.437
df	1	1	1	1	1	1	1	1
Asymp. Sig.	.865	.375	.030	.865	.062	.299	.220	.509

a Kruskal Wallis Test
b Grouping Variable: MailVsEmail with HistVsComp held at “Comp”

For an interaction, the significances for each dependent variable at Hist and Comp must add to less than 0.05.

Appendix XIII Survey #2 Results Tables

Feedback

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	44	33.8	33.8	33.8
	No	86	66.2	66.2	100.0
	Total	130	100.0	100.0	

Type

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Historic	24	18.5	18.5	18.5
	Comparative	20	15.4	15.4	33.8
	Non-PII - TOU	68	52.3	52.3	86.2
	Non-PII - non-TOU	15	11.5	11.5	97.7
	Invalid Feedback - Non-PII - TOU	3	2.3	2.3	100.0
	Total	130	100.0	100.0	

ActualMailOrEmail

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		83	63.8	63.8	63.8
	Mail	27	20.8	20.8	84.6
	Email	20	15.4	15.4	100.0
	Total	130	100.0	100.0	

A1.SamePerson

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	126	96.9	96.9	96.9
	No	4	3.1	3.1	100.0
	Total	130	100.0	100.0	

A2.ChangesInSummer

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	33	25.4	25.4	25.4
	No	97	74.6	74.6	100.0
	Total	130	100.0	100.0	

A3.HomeDuringDay

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	73	56.2	56.2	56.2
	No	57	43.8	43.8	100.0
	Total	130	100.0	100.0	

A4.CFL

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes, in most/all	59	45.4	45.7	45.7
	Yes, one or two	38	29.2	29.5	75.2
	No, but...in the next 2 years	19	14.6	14.7	89.9
	No	12	9.2	9.3	99.2
	I have not heard of CFLs	1	.8	.8	100.0
	Total	129	99.2	100.0	
Missing	No response	1	.8		
Total		130	100.0		

VAR00012

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		127	97.7	97.7	97.7
	8 bulbs so far	1	.8	.8	98.5
	garage, basement, outdoor lights	1	.8	.8	99.2
	wrote "about one third"	1	.8	.8	100.0
	Total	130	100.0	100.0	

A5.KnowAveDailyConsumption

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	47	36.2	37.9	37.9
	No	77	59.2	62.1	100.0
	Total	124	95.4	100.0	
Missing	No response	6	4.6		
Total		130	100.0		

NonPartA6.WhatConsumesMost

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		49	37.7	37.7	37.7
	(answered but can't read the writing)	1	.8	.8	38.5
	A.C.	1	.8	.8	39.2
	A/C	13	10.0	10.0	49.2
	A/C + dishwasher + washer/dryer	1	.8	.8	50.0
	A/C or dryer	1	.8	.8	50.8
	AC	1	.8	.8	51.5
	AC and the clothes dryer	1	.8	.8	52.3
	Air-Conditioner	1	.8	.8	53.1
	Air con.	1	.8	.8	53.8
	AIR CONDITION	1	.8	.8	54.6
	air conditioner	11	8.5	8.5	63.1
	Air conditioner	5	3.8	3.8	66.9
	Air Conditioner	6	4.6	4.6	71.5
	AIR CONDITIONER	6	4.6	4.6	76.2
	Air conditioner or oven	1	.8	.8	76.9
	air conditioning	2	1.5	1.5	78.5
	Air Conditioning	2	1.5	1.5	80.0
	AIR CONDITIONING	5	3.8	3.8	83.8
	Air conditioning (central air)	1	.8	.8	84.6
	air conditioning unit	1	.8	.8	85.4
	appliances, ac in the summer, hot tub	1	.8	.8	86.2
	central air	1	.8	.8	86.9
	CENTRAL AIR	1	.8	.8	87.7
	convection oven	1	.8	.8	88.5
	dryer/spa/computer (servers)	1	.8	.8	89.2
	Electric Stove	1	.8	.8	90.0
	fans - table top & 2 floor ones	1	.8	.8	90.8
	Fans	1	.8	.8	91.5
	FRIDGE	1	.8	.8	92.3
	Laundry Machine & dryer	1	.8	.8	93.1
	less (?)	1	.8	.8	93.8
	LIGHTING OR STOVE & FRIDGE (NO AC)	1	.8	.8	94.6
	Refrigerator	1	.8	.8	95.4
	REFRIGERATOR	1	.8	.8	96.2
	REFRIGERATOR & AIR CON	1	.8	.8	96.9
	Sprinkler System (Pump)	1	.8	.8	97.7
	TV	1	.8	.8	98.5

	Window A/C; Electric Appliances	1	.8	.8	99.2
	yes	1	.8	.8	100.0
	Total	130	100.0	100.0	

A6.ESAppliance

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		1	.8	8.3	8.3
	Yes	11	8.5	91.7	100.0
	Total	12	9.2	100.0	
Missing	No response	118	90.8		
Total		130	100.0		

A6.ESAC

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		1	.8	16.7	16.7
	Yes	5	3.8	83.3	100.0
	Total	6	4.6	100.0	
Missing	No response	124	95.4		
Total		130	100.0		

A6.UpgradeFurnace

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		1	.8	20.0	20.0
	Yes	4	3.1	80.0	100.0
	Total	5	3.8	100.0	
Missing	No response	125	96.2		
Total		130	100.0		

A6.UpgradeInsulation

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		1	.8	16.7	16.7
	Yes	5	3.8	83.3	100.0
	Total	6	4.6	100.0	
Missing	No response	124	95.4		
Total		130	100.0		

A6.UpgradeWinDoors

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		1	.8	12.5	12.5
	Yes	7	5.4	87.5	100.0
	Total	8	6.2	100.0	
Missing	No response	122	93.8		
Total		130	100.0		

A6.EnergyAudit

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	13	10.0	100.0	100.0
Missing	No response	117	90.0		
Total		130	100.0		

B1.HomeUseAwareness

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very high	21	16.2	16.2	16.2
	High	48	36.9	36.9	53.1
	Average	56	43.1	43.1	96.2
	Low	5	3.8	3.8	100.0
	Total	130	100.0	100.0	

B2.TalkConsChildren

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very frequently (every week)	15	11.5	12.8	12.8
	Frequently (every month)	11	8.5	9.4	22.2
	Occasionally (every few months)	11	8.5	9.4	31.6
	Never	6	4.6	5.1	36.8
	Not applicable	74	56.9	63.2	100.0
	Total	117	90.0	100.0	
Missing	No response	13	10.0		
Total		130	100.0		

B2.TalkConsSpouse

	Frequency	Percent	Valid Percent	Cumulative Percent

Valid	Very frequently (every week)	30	23.1	24.4	24.4
	Frequently (every month)	40	30.8	32.5	56.9
	Occasionally (every few months)	37	28.5	30.1	87.0
	Never	3	2.3	2.4	89.4
	Not applicable	13	10.0	10.6	100.0
	Total	123	94.6	100.0	
Missing	No response	7	5.4		
Total		130	100.0		

B2.TalkConsOtherFam

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very frequently (every week)	6	4.6	4.9	4.9
	Frequently (every month)	27	20.8	22.0	26.8
	Occasionally (every few months)	45	34.6	36.6	63.4
	Never	18	13.8	14.6	78.0
	Not applicable	27	20.8	22.0	100.0
	Total	123	94.6	100.0	
Missing	No response	7	5.4		
Total		130	100.0		

B2.TalkConsNeighbours

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very frequently (every week)	1	.8	.9	.9
	Frequently (every month)	10	7.7	8.8	9.6
	Occasionally (every few months)	42	32.3	36.8	46.5
	Never	54	41.5	47.4	93.9
	Not applicable	7	5.4	6.1	100.0
	Total	114	87.7	100.0	
Missing	No response	16	12.3		
Total		130	100.0		

B2.TalkConsFriends

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very frequently (every week)	2	1.5	1.7	1.7

	Frequently (every month)	12	9.2	10.2	11.9
	Occasionally (every few months)	70	53.8	59.3	71.2
	Never	28	21.5	23.7	94.9
	Not applicable	6	4.6	5.1	100.0
	Total	118	90.8	100.0	
Missing	No response	12	9.2		
Total		130	100.0		

B2.TalkConsCoWorkers

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		1	.8	.9	.9
	Very frequently (every week)	1	.8	.9	1.7
	Frequently (every month)	8	6.2	7.0	8.7
	Occasionally (every few months)	54	41.5	47.0	55.7
	Never	37	28.5	32.2	87.8
	Not applicable	14	10.8	12.2	100.0
	Total	115	88.5	100.0	
Missing	No response	15	11.5		
Total		130	100.0		

B3.CommitmentConservation

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very committed	35	26.9	26.9	26.9
	Committed	66	50.8	50.8	77.7
	Somewhat committed	27	20.8	20.8	98.5
	Minimally committed	2	1.5	1.5	100.0
	Total	130	100.0	100.0	

C1.HowOftenAdjustACDuringPeak

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Always - programmable	50	38.5	39.1	39.1
	Always - manual	28	21.5	21.9	60.9
	Only during provincial appeals	4	3.1	3.1	64.1
	Frequently (1 or 2 times per week)	9	6.9	7.0	71.1
	Occasionally	15	11.5	11.7	82.8
	Never	3	2.3	2.3	85.2

	I don't know peak times	1	.8	.8	85.9
	NA - no AC	3	2.3	2.3	88.3
	Question not in this survey	15	11.5	11.7	100.0
	Total	128	98.5	100.0	
Missing	999	2	1.5		
Total		130	100.0		

C2.ReducePeakCommitment

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very committed	43	33.1	33.3	33.3
	Committed	51	39.2	39.5	72.9
	Somewhat committed	17	13.1	13.2	86.0
	Minimally committed	3	2.3	2.3	88.4
	Question not in this survey	15	11.5	11.6	100.0
	Total	129	99.2	100.0	
Missing	No response	1	.8		
Total		130	100.0		

C3.MoreControlPatternsAndCosts

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		1	.8	.8	.8
	Yes	97	74.6	75.2	76.0
	No	11	8.5	8.5	84.5
	I didn't know about TOU pricing	5	3.8	3.9	88.4
	Question not in this survey	15	11.5	11.6	100.0
	Total	129	99.2	100.0	
Missing	No response	1	.8		
Total		130	100.0		

VAR00001

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		129	99.2	99.2	99.2
	(checked both "yes" and "no")	1	.8	.8	100.0
	Total	130	100.0	100.0	

C4.KnowPeakRate

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	71	54.6	55.5	55.5
	No	42	32.3	32.8	88.3
	Question not in this survey	15	11.5	11.7	100.0
	Total	128	98.5	100.0	
Missing	No response	2	1.5		
Total		130	100.0		

C4.SpecifyRate

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		47	36.2	36.2	36.2
	(nothing written)	1	.8	.8	36.9
	~ 11.9	1	.8	.8	37.7
	~10	1	.8	.8	38.5
	0.093	2	1.5	1.5	40.0
	0.105	8	6.2	6.2	46.2
	10	2	1.5	1.5	47.7
	10.3	3	2.3	2.3	50.0
	10.4	1	.8	.8	50.8
	10.5	20	15.4	15.4	66.2
	10.9	1	.8	.8	66.9
	10+	1	.8	.8	67.7
	105	2	1.5	1.5	69.2
	11.5	1	.8	.8	70.0
	41-42	1	.8	.8	70.8
	6-7	1	.8	.8	71.5
	9	2	1.5	1.5	73.1
	9 PLUS	1	.8	.8	73.8
	9.	1	.8	.8	74.6
	9.3	12	9.2	9.2	83.8
	9.4	1	.8	.8	84.6
	9.6	1	.8	.8	85.4
	9.6 about	1	.8	.8	86.2
	9.6?	1	.8	.8	86.9
	9.8	1	.8	.8	87.7
	9999	15	11.5	11.5	99.2
	twice the edge (?) rate and three times the night rate	1	.8	.8	100.0
	Total	130	100.0	100.0	

C5.KnowPeakPeriod

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	82	63.1	65.1	65.1
	No	29	22.3	23.0	88.1
	Question not in this survey	15	11.5	11.9	100.0
	Total	126	96.9	100.0	
Missing	No response	4	3.1		
Total		130	100.0		

C5.SpecifyPeriod

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		31	23.8	23.8	23.8
	(no response)	1	.8	.8	24.6
	(nothing written)	1	.8	.8	25.4
	10am, 2pm	1	.8	.8	26.2
	10am, 7pm	1	.8	.8	26.9
	10PM, 8AM (I think this is what he means)	1	.8	.8	27.7
	11, 5	4	3.1	3.1	30.8
	11,5	1	.8	.8	31.5
	11am, 5or6pm	1	.8	.8	32.3
	11am, 5pm	38	29.2	29.2	61.5
	11am, 6pm	2	1.5	1.5	63.1
	11am, 7pm	1	.8	.8	63.8
	11am,5	1	.8	.8	64.6
	12, 5	1	.8	.8	65.4
	12md(?), 8pm	1	.8	.8	66.2
	1pm, 6pm	1	.8	.8	66.9
	5am, 11am	1	.8	.8	67.7
	5pm, 10pm	1	.8	.8	68.5
	6am, 11am	1	.8	.8	69.2
	7-11am, 5-10pm	1	.8	.8	70.0
	7&5 AM&PM, 11&8 AM&PM (??)	1	.8	.8	70.8
	7, 10:30	1	.8	.8	71.5
	7, 6	1	.8	.8	72.3
	7am, 10pm	2	1.5	1.5	73.8
	7am, 11am	1	.8	.8	74.6
	7am, 11pm	1	.8	.8	75.4
	7am, 5pm	2	1.5	1.5	76.9
	7am, 6pm	2	1.5	1.5	78.5
	7am, 7pm	1	.8	.8	79.2
	8, 10	2	1.5	1.5	80.8

	8, 6 I think (I think underlined)	1	.8	.8	81.5
	8, 8	1	.8	.8	82.3
	8am, 11pm	1	.8	.8	83.1
	8am, 5pm	1	.8	.8	83.8
	8am, 7pm	1	.8	.8	84.6
	8am, 8pm	1	.8	.8	85.4
	9999	15	11.5	11.5	96.9
	9am, 5pm	1	.8	.8	97.7
	9am, 8pm	1	.8	.8	98.5
	wrote "off-peak, 10pm - 7am"	1	.8	.8	99.2
	wrote "posted on fridge"	1	.8	.8	100.0
	Total	130	100.0	100.0	

C6.EasyToRemember

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	35	26.9	27.1	27.1
	Somewhat	59	45.4	45.7	72.9
	No	12	9.2	9.3	82.2
	I've never tried to remember	8	6.2	6.2	88.4
	Question not in this survey	15	11.5	11.6	100.0
	Total	129	99.2	100.0	
Missing	No response	1	.8		
Total		130	100.0		

D1.WCRUseful

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		86	66.2	66.2	66.2
	Yes	39	30.0	30.0	96.2
	No	5	3.8	3.8	100.0
	Total	130	100.0	100.0	

D2.ClearEasyUnderstand

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		86	66.2	66.2	66.2
	Yes	40	30.8	30.8	96.9
	No	4	3.1	3.1	100.0
	Total	130	100.0	100.0	

D3.WantedOtherInfo

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		86	66.2	67.2	67.2
	Yes	7	5.4	5.5	72.7
	No	34	26.2	26.6	99.2
	Maybe	1	.8	.8	100.0
	Total	128	98.5	100.0	
Missing	No response	2	1.5		
Total		130	100.0		

D4.SurprisedAtConsumption

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		86	66.2	66.7	66.7
	Yes, I thought we consumed more	8	6.2	6.2	72.9
	Yes, I thought we consumed less	19	14.6	14.7	87.6
	No	16	12.3	12.4	100.0
	Total	129	99.2	100.0	
Missing	No response	1	.8		
Total		130	100.0		

D5.TakeActionBecauseOfWCR

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		86	66.2	66.2	66.2
	Yes	28	21.5	21.5	87.7
	No	16	12.3	12.3	100.0
	Total	130	100.0	100.0	

D6.WCRsUsefulReduceBill

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		86	66.2	66.2	66.2
	Yes	21	16.2	16.2	82.3
	No	11	8.5	8.5	90.8
	I don't know	12	9.2	9.2	100.0
	Total	130	100.0	100.0	

D7.ReportedMailOrEmail

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		86	66.2	67.2	67.2
	Mail	26	20.0	20.3	87.5
	Email	16	12.3	12.5	100.0
	Total	128	98.5	100.0	
Missing	No response	2	1.5		
Total		130	100.0		

D7.MailKeep

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		86	66.2	66.2	66.2
	Yes	23	17.7	17.7	83.8
	No	4	3.1	3.1	86.9
	Not applicable, no response	17	13.1	13.1	100.0
	Total	130	100.0	100.0	

D7.MailFolder

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		86	66.2	67.7	67.7
	Yes	13	10.0	10.2	78.0
	No	11	8.5	8.7	86.6
	Not applicable, no response	17	13.1	13.4	100.0
	Total	127	97.7	100.0	
Missing	No response	3	2.3		
Total		130	100.0		

D7.MailReferBack

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		86	66.2	66.7	66.7
	Yes	20	15.4	15.5	82.2
	No	6	4.6	4.7	86.8
	Not applicable, no response	17	13.1	13.2	100.0
	Total	129	99.2	100.0	
Missing	No response	1	.8		
Total		130	100.0		

D7.MailShowFamily

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		86	66.2	66.7	66.7
	Yes	22	16.9	17.1	83.7
	No	4	3.1	3.1	86.8
	Not applicable, no response	17	13.1	13.2	100.0
	Total	129	99.2	100.0	
Missing	No response	1	.8		
Total		130	100.0		

D7.EmailPrint

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		86	66.2	66.7	66.7
	Yes	10	7.7	7.8	74.4
	No	6	4.6	4.7	79.1
	Not applicable, no response	27	20.8	20.9	100.0
	Total	129	99.2	100.0	
Missing	No response	1	.8		
Total		130	100.0		

D7.EmailKeep

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		86	66.2	66.2	66.2
	Yes (emails)	13	10.0	10.0	76.2
	No	1	.8	.8	76.9
	Yes (email & printouts)	3	2.3	2.3	79.2
	Not applicable, no response	27	20.8	20.8	100.0
	Total	130	100.0	100.0	

D7.EmailReferBack

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		86	66.2	66.2	66.2
	Yes (emails)	11	8.5	8.5	74.6
	Yes (printouts)	1	.8	.8	75.4
	No	3	2.3	2.3	77.7

	Yes (email & printouts)	2	1.5	1.5	79.2
	Not applicable, no response	27	20.8	20.8	100.0
	Total	130	100.0	100.0	

D7.EmailShowFamily

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		86	66.2	66.7	66.7
	Yes (emails)	11	8.5	8.5	75.2
	Yes (printouts)	1	.8	.8	76.0
	No	2	1.5	1.6	77.5
	Yes (email & printouts)	2	1.5	1.6	79.1
	Not applicable, no response	27	20.8	20.9	100.0
	Total	129	99.2	100.0	
Missing	No response	1	.8		
Total		130	100.0		

D8.UsefulInEducation

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		86	66.2	66.2	66.2
	Yes	27	20.8	20.8	86.9
	No	5	3.8	3.8	90.8
	Not applicable	12	9.2	9.2	100.0
	Total	130	100.0	100.0	

D9.MoreLikelyConserve

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		86	66.2	66.2	66.2
	Yes	36	27.7	27.7	93.8
	No	7	5.4	5.4	99.2
	inb/tY&N	1	.8	.8	100.0
	Total	130	100.0	100.0	

v6

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	130	100.0	100.0	100.0

D10.HowOftenAtFirst

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		86	66.2	66.2	66.2
	More than once a week	10	7.7	7.7	73.8
	Once a week	29	22.3	22.3	96.2
	Fairly often	4	3.1	3.1	99.2
	Other	1	.8	.8	100.0
	Total	130	100.0	100.0	

D11.HowOftenByOctober

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		86	66.2	66.2	66.2
	More than once a week	6	4.6	4.6	70.8
	Once a week	31	23.8	23.8	94.6
	Fairly often	5	3.8	3.8	98.5
	Occasionally	1	.8	.8	99.2
	Other	1	.8	.8	100.0
	Total	130	100.0	100.0	

D11.IfOtherSpecify

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		128	98.5	98.5	98.5
	(looks like she check both 'more than' and 'once a week'	1	.8	.8	99.2
	Hardly ever look at them.	1	.8	.8	100.0
	Total	130	100.0	100.0	

D12.InterestedInContinuingToRcv

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		86	66.2	66.2	66.2
	Yes	39	30.0	30.0	96.2
	No	5	3.8	3.8	100.0
	Total	130	100.0	100.0	

D12.IfYesFormat

	Frequency	Percent	Valid Percent	Cumulative Percent

Valid		86	66.2	66.2	66.2
	Mail	18	13.8	13.8	80.0
	Email	21	16.2	16.2	96.2
	Not applicable, no response	5	3.8	3.8	100.0
	Total	130	100.0	100.0	

D12.IfYesFrequency

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		86	66.2	67.2	67.2
	Daily	2	1.5	1.6	68.8
	Weekly	14	10.8	10.9	79.7
	Monthly	7	5.4	5.5	85.2
	Monthly with my bill	14	10.8	10.9	96.1
	Not applicable, no response	4	3.1	3.1	99.2
	Quarterl	1	.8	.8	100.0
	Total	128	98.5	100.0	
Missing	No response	2	1.5		
Total		130	100.0		

D13.PreferIHDOverWCR

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		86	66.2	66.2	66.2
	Yes	15	11.5	11.5	77.7
	No	8	6.2	6.2	83.8
	I think both would be useful	20	15.4	15.4	99.2
	I would not want either	1	.8	.8	100.0
	Total	130	100.0	100.0	

D14.PayForIHD

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		86	66.2	66.7	66.7
	$100-$199	1	.8	.8	67.4
	$50-$99	7	5.4	5.4	72.9
	$20-$49	9	6.9	7.0	79.8
	Less than $20	4	3.1	3.1	82.9
	$0	13	10.0	10.1	93.0
	Would not pay because not interested	9	6.9	7.0	100.0

	Total	129	99.2	100.0	
Missing	No response	1	.8		
Total		130	100.0		

D15.ThinkBroaderConservation

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		86	66.2	66.7	66.7
	Yes	17	13.1	13.2	79.8
	No	26	20.0	20.2	100.0
	Total	129	99.2	100.0	
Missing	No response	1	.8		
Total		130	100.0		

E1.ItemiRemember

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		86	66.2	70.5	70.5
	Yes	35	26.9	28.7	99.2
	No	1	.8	.8	100.0
	Total	122	93.8	100.0	
Missing	No response	8	6.2		
Total		130	100.0		

E1.ItemiMainItem

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		86	66.2	68.3	68.3
	Yes	32	24.6	25.4	93.7
	No	8	6.2	6.3	100.0
	Total	126	96.9	100.0	
Missing	No response	4	3.1		
Total		130	100.0		

E1.ItemiClearEasy

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		86	66.2	69.9	69.9
	Yes	36	27.7	29.3	99.2
	No	1	.8	.8	100.0
	Total	123	94.6	100.0	
Missing	No response	7	5.4		

Total		130	100.0		

E1.ItemiUseful

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		86	66.2	69.9	69.9
	Yes	32	24.6	26.0	95.9
	No	5	3.8	4.1	100.0
	Total	123	94.6	100.0	
Missing	No response	7	5.4		
Total		130	100.0		

E2.ItemiiRemember

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		86	66.2	71.1	71.1
	Yes	35	26.9	28.9	100.0
	Total	121	93.1	100.0	
Missing	No response	9	6.9		
Total		130	100.0		

E2.ItemiiMainItem

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		86	66.2	69.9	69.9
	Yes	29	22.3	23.6	93.5
	No	8	6.2	6.5	100.0
	Total	123	94.6	100.0	
Missing	No response	7	5.4		
Total		130	100.0		

E2.ItemiiClearEasy

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		86	66.2	71.7	71.7
	Yes	31	23.8	25.8	97.5
	No	3	2.3	2.5	100.0
	Total	120	92.3	100.0	
Missing	No response	10	7.7		
Total		130	100.0		

E2.ItemiiUseful

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		86	66.2	72.3	72.3
	Yes	26	20.0	21.8	94.1
	No	7	5.4	5.9	100.0
	Total	119	91.5	100.0	
Missing	No response	11	8.5		
Total		130	100.0		

E3.ThinkWhy2005Different

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		86	66.2	67.7	67.7
	Yes	21	16.2	16.5	84.3
	No	1	.8	.8	85.0
	Question not in this survey	19	14.6	15.0	100.0
	Total	127	97.7	100.0	
Missing	No response	3	2.3		
Total		130	100.0		

COMP3SurprisedComparison

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		86	66.2	66.7	66.7
	Yes, thought we consumed more	4	3.1	3.1	69.8
	Yes, thought we consumed less	10	7.7	7.8	77.5
	No	5	3.8	3.9	81.4
	Question not in this survey	24	18.5	18.6	100.0
	Total	129	99.2	100.0	
Missing	No response	1	.8		
Total		130	100.0		

COMP4ThinkWhy

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		86	66.2	66.7	66.7
	Yes	13	10.0	10.1	76.7
	No	6	4.6	4.7	81.4

	Question not in this survey	24	18.5	18.6	100.0
	Total	129	99.2	100.0	
Missing	No response	1	.8		
Total		130	100.0		

COMP5Motivate

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		86	66.2	66.7	66.7
	Yes	7	5.4	5.4	72.1
	No	12	9.2	9.3	81.4
	Question not in this survey	24	18.5	18.6	100.0
	Total	129	99.2	100.0	
Missing	No response	1	.8		
Total		130	100.0		

COMP6GoodComparison

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		86	66.2	66.7	66.7
	Yes	10	7.7	7.8	74.4
	No	9	6.9	7.0	81.4
	Question not in this survey	24	18.5	18.6	100.0
	Total	129	99.2	100.0	
Missing	No response	1	.8		
Total		130	100.0		

E4.ConsumptionValueType

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		87	66.9	67.4	67.4
	kWh	17	13.1	13.2	80.6
	Dollars	9	6.9	7.0	87.6
	Both	16	12.3	12.4	100.0
	Total	129	99.2	100.0	
Missing	999	1	.8		
Total		130	100.0		

E5.ReactionTo$

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		86	66.2	68.3	68.3
	Seemed large	7	5.4	5.6	73.8
	Seemed to small	3	2.3	2.4	76.2
	Seemed reasonable	20	15.4	15.9	92.1
	Didn't know how to react	7	5.4	5.6	97.6
	I did not see this information	3	2.3	2.4	100.0
	Total	126	96.9	100.0	
Missing	No response	4	3.1		
Total		130	100.0		

E6.OnPeakDistinctionUseful

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		86	66.2	67.7	67.7
	Yes	36	27.7	28.3	96.1
	No	2	1.5	1.6	97.6
	I did not notice the difference	3	2.3	2.4	100.0
	Total	127	97.7	100.0	
Missing	No response	3	2.3		
Total		130	100.0		

E7.ItemiiiRemember

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		86	66.2	69.4	69.4
	Yes	35	26.9	28.2	97.6
	No	3	2.3	2.4	100.0
	Total	124	95.4	100.0	
Missing	No response	6	4.6		
Total		130	100.0		

E7.ItemiiiMainItem

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		86	66.2	71.1	71.1
	Yes	9	6.9	7.4	78.5
	No	26	20.0	21.5	100.0
	Total	121	93.1	100.0	
Missing	No response	9	6.9		

Total		130	100.0		

E7.ItemiiiClearEasy

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		86	66.2	70.5	70.5
	Yes	27	20.8	22.1	92.6
	No	9	6.9	7.4	100.0
	Total	122	93.8	100.0	
Missing	No response	8	6.2		
Total		130	100.0		

E7.ItemiiiUseful

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		86	66.2	70.5	70.5
	Yes	14	10.8	11.5	82.0
	No	22	16.9	18.0	100.0
	Total	122	93.8	100.0	
Missing	No response	8	6.2		
Total		130	100.0		

E9.ItemivRemember

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		86	66.2	70.5	70.5
	Yes	30	23.1	24.6	95.1
	No	6	4.6	4.9	100.0
	Total	122	93.8	100.0	
Missing	No response	8	6.2		
Total		130	100.0		

E9.ItemivMainItem

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		86	66.2	71.7	71.7
	Yes	13	10.0	10.8	82.5
	No	21	16.2	17.5	100.0
	Total	120	92.3	100.0	
Missing	No response	10	7.7		
Total		130	100.0		

E9.ItemivClearEasy

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		86	66.2	71.7	71.7
	Yes	30	23.1	25.0	96.7
	No	4	3.1	3.3	100.0
	Total	120	92.3	100.0	
Missing	No response	10	7.7		
Total		130	100.0		

E9.ItemivUseful

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		86	66.2	70.5	70.5
	Yes	22	16.9	18.0	88.5
	No	14	10.8	11.5	100.0
	Total	122	93.8	100.0	
Missing	No response	8	6.2		
Total		130	100.0		

E10.ConservationTipNewInfo

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		86	66.2	68.8	68.8
	Yes	15	11.5	12.0	80.8
	No	24	18.5	19.2	100.0
	Total	125	96.2	100.0	
Missing	No response	5	3.8		
Total		130	100.0		

E12.ItemvRemember

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		86	66.2	71.7	71.7
	Yes	31	23.8	25.8	97.5
	No	3	2.3	2.5	100.0
	Total	120	92.3	100.0	
Missing	No response	10	7.7		
Total		130	100.0		

E12.ItemvMainItem

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		86	66.2	72.3	72.3
	Yes	24	18.5	20.2	92.4
	No	9	6.9	7.6	100.0
	Total	119	91.5	100.0	
Missing	No response	11	8.5		
Total		130	100.0		

E12.ItemvClearEasy

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		86	66.2	71.1	71.1
	Yes	31	23.8	25.6	96.7
	No	4	3.1	3.3	100.0
	Total	121	93.1	100.0	
Missing	No response	9	6.9		
Total		130	100.0		

E12.ItemvUseful

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		86	66.2	72.3	72.3
	Yes	26	20.0	21.8	94.1
	No	7	5.4	5.9	100.0
	Total	119	91.5	100.0	
Missing	No response	11	8.5		
Total		130	100.0		

E13.UnderstandPeaksValleys

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		86	66.2	67.2	67.2
	Yes	34	26.2	26.6	93.8
	No	8	6.2	6.3	100.0
	Total	128	98.5	100.0	
Missing	No response	2	1.5		
Total		130	100.0		

E14.ConsultDailyChartChanges

	Frequency	Percent	Valid Percent	Cumulative Percent

Valid		86	66.2	67.2	67.2
	Yes	26	20.0	20.3	87.5
	No	16	12.3	12.5	100.0
	Total	128	98.5	100.0	
Missing	No response	2	1.5		
Total		130	100.0		

E15.UseNotes

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		86	66.2	67.2	67.2
	Yes	5	3.8	3.9	71.1
	No	37	28.5	28.9	100.0
	Total	128	98.5	100.0	
Missing	No response	2	1.5		
Total		130	100.0		

E16.ItemviRemember

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		86	66.2	71.1	71.1
	Yes	21	16.2	17.4	88.4
	No	14	10.8	11.6	100.0
	Total	121	93.1	100.0	
Missing	No response	9	6.9		
Total		130	100.0		

E16.ItemviMainItem

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		86	66.2	73.5	73.5
	Yes	8	6.2	6.8	80.3
	No	23	17.7	19.7	100.0
	Total	117	90.0	100.0	
Missing	No response	13	10.0		
Total		130	100.0		

E16.ItemviClearEasy

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		86	66.2	72.9	72.9
	Yes	18	13.8	15.3	88.1

	No	14	10.8	11.9	100.0
	Total	118	90.8	100.0	
Missing	No response	12	9.2		
Total		130	100.0		

E16.ItemviUsefulMeaningful

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		86	66.2	72.9	72.9
	Yes	11	8.5	9.3	82.2
	No	21	16.2	17.8	100.0
	Total	118	90.8	100.0	
Missing	No response	12	9.2		
Total		130	100.0		

E17.EmissionsDescription

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		86	66.2	67.7	67.7
	Yes	12	9.2	9.4	77.2
	No	6	4.6	4.7	81.9
	I did not see this description at the time	23	17.7	18.1	100.0
	Total	127	97.7	100.0	
Missing	No response	3	2.3		
Total		130	100.0		

E18.EmissionsReaction

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		86	66.2	68.8	68.8
	Seemed large	4	3.1	3.2	72.0
	Seemed to small	3	2.3	2.4	74.4
	Seemed reasonable	5	3.8	4.0	78.4
	Didn't know how to react	5	3.8	4.0	82.4
	I did not see this information	22	16.9	17.6	100.0
	Total	125	96.2	100.0	
Missing	No response	5	3.8		
Total		130	100.0		

E19.ItemviiRemember

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		86	66.2	70.5	70.5
	Yes	27	20.8	22.1	92.6
	No	9	6.9	7.4	100.0
	Total	122	93.8	100.0	
Missing	No response	8	6.2		
Total		130	100.0		

E19.ItemviiMainItem

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		86	66.2	74.1	74.1
	Yes	5	3.8	4.3	78.4
	No	25	19.2	21.6	100.0
	Total	116	89.2	100.0	
Missing	No response	14	10.8		
Total		130	100.0		

E19.ItemviiClearEasy

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		86	66.2	74.8	74.8
	Yes	15	11.5	13.0	87.8
	No	14	10.8	12.2	100.0
	Total	115	88.5	100.0	
Missing	No response	15	11.5		
Total		130	100.0		

E19.ItemviiUsefulMeaningful

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		86	66.2	73.5	73.5
	Yes	8	6.2	6.8	80.3
	No	23	17.7	19.7	100.0
	Total	117	90.0	100.0	
Missing	No response	13	10.0		
Total		130	100.0		

E20.UnderstandWeeklyVariation

	Frequency	Percent	Valid Percent	Cumulative Percent

Valid		86	66.2	68.3	68.3
	Yes	10	7.7	7.9	76.2
	No	9	6.9	7.1	83.3
	I did not notice the discrepancy	4	3.1	3.2	86.5
	I did not read the explanation	17	13.1	13.5	100.0
	Total	126	96.9	100.0	
Missing	No response	4	3.1		
Total		130	100.0		

E21.ItemviiiRemember

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		86	66.2	71.1	71.1
	Yes	19	14.6	15.7	86.8
	No	16	12.3	13.2	100.0
	Total	121	93.1	100.0	
Missing	No response	9	6.9		
Total		130	100.0		

E21.ItemviiiMainItem

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		86	66.2	74.1	74.1
	Yes	5	3.8	4.3	78.4
	No	25	19.2	21.6	100.0
	Total	116	89.2	100.0	
Missing	No response	14	10.8		
Total		130	100.0		

E21.ItemviiiClearEasy

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		86	66.2	74.1	74.1
	Yes	13	10.0	11.2	85.3
	No	17	13.1	14.7	100.0
	Total	116	89.2	100.0	
Missing	No response	14	10.8		
Total		130	100.0		

E21.ItemviiiUsefulMeaningful

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		86	66.2	73.5	73.5
	Yes	6	4.6	5.1	78.6
	No	25	19.2	21.4	100.0
	Total	117	90.0	100.0	
Missing	No response	13	10.0		
Total		130	100.0		

E22.ItemixRemember

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		86	66.2	70.5	70.5
	Yes	22	16.9	18.0	88.5
	No	14	10.8	11.5	100.0
	Total	122	93.8	100.0	
Missing	No response	8	6.2		
Total		130	100.0		

E22.ItemixMainItem

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		86	66.2	74.1	74.1
	Yes	6	4.6	5.2	79.3
	No	24	18.5	20.7	100.0
	Total	116	89.2	100.0	
Missing	No response	14	10.8		
Total		130	100.0		

E22.ItemixClearEasy

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		86	66.2	72.3	72.3
	Yes	16	12.3	13.4	85.7
	No	17	13.1	14.3	100.0
	Total	119	91.5	100.0	
Missing	No response	11	8.5		
Total		130	100.0		

E22.ItemixUsefulMeaningful

	Frequency	Percent	Valid Percent	Cumulative Percent

Valid		87	66.9	73.7	73.7
	Yes	10	7.7	8.5	82.2
	No	21	16.2	17.8	100.0
	Total	118	90.8	100.0	
Missing	No response	12	9.2		
Total		130	100.0		

COMP26MoreUsefulComparison

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		86	66.2	68.8	68.8
	Yes	3	2.3	2.4	71.2
	No	6	4.6	4.8	76.0
	Both were meaningful	3	2.3	2.4	78.4
	Neither was meaningful	4	3.1	3.2	81.6
	Question not in this survey	23	17.7	18.4	100.0
	Total	125	96.2	100.0	
Missing	No response	5	3.8		
Total		130	100.0		

E23.SurprisedComparisonOthers

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		86	66.2	69.4	69.4
	Yes, I thought we consumed more than others	1	.8	.8	70.2
	Yes, I thought we consumed less than others	4	3.1	3.2	73.4
	No	11	8.5	8.9	82.3
	Other	2	1.5	1.6	83.9
	Question not in this survey	20	15.4	16.1	100.0
	Total	124	95.4	100.0	
Missing	No response	6	4.6		
Total		130	100.0		

E24.ComparisonMakeYouThink

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		86	66.2	69.4	69.4
	Yes	11	8.5	8.9	78.2

	No	8	6.2	6.5	84.7
	Question not in this survey	19	14.6	15.3	100.0
	Total	124	95.4	100.0	
Missing	No response	6	4.6		
Total		130	100.0		

E25.ComparisonMotivation

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		86	66.2	69.4	69.4
	Yes	5	3.8	4.0	73.4
	No	14	10.8	11.3	84.7
	Question not in this survey	19	14.6	15.3	100.0
	Total	124	95.4	100.0	
Missing	No response	6	4.6		
Total		130	100.0		

E26.MoreAwareEmissions

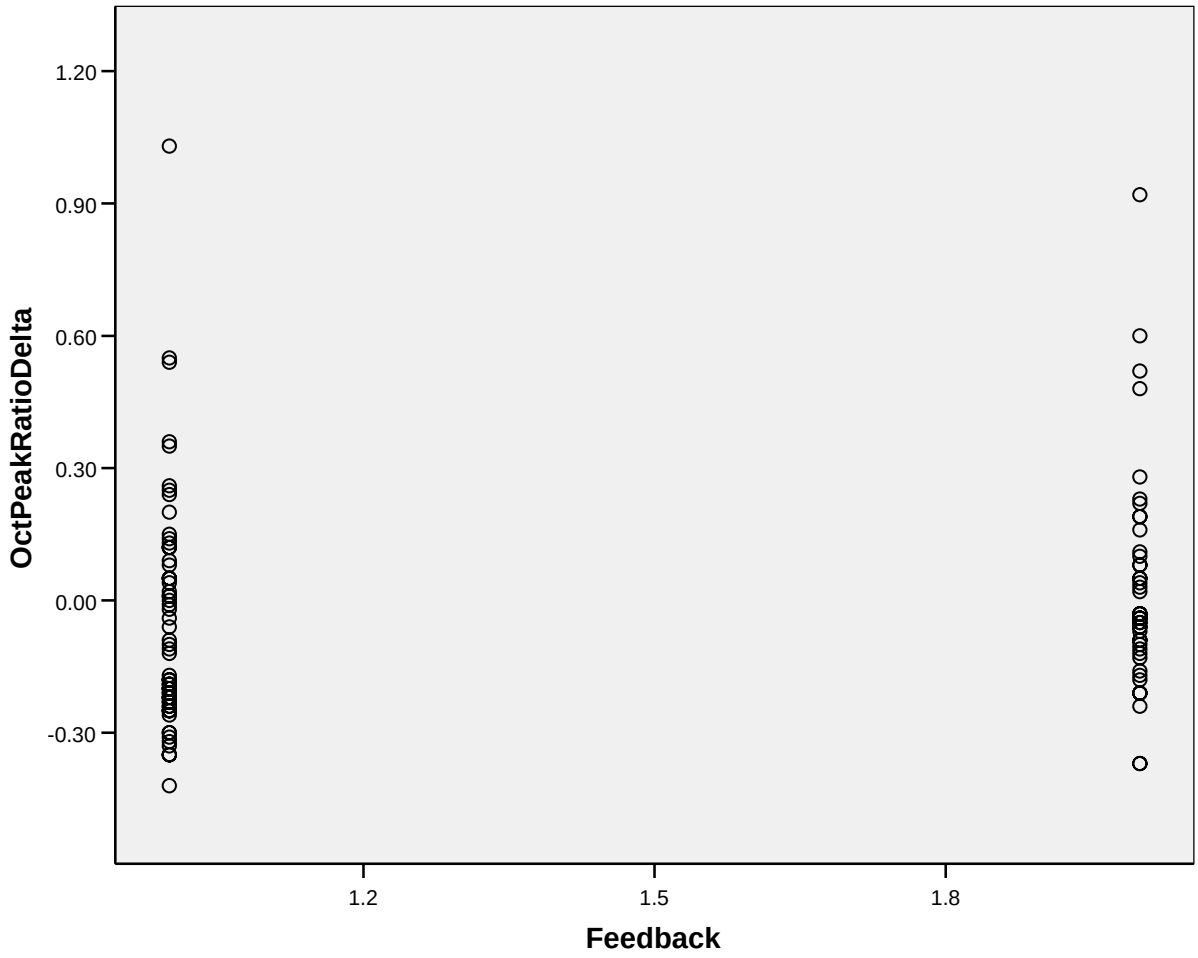
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		86	66.2	70.5	70.5
	Yes	24	18.5	19.7	90.2
	No	12	9.2	9.8	100.0
	Total	122	93.8	100.0	
Missing	No response	8	6.2		
Total		130	100.0		

X1.EnterDraw

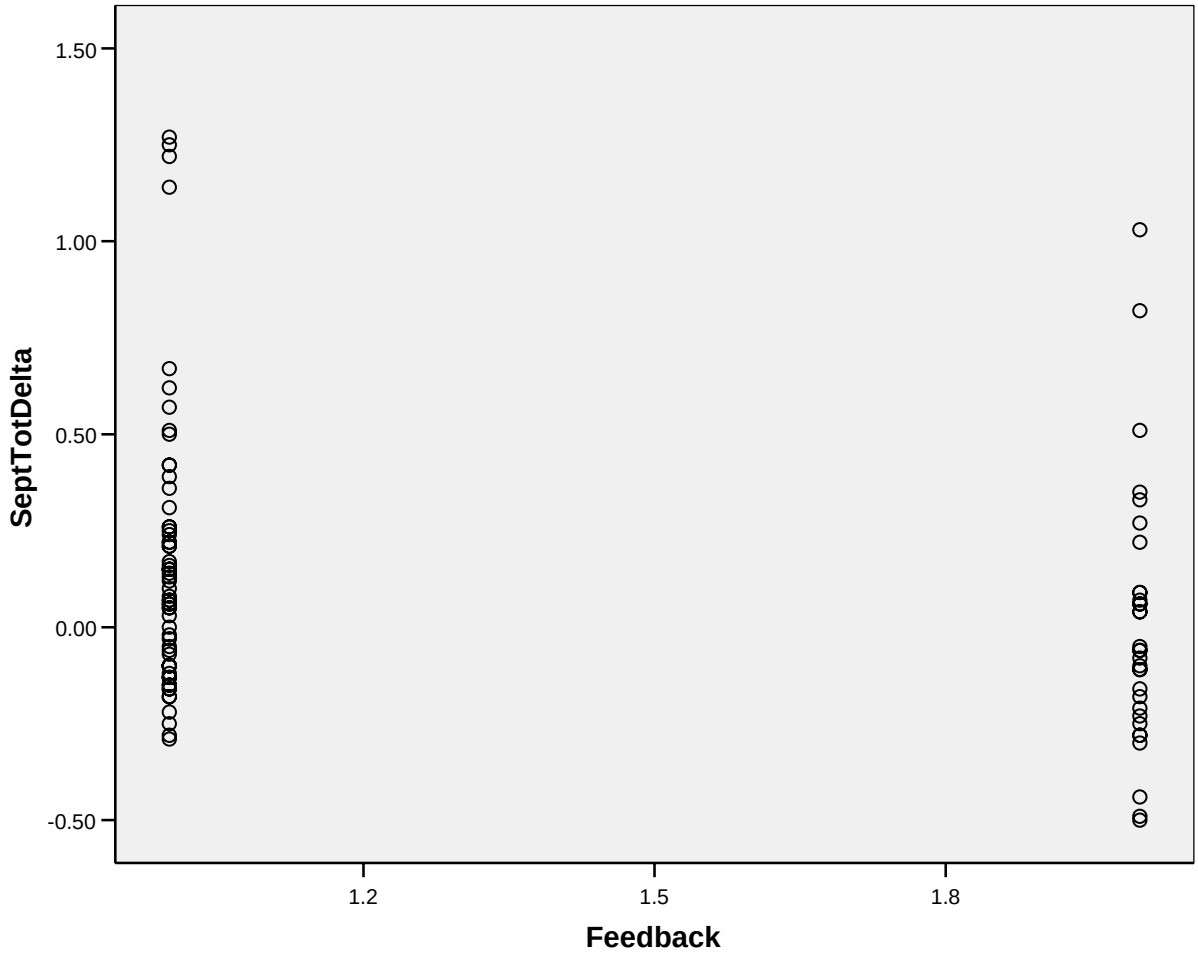
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		1	.8	.9	.9
	Yes	116	89.2	99.1	100.0
	Total	117	90.0	100.0	
Missing	No response	13	10.0		
Total		130	100.0		

Appendix XIV Plots of Significant Dependent Variables

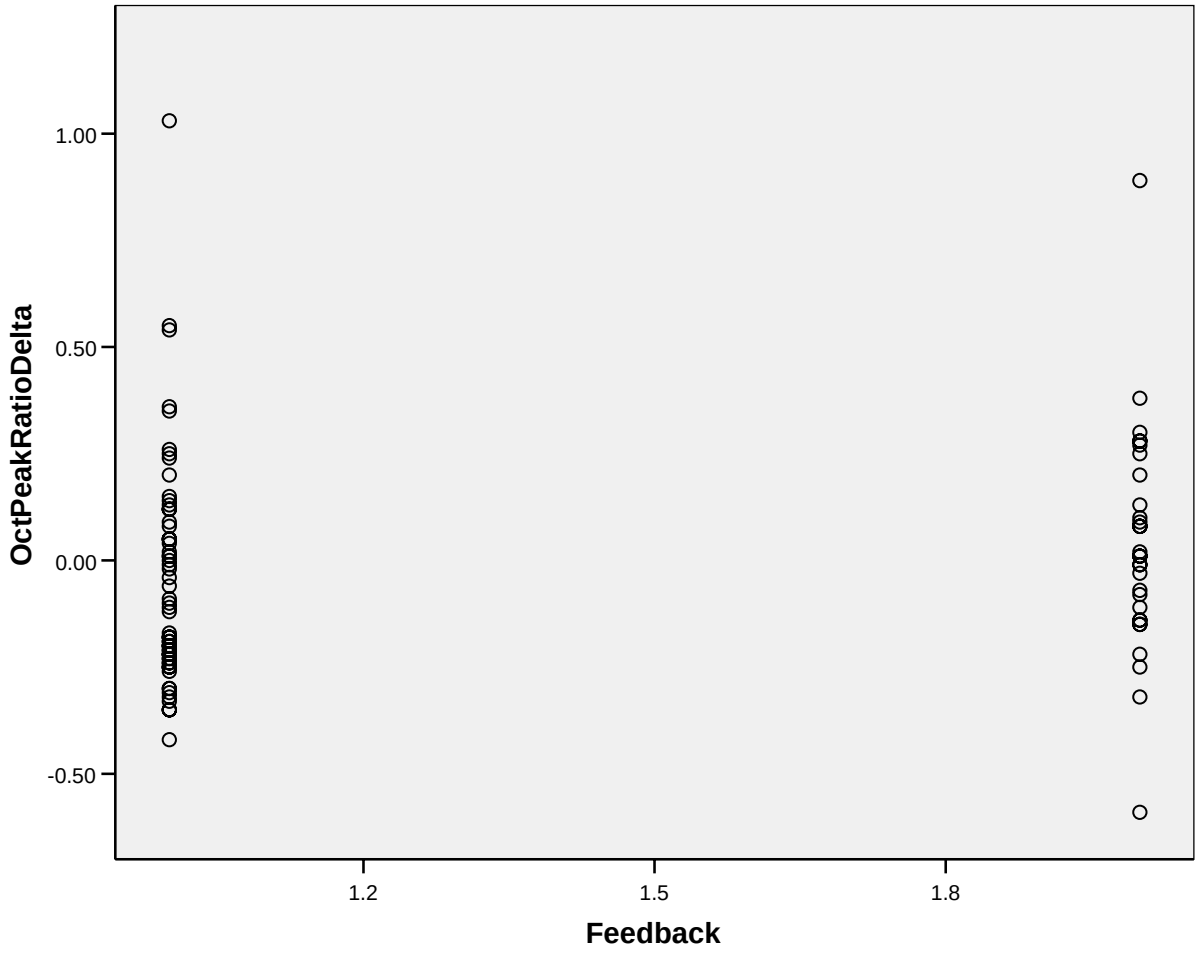
OctPeakRatioDelta – TG and CG3 Comparison



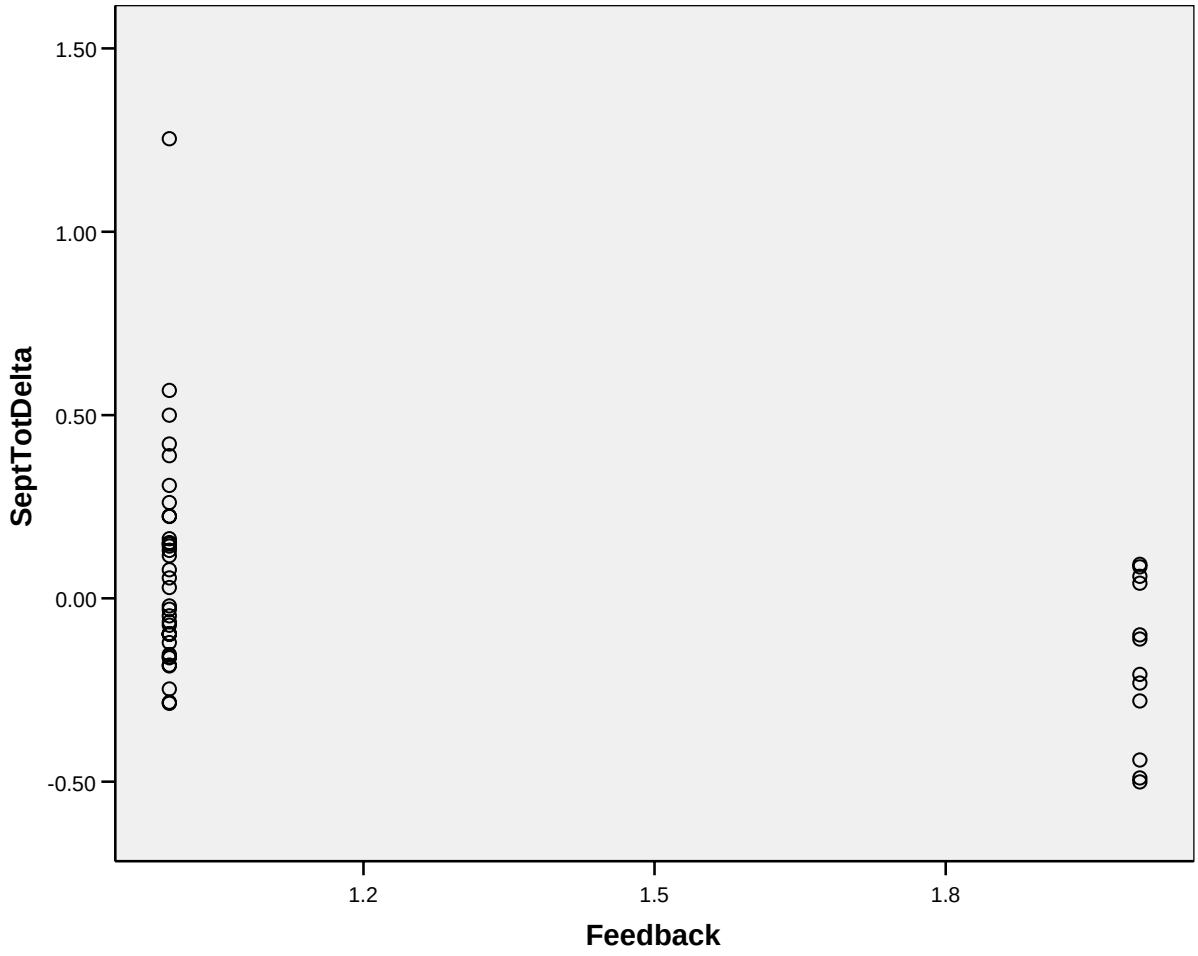
SeptTotDelta – TG and CG1/2 Comparison



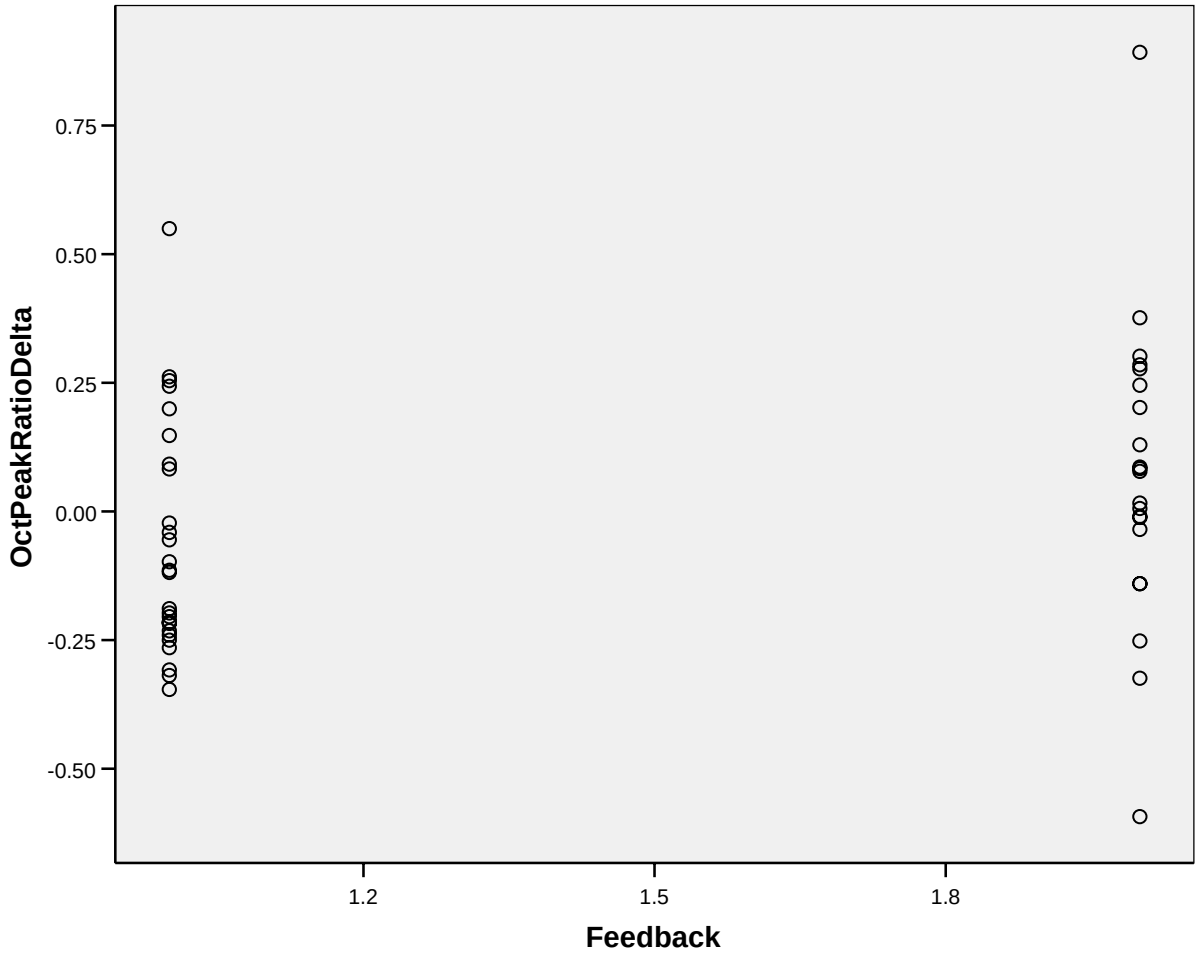
OctPeakRatioDelta – TG and CG1/2 Comparison



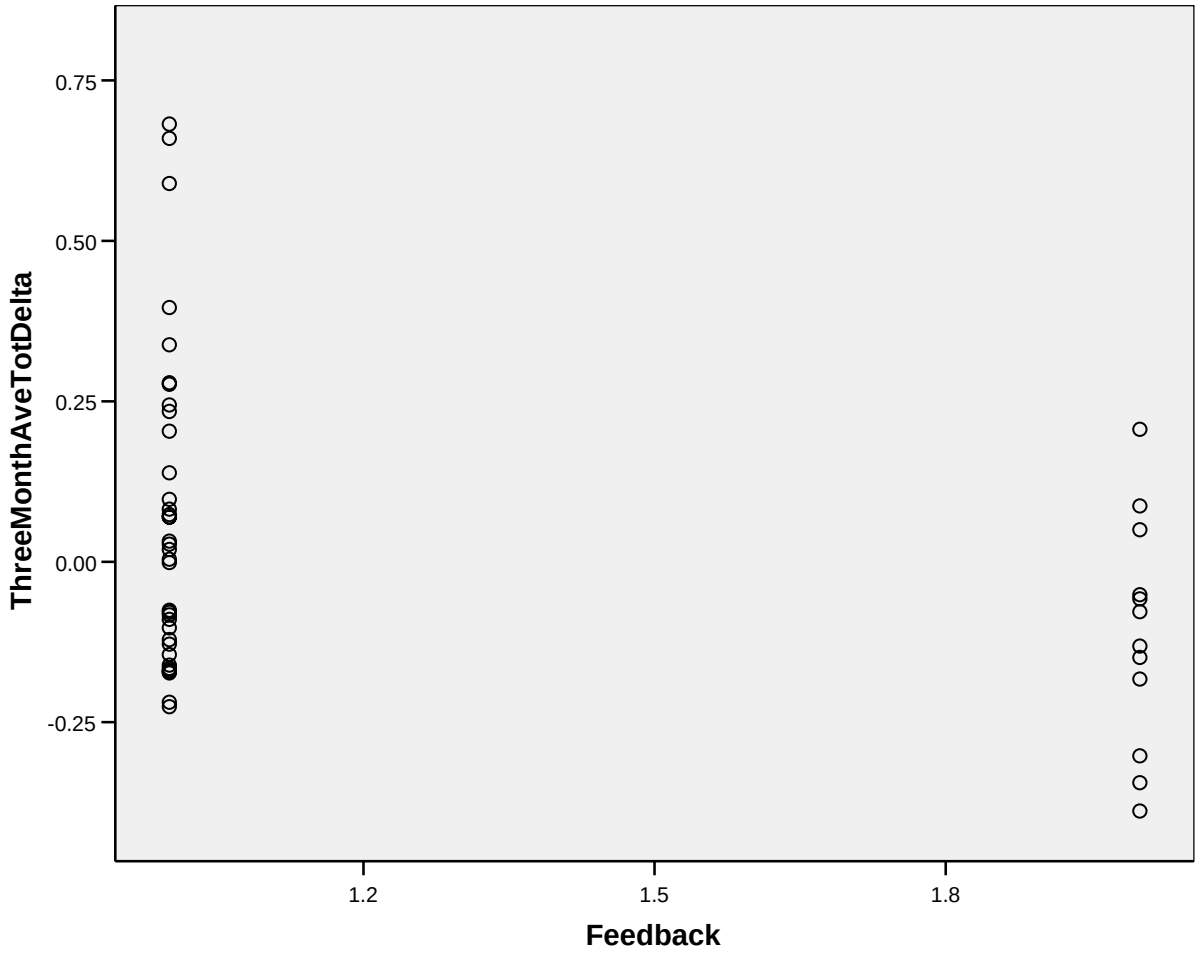
SeptTotDelta-High Consumers – TG and CG1/2 Comparison



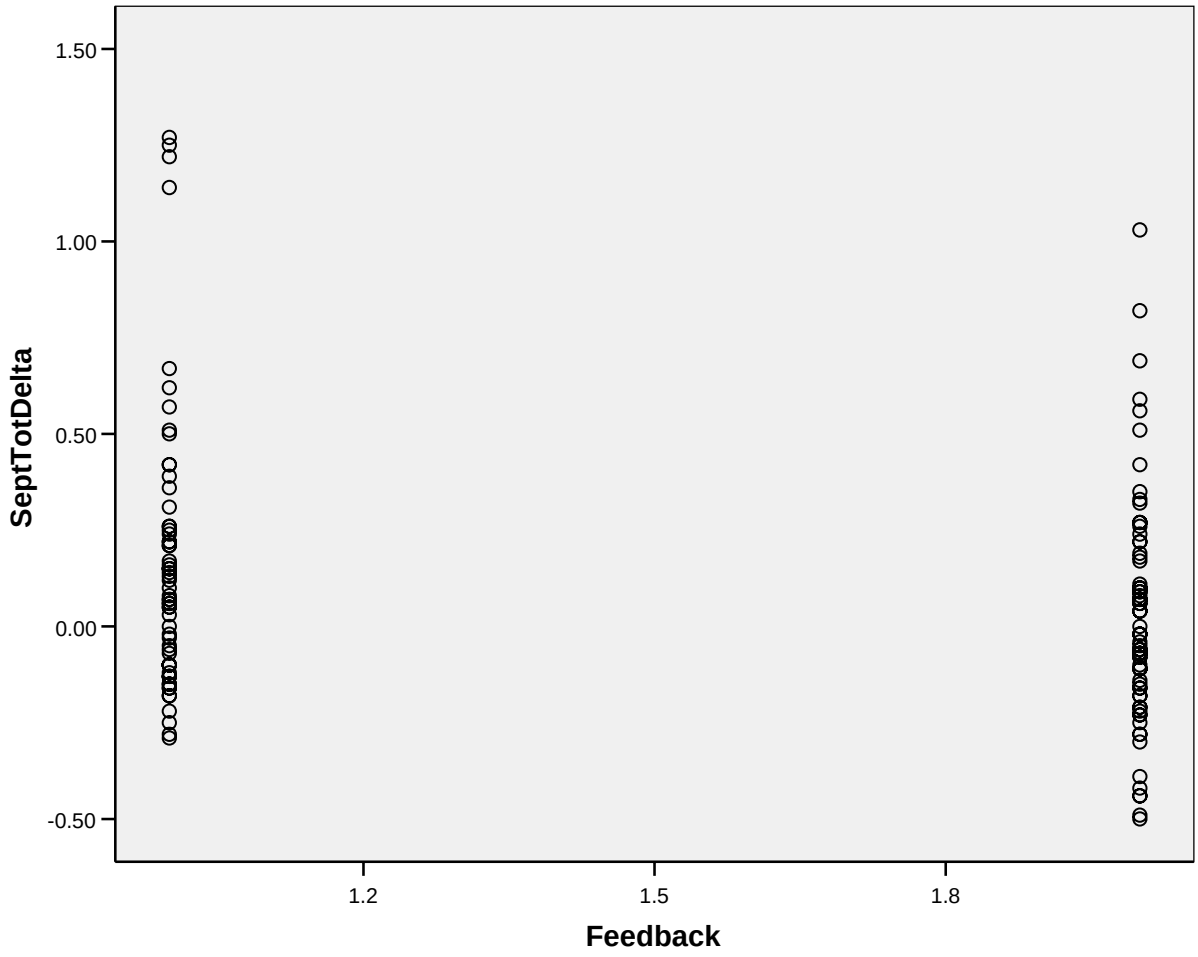
OctPeakRatioDelta-LowConsumers – TG and CG1/2 Comparison



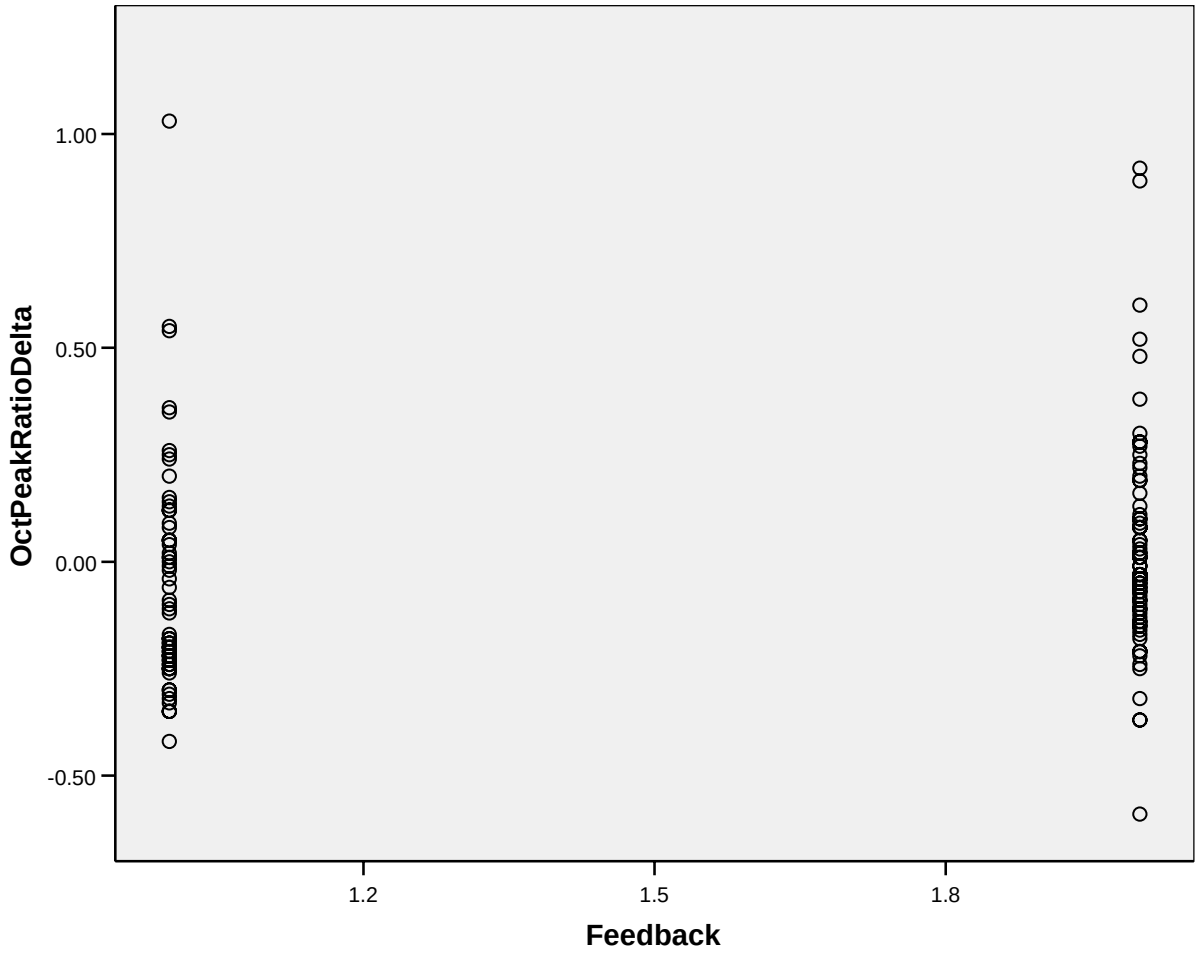
ThreeMonthAveTotDelta-High Consumers – TG and CG1/2 Comparison



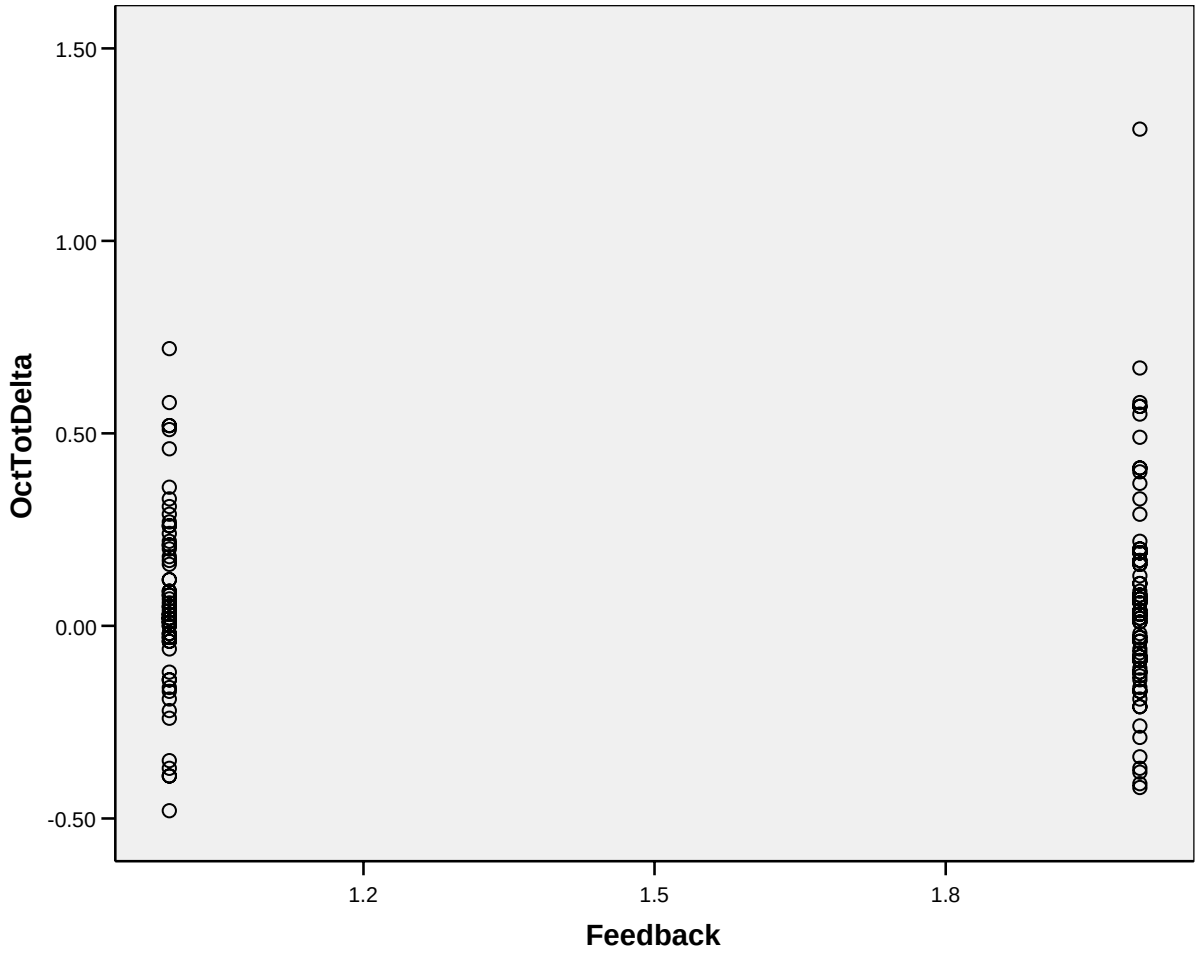
SeptTotDelta – TG and All CGs Comparison



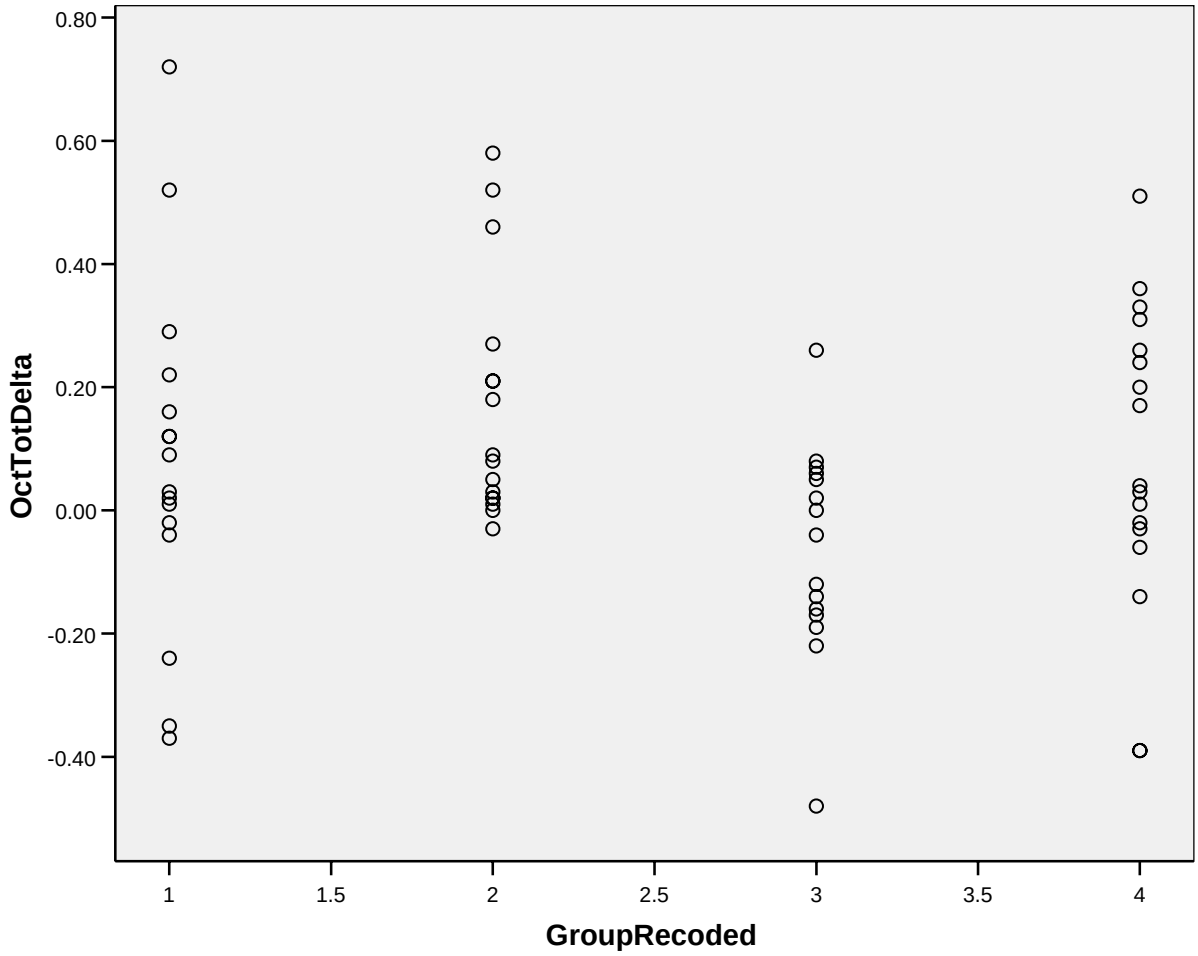
OctPeakRatioDelta – TG and All CGs Comparison



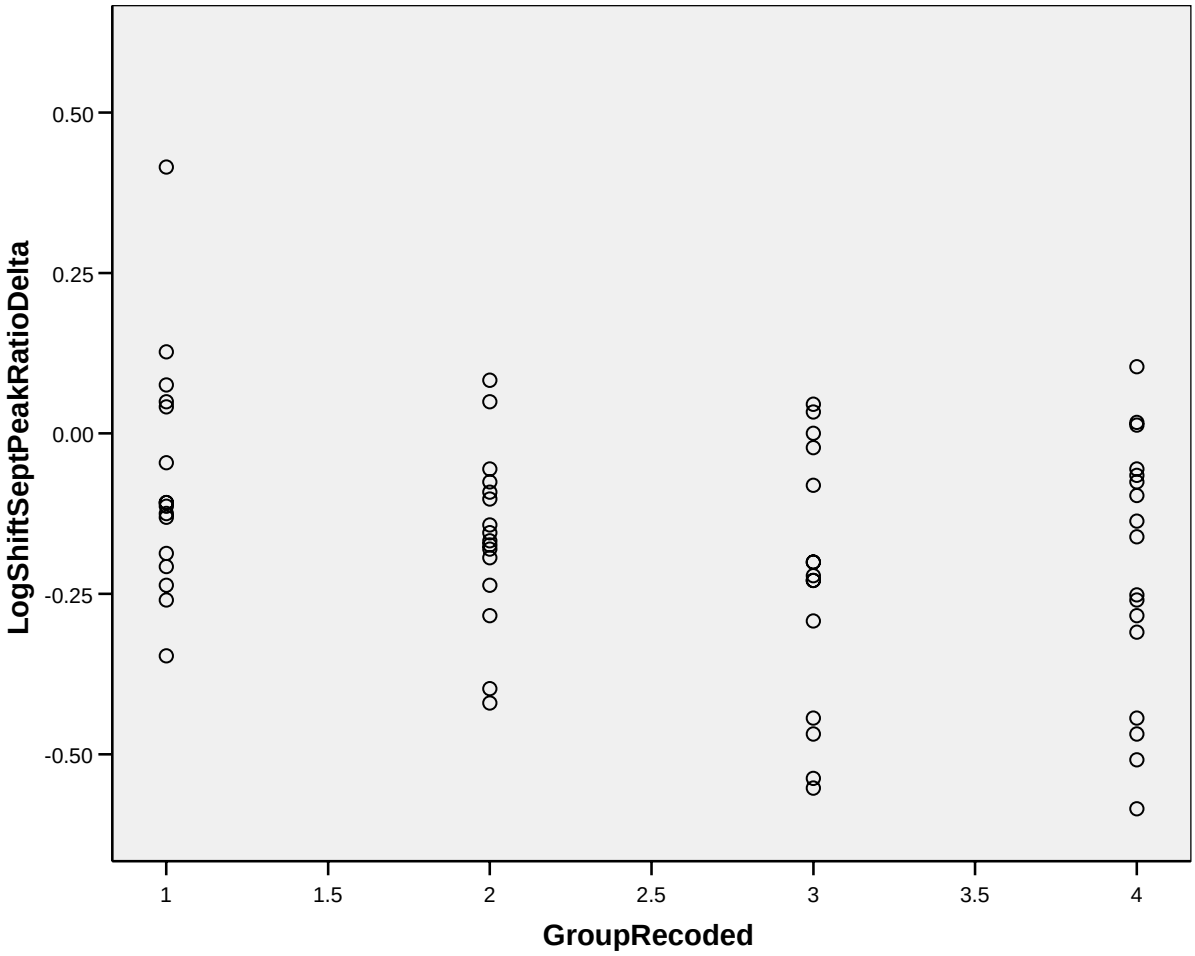
OctTotDelta-High Consumers – TG and All CGs Comparison



OctTotDelta versus Four Treatment Groups



LogShiftPeakRatioDelta versus Four Treatment Groups



SqRtShiftOctTotDelta versus Four Treatment Groups