

**Energy Efficiency Audits:
Identifying Perceived Barriers to Implementing Recommended Actions**

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2006

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Abstract

Improved energy efficiency in the residential sector is an important component of federal obligations to reduce greenhouse gas emissions under international commitments, of provincial (Ontario) policies to reduce energy consumption, and of municipal initiatives to address climate change. The federal government's home energy rating system (HERS) known as EnerGuide for Houses is designed to reduce emissions by encouraging energy efficient retrofits of residential housing stock through customized home energy audits. However, the ability of housing retrofits to meet current emission reduction targets is questionable given the achieved energy savings to date. This paper examined the retrofit recommendations made by a local delivery agent of the EnerGuide for Houses program in Waterloo Region, Ontario. Qualitative research was used to inform a community-based social marketing approach to identify the barriers to implementing the recommended retrofits. Telephone interviews and focus groups were conducted to examine why commonly recommended retrofits had not been accomplished. Two retrofits which provide the most potential for energy savings (foundation insulation upgrades and upgrades to high-efficiency furnaces) were examined in detail. Understandably, cost and inconvenience were barriers, but also significant was the uncertainty related to how to complete the retrofits, how to find suitable contractors, the final retrofit costs, and the process for receiving an incentive. Additionally, the structure of the present retrofit incentive program was seen as problematic. In order to overcome such barriers, it is recommended that steps be taken to mitigate uncertainty by providing more specific information at the time of the evaluation and restructuring the incentive program to help offset up-front retrofit costs.

1.0 Introduction

Reduced residential energy consumption is important to federal, provincial, and municipal government initiatives. Canada's Climate Change Plan calls for twenty percent of housing stock to receive energy efficiency retrofits by 2010 thereby resulting in a 1.5MT reduction in carbon emissions (Government of Canada, 2002). The Ontario Government aims to establish a "culture of conservation" with the goal of reducing provincial energy consumption by 5 per cent (Government of Ontario, 2004). The Federation of Canadian Municipalities has established the Partners for Climate Protection which is comprised of 120 Canadian municipal governments committed to reducing their greenhouse gas emissions (Federation of Canadian Municipalities, 2004).

It has become widely accepted that greenhouse gas (GHG) emissions are contributing to a state of global climate change which has the potential for widespread negative effects on health, the environment, and natural resources. Canada has the dubious distinction of being one of the world leaders in GHG emissions per capita (Environment Canada, 2002). Under the Kyoto Accord, Canada has agreed to reduce GHG emissions to 6 percent below 1990 levels (Government of Canada, 2000). Currently, the residential sector accounts for 16% of GHG emissions and 17% of Canada's secondary energy use - energy used by final consumers (Office of Energy Efficiency, 2005). National Climate Change Process identified a number of areas for action and within the building sector it was determined that the energy efficiency could be encouraged through the provision of "information, advice, and incentives" (National Climate Change Process, 2003).

A primary vehicle for establishing the necessary reductions in the building sector is Natural Resources Canada's EnerGuide for Houses (EGH) service. EGH contracts local agents to carry out residential energy efficiency evaluations. During the evaluation, data related to the building envelope and heating system is collected and input into an energy consumption modeling software package known as HOT2XP. The home is then assessed a score on a 100 point scale where 80 is the equivalent efficiency of an R-2000 home. Recommendations are provided on how to improve the score by making specific retrofits related to the home's heating system, air leakage, and heat loss in five major areas (foundation, attic, walls, ceilings, and windows and doors). Potential GHG reductions are also calculated.

The Waterloo Region-based, Residential Energy Efficiency Project (REEP) can be considered a highly successful delivery agent of the EGH program due to its completion of over 6,300 home evaluations since 1999. However, only about 12% of these homes have been retrofitted to the extent to qualify for and have received a follow-up evaluation (M.J. Patterson, personal communication, October 18, 2005). In the EGH program, follow-up evaluations are only provided when it has been determined that residents have completed enough energy efficiency upgrades to achieve an improvement of at least three points on the EGH scale.

Challenges with retrofit completion are apparent at the national level as well. For example, in October 2003, Natural Resources Canada introduced the EGH Retrofit Incentive which was a three year, \$73 million program where homeowners could receive

a partial rebate (10 to 20 per cent of the total retrofit costs) for improving their home's energy efficiency through the EGH program. Since that time, over 130,000 homes Canada-wide have received an evaluation. Though the average GHG reduction was 4 tonnes, only 30,000 grants have been awarded to date (Natural Resources Canada, 2005). This implies that less than 25% of evaluated homes have been retrofitted to the extent that they have achieved notable reductions¹. Given the rate and degree of retrofit implementation and the average GHG reductions, it will require an additional 23 years² and another 345,000 homes³ be retrofitted for Canada to reach its target of a 1.5 Mt reduction in GHG. Obviously, this far exceeds the 2010 target timeline.

In recognition of the need to improve GHG reductions, Green Communities Canada, an environmental organization providing EGH evaluations, has developed an analysis tool to determine success rates of achieving potential energy savings. The Total Savings Index is designed to indicate the 'depth' of retrofits, or in other words, how much identified potential was achieved by homeowner action. The 2004 TSI indicates that even with the retrofit incentive program in place only 18.3% of the potential energy savings were realized (Green Communities Canada, 2005a).

Apparently to address the problem of retrofit completion, the federal government has allotted significantly more funding to the EGH program. It will invest \$395 million over the next five years for the purpose of increasing the number of homes retrofitted under

¹ 30,000 grants out of 130,000 homes evaluated equals 23.1%.

² 30,000 homes achieving 4t GHG reduction per home equals 120,000t total GHG every two years or 60,000t per year. 1.5Mt target divided by 60,000t every year equals 25 years (or 23 years less the past two years).

³ 1.5Mt target divided by 4t per home equals 375,000 homes less the 30,000 already retrofitted equals 345,000.

the EGH Retrofit Incentive (Natural Resources Canada, 2005). The amount of incentive that residents can receive has been improved by approximately \$100 per grant (Green Communities Canada, 2005b) and eligibility for the incentive is now extended to rental housing stock (Natural Resources Canada, 2005).

The federal plan appears to rely on expanding the breadth of the EGH program and increasing monetary incentives. However, due to the low percentage of retrofit implementations to date, this strategy may not be entirely prudent. Two concerns lie at the root of this approach. First, monetary incentives may not be sufficient to motivate substantially more action. Past research has shown that the effectiveness of rebate programs may be limited by consumer attitude and consumer knowledge (Stern, 1992) or because programs assume people will act in an economically rational way and ignore the social or “human” side of behaviour (McKenzie-Mohr and Smith, 1999 p.13). The effect of incentives on behaviour are discussed in more detail later.

Second, without identifying specific barriers to the recommended retrofits and developing means to overcoming these barriers, it can be expected that EGH emission reductions will continue to fall short of the established targets. Indeed, this was the finding of Parker et al (2000) who examined the savings potential of 1,035 homes in the Waterloo Region and found that in order to meet emission reduction goals, methods were needed to encourage maximum participation in the retrofit process.

1.1 Research Objectives

This study argues that for the EGH program to be successful, additional interventions in addition to the present incentive program are needed. It should be noted that this study focuses on energy savings achieved through investment in technical upgrades rather than savings achieved by lifestyle changes such as lowering thermostat temperatures or hanging laundry to dry. These measures will be discussed in more detail later. Certainly, maximum energy savings and emission reductions would be gained by encouraging participation in all types of home energy saving activities. However, the scope of this study has been limited to examining technical upgrades for two primary reasons. First, policies and programs (primarily EGH) are already in place for encouraging technical upgrades. Given the urgency of the timetable to meet emission reductions, it is sensible to examine how existing programs can be improved rather than recommending new ones. Second, previous research regarding energy saving measures has shown that at the individual level, home retrofits were preferred over other types of home energy saving actions (Poortinga et al, 2003).

The goal of this research is to examine how the overall implementation of residential energy efficiency retrofits can be improved. To this end, the objectives of this research are to:

- Identify residents' perceived barriers to taking action on the retrofits recommended for their homes
- Make suggestions for interventions to motivate residents to accomplish more of their recommended retrofits

2.0 Literature Review

This study was informed by a review of psychological research related to pro-environmental behaviour change. Social marketing, and more specifically, community-based social marketing (CBSM) are approaches that emerged from this review. Both advocate the broad implementation of psychological techniques to influence individual behaviour change. The following provides an overview of social marketing and CBSM as well as a description of the underlying psychological elements associated with these approaches.

2.1 Social Marketing

Social marketing has been defined as ‘the application of commercial marketing technologies to the analysis, planning, execution, and evaluation of programs designed to influence the voluntary behavior of target audiences in order to improve their personal welfare and that of society’ (Andreasen 1995 p.7). Social marketing campaigns have been directed at a range of societal issues such as wearing seatbelts, drinking and driving, having safe sex, and smoking cessation. Generally, messages are designed to have individuals do one of the following: accept a new behaviour; reject a potential behaviour; modify an existing behaviour; abandon an old behaviour (Kotler et al, 2002).

Social marketing is among other approaches that have the potential to bring about socially or environmentally favourable behaviour. These other approaches include (Kotler et al, 2002):

- Economic incentives. These may consist of rebates or tax breaks, but also may take the form of disincentives such as increased taxes. Examples of this approach include government rebates for efficient appliances or increased taxes on cigarettes.
- Public education. This approach is concerned with communicating information but does not have the same emphasis on behaviour change or customer perception as found in social marketing. An underlying assumption in education campaigns is that once the audience is presented with the facts regarding an issue, they will act logically and alter their behaviour. Examples may include anti-litter or anti-smoking campaigns.
- Legislation. Policy-makers may introduce laws to enforce or prevent a particular behaviour. This approach usually emphasizes the negative consequences of non-compliance. Examples include fines for not wearing seat belts or penalties for intoxicated driving.
- Technological innovation. This approach makes use of technology to promote or control certain behaviours. Examples of such technologies include engine cut-off devices to prevent idling, and setback thermostats for automated control of household temperature.

Social marketing is quite different from means that rely on coercive legal or persuasive economic pressures to bring about change. The behaviours targeted by these approaches may only last as long as the pressures exist (McKenzie-Mohr and Smith, 1999).

Technological innovations tend to influence behaviour change only while they are present; if they are removed, the desired behaviour may disappear. Educational approaches tend to reflect organizational viewpoints rather than the customers'

viewpoints (Sutton et al, 1995). Instead of tailoring campaign messages to the perceptions of specific audiences, an educational approach may rely on a “one-size fits all” mass marketing message. Additionally, the measure of success in a social marketing campaign is the degree of behaviour change it has effected. Educational campaigns may have goals to instill knowledge or values upon the public. As compared to behaviour-oriented goals, these goals are much less tangible, and very difficult to measure (Kotler et al, 2002).

An important aspect of social marketing is the effort made to reduce the customer’s perceived costs and increase the perceived benefits of engaging in a new activity. This is necessary because the behaviour being promoted is often a less favourable or a less familiar option. Since the adoption of the proposed behaviour is voluntary, special efforts are made to have the new behaviour appear attractive. To this end, social marketing, much like commercial marketing conducts research to understand the target audience’s perceptions toward the product or behaviour being promoted.

2.2 Community-Based Social Marketing

CBSM differs from social marketing because of its emphasis on local or community-level interventions and use of face-to-face interactions as the primary means of communication (McKenzie-Mohr and Smith, 1999). In essence, CBSM is an amalgamation of interventions shown by social psychology research to be effective at changing behaviour. It has been called “a process...that attempts to make psychological knowledge relevant and accessible” (McKenzie-Mohr, 2000 p.543). Given the voluminous nature of

psychological literature related to social change and behaviour, it is practical to utilize a prescribed methodology such as CBSM in a study such as this. For an overview of the substantial breadth of different theories and models of behavior change and conservation, see Vinning and Ebreo (2002).

The primary aim of CBSM is to “change the ratio of benefits and barriers so that the target behavior becomes more attractive” (McKenzie Mohr and Smith, 1999 p.5). The process of CBSM involves four steps. The first step involves examining barriers to the behaviours associated with a desired social change. The second step is to select the behaviour to promote and develop a program to resolve the associated barriers. The third step is to pilot the program on a small scale. The final step is to evaluate the program after its large scale implementation (McKenzie-Mohr, 2000). This study addresses the first of these two steps by examining barriers to completing home energy efficiency retrofits and making recommendations regarding how to overcome these barriers.

Elements of CBSM have successfully been applied previously in Waterloo Region to achieve large number of EGH evaluations. These elements consisted of community-based outreach events, the development of distinct direct marketing materials, the promotion of word-of-mouth referrals, and credibility-enhancing partnerships with local utility companies (Kennedy et al., 2000). This study proposes to apply the CBSM approach to post-evaluation considerations and will identify barriers preventing retrofit completion.

While REEP's use of social marketing strategies was successful in garnering requests for EGH evaluations, a more in-depth approach is necessary for success in motivating households to act on their evaluation recommendations. Whereas calling to arrange an EGH booking is a 'one-time' action that involves only picking up the telephone, accomplishing energy efficiency upgrades can involve a more complex set of actions. This is because, as opposed to just booking an evaluation, the behaviours associated with completing the audit recommendations may be numerous and complex. What becomes necessary is an examination of the challenges to performing each of the desired behaviours. Previous research has recommended that a systematic approach is needed to identify barriers and improve motivation for implementing the actions recommended by EGH evaluations (Parker et al 2005). CBSM is an approach well-suited to this task.

2.3 Energy Efficiency and Behaviour

At its very basic level, the EnerGuide for Houses program is a behaviour change intervention. It provides homeowners with information that is intended to motivate them to perform energy saving measures. In this way, EnerGuide for Houses is not particularly different than other initiatives that assume that the provision of key information will result in a desired behaviour change. However, research indicates that solely providing information is not likely to lead to a change in behaviour (Geller, 1992; Finger, 1994). This is particularly true when it comes to information related to energy efficiency improvements.

In Gardner and Stern's (1996) review of programs providing home energy savings information, they concluded that programs could be successful if they provided straightforward information about easy to accomplish, low-cost measures. However, they found that detailed information delivered in-person by energy auditors about complex measures (installing attic insulation and installing wall/floor insulation) was not sufficient to motivate action. Gardner and Stern note that while face-to-face interaction overcame informational barriers, it did not overcome the larger barriers associated with implementing the energy savings actions. Similarly, in assessing the impact of the EGH program, Parker et al., (2005) found that of 420 evaluated households only 20 per cent of the potential energy savings had been achieved, despite residents having received a "detailed residential energy evaluation and an individualized energy plan for improvements" (p.175).

When information alone does not result in desired social changes, monetary incentives are often introduced in an attempt to remedy the situation. The disconnect between information and action can be seen in economic terms as market failure. Governments may perceive it as necessary to introduce funding programs to resolve this failure (Shove, 1998). However, people do not always act in an economically rational way, thereby limiting the effectiveness of such programs. Kempton et al. (1992) note, "Investment has been considered in the domain of economics, but there is more psychology there than is generally realized" (p.1216).

Numerous studies have focused on the relationship between incentives and behaviour change. Incentives have been widely applied to improve environment-related behaviours such as recycling, waste reduction, and transportation (McKenzie-Mohr and Smith, 1999). However, certain factors contribute to the success of incentives. Firstly, the size of the incentive is important. Gardner and Stern (1996) find that programs offering small incentives did little to influence behaviour, and that programs covering as much as 93 per cent of the retrofit costs were necessary for significant homeowner action. The current rebate offered under the EGH Retrofit Incentive program covers roughly 10 to 20 per cent of the upgrade costs. While the introduction of this program has caused an increase in the number of EGH evaluations requested, it has not resulted in the substantial numbers of retrofits needed.

Secondly, research has shown that it is important to make ‘conservation convenient’ and to avoid complex rebate processes and delays in granting incentives (Gardner and Stern, 1996 p.111). Gardner and Stern (1996) note, “Lack of knowledge, uncertainty, and the need to devote significant attention to the choice are major barriers to actions. A consumer may understandably take the attitude that ‘if it’s not broken, don’t fix it’” (p.111). In addition, the most effective elements for creating motivation have been identified as “soon” and “certain” (Geller, 2002b p.528). In other words, incentives are most likely to influence behaviour when the reward is close to the time of the desired action and individuals are confident they will receive it. Unfortunately, the present format for the EGH program provides rebates after desired action has taken place and the process involves a fair amount of uncertainty. Residents must first make the retrofits

without knowing how much of an incentive they may receive, request a second evaluation to determine the extent of their improvements, then apply for the rebate which comes at a later date. This process may take several months. Motivation for action understandably declines when residents are distanced from the incentives, either over time or due to uncertainty about the efficacy of their actions.

Stern (1992) points out that the reason for the failure of many policies is because of oversimplified policy analysis that does not give enough attention to human behaviour. As has been noted in previous research, it is necessary to address the social as well as the technical aspects of energy savings. Shove (1998) notes that the missing component of conventional conservation policies is an “appreciation for the social contexts of energy savings action” (p.1108). Similarly, Parker et al. (2000) note the importance of recognizing the “socio-technical potential” of energy savings where the “technical potential of savings is contextualised by the social situation of the resident” (p.31).

In fact, social processes have been found in some circumstances to undermine technical improvements and consequently offset the gains made by efficiency retrofits. For example, Hass et al (1998) found that building retrofits resulted in a rebound effect of about 15 to 30 per cent due to behaviours such as changing thermostat temperatures and adjusting ventilation rates. Also, Parker et al (2005) examined retrofitted homes and found that 12 per cent experienced a rebound effect where they increased their consumption by 25 per cent. It is clear that efforts aimed at improving technical upgrades must consider the socially-influenced behaviours related to energy conservation.

Energy conserving measures have been classified into three general categories. Investment measures have to do with purchasing energy efficient equipment, such as home insulation or a new furnace. Management measures involve living more efficiently; for example, by lowering thermostat settings while the home is unoccupied. Curtailment measures relate to ‘doing with less’ such as lowering thermostat settings while at home (Kempton et al, 1992). Each of these measures possess unique characteristics (Poortinga et al., 2003). Investment measures are generally associated with an improved quality of life, whereas behaviours to reduce energy conservation are often considered a sacrifice (Stern, 1992). From a behaviour standpoint, investment measures are considered “one-time” actions as opposed to curtailment measures that are ongoing (Kempton et al, 1992). Within the context of EGH, the home evaluations result in retrofit recommendations that involve investment measures that are generally considered to be one-time actions.

Numerous models and theories have been applied to the examination of behaviour change. This study has utilized the CBSM methodology. The basic tenets of CBSM are aligned with the Applied Behavioural Analysis (ABA) approach which posits that “people perform behaviors when they are presented with environmental stimuli that serve as cues or facilitators of the target behaviors” (Vinning and Ebreo, 2002 p.542). Both CBSM and ABA focus on behaviours rather than attitudes or perceptions as the primary means of bringing about social change. Attitudes and perceptions are seen as difficult to define and to effectively alter (Geller, 2002a). In his overview of strategies to influence environmental behaviour, Geller (1989) notes that ABA researchers observe that it is

more cost effective to target behaviours rather than attempting to alter attitudes or values and then hope for a subsequent indirect influence on behaviours. Past research has indicated that there is little causal relationship between environmental values or concern and environmental behaviour (Finger, 1994; Stern, 2000). This may be particularly true in promoting home energy conservation behaviour. Household energy use was not found to be related to attitudinal variables, but rather to other variables such as income and household size (Gatersleben et al., 2002). Consequently, this study hopes to find means to reduce energy consumption by focusing on the retrofit behaviour as the target for interventions, rather than attitudes or values related to the retrofits.

Within the ABA model there are three basic interventions used to change target behaviours. Instructional interventions involve actively engaging the individual and providing guidance, training, or feedback. Motivational interventions are used when behaviours are seen as being undesirable (i.e. inconvenient, uncomfortable, expensive, etc.) and consequences or incentives are needed to encourage the behaviour. Supportive interventions are designed to reinforce behaviour by providing reassurance that the actions are being done in the right way (Geller, 2002b). All three of these interventions are potentially involved in encouraging home energy efficiency retrofits. The EGH evaluation itself is an instructional intervention where the resident receives specific guidance about energy conservation measures. The incentive program (or some version of it) provides a motivational incentive to overcome barriers. Presently, EGH does not provide a supportive intervention, though a follow-up call from the evaluator or a hands-on workshop for home retrofits are potential examples.

In summary, encouraging energy efficiency through EGH requires social interventions to achieve technical potential. These interventions could be directed at altering values or attitudes though a more direct method is found in using the ABA approach which targets behaviours and their associated barriers. This study has chosen to utilize CBSM because of the accessible nature of its methodology that it reflects the effective elements of ABA. The remainder of this paper reports on the behaviours examined and suggests relevant interventions to overcome the identified barriers.

3.0 Methodology

This research suggests that behaviour change interventions will be better focused if directed at overcoming specific barriers to retrofit actions. The reviewed literature indicated that numerous such potential barriers exist. Rather than assuming all retrofits would have similar barriers and therefore require similar interventions, this study aimed to determine which specific barriers were relevant to each of the identified retrofits, in particularly foundation insulation improvements and furnace upgrades.

Barriers to Home Energy Conservation Identified in Literature		
Stern and Aronson (1984)	Gardner and Stern (1996)	Scott et al., (2000)
Initial cost	Initial cost	Initial cost
	Inconvenience	Inconvenience
	Financing costs	Financing costs
Lack of information	Lack of information	Lack of information
	Finding a contractor	Finding a contractor
	Lack of time	Lack of time
	Plan to move	Plan to move
Doubts about savings		Doubts about savings
		Doubts about reliability

Figure 1

Figure 1 provides an overview of several of the potential barriers to home energy conservation. As will be discussed, these barriers were used to inform the development of the interview script and focus group discussions used in this study.

The CBSM approach advocates the use of both surveys and focus groups to determine barriers associated with the desired actions (McKenzie-Mohr and Smith, 1999). A telephone interview was used to collect data regarding homeowner perceptions toward barriers encountered in implementing the recommended retrofits. All respondents were asked to report on their progress toward completing the retrofits, their intention to complete the retrofits, the barriers they may have encountered, and to choose from a list

of items that may be helpful in overcoming these barriers. Interview respondents (n=52) were chosen randomly from a list of candidates that met the following criteria:

- the EGH evaluation was conducted within the last two years
- the EGH evaluation recommendations included furnace upgrades and foundation insulation improvements
- the respondents had not yet completed all of the recommended actions

A list of 1,335 evaluations meeting these criteria was generated from the REEP EGH database of 6,025 evaluations. Interview candidates were then chosen randomly from the list. Roughly 200 attempts at contacting residents on this list were needed to attain the final 52 interviewees.

A subsequent focus group was held to provide a venue for a detailed examination of the interview results. To this end, the focus group discussion guide was written to reflect the main themes uncovered during the telephone interviews. The participants were chosen from the list of interviewees. As they had already been screened as interview candidates, the only selection criteria was their willingness to participate.

In addition to being aligned with CBSM methodology, focus group interviewing was chosen because of its potential for obtaining in-depth information from respondents and for its opportunity to explore responses that were not considered by the researcher (Krueger, 1994). A core precept of social marketing is to avoid imposing the ‘organizational mindset’ upon the target audience and instead strive to understand the

audience or ‘customer mindset’ (Sutton et al, 1995). Whereas interviews may be structured to include questions important to the researcher, the dynamic environment of a focus group discussion invites the opportunity for participants to provide unexpected answers and pose new questions (Palys 1997). In this way, the perceptions and concerns of the participants may be more accessible. Indeed, this study hoped to discover more detailed and perhaps unanticipated barriers to the noted retrofits.

Though the interview and focus group respondents shared many recommended actions such as air sealing, wall insulation, and attic insulation improvements, they all shared two key recommendations: furnace upgrades and foundation insulation improvements. This study focused on furnace and foundation insulation upgrades because of the significant energy savings potential of each. Housing data analyzed by the HOT2XP software indicated that among the homes audited in Waterloo Region, the furnace and foundation insulation upgrades had the greatest overall potential for reducing energy consumption (see charts 1-3). These findings echo Guler et al.’s (2001) examination of housing stock across Canada which also found furnace and foundation insulation improvements to have the largest energy savings potential of major energy efficiency retrofits. Furthermore, choosing these actions was in line with Stern’s (1992) recommendations that energy conservation interventions should focus on actions that are the most important in terms of energy use and can have the largest overall impact.

The following figures represent HOT2XP data and indicate the energy savings potential of 6,025 homes in Waterloo Region. By analyzing the frequency of retrofit

recommendation, the average savings by retrofit, and the sum total potential energy savings of each retrofit, it was determined that furnace upgrades and foundation insulation improvements should be the focus of this study.

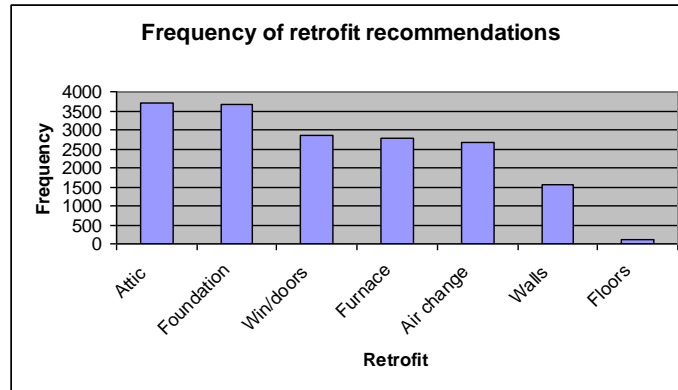


Figure 2.

Figure 2 shows that the most frequently recommended retrofits were attic insulation and foundation insulation upgrades.

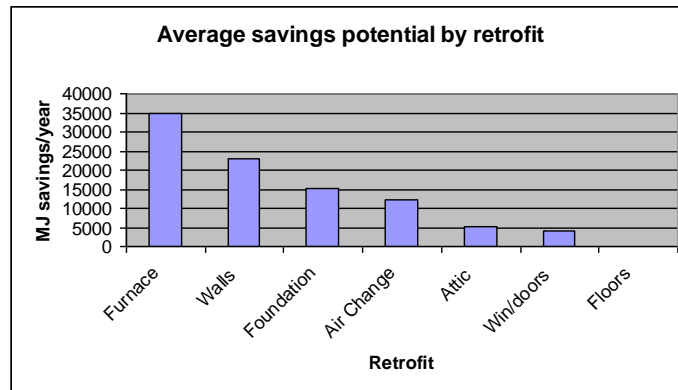


Figure 3.

Figure 3 shows that the average energy savings (MJ/year) were highest for furnace upgrades.

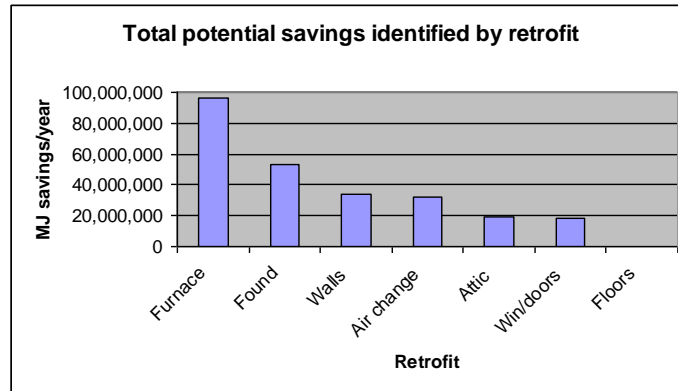


Figure 4.

Figure 4 shows that the total potential savings in MJ/year were greatest for furnace and foundation insulation upgrades. These figures were obtained by summing the estimated savings for each individual retrofit recommendation.

A portion of the interview questions were similar to an earlier survey conducted with REEP clients which sought to understand barriers to the recommended actions. These results have been reported previously by Scott *et al* (2000). However, this survey differs from the present study in two important ways. Since the Scott *et al* survey was given to homeowners at the time of the evaluation; respondents had not yet had the opportunity to implement the recommended retrofits and so were reporting their anticipated rather than actual barriers to the actions. Also, the respondents were asked about their perceptions toward their retrofit recommendations as a whole, rather than perceptions toward individual retrofit recommendations. It was thought that interviewing residents with retrofit experience about retrofit-specific perceptions would provide additional useful data. A comparison between responses from the original survey and the responses obtained from this research are provided later.

3.1 Profile of Participants

As already noted, participants were homogeneous in terms of having received a recent EGH evaluation, sharing common recommendations, and having not completed all of the retrofits. Figures 5 and 6 offer a comparison between the housing characteristics of the study participants and of homes found in the Region of Waterloo. It can be seen that the distribution of the age of homes is similar, except for the most recently built homes. This is to be expected given that residents with recently built homes generally have less interest in an EGH evaluation.

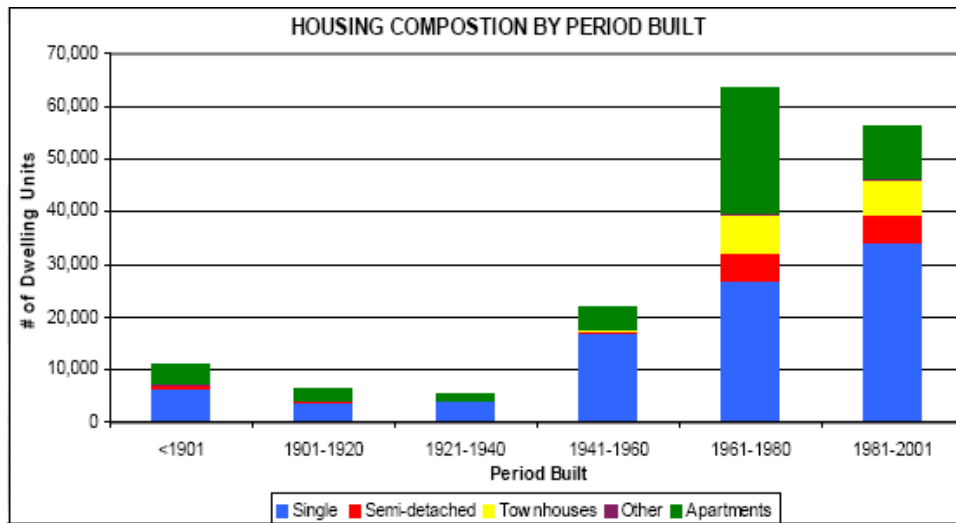


Figure 5 (Region of Waterloo, 2001).

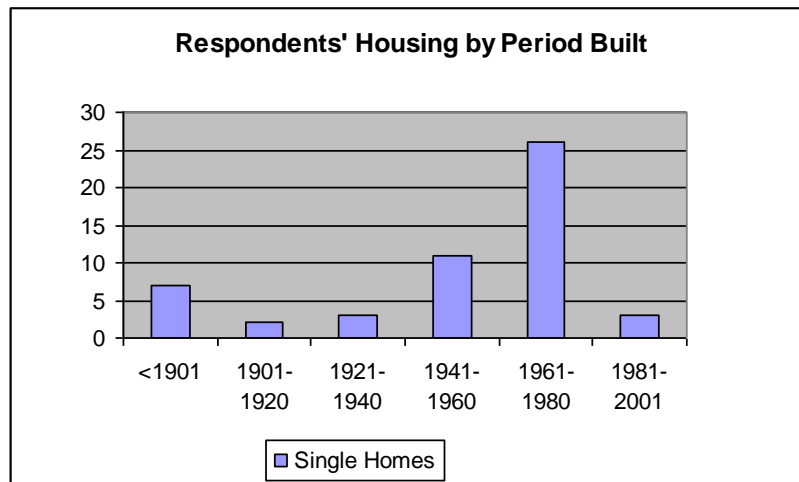


Figure 6.

The majority of the participants' homes in this study were constructed between 1961 and 1980. Previous research has identified that homes of this period typically have poor foundation insulation and that upgrades in this area have the greatest potential for energy savings (REEP, n.d.).

All of the study participants had single detached homes. Figure 7 shows the proportions of housing stock by type in Waterloo Region. Participants are among the majority of residents that have single detached homes.

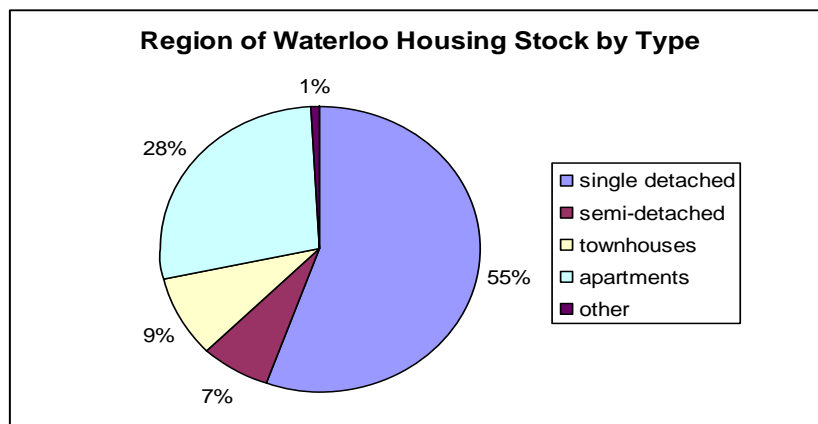


Figure 7 (Region of Waterloo, 2001).

Figure 8 provides a comparison of housing characteristics between the four different sample groups involved in this study: (A) the overall population consisting of EGH evaluations conducted by REEP in Waterloo Region to date (current at the time of this study); (B) the sample of this population which met the criteria for the study (date of evaluation and type of recommendations), (C) those interviewed from this sample, and (D) the focus group participants.

Housing Characteristics by Sample Group		(A)	(B)	(C)	(D)
		Waterloo Region EGH evaluations N=6025	Potential interview participants n=1335	Interview participants n=52	Focus group participants n=5
year built	avg	1961	1963	1950	1970
	st dev	39	30	32	9.6
area m2	avg	220.0	222.7	214.7	188.2
	st dev	80.5	78.6	155.3	44.1
Potential change in foundation HL	avg	8773.5	10699.0	30900.0	28037.6
	st dev	11156.9	11589.3	28078.1	12418.1
Total potential savings (MJ/y)	avg	43441.9	47431.6	88360.2	57207.8
	st dev	40007.7	41276.9	59518.5	19674.0

Figure 8

The characteristics chosen for comparison were year the home was built, the size of the home, the potential for changing (reducing) heat loss through the foundation, and the total energy savings potential for the home. Such a comparison provides an indication of the ability to generalize this study's findings to a larger population. The following is a discussion regarding the data in Figure 8:

- Potential interview participants (B). The data indicates that sample B was similar to sample A in all regards except average foundation heat loss. This is to be expected given that one of the primary criteria for selection was that foundation heat loss was identified as a problem.
- Interview participants (C). This sample resided in homes of similar size that were somewhat older than either A or B. Sample C had a significantly higher foundation heat loss improvement potential than either A or B. Also, it had a much greater average potential for overall energy savings.
- Focus group participants (D). Considering the large associated standard deviations of each, this sample resided in homes that were of similar age and size to the other groups. The potential to improve foundation heat loss was still

significantly higher than in group A or B. However, in respect to overall energy savings, sample D was closer to A and B than it was to sample C.

In summary, the interview and focus group participants tended to reside in homes with a greater potential for energy conservation than the average home evaluated in Waterloo Region. This places some limitations on the ability to generalize the findings of this study to a broader population.

3.2 Limitations

Other limitations of this study were that survey and focus group participants may not have been homogeneous in ways other than having been recommended furnace and foundation insulation upgrades. Consequently, variables such as education level and household income were not examined and could account for differing views regarding barriers to action. It should also be noted that the modeling software at times indicated retrofit improvements that were not actually communicated to the customer. This is because the EGH auditors recognized that certain values were too low to actually make any significant difference in energy consumption and so, were not included in the written report given to the customer. Therefore, EGH auditors were consulted to determine the technical values that would represent actual recommended retrofits.

4.0 Findings

This section discusses the findings from both the telephone interviews and focus group.

The following section discusses these results.

4.1 Interviews

In all, 52 residents that fit the participant profile were interviewed. It was found that among the five retrofits examined, furnace upgrades were the most often completed and wall insulation the least often completed. Air sealing was the only retrofit reported that had a significant ‘in progress’ category (work had begun, but was not completed).

Though, foundation insulation had a large potential energy savings, it was second only to wall insulation for most often being incomplete. See Figure 9.

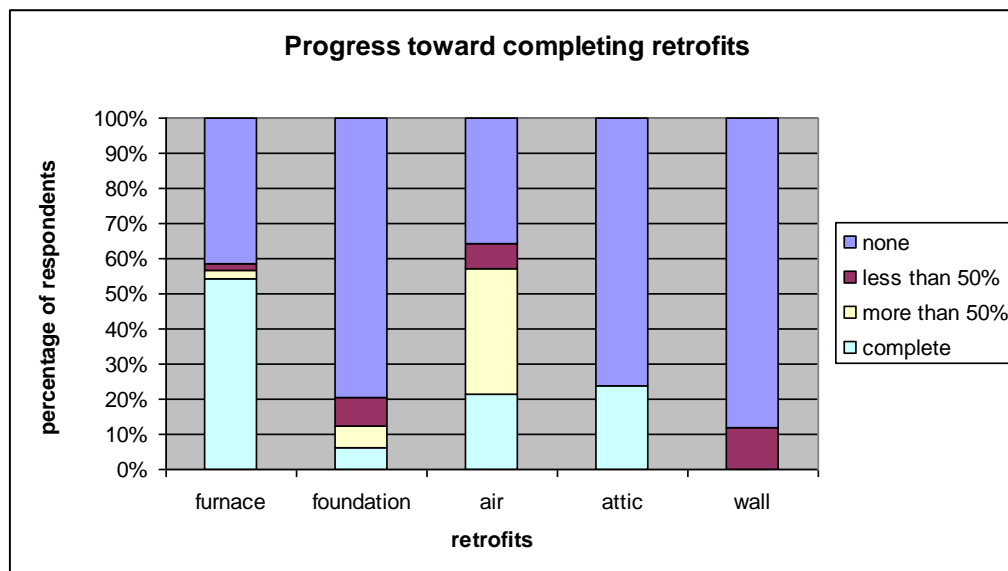


Figure 9.

Of the retrofits that had not been completed, respondents reported intending to complete air sealing more often than other upgrades. Respondents reported intending to complete air sealing more often than other retrofits. For all of the uncompleted retrofits with the

exception of wall insulation, over 50 per cent of respondents intended to carry out the recommendation. See Figure 10.

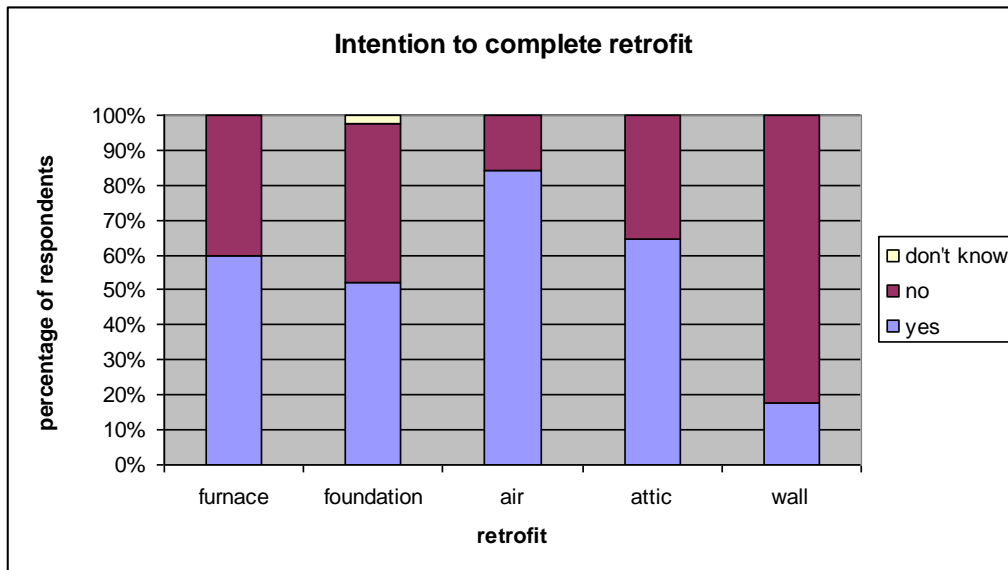


Figure 10.

Respondents were asked to choose from a list of barriers that may have been significant in preventing their accomplishment of their retrofits. As noted earlier, the barriers were chosen because they were identified in previous research as being relevant to home energy conservation. The questions were framed as follows:

- Cost – “Was the overall cost of the retrofit a significant barrier?”
- Contractor – “Was finding a contractor you were comfortable with a significant barrier?”
- Finance costs – “If you were planning to finance the retrofit, was the current financing cost, or interest rates a significant barrier?”
- Information – “Was feeling like you didn’t have enough information about how to accomplish the retrofit a significant barrier?”

- Time – “Was feeling like you didn’t have enough time to devote to the retrofit a significant barrier?”
- Inconvenience – “Was feeling like the retrofit was too inconvenient (meaning that it would cause a mess or a part of your house would be unusable for a period of time) a significant barrier?”
- Reliability – “Was having doubts about the reliability of the recommended products a significant barrier?”
- Moving – “Were potential plans to move in the near future a significant barrier?”
- Savings – “Was having doubts about the actual amount of money you would save by completing the retrofit a significant barrier?”

Figures 11 through 15 represent the reported barriers to implementing each retrofit. It should be noted that the data represents the frequency of reported barriers and not the respondents’ perceived level of importance of each barrier.

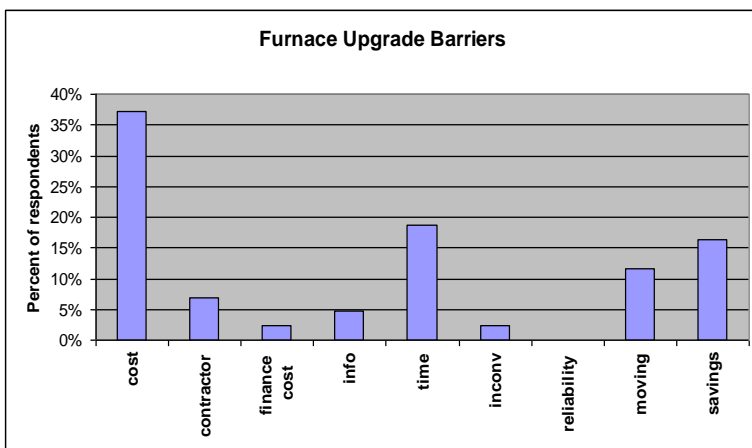


Figure 11

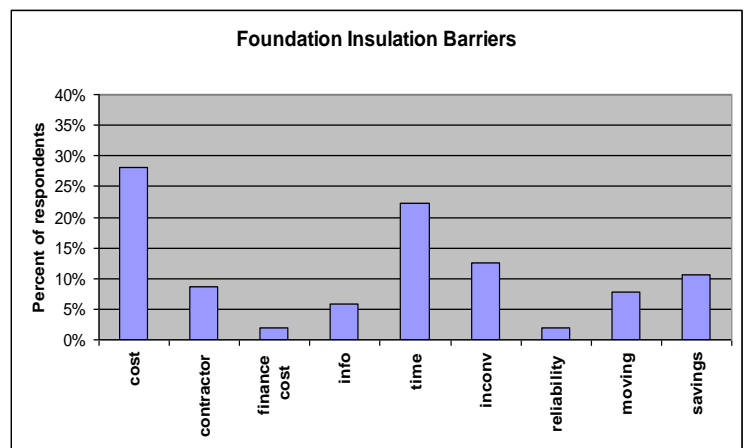


Figure 12

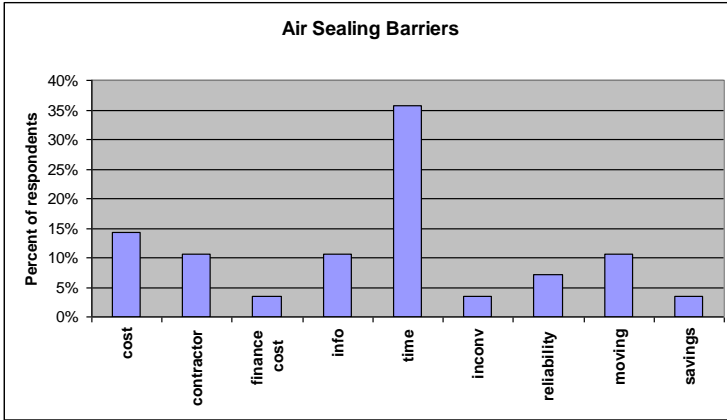


Figure 13

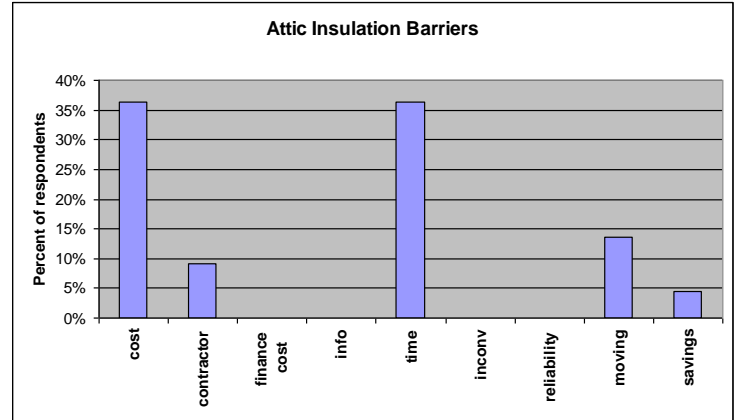


Figure 14

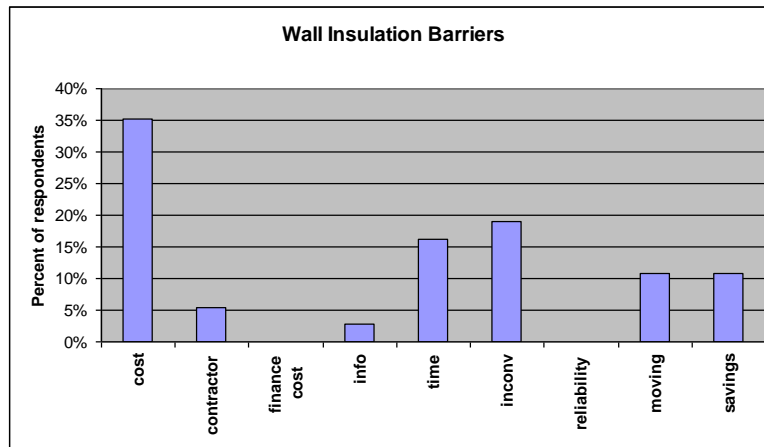


Figure 15

The following will briefly discuss the data represented in Figures 11 to 15:

- Furnace upgrade. Cost was the most often reported barrier to furnace replacement, followed closely by time and doubts regarding achieved savings.
- Foundation insulation. Cost, followed by time was also the most often reported for foundation insulation retrofits. However, inconvenience was also frequently reported.

- Air sealing. Time was by far the most often cited barrier for air sealing. Cost was less important to this retrofit as compared to others.
- Attic insulation. Time and cost were reported equally as often as barriers to attic insulation. Barriers that were noted for other retrofits such as lack of information and inconvenience were not reported for attic insulating.
- Wall insulation. Cost was the most often cited barrier to this retrofit. Time and inconvenience were also frequently reported. Inconvenience was most often cited as a barrier for wall insulating than with any other retrofit.

Respondents also had the opportunity to state other barriers that had not been included in the list of choices. These barriers along with their associated retrofits were:

- Furnace – laziness; other priorities; waiting until replacement is needed; the rebate period had expired; didn't understand the rebate program; hard to finance and schedule in 18 months; was hoping for easier recommendations
- Foundation – recommendations were not clear; didn't trust contractor quotes; laziness; other priorities; too much already invested in home; rebate period expired; didn't want to make house too tight; hard to schedule and finance in 18 mos.; was hoping for easier recommendations; couldn't find contractor to do the job
- Air sealing - rebate period expired; laziness; didn't want to make house too tight; door frames not square in old home
- Attic insulation - recommendations not clear; recommendations not needed; laziness; rebated period expired; hard to finance and schedule in 18 months

- Wall insulation - other priorities; rebate period expired; laziness; would lose heritage look of home

Finally, respondents were asked whether or not four potential sources of help would be useful in assisting with the completion of their recommended retrofits. The questions were framed as follows:

- Follow-up call – “If you had received a follow-up call from the evaluator at a later date, to clarify the recommendations or to answer any questions that you may have, would that have helped you to make significantly more progress?”
- Contractor list – “If you were provided a list of ‘approved’ contractors at the time of the evaluation, would that have helped you to make significantly more progress?”
- More information – “If you were given more detailed information about how to accomplish the recommendations, would that have helped you to make significantly more progress?”
- More incentives – described as “The current amount of the government rebate provides roughly 10 to 20 per cent of the cost of the retrofit. If this amount was increased, would it have helped you to make significantly more progress?”

Figure 16 indicates there were no significant differences between the proportions of sources of help identified for each retrofit. However, larger incentives seemed slightly more important for furnace upgrades and follow-up calls seemed slightly more important for air sealing. Also having a contractors list was not as important for air sealing as it was for other retrofits.

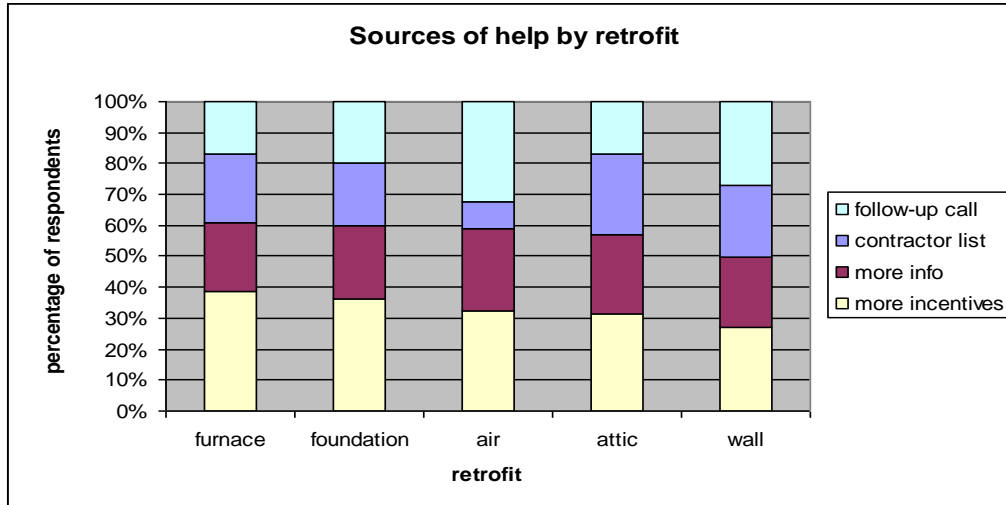


Figure 16.

Again, respondents had the opportunity to add to the list of choices by identifying other sources of help for accomplishing their retrofits. These sources of help noted were:

- Furnace - more time for rebate; interest free loan rather than rebate; renovations done by REEP
- Foundation - more time for rebate; estimate of costs; link to climate change; 50% rebate; interest free loan rather than rebate; renovation done by REEP
- Air sealing – more time for rebate; estimate of costs
- Attic insulation – more time for rebate; renovation done by REEP
- Walls – more time for rebate; estimate of costs

In summary, furnace and foundation insulation upgrades were quite different in terms of the criteria examined. Furnace upgrades were the most likely retrofit to have been completed, whereas foundation insulation was the second least likely to be completed. They were similar in terms of respondents' intention to complete the retrofits, but were different in the types of barriers identified. Cost and doubts about potential energy

savings were greater for furnace upgrades and inconvenience was a larger barrier for foundation insulation improvements.

The ‘other’ sources of help noted by respondents were mainly related to changing the incentive program, providing estimated costs for retrofit completion, and suggesting REEP complete the recommended actions rather than a contractor. These comments were incorporated into the focus group discussion guide for further examination.

4.2 Focus Groups

Appendix A contains a copy of the discussion guide and Appendix B provides selected transcriptions of the focus group participants’ responses. The following is a summary of the discussion.

Focus group participants generally had positive views about the EnerGuide for Houses evaluation provided by REEP and their primary motivations for booking the evaluation were to gain an understanding of the state of efficiency of their homes and to become eligible for a rebate. Some had specific problems (e.g. furnace needed to be replaced) that prompted them to arrange for the evaluation. Some also cited a desire to help the environment as a secondary motivation.

In terms of barriers, participants most often cited cost as a reason for not implementing the recommendations. However, several underlying factors were related to cost as a barrier. The large upfront expense of furnace replacement was problematic as was being

unsure of how much of a return they could expect from their retrofit investment. Some participants described how numerous priorities were competing for their available income and that the retrofits were not always a primary concern. The potential for a rebate seemed to pique their interest sufficiently to book an evaluation, yet was not significant enough to motivate the accomplishment of all the recommended retrofits. The participants strongly conveyed frustration with not having enough time to complete the retrofits within the 18 month window of eligibility for the rebate. Participants felt that this did not allow enough time to budget for the cost of the retrofits. Some expressed that a further problem with the rebate time frame is that once the 18 month eligibility period expires, there is reduced motivation to complete the retrofits. Additionally, some participants felt the rebate process was not clear and should be made easier to understand.

Participants also encountered barriers related to contractors. Some felt it was difficult to find trustworthy contractors and that word-of-mouth communication was the best way to find suitable contractors. Though participants felt if they were not “well-connected” then word-of-mouth information would not be accessible. Some participants had received information from contractors that conflicted with other contractors’ information, or conflicted with the information provided by REEP. This consequently left them frustrated and unsure of how to proceed with the retrofits.

Participants were asked specifically about barriers to furnace and foundation insulation upgrades. They noted the main barriers to furnace upgrades as being the upfront cost and confusion about which type of furnace (high versus medium efficiency) to install due to

conflicting contractor recommendations. The main barriers to foundation insulation upgrades had to do with information. Participants either lacked information on how to do the retrofit or did not know how much it would cost.

Participants were also asked to think of solutions to the problems that they had encountered. Regarding costs, it was unanimously expressed that some mechanism be in place to offset the upfront cost of the retrofits. Coupons and interest-free loans were proposed solutions. Also, participants thought that more “how-to” information should be included, seminars offered, and cost estimates provided. Most also felt strongly that more time be allowed for incentive eligibility. Some thought that retrofit completion could be encouraged by emphasizing the connection between reduced energy consumption and environmental protection.

Participants were also asked to comment on the potential sources of help noted by telephone interview respondents. They unanimously felt that REEP should not provide services to accomplish the recommended retrofits. It was expressed by the majority of the group that a follow-up phone call from an evaluator would not be of significant help.

Regarding solutions to furnace-related barriers, the participants noted that cost estimates, rebates, and recommendations about specific furnace types would be helpful. Regarding solutions to foundation insulation upgrade barriers, participants discussed how cost estimates and instructions on how to complete the retrofits would be helpful.

5.0 Discussion of Findings

As noted, the telephone interview questions were developed from previous research and were formatted to reflect the anticipated answers of the respondents. The interviews collected data regarding how frequently specific barriers were encountered for each retrofit, but did not capture respondents' perceptions of the relative importance of each barrier. The focus group proved to be an effective venue for examining the perceived significance of each barrier and for presenting unanticipated responses.

An important area investigated by this research was to determine if different retrofit recommendations had similar barriers and if they could consequently be addressed by a single interventions. The responses to the telephone and focus group interviewing indicated that each recommended retrofit presented its own set of unique barriers. The following provides a discussion of the barriers identified and the possible interventions for each.

As would be expected, cost was an important barrier to all the retrofits examined. However, it was apparent that several factors were related to cost being perceived as problematic. First, the upfront cost of implementing the retrofits, particularly furnace upgrades, was seen as significant. Second, residents found it difficult to budget for the retrofits because of competing priorities for available funds. Third, the costs (particularly to complete all the recommendations) were shown to be difficult to manage within the 18 month window of eligibility for retrofit rebates. This indicates that cost-associated barriers are not sufficiently remedied by a simple post-retrofit incentive.

Cost appears to be better addressed by an incentive program that provides a rebate at the time retrofit-related products are purchased e.g. a discounted price on an energy efficient furnace. One possibility would be for the federal government to give residents a coupon or instant rebate on select products when purchased. This change in rebate process would eliminate delays in receiving the incentive and would help offset some of the up-front retrofit costs. Also, this would help mitigate the uncertainty of how much of an incentive residents would receive. Furnace upgrades would be an obvious target for this change, given their expense and significant energy saving potential. A ‘hold-back’ or second incentive could be provided after the retrofits are completed and energy savings have been measured during the follow-up evaluation.

Time was the other major barrier identified for most retrofits and has two main facets for consideration. Residents may be busy with other priorities and feel that they do not have enough time to devote to accomplishing the retrofits. Also, residents believed that the time allowed for retrofit completion under the EGH Retrofit Incentive program was not be adequate for completing the work. An important consequence of exceeding the 18 month eligibility window was that it led to decreased motivation for completing the retrofits.

Most of residents participating in this study wanted an extension on the incentive eligibility period. This sentiment was closely associated with the cost-related barrier of not being able to manage to fund the retrofits within the 18 month period. Certainly, it

would seem obvious that even residents keen to complete the recommendations may only be able to accomplish the minimum retrofits required for a rebate when faced with limited time and money. If a period longer than 18 months was allowed it may result in a greater degree of retrofit completion and achieved energy savings.

The obvious counter-argument to this notion would be that a shorter deadline is necessary to avoid procrastination and help achieve the needed emission reductions in a timely manner. However, as has already been noted, the current rate and level of retrofit implementation will require another 345,000 homes to be upgraded to meet emission reduction goals. Improving the depth of retrofit completion would remove some of the burden of having to retrofit so many homes, and in the end may be less time consuming if a higher CO₂ reduction per home ratio is achieved.

It was interesting that barriers related to information and contractors were not as significant to telephone interview respondents as they were to focus group participants. Regarding focus groups, Kruger (1994) notes that attitudes and perceptions are developed through interactions with other people and that individuals may need to hear the opinions of others before they form their own. It may be that the focus group interactions prompted new insights regarding the need for information or about the problems with contractors and that these were not considered during the relatively brief phone interviews. In any case, there was a strong desire among focus group participants for additional information as a means of assisting with retrofit completion.

More information was important for reducing the significance of several barriers. It was felt that having more detailed, step-by-step instructions on how to complete the retrofits would assist those undertaking the retrofits themselves. For those using contractors, more information would be helpful in the form of a list of recommended contractors or an estimate of retrofit completion costs to use when negotiating with contractors. Also, an estimated return on investment would help with budgeting and priority setting. A barrier for furnace upgrades was having doubts about the actual energy savings achieved by high-efficiency models. More information about the advantages of certain models and levels of efficiency may assist in relieving some of the confusion experienced by homeowners when speaking with contractors about furnace options.

Inconvenience was an important barrier to foundation insulation improvements. While there may not be any easy way to make the work less disruptive or untidy, there are ways of making it easier to accomplish. The provision of information in the ways described above seems necessary. Doubts about the energy savings of foundation insulation improvements were also important. Given that foundation insulation has been shown to be major area of potential energy savings, residents' doubts about the savings may be a function of cognitive dissonance where the level of inconvenience of the work actually influences their perception of achievable energy savings. Cost estimates, 'how-to' information, contractor lists, and an emphasis on the return on investment may offset these concerns.

The lack of inconvenience of having a furnace replaced seems to be a reason for the greater implementation rates of this retrofit. Telephone interview responses indicated that furnace upgrades were the second least inconvenient retrofit of the five examined. Focus group participants expressed the relative ease involved with arranging a furnace installation. As one noted, “You just call one day and the next, they’re there.”

Barriers to completing air sealing were not directly addressed during the focus group. Telephone interview responses indicated that this retrofit had the unique characteristic of being the only one examined with a significant in progress component. It also had the highest reported intention for completion. Considering that HOT2XP data from Waterloo Region indicates the average energy savings potential for air sealing is 12, 131 MJ/year (greater than attic insulation improvements), it would be interesting to investigate how further action on this retrofit could be supported.

As mentioned, a previous survey was given to residents at the time of their EGH evaluation to assess their perceived retrofit barriers (Scott et al, 2001). Figure 17 notes the ranking of these barriers by their perceived importance.

Perceived barrier	mean*
initial cost	1.91
lack of information	2.22
upgrades take too long to pay for themselves (savings)	2.48
no time for upgrade work	2.63
financing too costly	2.65
lack of skill to install energy efficiency measures	2.75
unconvinced upgrades would result in savings	2.78
uncertain about reliability of technologies	2.83
plan to move	2.90
inconvenience of work	3.24

* Where 1 = very important and 4 = not important

Figure 17. Relative importance of perceived barriers (Scott et al, 2000)

The present study differs in several ways. It has examined post-evaluation retrofit experiences. It has examined perceptions towards retrofit-specific barriers rather than perceptions toward the recommendations as a whole. Finally, it has examined the frequency of encountered barriers rather than the relative importance of the barriers. Nevertheless, it is interesting to compare the perceptions of residents prior to and during the retrofit implementation process.

In comparing Figure 17 with Figures 11 through 15, it is apparent that cost has remained an important barrier to each retrofit. It is also notable that the perception of lacking time becomes more important during the post-evaluation period. Interestingly, the focus group participants emphasized the need for additional knowledge just as the resident's who had received an evaluation. As stated by Scott et al (2000) lack of information "is an important barrier that REEP and EGH are specifically designed to overcome" (p.86). It is apparent that further support in this area is necessary. Lastly, the inconvenience of the work associated with foundation insulation upgrades was reported to be greater in this study than in the Scott et al study. Overall, it appears that a shift in perceptions about some barriers occurs after the initial evaluation which would indicate that interventions should be temporally sensitive.

6.0 Conclusion

This study differed from previous research in that it examined the post-evaluation experiences of attempting to implement the recommended home energy efficiency retrofits. It also examined the specific barriers associated with implementing individual retrofits, particularly those related to furnace upgrades and foundation insulation improvements. These two retrofits were shown to have the most potential for energy savings and GHG reductions. The barriers associated with furnace upgrades were the initial cost, the time involved, and doubts about the savings achieved. The barriers associated with foundation insulation improvements were cost, time, and inconvenience.

Given that the interviewees and focus group participants in this study were similar to the larger population in terms of age of home and size of home, but differed in terms of potential energy savings and potential to improve foundation heat loss, generalizability may be limited. Certainly, the findings are germane to developing interventions for residents with similar housing characteristics and although other homes may not have the same level of energy savings potential, the interventions can still assist in achieving their potential, albeit less significant.

A CBSM approach was used which emphasized the importance of understanding the residents' perceptions toward the recommended retrofits. To this end, interviews and focus groups were used to examine barriers identified in previous research and explore possible sources of help. The interviews were conducted to obtain a basic understanding of the challenges to accomplishing the recommendations. These findings were then

incorporated into the discussion guide for a focus group comprised of homeowners with experience in attempting to accomplish the retrofits.

The CBSM approach was chosen for two reasons. First, CBSM has been used previously in Waterloo Region to develop effective strategies for motivating residents to request an EGH evaluation. It was of interest to see if this approach could be extended to also motivate residents to follow through with their recommended retrofits. Second, CBSM follows the basic precepts of Applied Behaviour Analysis which uses a pragmatic approach to alter behaviours rather than attitudes or values. CBSM prescribes a framework for developing effective behaviour change interventions that can be used to promote energy efficiency actions. This study's examination of the barriers to these actions is the first step of this approach.

It was found that although, the EGH incentive program proved effective at garnering an increased number of evaluations, it has not provided the depth of retrofit completion necessary to meet GHG reduction goals. The federal government's current strategy for increasing retrofit completion is to provide post-retrofit incentives. The findings from this research indicate that the effectiveness of such an incentive structure is limited because of several barriers: reluctance to finance the large upfront retrofit costs, difficulty in managing to finance all the needed upgrades within the eligibility period, and uncertainty related to the actual retrofit costs, the achievable energy savings, and the process of how to complete the actions. Also problematic to residents was an underlying sentiment that without more detailed product information and cost estimates they were

uncomfortable engaging in negotiations with contractors. Most importantly, the EGH incentive program will remain limited in effectiveness because it attempts to address multiple retrofit barriers with a single intervention. This research has shown that each retrofit would best be addressed by an intervention that targets its specific barriers.

It is possible that prior research which has characterized energy investment actions as ‘one-time’ (Kempton et al, 1992; Poortinga et al, 2003) may have led to oversimplified assumptions about the behaviours associated with some retrofit installations. For example, Geller (2002a) states, “In the case of one-time behaviors, only a single successful application of the (behaviour change intervention) is needed for desirable social change” (p.22). While it is true that the same structures of support are not necessary for furnace replacements as are needed for habitual actions like taking shorter showers, this study finds retrofit actions still require support, possibly extended over a period of time. For example, improving foundation insulation involves learning the necessary techniques, determining the related products to purchase, purchasing the products, and applying them successfully. Each of these stages may present its own set of unique barriers. This study has found that many homeowners, particularly those that perform the renovation work themselves, consider the retrofits to be a process rather than a discrete action. Consequently, viewing technical upgrades as a one-time action may lead to simplified assumptions about the types of support needed. The post-retrofit incentive offered by EGH appears to be a product of such thinking.

In summary, uncertainty is the one overarching theme that relates to residents' inaction. The need to cope with uncertainty is evident in the desire for cost estimates, return on investment information, contractor lists, up-front rebates, and how-to information. Mechanisms will need to be in place to mitigate uncertainty or else residents may default to doing nothing, which Gardner and Stern (1996) remind us "may not save energy, but it certainly saves time, planning, and effort" (p.112).

It is hoped that this study can inform further research using a CBSM approach. The next steps in this methodology would involve conducting a survey with a representative sample to verify the results of this study, implementing the noted program changes, and evaluating the effects. Certainly some additional action is necessary before the residential sector can make a significant contribution to reduced energy consumption and GHG emissions and allow Canada to take greater strides toward mitigating the effects of climate change.

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Appendix A

Focus Group Discussion Guide

Time: 1hr 30 min

Everyone signed permission form?

Introduction [5min]

I'd like to welcome everyone to our discussion tonight and thank you for taking the time to come out this evening. Again, my name is Tom Bird and I've spoken with each of you on the phone about your general experience with the EnerGuide for Houses evaluation provided by REEP. Tonight, we will talk a little more specifically about the challenges or barriers people may face when trying to complete REEP's recommendations. REEP has been quite successful in getting people to book an evaluation, but would like to find ways to help more of its clients follow through with the recommendations. Each of you has had an evaluation and so have valuable opinions and ideas to share that could help REEP to better assist its clients.

Just before we begin, here are some guidelines for our discussion that will help it flow more smoothly. Everyone is encouraged to share their opinions and it is fine if opinions differ. We are not striving for a consensus. However, it is important to be respectful of other opinions. I am really hoping that each of you can contribute at some point because based on our previous conversations, I know everyone has some valuable experiences to share.

We are taping this discussion because I don't want to miss any of your comments. We'll be on a first name basis and to ensure your confidentiality, our later reports will not include any names attached to the comments. Let's begin by finding out a little more about each other by going around the table.

Q. Please tell us your name and something about your house including its age.

Opening [5min]

Q. What was your reason for getting a REEP evaluation?

Q. What did you find valuable about the evaluation?

Transition [10min]

Q. What did you find difficult about the recommendations?

Barriers [15min]

Q. Here is a list of some potential problems people have found with REEP's recommendations. Did you find these difficult, and if so how were they difficult?

Q. Regarding cost as a barrier, which do you think is more important in considering cost – the initial upfront cost of the upgrade, or the rate of return?

Sources of help [15min]

Q. Thinking about the progress you were able to make with some of the recommendations, what were the important factors that allowed you to make that progress?

Q. Here's a list of potential sources of help with REEP's recommendations (double the rebate, contractor's list, follow-up call, 'how to' guide for upgrades, estimate of costs). Do you think any of these would be helpful, and if so, how would they be helpful?

Furnace and foundation [15min]

Q. For a few minutes, let's just talk about furnace upgrades and improvements to the basement area/foundation (including header area, crawlspace, exterior). Please use a piece of paper and make a list of the two most important barriers and two most important sources of help for each of these upgrades.

Q. Let's discuss what you wrote down.

Q. Regarding basement insulating, which do you think you would better be able to accomplish – adding insulation to the interior walls or on the exterior of the home?

Potential changes [15min]

Q. If you were in charge of the REEP program, what changes would you make?

Q. REEP would like to improve its word-of-mouth referrals. Homeowners that seem interested are asked to tell their neighbours about the program and give them an energy efficiency lightbulb. Or the homeowners are asked to put up a poster at their work. What do you think of these initiatives?

Summary [5min]

Provide summary of discussion

Q. What else could I add?

9.0 Appendix B

Focus Group Transcriptions and Notes

Note: For the sake of brevity and improved clarity, a word-for-word transcription of the focus group is not provided. The following are transcriptions of select comments given by the participants in response to the questions outlined in the discussion guide. For referencing the video tape, the time of the comment is noted along with the transcription.

Q. What was your reason for getting an evaluation from REEP?

The participants cited a limited number of reasons for wanting a home energy efficiency evaluation by REEP, with the most common being to obtain a better understanding of the state of energy efficiency of their homes. Some participants had existing problems with the heating systems of their homes, some were interested in the rebate program, and some saw the evaluation as a way to contribute to environmental improvement.

Typical comments included:

	Participant	Time
"It will give me some insight into how I can improve the overall efficiency of the house"	P	10:00
"The government contributes a little bit and that you can have somebody inspect it and give you feedback on what's going on"	A	10:41
"It's oil heat and the insurance company required...a new tank...called REEP and upgraded to a high efficiency furnace"	K	13:10
"We looked at the website incentives to do this and we are sort of an environmentally conscious family and we said 'okay, let's do this for our sake to see where we are.'"	T	17:15
"My furnace was on the fritz so I decided now's my chance to get a high efficiency"	C	20:05

	Participant	Time
furnace."		
"Wanting to know if we were efficient or not"	C	21:10
"Because I have concerns about this planet we live in, I want to make sure I'm not a waster."	K	35:17

What did you find valuable about the evaluation?

All participants found the evaluation to be helpful in some way. The most often mentioned factor was that the evaluation provided a valuable assessment of the current state of the home and a list of where to take action. Other comments conveyed that the evaluation provided ‘peace of mind’ by alleviating concerns about the home’s energy efficiency (by being rated higher than expected), that it provided an avenue for addressing environmental concerns, and provided motivation for implementing needed upgrades.

Typical comments included:

	Participant	Time
"Peace of mind...I wanted to know is this house an insulated, fuel efficient, relatively efficient house."	C	22:47
"Peace of mind and of course know all the intricacies (about the house)."	T	23:30
"Pointing me in the right direction as far as to what should my priorities be."	K	24:01
"Sometimes it's just procrastination and somebody needs to say 'Well, if you did that....'"	K	24:50
"We are environmentally concerned."	A	24:51
"Give you the bigger bang for the buck and now you've got a list to give you an	P	28:00

	Participant	Time
idea of where to start."		
"Puts things in perspective."	T	31:55
"(found out that) the best one would be the lowest hanging one which was also very expensive - the high efficiency furnace."	C	22:17

Q. What did you find difficult about the evaluation?

The participants discussed a wide range of difficulties they experienced in relation to the evaluation. Among these, cost was the most often mentioned difficulty. However, there were several underlying factors that contributed to cost as a being problem. These included views that the amount of rebate was not enough to offset the initial investment, that the return on investment was not clear, and that the money required to complete the retrofits was needed for other priorities. Related to this was an almost unanimous sentiment that the 18 month rebate expiry period was not sufficient to complete the retrofits given their associated expense.

The participants expressed other concerns such as not fully understanding how the rebate process worked, not knowing trustworthy contractors, inconvenience of the retrofit, and procrastination.

Typical comments included:

	Participant	Time
"I have other priorities, I have a daughter in university...wasn't able to do much	K	14:30

	Participant	Time
else, the budget was blown on the furnace."		
"\$340 that's not very much of an incentive to do anything."	T	31:40
"Cost is on everyone's mind."	P	39:31
"Procrastination would be one (of biggest barriers), but that's all factored into time and cost...if I knew it's going to cost me \$5000, maybe I won't get around to it."	C	47:35
"You can (only) apply for a rebate once, why have this limit?"	A	55:50
"The timeline is what I find the most difficult to deal with."	P	29:05
"Why should you be penalized for the rebate just because circumstances didn't allow you to do it?"	K	55:09
"On one hand we're telling people it will really benefit you, it will benefit everyone in the long run, but sorry, your 18 months is up so you're off the list and you can't benefit anybody, why?"	P	56:20
"What's the hurry (after rebate period expired)?"	P	55:19
"The whole (rebate) process has to be streamlined so the process isn't intimidating...it's got to be easy enough to do."	K	46:00
"A bit more explanation about how the rebate process works."	A	34:48
"That's an impediment, not being familiar with who (contractors) you can trust."	C	30:50
"They recommend a high efficiency furnace and you talk to various people in the trade and 'Oh, you don't need a high efficiency furnace in your house, you're better off with a mid-efficiency - for what you pay for the difference you won't save that much more.'"	P	49:50
"What is my return on a mid efficiency versus a high efficiency?"	P	50:20

Q. Thinking about the progress you were able to make, what were the important factors that contributed to your progress?

Responses to this question were quite animated, and participants tended to brainstorm solutions to the previously presented difficulties rather than solely speak from their own experiences. To address the difficulty of cost, the participants suggested providing a subsidy in advance such as an instant rebate, a coupon for the retrofits, or an interest-free loan.

Typical responses included:

	Participant	Time
"Form a partnership with Union Energy or Union Gas...you buy a furnace and from them in connection with the REEP program you get your 'x' number of dollars off your purchase price."	P	40:50
"Instead of forking out two grand for a furnace and waiting 6 months or a year or whatever the case may be for my \$200 back, give me my money up front."	T	41:05
"Why not furnace manufacturers... for each furnace you sell in Canada, I'll (the government) will give you \$100 off."	A	42:40
"If the furnace is EnergyStar and is sold in Canada give \$100, \$200, \$500 to manufacturer."	A	43:50
"When I go in and sign my contract to have the work done my bill is \$2000 and less REEP's discount (of) \$500, you pay \$1500."	P	45:20
"Maybe it's a coupon that you've taken the REEP assessment and with that REEP assessment comes a \$100 coupon that is accepted by various contractors."	K	46:17
"I think it should be a no-interest loan."	A	48:10

Though lack of information was not identified previously as a difficulty, participants seemed to think that it was quite important to provide additional information to households to better help them implement the recommended retrofits. They suggested that such information should come in the form of seminars hosted by REEP or printed materials left during the evaluation.

"It could be done in cooperation with Rona - Rona is having these seminars (how-to workshops) on a regular basis."	A	58:48
"Inform people how easy it is to do those things."	A	26:11

Other factors were also expressed such as increasing the length of time households are eligible to receive the rebate and motivating households to act by emphasizing the environmental benefits of completing the retrofits. These ideas were countered by other views that extending the rebate timeframe would lead to procrastination and that people would not understand the links between the retrofits and the environment.

"You can give some people all the time in the world and they still may not do anything with it and so sometimes for the guys who like to procrastinate, a deadline has more of a positive incentive."	C	102:00
"You can tie the impact of the environment to the cost by saying the total cost."	T	51:25
"...and the impact on taxes, the more smog days we have, the more people are sick, the more money we have to spend on health care."	A	51:41
"But that's nebulous, there's no way to have a cause (and effect) if I change my furnace - what is the impact?"	C	52:03

When asked what they thought were the two most important sources of help participants most often cited providing more information (“how-to”) and providing more time to complete the retrofits and still receive the rebate. Changes to the type of incentive and having a list of contractors were also mentioned.

"How-to and more time."	K	101:00
"How-to and interest-free loan or rebate and more time."	A	101:05
"How-to and more time."	P	101:12
"More information and contractor list."	C	101:23
"How-to and double the rebate."	T	103:05

Participants were also asked to comment on suggestions made by telephone interview respondents that it would be helpful to receive a follow-up telephone call from the evaluator to review the recommended retrofits and that it may be beneficial if REEP provided contractor services to accomplish the retrofits. It was implied that a follow-up call may be of some use. The notion of REEP as a contractor was unanimously rejected.

"That (a follow-up call) might not be a bad idea to reinforce the report."	C	104:27
"You cannot recommend something and implement it yourself - you can't be judge and executioner at the same time."	T	105:42
"They should be at arm's length. They'd be opening a real can of worms if they got into the renovation business."	K	105:49

Q. What are the two most important barriers and the two most important sources of help for basement insulation improvements?

The main barrier to upgrading basement insulation expressed by the participants was not having enough information about the retrofit. They noted that more information, particularly a cost estimate of the upgrade would assist with planning the retrofit and with negotiating a price with contractors. Other barriers noted were the inconvenience and time needed to complete the retrofit and that the work might entail additional renovations beyond the basic recommendation e.g. upgrading wiring to meet the current building code.

Typical comments included:

	Participant	Time
"Need lecture seminars for doing it yourself and...a cost estimate."	T	113:42
"REEP can say, this is how much it will cost if you're going to do it yourself - give us some guidelines."	T	114:45
"You can confront the contractors (using costs estimates provided by REEP)."	T	114:52
"For someone who maybe has never picked up a hammer in their life, a contractor could come in and say 'It's going to take me 50 hours' - now how would you know?"	P	115:05
"The electricity part of this is scaring me off (basement needs upgrades to meet code)."	K	123:05
"I need to get the priorities of the process first so that I can do it in the right order."	K	123:30
"It would have been helpful for them to say 'Another low hanging fruit is this one, it's not that difficult to do.'"	C	122:05

Q. What are the two most important barriers and the two most important sources of help for furnace upgrades?

Participants cited cost as the primary barrier to furnace upgrades, but some also noted having difficulty with determining the best type of furnace to install since contractors had provided different recommendations than had REEP. To overcome these barriers, it was suggested that REEP provide information about the payback period for the recommended furnace or a coupon to help offset costs.

Typical comments included:

	Participant	Time
"The (barriers for the) furnace is the cost vs. benefits and also the various opinions on efficiency."	T	113:36
"Problem I found was...making the right decision on what's the right size furnace for my house."	K	116:40
"REEP could say 'You would be better served by (a certain type of furnace).'"	K	119:45
"A return on investment and money or coupon incentive (would help)."	T	114:00
"As far as the furnace, a cost-benefit analysis would be nice...to know how quickly it would pay for itself."	C	121:15

Q. If you were in charge of the REEP program, what changes would you make?

The main ideas expressed by the participants were related to either improving the format of the rebate program or to emphasizing the environmental benefits of the retrofits as a way of motivating action. Doubts about the efficacy of the rebate program as it relates to market prices were also noted.

Typical comments included:

	Participant	Time
"Charge him \$150 and give him \$75 back when he gets the second evaluation."	C	132:50
"You could maybe get everything back."	A	133:07
"Time...get rid of the rebate window."	P	133:30
"No matter what you do, when it comes right down to this whole rebate thing...what's to prevent the retailer from adding an extra \$100 to the price?"	C	48:39
"Encourage us to be more mindful of how we treat our environment."	K	133:56
"Also connect REEP to that 'action-save-tonne' (One Tonne Challenge), if you do this to your house, you might be saving a tonne."	A	134:10
"Give us amounts (of CO2 reductions) - if you did this you would lower your emissions by whatever."	A	134:50
"Somehow, you've got to hit something people recognize as being a problem or an issue."	K	135:12