The Effects of Energy Considerations on House Purchase Decisions

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This paper proposes that home owners would be more likely to take energy conservation actions such as switching to energy efficient heating systems, attempting to reduce heating losses and consideration of passive solar energy, if they felt that this might increase the selling price or saleability of their homes. Survey results are presented which indicate that energy issues are not key to house purchase decisions. However, the presence of an underlying awareness of energy issues suggests the potential to develop this concept as an energy conservation strategy.

L'auteur suggère que les propriétaires seraient davantage enclins à prendre des mesures d'économie d'énergie — par exemple, adopter un système de chauffage plus efficace, tenter de diminuer les déperditions de chaleur et envisager l'installation d'un système passif de chauffage solaire — s'ils jugeaient que de telles mesures ajouteraient à la valeur marchande ou à la facilité de vente de leur maison. Les résultats d'enquête présentés ici montrent que les questions énergétiques ne sont pas un élément essentiel dans les décisions d'achat des propriétés domiciliaires. Néanmoins, la sensibilisation générale aux questions énergétiques indique l'importance que ce facteur pourrait éventuellement revêtir dans une stratégie d'économie d'énergie.

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The Ontario Ministry of Energy estimates that residential users account for 20% of all energy used in the province. In September 1986, the Ministry announced a conservation and efficiency strategy to the year 2000 which would include a 3-year, $5 million residential energy program. The objectives of this program included an attempt to increase public awareness of energy costs and consumption, and the promotion of energy-saving measures, with increased acceptance of the R2000 home as the goal (Ontario Energy, 1987b).

While the attraction of reducing heating costs may be sufficient incentive to persuade people to take energy conservation measures, if home owners also saw such measures as increasing the market price or the saleability of their home, it is likely that they would be further induced to take action. This paper presents the results of a survey conducted in Peterborough, Ontario to examine the significance of energy conservation features to buyers and sellers of existing housing.

1. Introduction

In the past, programs run by the federal and provincial governments have encouraged fuel substitution and conservation in the residential sector. Grants were made available to consumers

in an attempt to increase the use of alternative fuels, but this was viewed as a short term solution to energy problems. Government-funded research programs related to increased energy efficiency were designed to find long term solutions. Among the new ideas was a construction standard called the R2000 home. R2000 homes require 70% less energy for space heating than the typical Ontario residence (Ontario Energy, 1986a), thus saving significantly on the major use of energy in the residential sector. Upgrading existing houses towards this standard was viewed as important.

Currently the federal and provincial governments are making a greater effort in the areas of education, including the production of printed and video materials for schools and community groups and a large number of pamphlets for the public at large. In March 1987, for example, the Ontario Energy Ministry published a series of pamphlets relating to the improvement of existing homes via air vapour retarders, weatherstripping, and insulation. These brochures were made available through government offices and public libraries. The specific features to be considered in the survey were selected from an analysis of these publications.

Three major issues affecting energy conservation were identified: house characteristics; type of heating; and the efforts made to improve energy efficiency. House characteristics were identified as: the age of the house; the size of the house; the placement of the house on the lot with respect to taking advantage of passive solar energy; and the use of trees as wind and sun barriers.

The second area of interest was the type of heating used. This included heating preferences, willingness to switch to a more efficient form of heating, and auxiliary heating to supplement the main heating system.

The third area of concern was the adoption of energy reduction strategies by homeowners, including improvements to insulation, maintenance of caulking and weatherstripping, and use of storm or double glazed windows.

2. Methodology

It was decided that the data required for this study would be collected by means of a questionnaire survey administered by interviewer visits to the target groups.

The target response groups for the survey were people who were currently in the housing market, either as sellers or recent buyers. Personal visits were made to realty firms and a list of sellers was made from current listings posted in each office. Access to listings from the previous month provided a list of recent buyers. As a basic criterion, only single family detached houses were selected.

A list of 140 addresses was generated. In order to have equal numbers of houses from different parts of Peterborough and thus a representative sample of houses on the market, house addresses were grouped by census tract with an equal number of addresses in each tract.

Local information distribution points such as the public library and the riding offices of the MP and MPP were visited to collect a set of government pamphlets on the topic of home energy conservation. Examination of these pamphlets led to the identification of subjects to be covered in the survey. These were discussed in the introductory section of the paper.

The subjects identified were converted into a survey consisting of 21 questions which required respondent answers and six observations which were to be made by the interviewers during their site visit. Buyers and sellers were asked the same questions except for necessary changes in wording (questionnaire is provided in the Appendix).

3. Survey Results

Two problems were encountered during the survey. First, many of the potential respondents were preoccupied with the act of moving and were reluctant to participate. If other houses in the same area were available, substitutions were made, but the final number of completed surveys was reduced to 100. Second, many respondents were unwilling to provide information on the value of the home or on their personal in-

Table 1: Major Factors in Home Purchase or Sale

Factor	Number of Sellers	Number of Buyers
House Characteristics	30	24
Location	14	14
Cost	1	9
Heating System	0	2
No Response	5	1

come level. It was therefore reluctantly decided that analysis could not be done using these variables.

The collected data indicated that the homes surveyed had an average floor space of 1630 square feet, with three bedrooms and two floors or levels. Fifty-two of the 100 homes had a finished basement. The mean distance to neighbouring homes was 13 feet. Respondents who were the parents of one or more children comprised 75% of those surveyed.

Respondents who had just bought a house were asked to identify the major factor in their house purchase decision, while those who were about to sell their house were asked to identify the major selling feature. Over half of the responses indicated that a specific feature of the house or property was the most important selling feature. Location was the second most frequent answer, and cost was third (Table 1).

3.1 House Characteristics

Interviewers made visual observations to determine house characteristics which were felt to be related to energy efficiency. These included the direction in which most of the glass faced, the presence of trees or landforms, the placement of the garage, the presence of a fireplace and the presence of a heated pool.

Traditionally the majority of Canadian homes were built to face north-south streets; thus the front of the house, which usually has the most glass surface, faces east or west. Surprisingly, this was only true of 41 of the houses surveyed. Thirty-four had the majority of their windows facing south and north was the dominant direction in 25 cases.

An effort was made to explore the issue of passive solar energy more closely by asking participants if they felt that the direction that the majority of their windows faced had affected or would affect purchase decisions. Among sellers, 55.5% said they did not think this would have any effect on the sale of the house, while 24% said that it would, while 56% of buyers said that it had no effect on their decision and 40% said that it had been a factor.

Table 2: Presence and Type of Trees

	0	1-3	Over 3
Deciduous	-	39	11
Coniferous	-	9	1
No Trees	40	-	-

Another aspect examined was the effect of trees. The literature suggests that deciduous trees on the south side will keep the house cool in summer and allow in sunlight in winter, while coniferous trees are good windbreaks on the north or west side of a house. In the survey, only those trees large enough to shade windows or act as a wind barrier were counted. It was found that half of the homes had functional deciduous trees, while 10 had coniferous trees (Table 2).

Landforms can shield a house from unfavourable weather conditions and can be a source of energy savings. Although Peterborough is located on a large drumlin field, only seven of the houses examined were protected by landforms.

A house characteristic which is often overlooked as being a source of heat loss or acting as a wind barrier is the garage. Proper insulation is required if the garage has bedrooms above it. In the Peterborough survey, 51 of the homes did not have a garage and 42 had a garage that was insulated and acted as a wind barrier. Seven respondents said they felt that their garage was a cause of heat loss.

Another feature in a home which can either aid with heating costs or be a source of heat loss is a fireplace. Fifty-nine respondents had fireplaces. None of the fireplaces had an energy efficient air-tight design and only 19 had installed forced air inserts to improve energy efficiency. This factor did not seem to be of primary concern to those questioned.

A final home feature which was thought to be quite common in Ontario homes was the swimming pool. Swimming pools can create a drain on energy resources if they are heated. However, only eight of the 100 people surveyed in the study had a pool, three of which were heated.

3.2 Heating Systems

The second major area of concern in this study was the nature of the heating system used in the home. Although this factor was not offered as a major buying or selling feature in response to the first question, further questions suggested that people do consider this important in the marketing of a home.

The distribution of heating systems presently installed in the homes surveyed was 64 natural gas, 21 oil and 14 electric heat. One person did not know how the house was heated. Seventy-one respondents were satisfied with the current heating system. This group constituted 88% of natural gas users, 57% of electric heat users and 33% of oil users.

Those who wished to change were asked what type of system they were considering. Seventy-two percent said natural gas, 14% said oil, 7% said electricity and 7% said propane. The heating source of preference was obvious.

Questions were also asked about the use of auxiliary heating systems during the winter. Seventy respondents said this would be unnecessary, 10 mentioned their fireplace, 15 said they had a space heater and 5 made reference to a heat pump.

It was anticipated that the age of the house might affect the need for auxiliary heating (Table 3). A relationship can be observed in the data between the age of the home and the need for auxiliary heat. A noticeable increase in the use of auxiliary heating occurs in homes between the ages of 16 and 40 years. However, the use of auxiliary heating seems to decrease among those homes over the age of 40 years.[1]

A reasonable alternative to auxiliary heating may be to upgrade insulation in homes. It was found that improvements to insulation had been made by 20% of those in the 10-15 year age group, 18% of those between 26 and 40 years of age, and 21% of those aged 40-99 years. No changes had been made in any of the other age groups.

Table 3: Age of Home and Required Auxiliary Heating

Age (Years)	# of Houses	Percent
<1	19	10.5
1-9	12	16.6
10-15	20	30.0
16-25	18	38.9
26-40	11	63.6
40-99	4	37.7
>100	6	16.6

3.3 Maintenance Programs

The efforts of homeowners to improve their energy efficiency through home maintenance programs was the third area of study in this survey.

Table 4 shows that the majority of people do have an interest in heat loss during winter and conduct regular checks of their weatherstripping and caulking.

Those respondents who said that they made regular checks were also asked what types of extra measures they took to reduce energy loss in the winter. Table 5 shows double glazing and storm windows as the most often mentioned actions.

Respondents were asked if they were aware of any government grants which could aid them with decreasing energy or heating cost. Among the home purchasers, 13% said they were aware of grants. Among the house sellers, 30% said they were aware of grants.

4. Implications of the Results

The fact that only two respondents mentioned the heating system in response to the initial question on house purchase decision factors sug-

1/ Given the nature of the population studied, it was not possible to obtain many observations in the "century homes" category. Because of the small sample size, inferences concerning the fraction of homes using auxiliary heat in the underlying population are obviously more uncertain in this category.

Table 4: Regular Inspection of Weatherstripping and Caulking

Interest	For Sale (%)	Recently Purchased (%)
Inspect	76	87
Do Not Inspect	22	11
No Response	2	2

Table 5: Measures to Reduce Energy Loss

Measures	For Sale (%)	Recently Purchased (%)
Storm Windows	29.6	10.9
Double Glazed	33.3	54.3
Plastic	13.0	10.9
Weatherstripping and Caulking Only	11.1	10.9
No Extras	13.0	13.0

gested that people are far more interested in the physical appearance of the house than they are in its energy efficiency when making a purchase decision. Although one third of respondents viewed the position and size of their windows as being significant in terms of heat loss, the majority did not perceive passive solar energy or landscaping as a way to cut heating costs.

In further questioning, however, respondents did acknowledge energy considerations, suggesting that heightened awareness could foster an increased desire to take energy conservation measures.

A growing preference among homeowners for gas heating systems is apparent in the data. Respondents spoke of gas as being cleaner, more efficient and less expensive. It was the first choice if conversion was being contemplated. This would seem to be the result of promotions by the gas company rather than by the government.

Fireplaces were more important as aesthetic features than as heating sources. Few respondents seemed to recognize that the fireplace could be a major source of heat loss.

In regard to home renovation to reduce heat loss, most respondents recognized the value of sealing their homes. Over 80% of those interviewed made a check of the caulking and weatherstripping around their home every fall. Additional efforts to improve the energy efficiency of homes through the improvement of windows was identified as an important factor in selling a home. Double glazing was the most favoured action taken. Larger projects, such as increasing home insulation levels, were rare. It is common for real estate agents to suggest cosmetic changes to increase saleability and to warn sellers that they will not be able to recoup the cost of major renovations such as double glazing or insulation via a higher sale price.

A lack of awareness of government grants to support major changes was evident. Of particular concern was the relative unfamiliarity with the R2000 home. Those who were aware of it tended to feel that this program was not readily accessible to them. Some significant work with marketing this product will be required to achieve residential energy efficiency goals.

In general, the majority of the participants in the questionnaire survey did not seem to be aware of the available information concerning home energy efficiency. As well, some respondents did not seem particulary concerned about energy conservation as an issue despite the large amount of money spent by provincial and federal governments to enlighten the public. It is possible that part of the problem is that people are not being reached at times when energy efficiency issues could be significant to them, such as when buying or selling a house.

As mentioned above, real estate offices would seem a logical information distribution point. However, while agents are willing to supply sellers with tips on how to sell their homes, they have no incentive to encourage buyers to examine house features which may discourage the buyer from making the purchase. If the buyer is perceived as uninformed, the seller need not make changes. Another route to the buyer is required.

Peterborough is often used as a test market for new products. The views of its population are considered typical of a wider area. It would seem likely that the same could be said of the findings from this survey. If so, increasing the importance of energy efficiency as a consideration in the purchase decision process in the residential resale market would appear to have potential as an

energy conservation strategy for the province. The need remains to increase public awareness on energy issues and to find a suitable vehicle to achieve this goal.

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Appendix

QUESTIONNAIRE

(to be completed by participant)

1) How long have your owned this house?

2) How old is your home? pre-1920
1920-1960
1960-present
more specific if possible.

3) What is the approximate value of your house?

4) What is the major selling feature? eg. pool, fireplace.

5) What type of heating system does your home have?

6) Have there been changes in the heating system since the home was built?

7) Are there other changes you have made which have increased the value of your home?
Additions
Renovations
Redecoration
Other.

8) Have you considered alternative heating systems and if so what type?

9) Are you aware of any government grants that may help you with heating/energy costs?

10) Do you have a pool? Is it heated (how)?

11) Do you have a fireplace? Does it have an insert?

12) Do you use some type of auxiliary heating? eg. electric space heater.

13) What type of extra measures do you or will you take in the winter to increase energy efficiency? eg. storm windows, double glazed windows.

14) Are walls and ceiling insulated?

15) What type of questions did you ask when you were looking for a home, was energy efficiency a concern?

16) Did the position (orientation) of the house on the lot or the number and size of windows affect your decision to buy or sell?

17) Do you conduct regular checkups of caulking, weatherstripping, etc?

18) Next time you purchase a home will energy efficiency be a concern?

19) Age and number of occupants:
under 16 ____
16-25 ____
25-35 ____
35-50 ____
over 50 ____
____ Total # of occupants.

20) Income Category:
A) less than 10,000
B) 10,000 - 15,000
C) 15,000 - 20,000
D) 20,000 - 25,000
E) 25,000 - 30,000
F) 30,000 - 35,000
G) 35,000 - 40,000
H) 40,000 - 45,000
I) 50,000 and up.

VISUAL OBSERVATIONS

(to be completed by the interviewer)

1) House Size
a) square feet
b) # of bedrooms
c) # of floors.

2) Direction majority of glass is facing. North/South/East/West.

3) Placement of house on lot. North/South/East/West.

4) Size of lot and nearness to neighbours.

5) Number of trees, wind barriers, and/or landforms that may offer protection from the wind.

6) Is garage part of home? eg. bedroom above. Is the garage a wind barrier or does it create energy loss?

7) Address _____

Census Tract _____