

**An Evaluation of Energy Efficiency and its Applicability to
Low Income, Inner City Groups in West Broadway, Winnipeg, Manitoba**

By
Roselle M. Miko

A Thesis
Submitted to the Faculty of Graduate Studies
In Partial Fulfillment of the Requirements
For the Degree of

Master of Natural Resources Management

**Natural Resources Institute
University of Manitoba
Winnipeg, Manitoba
March 8th, 2005**

THE UNIVERSITY OF MANITOBA

FACULTY OF GRADUATE STUDIES

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**A Thesis/Practicum submitted to the Faculty of Graduate Studies of The University of
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ABSTRACT

Half of the properties in West Broadway are rental properties. West Broadway's socio-economic demographics such as high unemployment, low incomes, and higher crime rates have resulted in the City of Winnipeg's designation of "Major Improvement Area." West Broadway's local development corporation is helping revitalize housing and the neighbourhood. To date, energy efficiency has been underutilized in retrofits by low income groups and local community groups due to factors including retrofit costs, lack of targeted information, and barriers to program access.

While programs and policies targeting improving energy efficiency in the residential sector exist, these programs and policies have not focused on low income groups or low income housing providers. For low income groups, improving energy efficiency is important in light of potentially rising heating bills (high energy costs) and the inability of the lower income community to afford to pay these increasingly higher energy (heating) bills.

This combination of low income groups and rising energy costs presented an opportunity for examining how low income groups access energy efficiency programming. This project examined program availability across Canada, other country's energy policies and potential models that could be incorporated into the City of Winnipeg's zoning and taxation laws and sustainability goals. As well, low income groups provided feedback about improving Manitoba Hydro's existing programming.

This project recommended that a variety of stakeholders assume responsibility for improving energy efficiency for low income groups. Housing providers must incorporate energy efficiency in housing they provide, the City of Winnipeg must develop ordinances such as Residential Energy Conservation Ordinances, and programmers such as Manitoba Hydro must develop accessible programming designed for low income groups. Ongoing energy efficiency education is recommended for all stakeholders. The upfront costs of completing energy upgrades be lowered for low income groups. Mechanisms to lower the

upfront cost of upgrades include interest rates, energy mortgages, and community modeled savings programs. More needs to be done to connect people who most need to lower their heating bills—but cannot afford to—to programs they can afford, access, understand, and use.

ACKNOWLEDGEMENTS

I would like to extend a sincere thank you to my thesis committee for all of their support, encouragement, and direction. I would like to thank my committee members Professor Thomas Henley for his continued direction and knowledge of housing issues within Winnipeg and I would especially like to thank my committee member Dr. Shirley Thompson for her patient editing and assistance throughout this journey, and also for providing focus during this project.

I would also like to thank committee members Dr. David van Vliet for his insightful editing and Professor Ted McLachlan for his ability to help me understand issues clearly and the implications of housing policies. I would also like to thank my committee member Ms. Pamela Vernaus, Residential Marketing Specialist, Manitoba Hydro for her insight, focus, and advice.

I would like to thank my friend Arvind for his constant support and Sarayut for his technical aid with word processing issues. I would like to extend a heartfelt thank you to my mom, other family members, and friends for their continual love and support during this journey of learning. Also, thank you to Donald for his unwavering love, humour, and support.

Thank you to Manitoba Hydro for funding this research.

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GLOSSARY OF TERMS

Acceptable housing: Housing that is adequate in condition, suitable in size, and affordable. Adequate dwelling units are those reported by their occupants as not requiring major repairs. Suitable dwelling units have enough bedrooms for the size and make-up of resident households, according to National Occupancy Standard requirements. Affordable dwelling units cost less than 30% of before-tax household income (Engeland, Lewis, 2004).

Affordable housing: Housing that costs less than 30% of a household's pre-tax annual income (Engeland, Lewis, 2004).

Core need of housing: When households live in housing that is below one or more of the adequacy, suitability, or affordability standards, and have incomes that are too low to allow them to rent alternative local market dwellings that meet acceptable standards for less than 30% of their before-tax income, they are considered to be in core housing need. By definition, these households are excluded from acceptable housing and from the benefits such housing confers (Engeland, Lewis, 2004).

Downtown: The downtown is defined by specific boundaries including the Red River to the east, the Assiniboine River to the south, the Legislative Building, Central Park, Exchange District, and Chinatown to the west, and the CPR main-line at Higgins to the north (City of Winnipeg, 2001).

Housing Improvement Zones (HIZs): Neighborhoods classified and categorized based upon established criteria as "Housing Improvement Zones" will be targeted through the use of various incentive "tools" in order to stimulate housing investment. Neighbourhoods are designated into one of four categories based upon established criteria:

- **Major Improvement Areas:** Older areas that have experienced significant decline to the point where housing and neighbourhood infrastructure require complete renewal.
- **Rehabilitation Areas:** Areas where decline is having a spill-over effect to the extent that it is beginning to impact the overall stability of the neighbourhood. Some intervention would be required in order to stimulate private reinvestment and improve infrastructure.

- Conservation Areas: Neighbourhoods which are physically and socially stable but are showing initial signs of decline. The City will monitor these areas for any potentially detrimental intrusions and may intervene in isolated cases.
- Emerging Areas: Areas in which new development is being considered. The City's role will be to ensure appropriate coordination of land use and infrastructure. (City of Winnipeg, 2001).

Inner City: The Inner City is bounded by:

West -- Augrey / Ingersol / McPhillips

North -- Church / Red River

East -- Red River / Archibald

South -- Marion / Red River / Corydon / Cockburn / Assiniboine River

The Inner City area was first defined in the 1980s by the Core Area Initiative, a tri-partite government agreement to combat decline in the inner city. The official Downtown area is included in the Inner City. (City of Winnipeg, 2001).

Low Income Cut-Off: A family at or below the LICO is one that spends more than 55% of its pre-tax income on food, clothing, and shelter (Statistics Canada, 2003). Note: The LICO rate is subject to change based on yearly calculations completed by Statistics Canada.

The LICO varies by family size and community size. (Social Planning Council, 2004).

Mtoe: Million tonnes of Oil Equivalent (International Energy Agency, 1996).

Neighbourhoods: Neighbourhoods were defined following the amalgamation of the City of Winnipeg in the early 1970s, and were intended to serve as the basic building blocks of the city for planning purposes. The entire city is made up of neighbourhoods, designated residential, industrial or rural. The neighbourhoods were defined based on their characteristic features and natural boundaries, so that once identified the neighbourhood boundaries would not be subject to arbitrary change. Some neighbourhood areas were added or modified in response to new developments in parts of the city, but for the most part neighbourhood boundaries have remained the same. There are 230 neighbourhoods in the City of Winnipeg at present. (City of Winnipeg, 2001)

Non-Inner City: The Non-Inner City is not officially defined by the City of Winnipeg. Members of the Community Data Network defined Inner City and Non-Inner City to allow

comparisons of older and newer areas of Winnipeg. The Non-Inner City includes all of the neighbourhoods that are not part of the Inner City (City of Winnipeg, 2001).

CHAPTER 1

INTRODUCTION

1.0 Background

People spend 90 percent of their time indoors: at their homes, places of employment, and other locations, therefore it is important that the home is healthy. Research indicates that there is a relationship between the built environment and human health (Consumer Product Safety Commission, et al., 2003). Housing choices for low income groups are limited in scope. Neighbourhoods they can afford to live in, questions of ownership vs. tenancy, housing quality and affordability are all factors merging to create a situation where the housing quality that many low income individuals and families find themselves living in is less a *designed choice* and more of a *forced compromise*. As part of the housing compromise faced by low income groups is their energy use. Housing found in many of Winnipeg's inner city neighbourhoods was built before 1920 and lacks the adequate insulation necessary to keep the houses warm without using a lot of heat. For low income groups, high heating bills can be devastating to their budgets and force them to take funds from other life necessities such as food. But can those low income earners who get an expensive heating bill take measures to improve their energy efficiency and thereby lower their heating bills?

Unfortunately, those who would benefit most from retrofits to their homes and other energy-saving measures are in the worst position, both socially and economically, to take advantage of available programming. Low-income households often lack the capital or access to credit to pay for retrofits or audits to determine energy savings. These households may not be able to wait for the payback from reduced energy costs or have enough information about energy efficiency. As most do not own their accommodation, they have little incentive to invest in capital improvements for energy efficiency.

Through a comprehensive study focusing on examining Manitoba Hydro's family of PowerSmart Programming, access and use of this programming will be examined in the context of low income families living in West Broadway, Winnipeg, Manitoba. Based on pervasive pre-existing conditions such as larger energy inefficient housing that require

more energy for heating as well as social considerations such as low income levels, and a high rent to own ratio, the West Broadway area of Winnipeg provides an excellent forum to explore the above issues.

The relationship between low income housing, energy use, and current available energy efficiency programming will be examined in several ways in order to capture a holistic picture. Existing data sets, such as Statistics Canada's census data, the City of Winnipeg's property tax assessment information, and information gathered through home evaluations and ecological footprints will be used to develop a neighborhood level understanding of low income housing and energy efficiency. The combination of a large number of older homes in West Broadway, the lack of healthy affordable housing, the amount of housing requiring repairs and upgrades, and the need to improve inner city neighborhoods are all relevant factors for considering in a study on energy efficiency and low income groups within inner city neighbourhoods. West Broadway's current situation certainly challenges the World Health Organization's (WHO) definition of health, unchanged since 1948, which states "Health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity (WHO 1948)", and as such requires a response that incorporates social, cultural, community, ecological, and physical dimensions. Energy efficient housing for low income groups would be an important aspect of social health.

In keeping with the WHO definition, I undertook the following activities to develop an understanding of the use of energy efficiency programming, barriers, and existing inducements within West Broadway to improve energy efficiency:

1. Evaluated and made recommendations on Manitoba Hydro's Energy Efficiency Programming, including home evaluations via the on-line and mail-in assessment services, and observed EnerGuide for Houses In-Home Assessments as available in the West Broadway area.

2. Undertook a literature review on available energy reduction incentive programs across Canada and energy reduction models for low income groups in Denmark and the United States of America.
3. Developed a focus group for community group housing advisors and community members around Manitoba Hydro's PowerSmart programming.

With each of these activities, there is overlap between the information that was gathered and generated in terms of energy efficiency and socio-economic concerns, but this overlap, or linkage, grounded the research and provided different perspectives on the same activity.

1.1 Opportunity Statement

Improving energy efficiency within houses is important. Current programming that provides incentives for improving energy efficiency may not be reaching lower income or inner city neighbourhoods due to structure and/or residential constraints such as program awareness, home owner's ability to complete the program, or housing characteristics which do not qualify for the programming. Therefore, the opportunity to examine the PowerSmart programming in the context of lower income, inner city neighbourhoods is valuable for developing future programming and improving existing programming. As well, the Power Smart family of programming is Manitoba Hydro's largest group of residential energy efficiency incentive based programming. As the sole provider of energy in Manitoba, Manitoba Hydro has a responsibility to encourage responsible energy use in all sectors they service.

1.1.1 Study Rationale

The construction and renovation of housing requires large amounts of resources, is labour intensive, impacts human health, and can also present a financial burden for people with limited finances. This study investigated and identified mechanisms affecting current acceptance and use of energy conservation programs within low income housing groups. The following objectives provided insight into the issues of low income groups and their access to energy efficiency programming.

The objective of Power Smart Programming is to improve energy efficiency in residential, industrial, and commercial buildings. This study's research objectives were to determine whether the PowerSmart Residential Programming at Manitoba Hydro was satisfactorily meeting the needs of low income, inner city neighbourhoods, and the organizations that provide housing in those areas.

1.1.2 Objectives

In order to meet the goals of this research, the following objectives were conducted:

1. Determine current use of existing Manitoba Hydro programs and low income access to the programming in Winnipeg.
2. Evaluate the performance and scope of Manitoba Hydro's energy efficiency programs in comparison to other available provincial utility energy efficiency programming for low income earners.
3. Promote and make recommendations about the adoption of those mechanisms that encourage energy efficiency in housing for low income groups.

In order to meet the above objectives, the following activities were undertaken:

1. Attended twelve in-house evaluations in West Broadway or in neighbourhoods with similar characteristics and interviewed the evaluators that conducted the evaluations.
2. Examined current programs sponsored by Manitoba Hydro, specifically the Home Comfort & Energy Savings Assessment Guide (client checklist), and the EnerGuide for Houses In-Home Energy Evaluation (home energy audit) to make recommendations compared to best practices/programming in other provinces and countries.
3. Convened a focus group for community group representatives and residents focused on examining Manitoba Hydro's current PowerSmart programming.

Research underscores the importance of having good quality housing, particularly for children and women. A study done by Evans (2000) consistently found that housing

quality can affect mental health, in that better-quality housing was related to lower levels of psychological distress. The research suggests that significantly better housing quality is linked to improvements in psychological well-being. Such evidence is important and can be used to encourage legislators and policy-makers to promote housing improvements for low and moderate-income families (Evans, 2000). Part of promoting better quality housing for low income groups is addressing energy efficiency.

For already vulnerable populations such as the elderly, fixed income groups, single parent families, and First Nations — all of whom live within the West Broadway area—the socio-economic costs of having poor quality housing is reflected in their utility bills and high heating bills. In response to the quantity of poor quality housing and the lack of affordable housing ownership options, several community groups, including churches and service organizations, have begun to rehabilitate the existing housing stock (Santin, 1998) available in Winnipeg's inner city neighbourhoods.

For low income groups who cannot afford to pay higher heating bills, including energy efficiency in the rehabilitation process is critical, but often neglected due to a variety of factors and challenges that will be examined throughout this thesis—affordability of completing energy efficiency upgrades, awareness of programs to assist with energy efficiency retrofits, language skills to understand information about energy efficiency upgrades, and ability to complete the renovations.

1.1.3 LICO and Affordable Housing Definitions:

For the purposes of this research, Statistics Canada's Low Income Cut Off (LICO) definition has been used. While Canada has no official measure of poverty, the pre-tax Statistics Canada Low Income Cut Off (LICO) is the measure most commonly used by those reporting on poverty in Canada. Statistics Canada has noted that the LICO is a consistent way of identifying those who are "substantially worse off than average". In addition, Canada Mortgage and Housing Corporation's definition of affordable housing is being used. Affordable housing being housing that costs less than 30% of a household's annual income. Based on both LICO and the definition of affordable housing, the

community in West Broadway can be considered to be a lower income neighbourhood with higher housing costs.

1.1.4 Project Context: Global Energy Perspectives and Local Power Supply Concerns

World wide, the scarcity and preciousness of renewable and nonrenewable resources is indicated by rising oil and gas prices, water concerns, public policies, and public outcry from dispossessed groups. In light of the serious local and global impact of all resource and energy consumption, local determination of resource and energy use patterns in the housing industry is vital if Manitobans are going to lower their resource and energy consumption, and encourage healthy home construction. Energy consumption is expected to grow; estimates indicate that, "Between 1998 and 2020, world primary energy demand is expected to grow by 57% from 8,610 Mtoe to 13,539 Mtoe" (del Rosario, 2002).

In 2003, The World Meteorological Organization (WMO) issued a generalized warning about an emerging climate change pattern. "Global average land and sea surface temperatures in 2003 were the second highest since records began in 1880," (WMO, 2003 in CNN, 2003). The WMO indicated that for the northern hemisphere, increasing temperatures, longer, more severe droughts, and other extreme weather events seemed to be conceivable based on its data (WMO, 2003 in CNN, 2003).

New analysis of data for the northern hemisphere showed the increase in temperature in the 20th century was likely to have been the largest in any century during the past 1,000 years. (Cornford, 2003, CNN, 2003)

Chaotic weather events were not limited to the northern hemisphere, but also occurred around the world with many countries and continents experiencing record breaking heat waves, precipitation, flooding, tornadoes, etc. The following extreme weather events occurred in 2003 around the world.

562 tornadoes hit the United States in May, 2003—a record far higher than the previous monthly peak of 399 in June, 1992

- Colder and wetter conditions than normal in eastern and south eastern part of the United States for May and June, 2003
- A pre-monsoon heat wave in India caused peak temperatures of between 45 and 49 degrees Celsius (113 to 120 degrees Fahrenheit) and killed more than 1,400 people
- Sri Lanka experienced heavy rainfalls from Tropical Cyclone 01B, which exacerbated already wet conditions, causing flooding and landslides and more than 300 fatalities
- Switzerland experienced its hottest June in at least 250 years while in the south of France average temperatures were between 5 and 7 degrees Celsius (9 to 13 degrees Fahrenheit) warmer than the long term average
- England and Wales also experienced their hottest month since 1976
- Australia was hit by the longest drought in recorded history, which devastated crop yields and sparked continual bushfires which threatened major cities and
- Many parts of China and East Asia were hit by severe flooding resulting in thousands of deaths

(World Meteorological Organization, 2004)

While conserving energy within one tiny inner city neighbourhood does not provide a net global energy savings, the ability to replicate the savings in other inner cities and other economically depressed areas will help create local energy savings for Manitobans—especially if the wealthier residential customers also continue to reduce their energy consumption. On a global scale, improving energy efficiency within all socio-economic strata and in all industries will create greater net energy savings and help lower energy demand. In North America, the concept of “global energy concerns” has become a concrete reality for individual households and a concern for hydro-electric producing utilities such as Manitoba Hydro.

The recent power outage in eastern Canada and the United States, water flow concerns at hydro plants, and the current housing situation in Winnipeg are part of a larger picture and indicative of what the future may look like, if we remain passive today, rather than

taking action in the area of reducing energy consumption. Therefore, this study explores current use of energy conservation measures in low income housing renovations and how to educate low income groups about the need for energy conservation.

All indications are that climate change will have an increasing impact on Manitoba Hydro's ability to generate electricity by hydro electric means; therefore, it is important for Manitoba Hydro to increase energy conservation measures within all customers, including low income groups. In 2003, power shortages experienced by 50 million people in parts of Canada and the United States illustrates the important role that energy plays in all aspects of Western society. As the energy generated and used for many of the systems found in housing, such as air conditioning, refrigeration, lighting, and entertainment, failed, Canadians and Americans felt the consequences in their own homes and workplaces. The summer of 2003 was a clear indication that energy conservation measures for all energy consumers need to be advanced seriously.

New York State Governor George Pataki appealed Saturday [August 16, 2003] for people to conserve energy, even as electricity was restored across the state following the worst power outage in US history: "There is one outstanding word for today, and that is 'conservation', we are still in a delicate balance between what we can generate and the demands on the utility grid. Turn off the lights, turn off the air conditioners, and go outdoors" (Pataki, 2003 in Hewitt, 2003).

Canada's experience with energy conservation was similar: Ontario Premier Ernie Eves stated that Ontario came close to using up all of its available power Tuesday [August 22, 2003], having approximately 1,000 megawatts of electrical power to spare. With continuing hot weather, officials worried that people might become complacent in maintaining energy conservation measures (Canadian Broadcasting Corporation, 2003). While elected officials from both countries asked that citizens implement energy conservation measures for the short term, how can long term energy conservation measures in the home be achieved? How can energy conservation become the corner stone of residential energy use behavior? For Manitoba Hydro, recent (2003) low water

levels negatively affected energy production and their ability to meet contractual agreements to the United States:

If we don't have the power ourselves, we'll buy it. It could be Ontario, it could be Saskatchewan or it could be all of the United States, says Brennan. That's why we've got reserves in excess of a billion dollars, to take care of low flow conditions. (Canadian Broadcasting Corporation, 2003).

For Manitoba Hydro, improving energy efficiency in new and older housing stock could become part of a critical solution for increasing the amount of available energy for sale.

1.2 Challenges Associated with Older, Inner City Housing Stock

Many Canadian cities, including Winnipeg, have an older housing stock. In Winnipeg as a whole, 68.6 % of homes were built prior to 1971, while houses in inner city neighborhoods such as West Broadway are significantly older, with only 3.8 % built since 1971 (Canada Census, 1991). West Broadway is an inner city neighborhood with one of the lowest average household incomes in Winnipeg. According to census data, the average household income in West Broadway is \$16,211 compared to the Winnipeg average of \$44,937 (City of Winnipeg, 1996), which is almost one-third the annual average household income. West Broadway also has a significantly higher unemployment level than the rest of Winnipeg (City of Winnipeg, 1996). The average selling price of a house in West Broadway is \$32,971 (Morier, 2003). As well as the social-economic challenges created by unemployment/underemployment and low income levels, West Broadway also has one of the highest rates of absentee landlords. Many of the homes in West Broadway are either in poor condition or vacant, often attributed to low rates of owner occupancy and absentee landlords, as indicated in Table 1.

Table 1 West Broadway Owner Occupation Statistics

	West Broadway	City of Winnipeg
Total number of dwelling units	No owners in residence	At least one owner in residence
521 (land parcels with more than six dwelling units)	370 (71%)	161 (29%)
391 (land parcels with less than six dwelling units)	244 (62%)	147 (38%)

(City of Winnipeg, 2001)

As indicated by the Table 1, over 50% of rental housing in West Broadway is without an owner in residence. This phenomenon of high numbers of “absentee landlords” is often linked to revenue properties becoming run-down as owner’s continual revenue extraction is not matched by needed upgrades to the property. Low selling prices for housing in the area, coupled with high vandalism and crime rates also discourage owners from renovating properties to increase energy and resource efficiency. This results in the aforementioned vacant or poor condition housing.

For low income renters, making home repairs or improving energy or resource efficiency in their housing is often beyond their means as indicated by the lower income levels in the area. Also, tenants would not see a return on their investments because tenants do not own their accommodation. Therefore improvements to West Broadway’s housing situation must be attacked on four fronts, focusing on: 1) changing the energy behaviors of low income groups living in the areas 2) convincing landlords (resident and absent) that improving energy efficiency will be beneficial for their pocketbooks, 3) convincing community groups that provide housing in the area, such as the West Broadway Development Corporation that energy efficiency can be cost effective, and 4) improving existing energy efficiency programming and policies so that they are inclusive of low income groups.

While the low income, high crime rate, low ownership ratio, high unemployment scenario currently occurring in West Broadway is dire, there is also a strong community spirit voiced in a number of ways such as the West Broadway Development Corporation

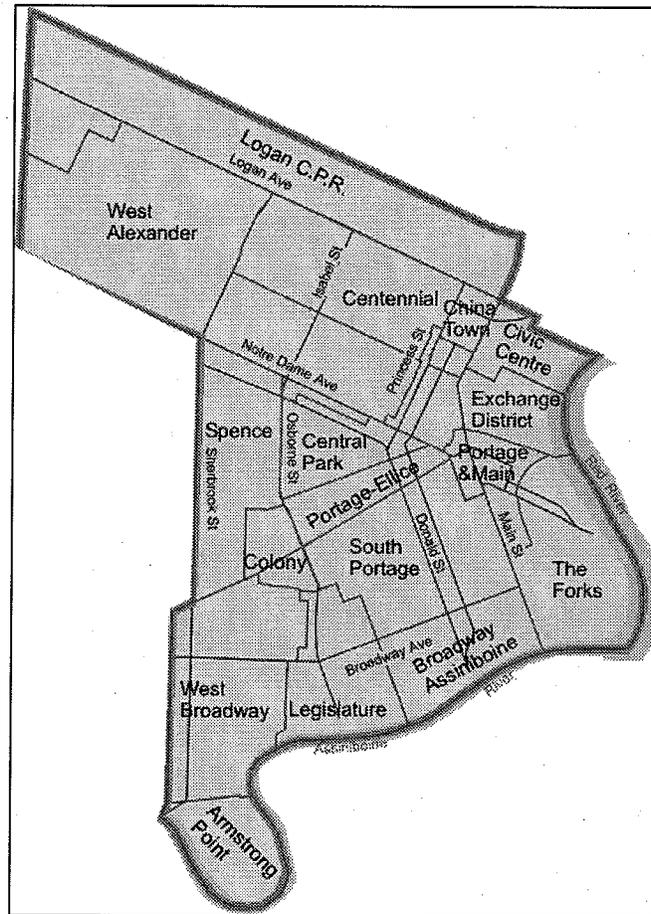
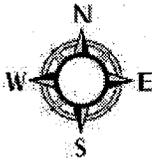
(WBDC). As a community group, West Broadway is committed to increasing the amount of affordable housing stock in the neighborhood. While community groups are committed to renovating and building affordable housing, there is still a need for *healthy* affordable housing that incorporates elements of sustainable design, energy and resource efficiency, and human health concerns.

Many of the predominant housing problems, characteristics of older, inadequately constructed housing, and the socio-economic demographics found in West Broadway are also found in other inner city areas of Winnipeg and in rural areas. Therefore, the knowledge gained from the Broadway area may be used in other parts of Winnipeg and rural Manitoba to improve energy efficiency for low income groups. As well, energy inefficient housing conditions can be found in other core neighbourhoods in Canada. Thus understanding how low income groups access and use energy efficiency incentive programming will be transferable to these other areas of Canada. This examination of energy efficiency programming access and use by low income groups may help factor into developing Winnipeg and Manitoba as more sustainable regions.

1.3 Project Location

Often referred to as the “jewel in the rough”, West Broadway is located close to downtown Winnipeg and many amenities such as parks, and shopping. West Broadway offers a diversity of ethnic and cultural populations. The area covers 0.67 % square kilometers and is bounded by Portage Avenue to the north, Cornish Street and the Assiniboine River to the south, Maryland Street to the west, and Osborne Street to the east.

Map 1: Downtown Winnipeg—Including West Broadway (City of Winnipeg, 2001)



1.4 Choosing to Conduct Research in West Broadway

Preliminary research and communication with West Broadway Development Corporation's (WBDC) Executive Director at the time, Paul Chorney, confirmed the researcher's initial hypothesis—that few low income families or the WCDC were taking advantage of Manitoba Hydro's PowerSmart Programming. For people living in low

income situations and for low income housing providers, the opportunity to lower heating bills by improving energy efficiency was a significant area that required research.

1.4.1 Who is the West Broadway Development Corporation? (WBDC)

Created in 1997, the West Broadway Development Corporation (WBDC) is the legal arm of the West Broadway Alliance (a group of interested community members, service organizations, elected officials, and residents groups interested in revitalizing West Broadway). The mandate of the West Broadway Alliance and its Development Corporation is,

To renew and revitalize West Broadway through the responsible leadership and participation of people who live, work, and play in the neighborhood (West Broadway Development Corporation, 2003).

The Alliance and its Development Corporation's vision of West Broadway is of "A stable, healthy, safe neighborhood that is diverse, welcoming, vibrant, clean and self reliant" (West Broadway Development Corporation, 2003). West Broadway Development Corporation has developed its mission and vision statements into twelve strategic goals focused on several areas such as community participation, housing development, social and community development, organization, and construction technology through housing renovation.

A large proportion of West Broadway's goals include improving local housing options through the Community Land Trust (CLT) initiative, whereby vacant, fire damaged, or unusable housing is assessed and renovated and then rented, with a purchase option, to interested individuals. For this project, WBDC served as a link to the West Broadway community in order to elicit community interest and input into this research project about the challenges facing low income groups and their ability to access energy efficiency programming.

The eligibility criteria of programs such as EnerGuide for houses and the accessibility issues around no-cost tools for assessing energy efficiency were issues that needed to be examined in the context of low income, inner city neighbourhoods and led to the

development of this proposal. Some examples of groups that may have difficulty assessing energy efficiency programming include, but are not limited to the following:

- People living in rental units (current program criteria requires home ownership in order to access program or have landlord agreement in order to receive an EnerGuide for Houses home audit),
- Low income groups (affordability issues: inability to complete upgrades due to lack of funds),
- Groups with that are underemployed/not employed,
- Groups with less than grade twelve education, and
- Immigrants (issues with language/comprehension issues in understanding complex or detailed information explaining how to complete energy efficient upgrades).

In light of these potential gaps in customer access to existing PowerSmart programming, a proposal was developed and submitted to Manitoba Hydro outlining the researcher's objectives of examining their PowerSmart family of Programming and its applicability to low income, inner city neighbourhoods groups.

1.5 Manitoba Hydro's Involvement and Commitment

Manitoba Hydro is committed to providing energy saving programming as indicated by its current residential, industrial, and commercial services. However, access to current services by low income groups has been limited; therefore this research will examine why these programs are underutilized by low income residential customers. As well, Manitoba Hydro's support of this project signifies a willingness to fulfill their corporate responsibilities to the people of Manitoba and to help reach our Kyoto commitment.

As a signatory to the Kyoto Protocol, Canada is committed to reducing energy consumption, lowering greenhouse emissions, and promoting the development of cleaner energy sources. For the construction industry, Canada has set a target to retrofit 20% of existing building stock, both

residential and non-residential by 2010 to meet green house emissions goals (Canadian Construction Association, 2003).

While the project provides local opportunities, it also serves a regional need. Helping to develop Winnipeg as a sustainable city will provide an example for other regions to follow and may also help increase local economic activity. Research indicates that economic activity increases as sustainability increases, "Rather than producing more energy to meet increasing demand", the United Brotherhood of Carpenters and Joiners of America Local Union 343 state, "Energy efficiency creates more jobs per dollar than mega projects" (Frayne, 1993)." A more recent study by the Pembina Institute for Appropriate Development confirms the Brotherhood's statement: "For each million dollars invested in efficiency, 36 full-time jobs were created" (David Suzuki Foundation and The Pembina Institute, 1998).

1.5.1 Implications for Manitoba Hydro Policy

As described above, Manitoba Hydro experienced reduced electrical generation in 2003 as a result of natural phenomena impacting water levels at various dams and reducing capacity. Coupling decreased capacity with increasing consumer consumption (based on future population growth) creates a potential recipe for disaster such as the one that occurred in portions of Canada and the United States in the summer of 2003. The situation of reduced water levels and increasing electricity consumption could occur again, therefore, it is important that Manitoba Hydro proactively examine opportunities for reducing consumer demand as part of a strategic plan to reduce electrical consumption.

For Manitoba Hydro, there are two ways to increase energy production: active and passive. Large hydro-electric projects are an active way to increase energy production, but associated costs of developing mega projects or upgrading existing generating stations can potentially be economically prohibitive as well as risky; given that there is no guarantee that low waters or other factors will not continue to inhibit the economic return on the project. As well, current public perception and First Nation concerns over mega projects may influence choices to postpone large scale development. Therefore, a

secondary, passive form of energy generation exists in terms of demand side management, which Manitoba Hydro does through its residential, commercial, and industrial energy saving programs. By using demand side management, Manitoba Hydro limits economic risk, develops good public relations, and fulfills its mandate of reducing energy consumption. While Manitoba Hydro has several energy saving programs aimed at residential consumers, many of these programs may not be reaching community groups and low income groups in the inner city neighborhoods such as Point Douglas, Main Street, and West Broadway (For full listing of all neighborhoods designated as “inner city”, please see Appendix 5 and Appendix 6 for list of all neighbourhoods designated Major Improvement Zones).

While the residential/renovation sector provides smaller conservation opportunities compared to new commercial or industrial construction, residential programming is being utilized, indicating that there is public interest in conserving energy. But do community groups, low income earners, English as second language families, or First Nation groups fit the current accessible “residential” category”? For these groups, Hydro programming may not provide options necessary for program up take, therefore, it is necessary to understand how these low income groups use or do not use available Hydro programming.

While 100 dollars*, plus G.S.T sounds like a reasonable amount for an in-house energy audit, the payment system and amount may prove out of range for some low income customers. As well, the high ratio of rental units in the West Broadway area may impact the ability of customers to change their energy consumption patterns (currently, rental units do not qualify for EnerGuide for Houses Assessments). Therefore, it is important to determine how current energy efficiency programming is being used by low income groups. In the literature review in chapter two, available residential energy efficiency programming across Canada is documented.

*Cost of EnerGuide for houses audit subject to change. Price here reflects 2005 Manitoba Hydro rate of audit.

CHAPTER 2

LITERATURE REVIEW

2.0 Introduction

Increasing demand for electricity is created by population growth and economic expansion, but this increasing demand for energy requires a solution. An imperfect solution is to build more hydro-electric infrastructure to meet demand. However, this solution is imperfect because it does not account for economic costs such as potentially prohibitive costs for building new hydro-electric infrastructure, socio-economic costs to First Nations culture, land, and livelihoods, and environmental costs such as greenhouse gas emissions. Therefore, it is important to examine consumer behavior and to develop methods to help change consumer energy behaviors.

Therefore, a perfect solution is one in which supply side management and demand side management is used to help curtail consumer energy consumption. As part of its voluntary actions, Manitoba Hydro has committed to “energy efficiency improvements both on the demand side and the supply side” (Manitoba Hydro, 1996).

Canada’s commitment under the Kyoto Protocol is to reduce net GHG emissions to 6% below 1990 levels between 2008 and 2012 (Environment Canada, 2004). Globally, electricity production accounts for approximately eleven percent of human-caused emissions of greenhouse gases. Canada developed the National Action Program on Climate Change which identifies options to reduce green house emissions. As part of the plan, the Canadian Electrical Association (CEA) endorsed a Voluntary Challenge and Registry (VCR) that includes opportunities for decreasing emissions. Manitoba Hydro agreed to do its part in lowering green house gas emissions by improving demand side management which

Would assist customers in utilizing energy-efficient technologies and practices, resulting in their securing the same or better service with decreased energy consumption. (Manitoba Hydro, 1996)

In response to climate change commitments and the overall need to reduce energy consumption, Manitoba Hydro has created energy savings programming for the residential, industrial, and commercial sectors. However, for the residential programming to effectively reach all segments of the residential market, the programming must address the regressive energy use of lower income groups (Roseland, 1998). Lower income groups tend to live in poorly built housing stock, which is often characterized by drafts, inefficient heating systems, and older appliances (Roseland, 1998).

The literature review is divided into five main areas:

1) West Broadway/inner city demographics, 2) energy efficiency policy and demand side management, 3) social marketing, 4) existing energy efficiency programming across Canada, and 5) Models for improving energy efficiency within low income households and inner city neighbourhoods.

Existing provincial programming for improving residential energy efficiency, case studies of successful low income housing models incorporating energy efficiency objectives, and literature examining the perception of housing providers towards improving energy efficiency in low income housing they managed/owned was examined. The scope of examination for energy efficiency was focused on the socio-economic implications of incorporating energy efficiency into inner city neighbourhoods and did not examine the mechanics and technical details of improving energy efficiency in residential housing. The researcher acknowledges the importance of understanding the technical data behind improving energy efficiency, however, it was deemed to be outside the scope of this project.

Neighbourhood data summarizing socio-economic conditions was collected for the West Broadway area. Specific data about education levels, income, homeownership, language, and ethnic composition was collected and compared to other inner city neighbourhoods in Winnipeg to aid in understanding the factors influencing people's ability to improve their housing situations through the use of Manitoba Hydro's PowerSmart programming.

2.1 Gentrification Issues within West Broadway

Gentrification has always been an issue in West Broadway. All neighbourhoods oscillate on a scale of socio-economic well-being and experience “boom and bust” periods. However, for the purposes of energy efficiency research in West Broadway, understanding the impacts of gentrification is critical in helping to understand who is able to upgrade their housing and how local residents are reacting to gentrification. Therefore, issues and indicators around gentrification were examined in light of how improving energy efficiency in West Broadway’s housing stock might impact the very poor. The following three photographs illustrate current levels of urban decay within the neighbourhood (1), the beginnings of revitalization (2), and finally, the finished restoration of a house (3) and all it represents—neighbourhood revitalization, and better quality housing. But does it also represent energy efficiency, gentrification, and loss of community? The photographs illustrate a revitalization cycle which may result in higher rents for low income earners. For low income earners living in rented housing such as indicated below, landlords may refurbish their properties to raise the rent or may sell the properties, requiring families to move. Maximum allowable rent rates, as set by Manitoba Family Services (2003), range from \$285 to \$471 for household sizes ranging from two to four people. According to Canada Mortgage and Housing Corporation’s October 2003 figures, the average cost of a two bedroom apartment in Winnipeg was \$645 (CMHC, 2004). When compared to the set allowances above, rents are unaffordable. Low income families may find the revitalized area too expensive to live in and may be forced to move. This movement has a significant effect on their lives and may result in loss of local informal support services.

Photograph 1 Current Urban Decay

Example of housing in disrepair in West Broadway, an inner city neighborhood.



Photograph 2 Housing Revitalization

Revitalization occurring within West Broadway.



Photograph 3 Completed Revitalization

Revitalization? Upgraded housing may no longer be affordable for low income groups, resulting in changing socio-economic composition of the West Broadway neighbourhood.



2.1.1 Inner City Housing Costs and Demographics of West Broadway

Winnipeg has some of the lowest housing prices of all the major cities in Canada. This statement held true even during last year's (2003) housing price boom, where, due to low interest rates, Winnipeg's housing prices steadily increased. Within the City of Winnipeg, West Broadway continues to have some of the lowest housing prices available.

The average purchase cost of a house in West Broadway rose slightly from \$29,027 in 1998 to \$32,971 in 2003 (Morier, 2003). In 1998, the housing prices in West Broadway were the second lowest of approximately sixty areas in Winnipeg (Winnipeg Real Estate Board, 1999). Prices in the area have continued in a modest flux — dropping to an average of \$23,752 in 1999, rising to an average re-sale price of \$28,522 in 2000, and again rising modestly to \$32,971 in 2003 (Morier, 2003).

West Broadway is primarily home to rental properties with “absentee landlords”. 93.8% of the properties in West Broadway are rental with the remainder, 6.2% of housing being privately owned (City of Winnipeg, 2001).

Table 2 Dwelling Tenure in West Broadway

Dwelling Tenure	Number of houses within West Broadway	% of Total Houses in West Broadway	Number within Winnipeg	% of Total Houses in Winnipeg
Owned	190	6.2%	160,760	63.6%
Rented	2,875	93.8%	92,055	36.4%
Total	3,065	100.0%	252,815	100.0%

(City of Winnipeg, 2001)

Many residents and experts attribute West Broadway's poor quality housing to a combination of high rates of absentee ownership and the landlord's prevailing practices of low building investment (Hartshorn, 1980). 46.6% of the buildings in West Broadway were built before 1946 (City of Winnipeg, 2001). The second largest majority, 46.5%, was built between 1946 and 1990 (City of Winnipeg, 2001).

High rates of absentee landlords, pre-war housing stock with little or no insulation built before the advent of improved building practices and technologies, and the legal inability of tenants to upgrade their surrounds creates a situation where many energy inefficient buildings are not having their energy consumption curtailed—largely due to the fact that landlords are still able to get a profitable return on their investment.

Anecdotal evidence from "Housing Solutions" (Miko, 2004), a public seminar, indicated that local perception of landlords and the issue of re-investment in their buildings has, to date, been poor. Community perception of many landlords in West Broadway and in other inner city neighbourhoods is negative, with few people viewing landlords as being "good" in terms of providing regular maintenance and major improvement to their buildings. The City of Winnipeg developed and implemented Housing Improvement Zones as part of a strategy to combat the ongoing dilapidation of inner city neighbourhoods such as West Broadway.

Housing Improvement Zones are further delineated into four areas.

1. Major Improvement Zones (MIZ)
2. Rehabilitation Zones (RZ)
3. Conservation Zones (CZ)
4. Emerging Areas (EAs)

For the purposes of Housing Improvement Zones (HIZs), only neighborhoods that qualified for the first two designations could be designated HIZs. The City of Winnipeg developed criteria to determine which zone a neighborhood would fit into based on socio-economic data and other city data. Based on the City of Winnipeg's criteria, West Broadway was designated both a "Major Improvement Zone" and a "Rehabilitation Zone" (City of Winnipeg, 2001). For West Broadway, this designation reflects the general downswing in economic development, repairs and upgrades to buildings within the neighbourhood. For landlords, low income neighbourhoods provide an excellent return on investment — and limited investment at that: it was reported that for a duplex sold in the North End (another inner city area) for \$30,000 in 1988 was earning \$1, 830 per month from the three two-bedroom suites (\$450 each), and two bachelor apartments (\$240 each) in 1989 (Simms, Loxley, 1997 in Nesdoly, 2001). This type of profit is typical of rental suites throughout Winnipeg's inner city and holds true for West Broadway as well.

Based on the development and categorization of West Broadway as a "Major Improvement Zone" by the City of Winnipeg, it may be assumed that West Broadway is facing socio-economic challenges that extend beyond and include housing as issues that need "improvement". It is important to understand the other socio-economic factors impacting West Broadway resident's ability to improve energy efficiency because factors such as education levels, income, family size, tenant/owner status, and language skills all interact with the physical setting of older housing stock to create situations where it may be harder to incorporate energy efficiency into the buildings.

Table 3 Maximum Allowable Rent Rates

Household Size	Basic Rent	Rent including Utilities
2 people	\$285	\$387
3 people	\$310	\$430
4 people	\$351	\$471

(Manitoba Family Services, 2003)

According to Canada Mortgage and Housing Corporation's October 2003 Statistics, the average cost of a 2-bedroom apartment in Winnipeg was \$645. When compared to the set

allowances above, rents are unaffordable for all families on assistance. As indicated below, unaffordable rent coupled with other factors such as low income can lead to social, economic, and health problems that may not be quantitatively measurable until years later.

According to the City of Winnipeg's 2001 census data for West Broadway, *tenant* single family households spending thirty percent or more of their household incomes on shelter was 44.9% compared to the City of Winnipeg' total of 29.4%, which is 15.5% higher than the Winnipeg total. The average gross *tenant* rent (City of Winnipeg, 2001) in West Broadway was \$579 as compared to the Winnipeg average of \$586. Owner family households, meaning those families who own their resident as opposed to being tenants, who were according to the City of Winnipeg (2001), spending more than thirty percent or more of their income on shelter was 26.3% (25 households) in West Broadway compared to 8.6% (9, 905 households) in Winnipeg proper.

The average monthly mortgage payment for a house in West Broadway was \$696 in 2001, slightly lower than the Winnipeg average of \$798 (City of Winnipeg, 2001), due in part to some of the characteristics within West Broadway. People wanting to purchase a house are attracted to the lower cost of purchasing housing in West Broadway. For people renting their housing, the movement of home owners into the neighbourhood can be destabilizing as it may lead to the renters moving into other inner city neighbourhoods where there are lower housing costs. The movement of lower income groups out of a neighbourhood can lead to household instability:

Families are always searching for cheaper housing and have to pay for moving. Children have to switch schools often - sometimes in mid-year. This hurts their social and academic development. The children and their families lose their community support systems when they move too far from their networks. While the "new" accommodation may be cheaper, it may also be more crowded or less safe in more run down neighbourhoods. Cheaper housing is often further from services such as laundromats and grocery stores. This increases transportation costs. The constant moving and searching for cheaper housing is emotionally draining and stressful. (Miko and Thompson, 2004).

In addition, the instability in low income lives makes it difficult to think about anything other than life necessities. So, even though improving energy efficiency may actually help stabilize portions of a low income person's life, it is too far removed from their daily needs and they cannot incorporate it without a support system. Factors that negatively impact the up take of energy efficiency programming include the issues outlined in the following sections: low income, older housing stock, and tenancy.

2.1.2 West Broadway Demographics

Inner city neighbourhoods such as West Broadway share numerous characteristics,

- low income
- older housing stock and
- higher rates of tenancy.

In combination with eligibility criteria for energy efficiency programming, these characteristics of inner city neighbourhoods may further discourage low income groups from becoming energy efficient.

Table 4 Dwelling Tenure in West Broadway

Dwelling Tenure	West Broadway		Winnipeg	
	Number of Houses in West Broadway	% of Total Housing in West Broadway	Number of Houses in Winnipeg	% of Total Housing in Winnipeg
Owned	190	6.2%	160,760	63.6%
Rented	2,875	93.8%	92,055	36.4%
Total	3,065	100.0%	252,815	100.0%

(City of Winnipeg, 2001)

As indicated in Table 4, West Broadway goes against the City of Winnipeg trend of having home ownership—West Broadway has over 90% percent of its residents renting and only six percent home ownership. West Broadway is similar to other inner city neighbourhoods in that it has a higher than average amount of rental and public housing. For programming requiring primary home ownership in order to obtain access to knowledge and grant monies, this high tenancy rate is challenging because it poses a

barrier to programming access. The high tenancy rate in West Broadway identifies an initial programming gap for promoting energy efficiency in rental housing.

Table 5 Dwelling Characteristics

Dwelling Type	Number of units in West Broadway	Number of units in City of Winnipeg
Single detached house	225	151,355
Semi-detached house	30	9,805
Row house	35	9,185
Apartment, detached duplex	195	4,345
Apartment, building with five or more storeys	720	35,140
Apartment, building with fewer than five storeys	1855	42, 150
Other single detached house	0	390
Movable dwelling	0	450
Total Occupied Private Dwellings	3,060	252, 815
Average number rooms	3.8	5.8
Average number of bedrooms	1.3	2.5

(City of Winnipeg, 2001)

Table 5 illustrates the predominance of apartment buildings found within the West Broadway neighbourhood. In terms of adopting and implementing programming within apartments, there are several problems. One is the legal requirement of some programming that the owner is responsible for accessing the programming, thereby leaving renters no recourse to understand their energy consumption if they chose to. If landlords do wish to pursue an in-house assessment in their apartment buildings, there would be issues of access to each suite, as a portion of the assessment—the blower door test—requires that air movement be unimpaired. The blower door test is a technical requirement without which the owner cannot receive an EnerGuide for Houses rating for their home. As well, existing programming that is used for processing the data collected in the in-house evaluation is not designed for the processing of larger buildings such as apartment buildings.

Table 6 Period Houses were Constructed in West Broadway

Period of Construction	West Broadway		Winnipeg	
	Number of Houses in West Broadway	% of Total Houses in West Broadway	Number of Houses in Winnipeg	% of Total Houses in Winnipeg
Before 1946	1,735	56.3%	51,280	20.3%
1946 to 1960	415	13.5%	52,415	20.7%
1961 to 1970	240	7.8%	44,765	17.7%
1971 to 1980	205	6.7%	52,460	20.7%
1981 to 1985	340	11.0%	18,635	7.4%
1986 to 1990	85	2.8%	19,490	7.7%
1991 to 1995	50	1.6%	7,815	3.1%
1996 to 2001	10	0.3%	5,960	2.4%
Total:	3,080	100.0%	252,820	100.0

(City of Winnipeg, 2001)

According to Table 6, almost 60 percent of the houses in West Broadway were built before 1946, with the second largest majority of the houses being built between 1946 to 1985 (29%). The technologies and practices surrounding energy efficiency have advanced greatly since the period in which houses before 1946 were built. For example, recommendations include increasing minimal insulation levels in ceilings and attics to R50 or even R60 (Manitoba Hydro, 2000).

In addition to increasing insulation values according to degree day zones (climate regions), advancements have also been made in vapour and air barrier technology, and indoor air quality. Houses prior to 1946 would have had minimal insulation consisting of wood shavings, rock wool, or no insulation. Therefore these houses are greatly disadvantaged in terms of their ability to decrease heating bills based on the insulation levels currently found in them. Vapour barrier technologies and philosophies have also advanced from earlier construction techniques—mainly that newer houses built since the 1970s have them. Vapour barriers in modern construction control moisture movement within the wall cavity where the insulation is; an over simplification of a complex interaction-vapour barriers help ensure that insulation does not get wet, and therefore is able to perform. Vapour barriers were not used in the majority of houses built in West

Broadway, chiefly because the reigning building techniques of the time did not include vapour barriers.

Air barriers are also another important factor in saving energy and decreasing heating bills. Tar paper was used in construction dating to the 1940's, (although some construction companies can still be found using it) to provide a simple air barrier. Today's construction uses higher technologies such as Tyvek or Typar or similar products to provide air barriers. As well, the majority of houses built prior to 1946 as well as houses built into the early 1970's did not have air barriers due to the reigning philosophy that houses should "breathe". The concept of controlled housing ventilation did not come into practice until the late 1970's with the advent of R2000 houses.

Together, the lack of insulation or low insulation values, lack of air and vapour barriers or limited use of these barriers have resulted in houses that have high energy consumption in terms of heating loads. For West Broadway residents, lowering their energy consumption (heating bills) is directly related to improving and understanding how their houses function and how they can be improved. Unfortunately, the cost of insulating, adding air and vapour barriers to the houses may be out of financial range of some West Broadway residents.

Table 7 Condition of Houses in West Broadway

Dwelling Condition	West Broadway		Winnipeg	
	Number of houses in West Broadway	% of Total	Number of houses in Winnipeg	% of Total
In need of regular maintenance only	1,750	57.0%	156,685	62.0%
In need of minor repairs	945	30.8%	72,735	28.6%
In need of major repairs	375	12.2%	23,735	9.4%
Total	3,070	100.0%	252,810	100.0%

(City of Winnipeg, 2001)

According to Table 7, almost 60% of West Broadway housing requires only regular maintenance, while almost 40% of the houses require both minor and major repairs. West

Broadway has more building in both the minor and major repair categories as compared to the rest of Winnipeg. This increase in the minor/major repair categories is partly due to the fact that more of West Broadway's buildings have slipped from the "in need of regular maintenance" into the minor/major repair categories.

While the needed repairs represent a financial cost to the owners, the repairs also represent an opportunity to encourage energy efficiency if people are going to make major structural repairs and exterior repairs, they can, at the same time, also increase their insulation levels and add/improve the vapour and air barriers. In terms of income levels within the neighbourhood, the low income levels as compared to the rest of Winnipeg may have a negative impact on people's ability to afford energy efficiency improvements and may impact which upgrades that they choose to complete. According to City of Winnipeg (2001), the average household incomes in West Broadway for 2000 were less than half of the City average.

Table 8 Average Household Incomes

Household income in 2000	West Broadway average	Winnipeg average
Average household income	\$20,923	\$53,176
Median household income	\$16,085	\$43,383

(City of Winnipeg, 2001)

Table 9 Incidence of Government Transfer Payments in West Broadway

Income	West Broadway	Rest of Winnipeg
Composition of Total Income in 2000	%	%
Employment Income	66.7%	76.1%
Government Transfer Payments	27.2%	12.1%
Other	6.1%	11.8%

(City of Winnipeg, 2001)

While the majority of income in West Broadway is generated through employment, West Broadway has approximately twice the rate of government transfer payments in the form of employment assistance and other assistance, as indicated in Table 9. The higher incidence of assistance payments indicates that locally conditions are not favorable for

energy efficient improvements, given that such improvements would be out of economic range for people on assistance payments. Therefore, for lower income groups to access energy efficiency programming, they must be assisted in term of economics, information, and technologies.

Table 10 Income Levels in West Broadway Compared to the Rest of Winnipeg

Employment Income	West Broadway		All West Broadway	All Winnipeg
	Male	Female	Both Sexes	
Worked full year, full time	730	515	1,250	200,975
Average employment income	\$25,935	\$20,971	\$23,884	\$38,877
Worked part year or part time	805	605	1,410	143,670
Average employment income	\$11,578	\$9,786	\$10,812	\$16,481
Average employment income	\$18,018	\$14,632	\$16,590	\$29,145

(City of Winnipeg, 2001)

These statistics indicate that the average male or female West Broadway resident earns almost half the income average of \$29,145 of the rest of Winnipeg. For West Broadway residents, their average earning power is relatively modest in view of some of the improvements that they would have to undertake to improve their house — if they own it (eligibility criteria for EnerGuide for Houses program requires home ownership, see appendix three). Therefore, due to economic constraints many West Broadway residents cannot afford to make energy efficiency improvements if they wanted to. The average and median incomes of West Broadway residents according to the City of Winnipeg (2001) is as follows:

Table 11 Average and Median Individual Incomes of West Broadway

	Male	Female
Average Income	\$17,610	\$14,010
Median Income	\$14,889 (Male)	\$12,355

(City of Winnipeg, 2001)

While West Broadway residents have lower incomes than the rest of Winnipeg, there is also a higher incidence of low income families and households in the West Broadway

compared to the City of Winnipeg average, as indicated in table twelve below. For families, reducing heating bills would have an overall benefit of allowing them to put their finances towards other necessities such as food, items for their children, and transportation, etc. Unfortunately, the high numbers of low income families in the West Broadway area may potentially be unable to access programming because they cannot afford to pay for the energy efficiency upgrades.

Table 12 Incidences of Low Income Households in West Broadway

Incidence of Low Income in 2000	West Broadway	Winnipeg
Total Economic Families	840	165,660
Low Income	595	32,165
Incidence of Low Income	70.8%	19.4%
Total Population in Private Households	4,730	606,770
Low Income in Private Households	3,625	147,425
Incidence of Low Income in Private Households	76.5%	24.3%

(City of Winnipeg, 2001)

According to Table 12, West Broadway residents are experiencing almost three times as much low income as compared to the rest of Winnipeg. The higher rates of low income in the neighbourhood is due in part to lower education levels, lower employment participation levels, and a higher rate of immigrants and people of Aboriginal descent (City of Winnipeg, 2001). The factors of low incomes, high unemployment, and less than average education attainment by the population combine to create, from the programming supplier, a very challenging atmosphere in which to improve energy efficiency. On the other hand, these very same factors — low incomes, high rental rates, low education — combine to create a situation in which the very same people have minimal decision making power to effect positive changes such as improving energy efficiency. This would in turn, lower their heating bills, thereby improving their quality of life. Therefore, in the interest of improving energy efficiency and improving quality of life by reducing heating bills, future programming should be developed that meets the needs of low income groups in terms of affordability, accessibility, and applicability.

Table 13 summarizes available employment statistics for residents ages fifteen years and older. In all age categories, unemployment rates are higher than the City of Winnipeg average. For those households experiencing inadequate or no employment, saving money is essential to meeting their basic daily needs. For these households, reducing heating bills may help them maintain a budget in the black.

Table 13 Labour Force Activities in West Broadway

Labour Force Activity	West Broadway			City of Winnipeg
	Male	Female	All	All
15 years and over				
Participation rate	69.8%	52.8%	61.4%	68.1%
Employment rate	58.5%	46.3%	52.5	64.2%
Unemployment rate	15.9%	12.3%	14.4%	5.7%
15 to 24 years				
Participation rate	76.9%	66.1%	70.5%	71.3%
Employment rate	60.4%	53.9%	56.5%	63.6%
Unemployment rate	20.0%	19.7%	19.2%	10.9%
25 years and over				
Participation rate	68.2%	47.6%	58.6%	67.4%
Employment rate	58.2%	43.5%	51.2%	64.3%
Unemployment rate	14.7%	8.6%	12.6%	4.6%

(City of Winnipeg, 2001)

Table 14 Education Levels within West Broadway

Education	West Broadway		City of Winnipeg	
	Number	% of Total	Number	% of Total
Less than Grade 9	490	11.1%	44,420	9.1%
Grade 9 – 12 without secondary certificate	1,215	27.5%	127,140	26.0%
Grade 9 – 12 with secondary certificate	415	9.4%	56,680	11.6%
Non-university – without certificate or diploma	390	8.8%	27,065	5.5%
Non-university – with certificate or diploma	650	14.7%	93,450	19.1%
University without degree	830	18.8%	66,130	13.5%
University with degree	425	9.6%	73,590	15.1%
Total (15 years and older)	4,415	100.0%	488,475	100.0%

(City of Winnipeg, 2001)

West Broadway is similar to other Winnipeg inner city neighbourhoods and to neighbourhoods classified as Housing Improvement Zones specifically. Similar education attainment by residents, employment levels, and analogous rental levels makes West Broadway comparable to other Housing Improvement Zones. Because West Broadway is similar in socio-economic composition to other inner city neighbourhoods, challenges to implementing energy efficiency could be assumed to also be similar from West Broadway to other areas and therefore, the tools to improve energy efficiency would also be transferable.

While education levels found within West Broadway's population is similar to education levels found overall in Winnipeg (see table fourteen, previous page), there is a correlation between education level and ability to improve energy efficiency. While there are obvious correlations between income levels and attained education levels, poverty and education, and ability to purchase energy upgrades and education levels, there is a strong correlation between what type of energy upgrades that will be undertaken and education level attained by head(s) of the household. Fenton (1986) for example, indicated that there is a direct correlation between education levels and what he refers to as "structural" and "non-structural" energy conservation activities. Fenton (1986) refers to structural upgrades as being the addition of insulation to a dwelling, new heating system, new furnace, weather stripping, addition of storm doors, and replacement of windows as structural activities. Non-structural activities include as turning down the heat, turning off unnecessary lights, using less hot water, and trying not to use appliances as much. In a study completed in 1986, Fenton found that education played a significant role in determining home owner's choice to complete structural vs. non-structural energy efficiency upgrades.

Trade school or community college respondents report structural activities about 14 percent more frequently than expected. All other levels report structural activities less frequently than expected. (Fenton, 1986).

Therefore, determining the relative education levels and understanding other socio-economic factors such as low income frequency, poverty rates, employment, languages spoken, neighbourhood classification, and ethnic composition may help determine how to

best ensure that energy efficiency upgrades are undertaken in the neighbourhood. Fenton (1986) also indicated that in Major Improvement Zones, word-of-mouth, television, and print media are indicated more frequently as a way to access information than in other neighbourhoods. Again, Fenton's finding illustrates the importance of understanding the neighbourhood in which you are trying to achieve energy efficiency in order to achieve success.

2.2 Who Pays the Heating Bill? Linking Neighbourhood Improvements with Gentrification

Gentrification is a complex interaction of social, economic, and environmental factors working over time within neighbourhoods. It is a process that has inherent class connotations and is an extremely visible process, which plays a key role in the physical and social form of contemporary cities. Sociologist Ruth Glass (1964) came up with this definition of gentrification, which she defined as follows (using London in her example):

One by one, many of the working-class quarters of London have been invaded by the middle-classes - upper and lower. Shabby, modest mews and cottages - two rooms up and two down - have been taken over, when their leases have expired, and have become elegant, expensive residences....Once this process of 'gentrification' starts in a district it goes on rapidly until all or most of the original working-class occupiers are displaced and the whole social character of the district is changed (Glass, 1964 in Wikipedia, the Free Encyclopedia).

At a more specific level, however, gentrification refers to the physical, social, economic, and cultural phenomenon whereby working-class and/or inner-city neighbourhoods are converted into more affluent middle-class communities, by remodelling buildings, resulting in increased property values and in the displacement of the poor. Gentrification is intertwined with change; not only to the buildings, themselves, undergo renovation and beautification, but so too do the people, as such neighbourhoods often see an influx of highly educated, highly skilled, and highly paid residents moving in (<http://en.wikipedia.org/wiki/Gentrification>, 2004).

In the case of West Broadway, residents view improving energy efficiency as potentially increasing the flow of gentrification (Residents meeting, 2004). Improving energy efficiency within the neighbourhood has the potential for both positive and negative impacts due to lower income levels and higher levels of tenants. This dynamic around improving energy efficiency would also be typical of other inner city neighbourhoods in Winnipeg.

The high rent-to-own demographics of West Broadway (93.8% rental vs. 6.2% ownership) is important to note. A critical question about improving energy efficiency revolves around who pays the heating bills. If the landlord pays the utility bills, they may consider the cost of improving energy efficiency in their buildings as being prohibitively high and may choose to continue to pay the higher bills until it becomes economically favorable or when cost-benefit analysis indicates that they will have a short payback period on their energy efficiency investments. If the tenant is paying the utility bills and they are finding that their heating bills are high or increasing, they may not have an option to improve energy efficiency in the building or space they rent. This is due partly because people cannot invest in buildings that are not their own and secondly, the landlord may not choose to invest in energy efficiency upgrades because the heating bill is not being paid by themselves and is being paid by the tenant. Therefore, in areas of high rental properties, two things can be safely assumed, one being that tenants who pay for utilities can invest in small energy efficiency improvements such as energy efficient lighting and will not invest in larger upgrades because the property is not theirs. Secondly, property owners who pay the heating bills may not choose to improve energy efficiency because the timeframe to recoup their investment is perceived as being too long.

Community groups such as West Broadway Development Corporation (WBDC) have attempted to improve housing stock, specifically single dwellings and duplexes—but there are too many houses and not enough community groups to fill this void. The WBDC focuses on improving housing stock and maintaining current residents through rent-to-own programs through the Community Land Trust (CLT). In this way, WBDC encourages long time residents to remain within the community which helps counteract

the process of gentrification. However, indications are that despite the work of development corporations, rental properties that are in poor condition contribute to holding down the value of neighbourhoods and make it more difficult to recover renovation costs when finished houses are sold (Simms, 2000). In West Broadway, improving energy efficiency in single family dwellings and multi-family dwellings is like filling a bucket with an eyedropper — it is a slow and painstaking process. Addressing energy efficiency within the 93.8% rental properties is one of the biggest challenges facing West Broadway.

2.3 Household Behaviour and Energy Consumption: Social Marketing

There is an information gap in identifying low income groups and their energy consumption patterns, therefore, some references will be made to research that examines the energy behaviours of the broader residential group. Kushler and Saul (1984) also indicate that there is a lack of information about the energy use in the low income sector.

One problem that has contributed to the relatively poor success of conservation programs with the low-income sector is the fact that there is a general lack of information about low-income energy consumers, what their specific needs are, and how they can best be reached and served. Furthermore, this lack of success has tended to perpetuate itself due to the fact that the program administrators have consequently not gained familiarity and experience with that target population. Thus, subsequent programmatic efforts continue to miss the mark. (Kushler and Saul, 1984).

Because there is so little information about low income groups and their energy behaviour, an examination of the general area of residential energy behaviour was undertaken. It is a well documented fact that human behaviour influences household choices. This fact is also true when examining consumption behaviours in individual households. Research indicates that energy consumption behaviour can differ significantly in households. Early studies by Socolow (1978) indicate that household behaviour can greatly influence energy consumption among structurally similar households. Meyers and Shipper et al. (1983) also concur: “Energy use in similar homes located in similar climates can vary greatly: people matter.” Gaunt and Berggren (1983)

in Erickson (1997) also indicated that small changes in energy consumption patterns can be consequential. They found (1983) that variations in electricity consumption can be as great as 3, 500 kWh (12.6 GJ) and is based on how much appliance use individual households had. Therefore, the need for examining human behaviour in relation to energy consumption is important to understand and it follows that the unique energy behaviours of low income groups would also be important to understand when designing energy conservation programming for these groups.

Erickson (1997) indicates that energy consumption behaviours also have a cultural component, "...individual informants explained these and other energy-intensive choices are related to broader cultural factors." In her work, Erickson examines contrasts and attempts to make sense of the energy consumption patterns of Swedish people vs. American people. Erickson cites the example of how Swedish people may choose an option based on cultural preferences which would be contrary to what Americans might choose.

They choose to bicycle or walking over driving mainly because it is "beautiful to exercise" or because 10-speed bicycles are part of the latest assemblage of status symbols rather than to save fuel or the environment. (Erickson, 1997).

Lutzenhiser (1992) argues in his analysis of household energy consumption that "...even though individuals make choices, they are "culturally-sensible and collectively-sanctioned" choices. Lutzenhiser is saying that communities and culture act as "peer pressure" and knowingly or unknowingly to the individual, influence their energy consumption. For example, leaving all the lights on in stores at night is cultural and is based on Western culture's idea that it will prevent robberies, while many businesses in European countries do not leave lights on after office hours—with no apparent increase in break-ins or theft. While culture and community (society) play a large part in molding energy consumption, Lutzenhiser (1992) also indicates that there is still variation within the collective: "Core sample households vary widely in their daily routines and energy use choices, even within the community." Therefore, it can be assumed that low income groups in West Broadway would have energy choice similarities to other low income

groups within Winnipeg, but that they would also have energy patterns unique to their individual households. Similarly, low income groups would also mimic some of the larger energy choices of the Winnipeg community, but low income groups would also again be unique in some instances. Erickson (1997) concludes that there is an energy, time, and money tradeoff that is made in every energy conservation/consumption choice. Each individual's decision is based on these three determinants: personal time cost (how long will this take me?), energy (how much energy can be saved by using a mechanical device?), and money (how much money is required to purchase the 'time saving' device?). The complication that this Ouroboros presents is that individuals are faced with never ending decision: compelling an individual to choose if they will expend money to purchase energy saving devices or complete the task themselves—without the device—which leaves less time for the pursuit of money. The difficulty in this never ending energy conservation/consumption choice is that each individual's unique energy requirements creates an almost infinite variety of energy/time/money combinations. For programmers, the challenge is that they must try and reach all customers with an almost finite set of unvarying programming.

McKenzie-Mohr (1996) argues that understanding the psychology behind groups will help you understand whether or not they will participate in sustainable behaviour and to what extent they will. Therefore, social marketing can be used to determine current energy use patterns of low income groups and then used to help shape programming best fitted to reach these low income groups.

The emergence of community-based social marketing over the last several years can be traced to a growing understanding that social marketing, which relies heavily or exclusively on media advertising, can be effective in creating public awareness and understanding of issues related to sustainability, but is limited in its ability to bring about behaviour change (McKenzie-Mohr, 1996).

McKenzie-Mohr's case that community based initiatives are working better in reaching groups and changing behaviours is further outlined.

Social psychology indicates that initiatives to promote behaviour change are most effective when carried out at the community level and involve direct contact with people (McKenzie-Mohr, 1996).

Social marketing, simply put, is the connection between programs and people. The basis of social marketing is the removal of barriers that impede access to behaviour changes. For example, for low income groups, the cost of insulation may represent an economic barrier to their ability to improve their sustainability. Therefore, social marketers would indicate that the process to get the insulation to the individual would be to remove the barrier—in this case, the economic cost—in order to improve the sustainability of the person's choice. While we know of many of the barriers facing low income group's access to energy efficiency programming, barrier removal is important if low income groups are going to improve their own energy efficiency. Program strategies must be developed in order to aid in removing barriers such as comprehension issues, economic costs of upgrades, and access to support systems, if low income groups are to improve their energy efficiency. Therefore, many of existing energy conservation and upgrade programs need to be examined in order to understand and remove barriers that limit low income group's ability to become energy efficient.

Practitioners of community-based social marketing recognize that there may be multiple internal and external barriers to widespread public participation in any form of sustainable behaviour. Community based social marketing strategies attempts to remove as many of the barriers as possible to a given sustainable behaviour as possible. Once these external and internal barriers have been identified, they develop a social marketing strategy to remove those barriers (McKenzie-Mohr, 1996).

It is important that low income groups and their energy behaviour patterns are examined because it is these vulnerable groups which experience a greater disadvantage when utility prices rise. For that reason, the energy behaviours of low income groups must be understood in order to create programming that reaches them. Kushler and Saul (1984) concur with the need to focus on improving energy efficiency in low income groups.

The energy gap between low-income and non-low-income households is growing wider. Middle and upper class families, who already reside in

more fuel efficient homes, are also implementing more additional conservation actions, especially in the more expensive (and greater impact) category of measures (Kushler and Saul, 1984).

Understanding the energy consumption patterns of any group is essential if the programming is going to succeed. Knowing the energy consumption patterns of low income groups is especially important so that the "energy gap" can be closed and more low income people can benefit from energy conservation in real ways: savings on their heating and utility bills.

2.3.1 Energy Consumption

Reducing energy consumption is essential at many levels: household, local, provincial, and federal. At the local, household level energy conservation can potentially reduce heating and utility bills, thereby leaving families with more money for food, etc. Energy reduction by all sectors, including housing, will help reduce emissions, thereby helping Canada and the province meet the requirements set out in the Kyoto Protocol. Reducing energy consumption is good for Manitoba Hydro because it allows them to sell the electricity elsewhere for potentially more money and it potentially can reduce the need for building large hydro-electric dams. Reducing energy consumption has potential benefits for the City of Winnipeg. D'Amour (1991) says that there is a potential benefit in the relationship between urban form and land use and the resulting patterns of energy consumption and green house gases produced. For the City of Winnipeg, energy reduction can change patterns of inner city decay and help revitalize these areas. In addition, D'Amour (1991) indicates that improving inner city neighborhood's energy consumption also helps reduce greenhouse gas emissions from other sources, thereby reducing the overall production of greenhouse gases by the city. For example, transportation greenhouse gas emissions decrease as inner city neighbourhoods become livable.

Inner city neighbourhoods are associated with derelict, vacant buildings, higher crime rates, and other socio-economic issues. People's perception of neighbourhoods is largely visual and therefore, those who can move away from neighbourhoods with vacant

buildings, overgrown lawns, etc. tend to do so. As neighborhoods become less “desirable” for ownership, housing prices fall and reflect the inclination of people to choose not to live there. The lowered selling prices of housing in inner city neighbourhoods create investment opportunities for landlords. Hartshorn (1980) says:

Houses may become vacant or may be bought at bargain prices as rental properties by absentee landlords. The sight of one, two or even three boarded up houses in a row is a strong detriment to anyone who wishes to purchase a house in the neighbourhood (Anonymous report, 2003).

This sequence of property abandonment, neighbourhood gang location, and finally neighbourhood revitalization was the case on Langside Street in West Broadway, where two houses were boarded up and vacant on one side, with a boarded up and vacant duplex opposite them (Miko, 2003). Unfortunately, this cycle of dereliction/renewal took approximately three years, in which time other houses on the street were abandoned.

As indicated by D’Amour, the *overall* energy consumption patterns for cities with many inner city neighbourhoods tends to increase as people move away from the city center into suburbs, therefore requiring using more energy for transportation (Jessup and Torrie, 1995). Additionally, not addressing energy inefficiencies of buildings within the inner city also increases the overall energy use of larger centres such as Winnipeg. Nesdoly, (2001) indicated that the majority of information concerning energy efficiency are written with new buildings in mind. While information for new buildings is generally useful, this information does not translate well in areas such as West Broadway or other older neighbourhoods because the relative age of construction requires very specific information in order to effectively improve energy efficiency.

2.3.2 Kyoto and Improving Energy Efficiency

The Kyoto protocol was signed in 1997 by Canada and 160 other countries. The Kyoto protocol is an agreement to reduce greenhouse gas emissions. Human activities, including the heavy use of fossil fuels for heating, transportation and electricity production, release greenhouse gases that are accumulating in the atmosphere and causing global warming (Government of Canada, 2002). Canada’s Climate Change Plan has identified the following six sectors for reducing greenhouse gas emissions:

- Transportation
 - Agriculture, Forestry and Landfills
 - Housing and Commercial/Institutional Buildings
 - Large Industrial Emitters
 - Renewable Energy and Cleaner Fossil Fuels
 - Small and Medium-Sized Enterprises and Fugitive Emissions
- (Government of Canada, 2002)

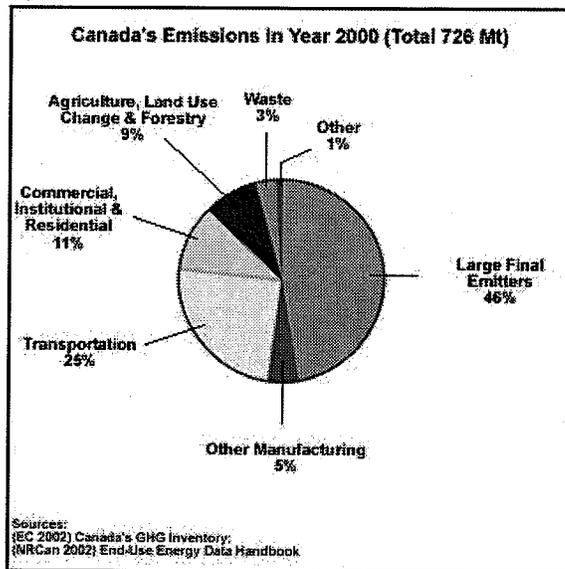
The Government of Canada's Climate Change Plan (2002) proposes the goal of energy efficiency retrofits for twenty percent of housing by 2010. The commitment of the government to improving energy efficiency in the existing housing stock may have the potential to help improve energy efficiency in West Broadway's housing stock. With the year 2010 only six years away, drastic changes will have to be made in order to meet Canada's present goal of retrofitting housing. The Canadian government acknowledges that it needs a two prong approach that examines both new builds and retrofits:

Emissions from energy consumption in buildings can be significantly reduced through improved energy efficiency, both in the construction of new buildings and the retrofit of existing ones. In the shorter term, the greatest energy efficiency gains will come from retrofitting existing buildings, but better building standards for new construction will reduce emissions over the longer term.

(Government of Canada, 2002)

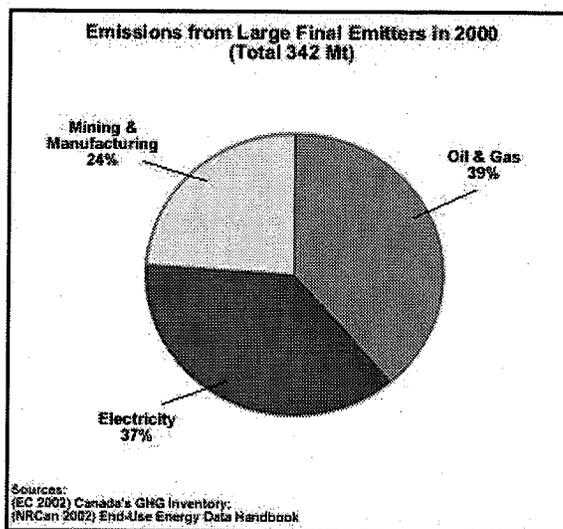
A break down of emissions by sector is detailed in the two graphs below:

Table 15 Canada's Greenhouse Gas Emissions in 2000



(Natural Resources Canada, 2003)

Table 16 Emissions from Large Final Emitters



(Natural Resources Canada, 2003)

While the "Commercial, institutional, and residential" sectors only account for eleven percent of emissions, electrical consumption accounts for 37 percent, some of which is

used by the residential sector. Note: the large final emitters chart is only applicable to Manitoba during low water/drought years because Manitoba Hydro uses hydro-electric generation rather than coal or nuclear.

The electrical industry, representing 2.5 percent of GDP, comprises about 250 companies but the ten largest accounts for 84 percent of capacity. Production is dominated by hydro generation - at approximately 60 percent which is nominally emissions-free. Canada receives about 12.5 per cent of its electricity from nuclear generation (Ontario, Québec and New Brunswick) which is also counted as a non-emitting source. Renewable energy - wind, biomass and solar - provides about 1.6 per cent of Canada's electricity. However, the percentage of generation from thermal, or emitting, sources is growing (Natural Resources Canada, 2003). In the North American electricity market, with inter-provincial and inter-national exchanges, Canada is a net exporter of electricity (Natural Resources Canada, 2003).

While the commercial, institutional, and residential sectors represent eleven percent of greenhouse gas emissions, the federal government is asking all sectors to decrease emissions. For the residential sector, programs such as the 1 Tonne Challenge targets residents at the individual level to reduce greenhouse gas emissions by one tonne in one year. In addition to programs such as the 1 Tonne Challenge, other programs such as EnerGuide for Houses targets residents in order to reduce energy use, which has the added benefit of aiding in reducing greenhouse gas production.

In order for Canada to meet its Kyoto commitment of reducing emissions in the period of 2008 to 2012 to six percent below the 1990 emissions levels, the various sectors must all lower their greenhouse gas emissions. In order to achieve this reduction, Environment Canada (1999) estimates that the emissions levels in 2010 must be approximately twenty one percent below the projected level that would have occurred if energy use patterns were not changed. The need to improve energy efficiency in all sectors is apparent and movement has been made in the residential sector to improve energy efficiency through programming designed to improve and promote energy efficiency. While improving

energy efficiency in West Broadway's 0.67 square kilometers does not seem to have much of an impact, improving energy efficiency in every household in Canada would—as Canada has more than six million single detached houses (Statistics Canada, 1996).

2.3.3 Housing: A Complex Issue

Housing is a very complex issue that envelopes social, economic, and environmental considerations. Interviews with women living in West Broadway and the surrounding area indicated that housing is a critical component of daily life. “Both women ranked *affordable housing* as their main priority, closely followed by *food for their children*.” (Miko and Thompson, 2004). The women indicated that, “all things revolve around housing: access to services such as affordable food and transportation, the importance of community and access to community, and the need for stability are critically intertwined with their housing situations.” (Miko and Thompson, 2004). Unfortunately, these women do not have much control over where they live and even less control about how energy efficient they are. Their energy consumption is influenced by their landlord's ability and desire to improve energy efficiency in the rental units.

While renovation costs are difficult to predict over time with both construction materials becoming increasingly expensive and rising labour costs, it is difficult to convince people to invest in energy efficiency improvements. In areas such as West Broadway where property values are low due to negative neighbourhood influences, it becomes even more difficult to convince people to improve their energy efficiency. Therefore, it becomes critical to develop a positive social marketing relationship between improving energy efficiency and improving quality of life (lower heating bills, ability to stay within the community) which increases access to services such as transport, food, and community. For the WBDC, being able to socially market energy efficiency as a tool to improve socio-economic conditions, such as neighbourhood stability, may encourage the implementation of energy efficiency technologies and practices.

Nesdoly (2001) indicated that “Renovating and retrofitting to reduce energy use remains a relatively new concept”. Nesdoly also completed a study about energy efficiency in West

Broadway. Whereas, his study examined financial costs and benefits of upgrading inner city housing and the use of EnerGuide for Houses, this research examines available programming and policies in terms of access barriers for low income groups. Nesdoly specifically examined one house being renovated by a community group to determine if energy efficiency upgrades were occurring. He found that the blower door test performed as part of the EnerGuide for Houses program "exposed a costly oversight in remedying overall air leakage (Nesdoly, 2001) and indicated that community groups should take advantage of the EnerGuide testing prior to undertaking renovations. Nesdoly's research supports the argument that energy efficiency upgrades need to be determined before renovations begin and that informed decisions about which retrofit to implement needs to be determined. Nesdoly's (2001) recommendation that community groups implement energy efficiency upgrades provides evidence that there has not been an emphasis on improving energy efficiency in housing retrofit for low income groups. The concept of retrofitting for energy efficiency is so recent, that low income groups are still an afterthought. Energy consumption behaviours by low income groups is also an information gap that needs to be explored. Participation by low income groups in existing energy conservation programs is also limited, again begging the question as to why this is so.

As troubling as the lack of information about energy efficient renovations is, there is also a lack of participation in current energy efficiency programming by low income groups. There is also a high concentration of housing requiring energy efficiency upgrades in West Broadway. This situation highlights the need for addressing barriers to low income sector use of programming and access to energy efficiency information appropriate to their situation.

For the low-income sector, current publicity and marketing efforts are succeeding in *promoting* name awareness of available programs, but are failing to produce *participation*. This may be due to several factors, including the fact that the programs as presented are not sufficiently attractive. (Kushler and Saul, 1984).

Kushler and Davidson (1978) argue that "...more aggressive techniques of service delivery are necessary..." if low income groups are to improve the energy efficiency of their residences. The following section expands on the issue of new construction related information and its relative worth in terms of the low income sector.

2.4. Available Housing Information: Another Level of Complexity

Current literature about improving energy efficiency in housing can be accessed through provincial and federal sources, such as Canada Mortgage and Housing Corporation (CMHC). When looking for information specifically related to improving energy efficiency in existing buildings, the information is limited, with the majority of literature referring to how to improve energy efficiency in new construction. This is due in part to the increased difficulty in developing a renovation energy retrofit guide that would span all ages of houses and span all construction types from balloon framed methods to brick. If such a document did exist, it could open a legal "Pandora's Box" as not all renovation methods are applicable to all housing types and failure to achieve energy efficiency improvements could lead to organizations being sued.

Much of CMHC's literature does not provide exact cost-benefit data related to how much savings could be achieved if energy efficiencies were made. The need to understand the cost benefit of short term investment vs. long term savings is an important determinant for home owners and whether or not they will consider doing energy efficiency upgrades. The researcher's field observation of the difficulties home owners have with technical information, or with information which only vaguely outlines potential savings based on structures of similar age and condition, is supported by Nesdoly's findings.

While technical information is plentiful, it is often not presented in a comprehensive manner that allows someone to make informed decisions about the financial viability of changes to a household energy system. Achieving lower energy costs is often addressed in a general and sometimes superficial way with many brochures listing only approximate savings for the average home. The enquirer must often determine the cost of an upgrade and calculate how the results might apply to their particular situation. (Nesdoly, 2001).

For the average homeowner, finding cost-benefit data comparing a house without energy efficiency upgrades to a house with upgrades would help the consumer make informed choices. Note: the comparison would have to be structures of like size, condition, age, and climate (geographic location) in order for the comparison to have any relevance. Often, the home owner must determine the cost of the upgrade and calculate savings based on their situation. For many of the West Broadway residents, it is expected that completing this calculation may be a mammoth undertaking due to social factors that influence their ability to access the information and to understand how to do the calculation (lower education levels, higher population of English as a second language households). In addition, accessing information from Canada Mortgage and Housing for people outside the Ottawa region is also time consuming and can be overwhelming for people not familiar with how to access information from libraries in other regions or do not have access to the internet. While CMHC does have regional offices and there is an office located here in Winnipeg, the office itself does not have a computer terminal to access the Ottawa database and office staff capabilities are varied in their ability to help people find information (Miko, 2004). For low income earners, their ability to access information may be limited due to transportation, initial knowledge of the existence of the information, and other factors such as lack of awareness or access to regional information offices such as CMHC's office. The language found in some of the publications and forms is also "technical". For those people who lack an understanding in basic building sciences, the information, while relevant, may be incomprehensible. Frustration with understanding the information may lead to ill-informed decisions or to not pursuing upgrades.

2.4.1 Policy and Programs: Canada Compared to Europe

Canada proves to be far behind such European countries as Denmark and Sweden, in terms of its national energy policy (please refer to section 2.10, Denmark and Energy Efficiency Policies). Having comparable climates, it would stand that energy consumption patterns should also be similar, but it is not so. Canada's energy use is 50 percent higher than Sweden (City of Toronto, 2003). Between 1972 and 1994, Denmark

has also managed to halve its total energy use for space heating in spite of considerable new home construction. The main reason behind this marked change is some of the world's strictest building regulations and an energy certificate system. The European energy certificate is mandatory for all homes being sold and is a similar concept to Canada's evolving EnerGuide Rating (See Section 2.6.3 for description of EnerGuide Rating). While our climates may be similar, there are other factors shaping energy use patterns that vary from Canada to Denmark, and other European countries. Factors such as energy policy, urban programs, and type of heat supply systems all contribute to the amount of energy used in each country.

Most European countries do not have the necessary conditions for producing vast quantities of energy the way Canada can through hydro-electricity. While some European countries have equivalent access to oil fields, they have been aggressively exploring wind, solar, and wave energy in connection with increased consumer awareness with demand side management (DSM) as a preferred method for reducing energy consumption in all sectors. This is reflected in Denmark's building regulations, transportation (cheap, timely, comprehensive interlocking systems), and all other sectors. European countries lead the way in "alternative" energy production. Windfarms in both Germany and Holland have made considerable impact in making "alternative" energy common. Germany is the highest producer of wind energy per capita in the world (Feller, 2004).

For Canadians, access to some of the cheapest residential electrical rates in the world aids in developing a complacent attitude towards energy consumption and arguably, decreases the short term cost-benefit analysis of upgrading energy efficiency in buildings. With some of the lowest residential electricity rates in Canada, Manitoban's have not felt the need for investing in energy efficiency in their houses. While Manitoban's benefit from Manitoba's low electrical rates (reflected by paying lower heating bills), electricity prices are expected to rise. For low income groups, rising electricity rates will mean higher heating bills making the issue of improving energy efficiency in their housing more important—if they cannot afford to pay now for efficiency upgrades, it will not get easier as the price of electricity rises.

The Danish social mindset is also more open to reducing, recycling, and reusing, which is due in part to the fact that they have limited geographical space and a higher population density. In comparison, Canada has wide open spaces and a lower population density, which is reflected in our planning attitudes of continual urban sprawl instead of urban densification. Our lower overall population density and longer travel distances also shapes our view of energy in a localized sense. For example, in Denmark, district heating systems are common, but nearly unheard of in Canada and in Winnipeg. Marshall suggests that district heating systems would be appropriate technologies to use for low income groups:

This type of heating system efficiently allows one heating system and efficient energy management systems for the control of both central heating and water heating, and is feasibility for volume production and use in all types of homes, including low cost housing. (Marshall, P.E., 1995)

In 2002, 59 percent of homes in Denmark were heated through district heating. The heating is produced either at district heating stations or as a by-product of electricity generation (Cook, 2004). District heating systems are more efficient ways to use waste to produce energy and therefore, they also have greater potential to reduce the cost to individual home owners (Sjursen, 1996). In addition to using district heating systems, Denmark also has a strong national energy policy that has two focuses: one on future infrastructure and energy supply and the second on greater energy efficiency (Governance for Sustainable Development in the Nordic Region (SusNord) (SusNord, 2003). The implementation of energy conservation is dependent on a change of attitude in households, active local efforts, and the efforts of the utilities, suppliers, the authorities, and other actors (Danish Ministry of Energy and Environment, 1996). As part of the Danish commitment to improving energy efficiency, the Danish government has consciously decided to improve energy consumption behavior and attitudes in current and future consumers, technicians, and others who advise consumers:

A special high-priority area is influencing attitudes to energy conservation and energy efficiency in the long term. The basis of a high degree of energy consciousness in future consumers as well as in the craftsmen, technicians and others who advise consumers must be

established already in schools and technical colleges. It is therefore intended that an initiative shall be taken to implement an investigation of the status of energy-related issues in primary schools, higher preparatory and grammar schools, as well as the relevant technical and further education institutions. On the background of the outcome of the investigation, specific initiatives are under consideration to promote teaching of energy questions at all relevant levels and in all curricula in the context of the wider study of environmental issues.

(Danish Ministry of Energy and Environment,1996)

In contrast, while Canada has created a Model National Energy Code for Houses and a Model National Energy Code of Canada for Buildings, these two codes are not mandatory and do not include initiatives to “promote teaching of energy questions at all relevant levels and in all curricula [in all applicable school settings]” (Danish Ministry of Energy and Environment,1996). Nor does the Canadian Energy Policy include a vision for including energy efficiency for current and future energy consumers.

As long as there is a constant and seemingly unlimited supply of energy available, it appears to many that there is often no need to think about the source of that energy (The Clean Air Partnership, 2004). Currently, Canada appears to lack the impetus for improving energy efficiency in housing. While some would argue that being a signatory to the Kyoto Protocol would provide an impetus for improving Canada’s overall energy efficiency, how does a national commitment to reduce greenhouse emissions through energy efficiency filter from a national level to a local level and finally to the individual household? With only one percent of Canada’ new housing being built to the R2000 standard (Noble, 1995), what is the potential for generating interest in retrofitting housing to improve energy efficiency? If we can only get one percent of new housing built to R2000, how will older building retrofits be regulated and how will energy conservation measures and the Kyoto Protocol manifest itself for the individual Canadian?

2.4.2 Affordable Housing Programs in the United States of America: HUD and RECOs

In the United States, the 1990 Affordable Housing Act helps to ensure that energy use and costs are considered in construction decisions impacting Housing and Urban Development (HUD). HUD is similar to the Residential Rehabilitation Assistance Program (RRAP) found in Canada. HUD as an agency has funding mechanisms that oversees programs for improving housing for low income groups, which RRAP also does. Under HUD, access monies for housing projects at the state, municipal, or county level, must have a Comprehensive Housing Affordability Study (CHAS) completed. CHAS (Colton and Saunders, 1992) addresses the gap of incorporating energy efficiency into low income housing projects. Affordability is an important component of CHAS and energy efficiency (lowering heating and cooling bills) is an important component of affordability. In Canada, RRAP programming currently does not include energy efficiency as an eligible criterion for accessing money for housing upgrades. Incorporating energy efficiency into low income programming requirements could be beneficial for reducing energy costs and demand as well as improving human comfort and home affordability, but this is currently not the case in Canada.

In Manitoba, programming accessed by individuals or community development organizations does not currently consider improving energy efficiency as a criterion for allotting monies. Programs such as Residential Rehabilitation Assistance Program (RRAP) currently do not prioritize energy efficiency, nor does the Housing Improvement Fund under the directorship of the Affordable Housing Initiative (City of Winnipeg, Draft Housing Policy, 1999). While these programs deal directly with the neighbourhood and individual level, energy efficiency is not mentioned as criteria for funding retrofits. On a national scale, Canada is promoting energy efficiency through the One Tonne Challenge, the Community Climate Change Challenge, (C4), and the EnerGuide for Houses program—which will be examined in chapter three of this document. However, the continual reference to “reducing your greenhouse emissions”, One Tonne Challenge, Kyoto Protocol, “C4”, and “improving energy efficiency” may be lost on the average Canadian. In relation to everyday life, these concepts and programs may be seen as

supercilious or dictatorial and thereby not entered into with the gusto that the program's champions had envisioned. Desmond (1986) advises against emphasis on energy efficiency since this may only lead to a focus on modifying or replacing small components in a house that would only result in a modest improvement in energy savings. He advises that a "systems" approach be utilized for energy efficiency improvement, whereby technologies such as blower door tests and/or infrared scanning is used. One component that Desmond does not address is home owner perception of how to improve energy efficiency and what energy efficiency means. As well, Canada has also fallen behind some of the policy innovation found in the United States. Within the United States there are categories of energy efficiency policies that revolve around loan financing opportunities, residential energy conservation ordinances (RECOs), and information and mortgage incentives for upgrading inefficient homes.

"Loan programs appeal to energy efficiency administrators because they typically cost the state or utility less than a direct subsidy for a given energy conservation measure" (Suozzo, et al., 1997). In addition, because loans often leverage private sector funds, they tend to result in greater investment in energy efficiency. Suozzo, et al. (1997) state that developing partnerships with banks or credit unions for originating and servicing loans, and with contractors and energy auditors for marketing the loans also helps keep program administration costs down. The use and development of affordable financing is wide spread in many of the States. Some of the lessons learned from implementing a wide spread loan program include the following:

1. Financing is not a program design, but is a component of an overall design. Attractive, low cost financing can overcome first-cost barriers, but it can also create more debt unless the loan can be shown to create a positive monthly cash flow (monthly savings in energy efficiency exceed monthly payments on loan) (Suozzo, et al., 1997). Low rate financing is seen to improve the economic value of the action and less stringent underwriting criteria can be used for low income households who need the upgrades the most, "flexible criteria allows 'marginally creditworthy customers' to participate (Suozzo, et al., 1997).

2. Education of contractors and customers about energy efficient financing is important. Many contractors shy away from telling customers about available energy efficient financing, citing the amount of paper work required and the headache of waiting for approval. Suozzo, et al. (1997:29) suggest that getting the contractors and customers on board and knowledgeable is a key bridge in having energy efficiency upgrades undertaken in the first place: “integrating better financing options into the existing infrastructure between suppliers and contractors and between contractors and customers may be the best way to optimize the value provided throughout the current delivery and marketing chain from producers to customers.”
3. Examine the energy efficiency programming in the socio-economic conditions in which they operate. Utility rates are cited (Suozzo, et al., 1997:29) as a crucial factor in generating customer interest in energy efficiency. While this is true, other factors also come into play, especially for low income households: Suozzo, et al., (1997:29) state that “...limited disposable income and increased risk or perceived risk of having little liquidity in an uncertain employment world are compelling reasons for customers to avoid debt or incur debt only for items that are perceived as more valuable than energy efficiency...therefore low cost or subsidized financing energy efficiency programs may prove more desirable to well off customers with little concern about liquidity than marginally creditworthy customers who have little extra income to address potential emergency needs...”

In order for a loan program to function successfully, the credit programming needs to incorporate and address some of the following areas:

1. Customer participation: People are often unwilling to participate because they are reluctant or unable to incur additional debt, they do not want to take the time to learn about the program, fill out forms, or follow the requirements, and (Suozzo, et al., 1997) do not generally trust the home improvement contractors. As well, customers often are

not knowledgeable about what energy conservation measures are cost-effective in their personal situation and do not always perceive the value of energy efficiency upgrades (Berkowitz, 1996). Therefore, to address potential customer's needs, the following will help make loans for energy efficient upgrades less bothersome to customers.

2. Participation in loan programs should be simple (simplified application process). The process to receive funding to undertake energy efficiency upgrades should be a simple process that eliminates hassle. Some programs (Suozzo, et al., 1997) offer same day approval and application by phone (a program assistant fills out the forms), while other programs such as those found in Wisconsin, offers auditor and contractor bid reviews to ensure that customers are getting the best possible advice and costing. Some programs also have a 1-800 number to facilitate interested parties questions, though Suozzo, et al., (1997) state that a knowledgeable assistant on the other end of the line is critical to the success of the program.

3. The loan program should be flexible and offer choices that suit individual consumers. The minimum borrowing amount, interest rates, repayment period, and eligibility criteria for additional funding should be flexible. This type of flexibility encourages consumers to choose what is "right" for their energy efficiency upgrades.

4. Suozzo, et al. (1997) state that built-in quality control mechanisms are critical for a successful program: "While increased choice may attract more customers, it may also lead them to implement measures that are not cost-effective." They recommend that the loan be conditional with an audit to help educate home owners about the cost-effectiveness of alternative energy saving measures. Connecticut requires all loan applicants to have a face to face educational meeting both before and after receiving the funds to ensure that the home owner has an educated decision making process (Suozzo, et al. (1997). In addition, other programs focus on contractor education and provide quality assurance inspections after the work has been completed to encourage quality workmanship.

5. In terms of loans, Suozzo, et al., (1997) feel that loans are not enough and that marketing is important. Edgar, 1995, (Edgar, 1995 in Suozzo, et al., 1997) also states that effective and targeted marketing is key: “the presence of a loan by itself will most often not be enough...and should not be used as a substitute for effective program delivery and marketing...” Both stress the importance of developing education programs for stakeholders and partnering with stakeholders who benefit from the programming to aid in program delivery and marketing efforts. For loans to work for low income customers, they must offer attractive rates, have paperwork that is easy to fill out or have access to aid to fill out forms, and there must be a mechanism to ensure that the most cost-effective energy upgrades are being undertaken.

Energy efficiency related policies or regulations are also becoming more prevalent both in the United States and Europe. Over the last twenty years, it can be argued that people’s energy consumption behaviors have not, for the large part, abated and are in fact growing: Canada’s energy use is 50 percent higher than countries with similar climates such as Sweden; between 1990 and 1998, Canadian energy consumption grew by 13 percent. Canadians consume more energy per capita than any other country in the world, using more energy than the 700 million people in Africa combined (Energy Information Administration, 2003). While some people utilize voluntary programs, it often requires institutionalizing once voluntary measures to achieve objectives (increasing energy efficiency). In recognition of this, the United States has developed and implemented Residential Energy Conservation Ordinances, (RECOs) which can: 1) Guarantee improvements in the existing housing stock to higher levels of efficiency—some research is indicating gains of up to fifteen percent 2) Ensure a minimum level of home comfort for residents and renters 3) Cost relatively little to operate and 4) Help support jobs in the community by providing/increasing work for energy auditors, contractors, and other conservation professionals. Both Berkeley and San Francisco have the most successful well established RECOs dating to 1981 and Wisconsin is a state wide program that has effective enforcement (Suozzo, et al., 1997). In addition RECOs have been applied to multi-unit rental housing in Minneapolis. It should be noted that RECOs apply to all types

of residences, but have been most successfully applied to multi-tenant dwellings in Minneapolis.

While RECOs are similar to EnerGuide for Houses in that they both utilize auditors and have educational components, under RECOs, non-compliance fines can be charged under the Municipal Code and RECOs apply to a building at the time of sale. RECOs establish particular measures or standards that a building must be brought up to, it also identifies the parties subject to the ordinance and the entities responsible for administering, enforcing, and implementing the ordinance, and thirdly, RECOs come with an enforcement system. RECOs typically require measures such as improving insulation in the attic, water tank and pipe insulation, weather-stripping and caulking for windows and doors, water saving measures, and additional energy saving measures (Butterfield and Eisen, 1987). Communities choose which energy reduction measures best fit the climatic conditions for their areas. For example, Berkeley's RECO focuses on insulation improvements based on the fact that most of its housing stock was built before 1950 when insulation was not required (De Snoo, 1996 in Suozzo, et al., 1997). In water-stricken California, water saving measures top their priority list (Suozzo, et al., 1997), and in locations with high densities of apartments, the RECO may focus on requirements for high density housing rather than single family dwellings (Butterfield and Eisen, 1987). Therefore if a RECO was enforced in various parts of Winnipeg, it could be tailored to fit our specific housing mix/age to maximize energy savings. Mandating RECOs can be difficult if not all stakeholders are on board initially. Suozzo, et al.,

States that RECOs target easy to implement (and relatively small) household energy efficiency improvements that reach a large portion of households in a given community, rather on large per household energy savings...RECOs can result in a substantive overall energy savings in the housing stock and cost relatively little to implement Suozzo, et al., (1997).

It has been determined that in order to have RECOs succeed, there must be buy-in from all levels of stakeholders such as realtors, contractors, owners, renters, energy auditors, etc. and that the stakeholders must be involved in the development of the RECO

parameters. Suozzo, et al., (1997) states that some American communities are hesitant to implement mandatory standards despite the benefits while other communities embrace and include energy efficiency ordinances as part of the solution to lowering overall community energy use.

Requirements in the RECO should not be too aggressive, meaning that the mandatory measures should fit existing financing options for consumers who require it, should be generally low cost, contain an educational component, and be easy to implement and understand. Suozzo, et al., (1997) also state that identification and partnerships with key stakeholders to help them devise a continual process for meeting the RECO requirements may encourage participation, rather than creating adversity. In addition, ongoing community education and awareness is critical to developing RECOs to the point that they are seen as a part of “doing business” by local stakeholders (Suozzo, et al., 1997).

The success of RECOs also relies heavily on effective compliance tracking and enforcement mechanisms. Tracking systems linking building/renovation permit applications to the required RECO regulations to the actual RECO auditors helps ensure that the RECO recognized energy efficiency measures are being incorporated. Resistance to incorporating RECO measures results in actions ranging from warning letter, fines, property liens, to withholding of the property transaction between the seller and buyer. In this way RECO ordinances are brought into effect only during the buying and selling of properties. Monitoring of the success of RECOs is important in order to improve delivery and to decide if additional measures should be required.

2.4.3 Affordable Housing Programs in the United States of America: Home Energy Rating Systems and Energy Mortgages

Another option for encouraging house holders to improve energy efficiency is Home Energy Rating Systems (HERS) and Energy Mortgages (EMs). Both of these strategies are employed with varying degrees of success in the United States. In Canada, the EnerGuide for Houses Rating Systems is similar to the HER — but the main difference between the two programs is the addition of the Energy Mortgage as a home owner

option. EMs (Suozzo, et al., 1997), "...Stretch the debt-to-equity ratio above maximum loan limits for homes rated as energy efficient" while Energy Improvement Mortgages (EIMs) provide financing for upgrading an existing home." The importance of developing a continual educational bridge between program delivery and stakeholders was also identified in the development and implementation of HERS, EIMs, and EMs:

The home energy rating and energy mortgages industries have been developing and refining their products while building a delivery infrastructure...the infrastructure requires an educated stakeholder group consisting of consumers, lenders, realtors, auditors, utility personnel, appraisers, contractors, builders and all levels of government (Suozzo, et al., 1997).

In Canada, more bridges need to be built between the above stakeholders such as low income housing providers, the City of Winnipeg, federal programs such as RRAP, low income groups, and Manitoba Hydro in order to hammer home the importance of incorporating energy efficiency measures into all residential dwelling types.

2.4.4 Full House vs. Partial Home Renovations

Completing a full renovation of a house is financially costly and has associated qualities of life disruptions, therefore partial renovations or targeted renovations may be more attractive financially and may limit disruptions to daily life. Many of the existing programs seem to encourage the partial renovation model by providing information that can be used to target certain areas of a house or to improve certain systems such as the heating system. One of the main drawbacks of encouraging minor energy efficiency retrofits is that the amount of energy savings per dollar is not maximized. If the energy saving per dollar is not maximized, home owners may not see substantial savings in terms of their heating bills and become disheartened and choose not to pursue further energy efficiency savings (Suozzo, et al., 1997). For those home owners who wish to do a larger energy efficiency retrofit, limited personal finances and the inability to qualify for a loan or financial assistance may preclude any energy efficiency undertakings.

2.4.5 Financing Options Available to Home Owners

Manitoba Hydro currently offers the Power Smart Residential Loan. The loan covers a variety of measures such as adding insulation, installing ventilation, sealing air leaks, replacing windows and doors, lighting, electrical service and wiring, and upgrading the efficiency of furnaces or water heater. Customers may borrow up to \$5,000 per residence, with a minimum loan amount of \$500. The interest rate in 2004-2005 was 6.5% (Manitoba Hydro, 2004). To qualify, homeowners must be a Manitoba Hydro customer and own the home where the improvements were to occur. For West Broadway residents, this program again does not address the needs of a high rental property neighbourhood in which the majority of residents are either renting houses or apartments.

Manitoba Hydro also offers the Energy Finance Plan (EFP). Customers must own the building where the natural gas and/or electrical improvements are going to occur. Upgrades to electrical service entrance and panel board equipment, wiring circuits and associated equipment, natural gas piping, venting, ductwork, delivery, permit cost, and taxes, central air conditioning systems, electric/conventional natural gas water heaters, electric/mid-efficient natural gas furnaces/boilers, combination heating systems, unit heaters, and direct vent natural gas fireplaces are some of the items covered by EFP. The maximum loan amount is \$5,000 and the minimum loan amount is \$500 and repayment must be completed by five years. However, in comparison to the 6.5 percent Power Smart Residential Loan rate, the Energy Finance Plan interest rate is 11 % (Manitoba Hydro, 2004). As with the Power Smart loan, many West Broadway residents do not qualify for the loan because they do not own their residence. In addition, the higher interest rate may not be affordable for lower income groups.

2.5 Province of Manitoba

The provincial government through Manitoba Housing and Renewal Corporation (MHRC) and the Manitoba Housing Authority (MHA), administers the following programs:

- Public Housing
- Public Non-Profit Housing Program

- Private Non-Profit Housing Program
- Urban Native Non-Profit Housing Program
- Cooperative Housing Program

Each of these programs/agencies represents a potential opportunity for incorporate energy efficiency into low income housing by requiring housing providers to incorporate energy efficiency upgrades into their retrofits as part of their responsibilities to the province of Manitoba. In addition, the Province participates with CMHC, through the Residential Rehabilitation Assistance Program (RRAP), which is delivered by the City of Winnipeg and other delivery agents (i.e., Manitoba Métis Federation). For each of its housing delivery agents, the province of Manitoba could require that energy efficiency be incorporated into long term maintenance and repair schedules. The MHRC provides subsidies for approximately 36,300 housing units developed under various federal/provincial housing programs. Approximately 13,000 units are direct-managed through the Manitoba Housing Authority (MHA) (Manitoba Family Services and Housing, 2003). In total, Manitoba Family Services and Housing is responsible for almost 50 000 housing units in Winnipeg. Therefore, incorporating energy efficiency into these units would help save Manitoba Family Services and Housing money and would improve the quality of housing for low income groups.

Currently, the Province of Manitoba also has a revitalization program, Neighbourhoods Alive, which is designed to provide for safety, economic development, education and training, and housing activities at the neighbourhood level. Neighbourhoods Alive is meant to complement the City's Housing Policy. Each of these programs may inadvertently deal with improving energy efficiency, but none of these programs are designed specifically to improve energy efficiency.

2.5.1 Federal Commitment to Housing

The R2000 program is a federal initiative and the delivery agent of this program in Manitoba is Manitoba Hydro. The R2000 program deals with new home builds and uses a "systems approach". R2000 focuses on:

- Improving indoor air quality

- Improved comfort levels by reduction of heat loss and drafts
- Quieter indoor environments
- Higher levels of insulation
- A “House as a system” ventilation
- Advanced heating and cooling
- Energy efficient appliances and lighting
- Reduction in water consumption
- Environmentally and healthy building materials and techniques.

At this time, the scope of the R2000 program is limited to new builds only, however its goals as listed above can be incorporated into renovations and additions. The federal government has been providing information about energy efficiency through Natural Resources Canada (formerly Energy, Mines, and Resources). Since 1998, the Office of Energy Efficiency has continued the role of providing access to information about energy efficiency. Currently, Manitoba’s provincial government has been organizing “Efficiency Manitoba”, as a model for “one stop” funding and technical programming for Manitobans interested in water and energy efficiency, and other resource efficiency opportunities. To date Efficiency Manitoba is a “working title” only (Province of Manitoba, 2003) and is not available to Manitobans.

2.5.2 Housing Program Distribution—Needs Based Model

A basic principle for distributing social programs is that the allocation between the provinces and the communities should be done according to relative need. This is the argument presented by (Fitt,1986). Fitt’s report reviews housing program allocation at the sub provincial level and describes three steps for needs based planning: measuring need, developing needs based allocation methods, and integrating the results of the analysis with community dynamics at the community level (Fitt, 1986). For Fitt, housing information is seen as both necessary and useful for developing other needs based programming. His interdisciplinary approach to needs assessment attempts to ensure that programming is seamless within a community for the individual. Fitt (1986) argues that traditional measurements such as affordability, suitability, and adequacy are “unidimensional and arbitrary” when examined individually. Fitt supports the need for

utilizing a multi-dimensional measurement such as “core housing need” which attempts to fill the gaps and overlaps in the three separate categories.

Canada Mortgage and Housing Corporation has determined that households in need of “core housing” are those households whose “housing falls below at least one of following three standards: the adequacy, suitability or affordability standards *and* it would have to spend 30 percent or more of its income to pay the median rent of alternative local market housing that meets all three standards (Canada Mortgage and Housing Corporation, 2004). Note that households who choose to spend more than 30 percent of their income on housing are not considered to be in core housing, nor are residents of social housing where rents are geared to their income. The homeless are also not included in the definition of “in core housing need”.

Fitt, (1986) provides two calculations for helping determine needs based allocation.

Share is calculated by:

No. of households in need in location “a”

Total households in need in the province

And incidence of need is calculated as:

No. of households in need in location “a”

Total households in location “a”

Share is defined as the “measure of the extent of need in each area” and incidence of need “is a measure of the severity of household need situations in a given area, independent of the actual size of the area” (Fitt, 1986). These calculations could be used to direct the development and funding of energy efficiency programming within Manitoba to those areas and households in most need of core housing upgrades such as energy efficiency. These calculations could be used to justify funding allocations that to some, would seem unfair, but to the households in need of core housing, would be an equalizer. Fitt (1986) also recommends “integrated community delivery” which requires that “local knowledge

and input into the planning process” [of programs] should be mandatory: “the maintenance of an effective network of field staff who are a part of a community level market dynamics appears to be vital to successful delivery of housing programs” (Fitt, 1986). Many experts debate the need for developing community networks but Fitt thinks that appropriate mechanisms should be fostered [between delivery agents and the community].

For areas that have severe housing conditions, Fitt recommends that, “detailed attention be paid to small areas with relatively severe local problems...the statistical analysis of needs does not appear to be sensitive enough to really respond to differences in the nature and incidence of problems at community levels...some form of qualitative local input is a necessary part of the planning cycle” (Fitt, 1986).

The implications of Fitt’s argument for West Broadway and other small, inner city neighbourhoods is two-fold — in that more qualitative research needs to be completed in order to compile housing needs data of the area. Secondly, Fitt indicates that reliance on purely statistical data in quantitative research may not identify true programming gaps if used solely by themselves. In the case of West Broadway, examination of statistical data related to only housing statistics would not in itself provide a clear picture of the people’s ability to access, understand, and utilize housing programs such as energy efficiency programming.

Planning housing program distribution is a dynamic and complete process that should integrate both qualitative and quantitative data into decision making. The relative academic (Fitt, 1986) process of data collection and analysis must be tempered with knowledge of local conditions that numbers cannot impart. Only by attempting to achieve this balance of qualitative and quantitative data and analysis can the process be seen as “...fair in a statistical sense, but also be seen as fair by the communities and households who are affected in the end” (Fitt, 1986). Fitt concludes his argument that more research needs to be undertaken in understanding socio-economic influences in program use and

understanding how local market knowledge can be formally, “yet sensitively” integrated into decision making.

2.6 Energy Labels and Standards

Canada has extensive appliance and equipment energy labeling and standards programs (International Energy Agency, 2000). Increased consumers awareness has led to the development of product labeling systems which reflect environmental criteria (Reid/Foster Associates, 1995). The difficulty in determining what a “green” product is or what is “environmentally friendly” in terms of products has continued to plague consumers and hinders their abilities to make choices from products where the same variables are used to determine “green”, “environmentally friendly”, “sustainable”, etc. The marketable value of a product that is labeled as being “green” as opposed to products without “green” labeling is increasing. Companies are taking advantage of consumer’s increasing demand to know about how products are made, the energy they use, etc. Consumers are often fatigued and bewildered by the plethora of symbols and signs that tout “green” and are suspicious of the “green” claim, while at the same time desiring that a product be “green”. To this end, there are a number of programs within Canada that provide environmental labeling programs. The need for these environmental labeling programs is self-evident. Everything that can be done to convince consumers that improving energy efficiency in their appliance and housing choices should be argued on the grounds that said improvements are both cost effective in the long term for consumers and better for the environment. However, environmental labeling does not factor customer income levels into its parameters; what may constitute a wise environmental choice may be constrained by low income customer’s inability to purchase the item. Therefore having environmental labeled products is useful as long as it reaches the largest customer base. While some people argue that low income groups do not consume as much as higher income brackets, there is still a need and responsibility to provide energy efficient appliances for these groups, in order to expose low income groups to the benefits of energy efficient appliances—lowered energy bills.

The International Energy Agency (IEA) states that: "improving energy efficiency at the end-use level is increasingly important as Climate Change commitments force policy makers to look for areas where greenhouse gas emission reductions can be achieved rapidly (IEA, 2000)." They go on to say that "labeling and minimum efficiency standards for appliances and equipment have proven to be one of the most promising policy instruments." Though labels, standards, and targets can be used individually, the IEA indicates (2000) that they have more effect when used in conjunction with other energy efficiency promoting measures which include education, information, financial incentives, and targeted procurement.

As of June, 2000 energy efficiency labels were in use in 37 countries and standards in 34 countries, Canada being one of the countries in which both labels and standards are used. Canada has labels and standards for the following: clothes dryers and washers, dishwashers, freezers, electric ranges, stacking dryers and washers, refrigerators, and air conditioners. The following is a short list of those product areas which have standards only: oil and gas boilers, dehumidifiers, fluorescent lamp ballasts, gas and oil furnaces, ground or water source heat pumps, internal water-loop heat pumps, gas ranges, and gas fireplaces, etc.

NRCAN (2002) found that regulations have significantly affected the energy efficiency of new appliance models. NRCAN (2002) cites declines of between 29 and 34 percent for refrigerators, freezers, and dishwashers in [energy use]. Regulations have also impacted the efficiency of natural gas furnaces, with the normal low-efficiency furnaces disappearing from the market since 1990 (NRCAN, 2002). The IEA recommends that labels and standards become part of a holistic cost-effective energy savings program and recommends that, "...it is necessary to implement packages of multiple policy instruments..." (IEA, 2000: 132).

Both the IEA and NRCAN have demonstrated the importance of policies which target energy efficiency and the significant impact that labels and standards may have.

Potentially, the EnerGuide for Houses label may also lead to overall market improvements in energy efficiency.

Within Canada there are two groups of organizations which deal with labeling. The one group issues a product label that is in whole or partially based on environmental criteria, including energy efficiency (Reid/Foster Associates, 1995) and the second group are organizations that are actively informing consumers in the marketplace about the environmental aspects of products.

Table 17 Available Energy Efficiency Programming in Canada

Labels Based on Energy Efficiency
Environmental Choice Program
PowerSmart
The EnerGuide Program
Build Green
R-2000 Program
Energy Star

Table 18 Agencies Promoting Energy Efficiency Products in Canada

Groups promoting Environmental Aspects of Products
Healthy Housing Initiative
Green Communities Initiative
EnviroHome Initiative

The first table refers to programs in which labels are based wholly or partially on energy efficiency considerations. Each of the three groups listed in the second table are varied in their scope, mandate, and in the organizations that promote energy efficiency and other resource efficiencies such as water efficiency. Each of these programs does attempt to engage consumers and corporations in improving their energy efficiency. The following sections will elaborate on each of the above agencies and labels.

2.6.1 Environmental Choice Program

The Environmental Choice Program began in 1988 by Environment Canada and the Canadian Standards Association (Reid/Foster Associates, 1995) and its mandate is: “To encourage the supply of products and services that are more environmentally responsible and to help organisations and consumers buy ‘green’ (Environmental Choice Program, 2003). The “Ecologo” is a symbol that denotes a product’s environmentally soundness. In the program’s context, “environment” has a global context and involves full life cycle analysis of a product, from resources extraction to manufacturing and finally, disposal. The labeling criteria consider issues such as global warming, CFC production and the ozone layer, hazardous waste disposal, and ground water pollution (Reid/Foster Associates, 1995). The “Ecologo” can be found on such products as building and home care products, cleaning products and services, personal care products, automotive parts and services, and office/school products and services.

There are thirty two guidelines (Environmental Choice Program, 2003) that products such as building materials, paints, and energy efficient lights must meet in order to be considered “Ecologo” materials.

2.6.2 PowerSmart

Power Smart was developed in 1990 by BC Hydro and licensed to BC Hydro, Hydro-Quebec, Manitoba Hydro, Newfoundland Hydro, Nova Scotia Power Inc., Ontario Hydro, and TransAlta Utilities (Reid/Foster Associates, 1995). The mandate of this program is to, “influence the demand for energy-efficient products in North America and around the world.”

In the Power Smart context, “environment” refers to and is concerned with energy efficiency, particularly in relation to the use of electricity and promotes the environmental benefits resulting from the wise use of energy, (Reid/Foster Associates, 1995). The program has both a residential and commercial component and includes thirty three utilities and government agencies from Canada, the United States, Mexico, South America, Eastern Europe, and the Caribbean. Of the participating utilities, approximately

forty percent are privately owned and sixty percent are publicly owned (Reid/Foster, 1995).

PowerSmart endorses some of the following product areas:

- appliances (fridges, microwaves)
- building envelope materials (caulking, insulation, weatherstripping, high performance windows)
- electrical products (heat pumps, block heater controllers)
- Hot water savers (electric hot water tanks, hot water tank insulating blankets, low flow faucets)
- High efficiency lighting (halogen, fluorescent, LED)
- Industrial products for the commercial sector (high efficiency motors, efficient compressed air, fans, pumps)

The Power Smart “Seal of Energy Efficiency” is used for energy efficient products that are in the top twentieth percentile for energy efficiency. A task force representing member utilities determines criteria for product selection. The “Power Smart Saves” certificate is also used to identify products which, while they do not consume energy [in their use, not referring to production or disposal], do contribute to energy efficiency, substitute for less efficient products, or are a more efficient alternative to other applications. For example, one insulation type might be certified over another type of insulation based on the product’s ability to reduce energy consumption in the use cycle of the building. Products that are being submitted for the “Seal of Energy Efficiency” must meet efficiency criteria outlined in the North American Product Guide which are compiled by the Power Smart technical staff (Reid/Foster Associates, 1995). The Power Smart programming may overlap with EnerGuide and the Environmental Choice Programs in terms of duplicate labeling appearing on the same product.

The Power Smart programming currently has, as mentioned earlier, a residential and commercial component, however, electronic or hard copy literature about Power Smart in Canada does not indicate that the programming to date has substrated the residential sector to focus on specific residential market segments such as First Nation, low income households, or northern communities.

2.6.3 EnerGuide for Products and Houses

EnerGuide began in 1978 under the Consumer Labeling and Packaging Act and was administered by Consumer and Corporate Affairs and was then continued by Natural Resources Canada (Reid/Forster Associates, 1995). As of 1995, all major household appliances must have an EnerGuide rating. EnerGuide takes a cautious approach to using the word “environment” (Reid/Forster Associates, 1995). Their mandate is primarily related to the energy efficiency of major household appliances and supports reduction of greenhouse gas emissions by encouraging the efficient use of energy. Unlike the life cycle analysis of the Environmental Choice Award, EnerGuide is primarily an end use label.

The EnerGuide label has been expanded to include and label buildings such as residential housing. The EnerGuide for Houses is part of Natural Resource Canada’s Office of Energy Efficiency and through an in-house assessment, determines and develops an energy efficiency rating based on the technical scores generated through the blower door testing, air volume measurements, etc. EnerGuide for Houses is available throughout Canada and is delivered by many different utilities and non-government organizations across Canada. Current reviews of the program indicates that there is limited program focus within the residential sector recognizing low income, First Nation, or other marginalized populations ability to access the programming.

2.7 Build Green

Begun in 1990, this program was driven by the Greater Toronto Home Builder’s Association and was concerned with promoting the use of renewable resources in construction (Reid/Forster Associates, 1995), but is not currently active in developing criteria or researching materials at this time. The program promoted the use of building materials containing recycled content and building materials produced from renewable resources. However, this group is not active. Currently, the Calgary Home Builder’s Association manages a similar program, Build Green Alberta.

The four main target areas of the Build Green Alberta program is reducing energy costs in new residential builds by 10 to 30 percent, incorporating three of the nine recommend air quality features, lowering resource use, and incorporating at least two of a potential thirteen environmental friendly items. This program is different from the EnerGuide for Houses and it draws more from the American rating system, LEEDS (Leadership in Energy and Design Standard) in which buildings receive a bronze, gold, or silver rating.

2.7.1 R-2000 Program

The program originated partly in response to the oil crisis on the 1970's and fully emerged in 1982. R2000 is a voluntary performance standard for new homes that uses a "systems approach". A "systems approach" views houses in a series of inter-related systems such as heating, cooling, and human interaction with the house. The scope of products encompassed within this program includes all building materials, but none of the materials are endorsed by the program (Reid/Forster, 1995). The house is put through rigorous testing to determine if it meets the criteria for being certified an R2000 home. The criteria that a house must meet include indoor air quality standards, technical requirements, and environmental responsibility. As used in the R2000 program, "environmental" includes the following two goals:

1. Reducing green house gas emissions
2. Minimizing the impact of a house on the environment by mandating minimal recycled material content, water reduction strategies, reduced construction waste, and use of locally available materials.

R2000 is available throughout Canada and is delivered by a variety of organizations, which results in regional disparities of program use as some participants and areas are more active than others. The Ontario Home Builder's Association in Ontario, Canada is an example of a strong, localized delivery organization (Reid/Forster, 1995). In addition, the federal government heavily promotes the R2000 program as a model to Japan and the United States. While R2000 is currently for new homes, the air quality, ventilation, insulation levels, etc. it requires could be modified for use in existing construction to help ensure that upgrades and additions are brought to a standard stricter than existing code.

By modifying an existing program such as the R2000 program, time and money could be saved and groups such as low income groups may experience appreciably better housing sooner.

R2000 allows for housing related products to be tested in conjunction with other labeling programs such as "Ecologo", or "EnerStar", however, products being tested (Reid/Forster, 1995) must be readily available. Reid/Forster Associates (1995) state that the building products industry is developing environmentally orientated products at a much faster rate than labeling organizations by themselves, therefore, they recommend that an opportunity exists to develop partnerships between R2000 and labeling groups. The benefits of developing partnerships would allow for products to be field tested and examined by building experts at R2000 and by the end users, home builders. The opportunity to test housing related products in low income housing would provide researchers and stakeholders a better understanding of how low income groups use their housing and it would help create housing with better quality materials.

Each of these programs promotes energy efficiency as either a primary or secondary concern as indicated by their mandates and goals. Each of these programs is concerned with the end user and focuses on providing information and programming for the household level. The labeling programs identify products for consumers ranging from light bulbs to the home the light bulb eventually lights, while R2000, EnerGuide for Houses, and Build Green provide voluntary best practices and technical measures to evaluate building design, construction/renovation, and maintenance. The following three programs have strong consumer education and awareness raising aspects to them. They are focused on encouraging consumers to make informed decisions in terms of energy use and health concerns related to the built environment. In addition, they share research developments in language that non-experts, consumers, could understand and hopefully, think about applying to their own residence.

2.7.2 Energy Star

Energy Star is a government/industry partnership that offers energy efficient solutions. In 1992 the US Environmental Protection Agency (EPA) introduced Energy Star as a voluntary labeling program designed to identify and promote energy-efficient products to reduce greenhouse gas emissions (Energy Star, 2004). There are 40 product categories for products qualifying for an Energy Star label including office supplies, heating and cooling equipment, home electronics, and new homes and commercial and industrial buildings. Energy Star provides consumers with energy efficient options for their products while using less energy and saving money (Energy Star, 2004). Energy Star was fundamental for encouraging the widespread use of such technological innovations as light emitting diode (LED) traffic lights and efficient fluorescent lighting, which use less energy and provide the same or better performance as comparable models (Energy Star, 2004).

2.7.3 The Healthy Housing Initiative

CMHC's healthy housing initiative evolved out of its Healthy Housing Design Competition in 1991 (Reid/Fraser, 1995). The healthy housing project explores the use of environmentally and economically feasible development and design techniques for buildings. CMHC defines healthy housing as "housing that is healthy for its [human] occupants as well as for the global environment" (CMHC, 2003). They have identified five areas when considering healthy housing: occupant health, energy efficiency, affordability, environmental responsibility, and resource efficiency. For CMHC, "environmental" has a three fold meaning (Reid/Fraser Associates, 1995) and relates to the following:

- Whole house (systems) approach that examines air, materials, waste, and the impact of people living in the house.
- The idea of community and how people interact with the community—density and planning to minimize human impact on the environment and

- The relationship of the built environment with the greater environment, both locally and globally in terms of green house emissions and resource depletion.

Under this initiative, consumer fact sheets, articles highlighting healthy housing models, and technical fact sheets are utilized.

2.7.4 Green Communities Initiative

“Greenest Communities” is available in Ontario and focuses on encouraging both individuals and communities to increase energy and water efficiency, reduce waste, and prevent pollution (Green Communities, 2003). Each community develops and implements “green” strategies based on their own local priorities (Green Communities, 2003). One feature that is prevalent in all the communities is the use of “green home visits” which are similar to EnerGuide for Houses evaluations in that recommendations are made about energy efficiency, however, the program also examines and makes recommendations about water efficiency as well (Thompson, 2003, Green Communities, 2003). Reducing solid waste production and reducing air, water, and land pollution is also critical components of the programming. Sustainability is a consistent theme within the Green Communities programming. As of 1995 (Reid/Fraser Associates), almost ninety percent of Ontario’s population lived in a “Green Community”.

The mandate of Greenest Communities is to, “...transform the way households, neighbourhoods, and communities make the transition to environmental and economic sustainability...” (Green Communities, 2003).

While the Green Community Program has similarities to other programming, it is unique in utilizing more of a grass-roots “bottom up” approach. Green Communities believes that using such an approach further encourages change at local community levels and is better adapted to reach the smallest, yet so important levels, households, and individuals. The program is used to “stimulate and assist local, community-based planning and action within a generally defined framework which is more performance orientated than prescriptive” (Green Communities, 2003).

This program also has a strong participant education component and focuses on increasing environmental awareness and consciousness in people. At its time of implementation in 1991, the Green Communities Program had what was then—and still is in part—a novel approach to encouraging sustainability. This program acted as a “one-stop” shop for community members and delivered integrated programming and activities. Until this integrated approach was taken, each government department would market some aspect of sustainability: one group would be designing and delivering water programming while another department would focus on energy efficiency, etc. Streamlining the delivery process from multiple government departments to one agency (Green Communities) allowed for the “...bulk of resources used to create delivery infrastructure to go directly to assisting communities in implementing change...” (Reid/Fraser Associates, 1995).

2.7.5 EnviroHome Initiative

This program is focused on new home builds and is sponsored by the Canadian Home Builders Association. This program has specific technical criteria, some of which is based on R2000 standards (indoor air quality), and CMHC’s healthy housing criteria (concern for environmental performance). New homes that meet the criteria set out by EnviroHome program are labeled with an EnviroHome trademark. The mandate of the EnviroHome program is to provide new housing for the public, which are “...good for you, good for your community and good for the environment...” (Canadian Home Builders Association, 2003).

While this program is similar to the R2000 and CMHC healthy housing programs, the main difference is that the aforesaid are government programs and the EnviroHome program is run by the Canadian Home Builder’s Association (CHBA) which is a private organization to which home builders may belong to. As a marketing tool, the EnviroHomes are marketed on their affordability for the average home buyer “...environmentally improved new homes are available today at a price relevant to the majority of home buyers...” (CHBA, 2003). The key word that outlines the difference between R2000 and EnviroHomes is “improved”. EnviroHomes do not meet all of the

exact testing and guidelines for R2000 houses, but they do meet some of them, therefore the houses are said to be “improved” when judged against new housing in general, but when judged against R2000 houses, EnviroHomes do not always equate. The other key component about affordability is that because the EnviroHomes do not have the same testing requirements or follow all of the same technical requirements of R2000 housing, and have lower fees for builder certification, the houses can be less costly than purchasing a similar new build R2000 house.

All of these programs show areas of duplication in terms of target groups, mandates, and functions. With new programs being continually implemented at the federal, provincial, and regional levels, it is difficult for consumers to understand what their best options are for improving their energy, water, and resource efficiency. For the delivery agents, duplication of programming is costly, time consuming, and creates overlap of some program areas and has the potential to overlook programming gaps for sub-groups such as low income groups.

An atmosphere of co-operation, collaboration, and knowledge sharing between delivery agents may help all parties involved in receiving better programming, targeted programming, and the development of more creative programming.

2.8 Canada Mortgage and Housing Corporation’s Healthy Housing Initiative

Winnipeg’s Community Economic Development sector and non-government organizations dealing with the housing crisis in the inner cities have long been faced with the ongoing challenge of renovating a building to a better condition than previously found while keeping within the modest budgets many of these organizations have. To date, no single NGO dealing with housing renovations and new builds in Winnipeg has adopted energy efficiency as an important criterion when developing their renovation plan. When asked, NGOs cite lack of funding to improve energy efficiency and having to make “hard choices” between energy efficiency and other renovation requirements. Some organizations such as WBDC currently have (2003, ongoing) pilot projects such as the Eco-house in West Broadway, a model home that is attempting to incorporate healthy

human components with energy efficiency, and environmental awareness in material choices. However, one house in one neighbourhood is a long way from improving energy efficiency in the entire neighbourhood. Private corporations, such as Kinkora Developments Limited, have adopted best energy efficiency techniques and practices for all renovations undertaken, (Pendergast, 2004). However, these corporate organizations are also limited in the scope of their activities by time, size of the organization, and finances available to undertake the work.

The concept of development corporations in Winnipeg is a well established fact. There are development corporations active in each of the inner city neighbourhoods (some development corporations serve more than one neighbourhood). Therefore, it would be feasible to incorporate energy efficiency in renovations as an integral part of the housing plan of all these corporations. One way of incorporating energy efficiency into all development corporations would be to make it mandatory; however, doing so may make the development activities even more difficult for organizations with limited budgets and skills capacity to implement the requirements. Also mandatory implementation would not be fair to implement at the community level as it has not been implemented or adopted in the private sector. In addition, mandatory implementation would also go against the community “spirit” of development corporations and is in a sense an “environmental injustice”, as there is a bureaucratic tendency to over-regulate the poor and disenfranchised populations—as if strict rules will make the situation “go away”. There are options that may prove acceptable to development corporations in Winnipeg and elsewhere. Options such as the development of an energy efficiency renovation guide book or stringent municipal laws may prove beneficial. Targeted funding specific for energy efficiency upgrades for low housing providers may also be beneficial.

2.9 Military Housing Renovation Guide as a Model

Ternes et al. (1997), compares the current state of the United States military housing to the state of public housing and concludes that development of a guide or “standard-of-practice be developed in regards to renovating. He states that, “...there is a need to ensure

that inefficient building practices are not repeated in future renovation and new construction projects...” (Ternes et al.,1997). He goes on to outline a “chain of command” of who should be involved in training for understanding what to do and what not to do energy efficiency retrofits:

Comprehensive diagnostics are needed to identify house-specific energy related issues in housing to be renovated, important energy-related issues and solutions must be brought to the attention of designers...and inspectors must be shown important energy-related elements to look for during the construction and be shown a correct or ‘standard-of-practice’ (Ternes et al., 1997)

As part of a past program, Ternes et al. has already developed guides to energy efficient design and inspection of new and revitalized housing (U.S. Air Force 1996 and U.S. Air Force and Army 1997). Ternes et al. identifies opportunities for implementing such guides into public housing and other affordable housing models such as West Broadway, noting the similar sub-standard state of the military and public housing as well as opportunities to reduce cost and increase efficiencies in both public and military housing.

On-site energy inspections of revitalized and unrevitalized military housing and public housing have demonstrated that the potential for energy improvements is large and that these current approaches [renovations, new builds without upfront energy efficiency considerations] have been insufficient to correct or avoid many of the energy deficiencies found (Ternes et al., 1997). The guide focuses on two main areas:

- Identification of existing energy inefficiencies and
- Inspection of remediation work during completion and after to ensure best practices for energy efficiency were followed

The guide is broken into two mini guides, starting out with a “design guide” which provides sample forms for the designer to walk through the house and identify energy inefficiencies. Cooling and heating systems, building envelope, major appliances, water heating, etc are examined for the potential to improve energy efficiency. Ternes, et al. notes that this process is not to “...replace other inspection practices that evaluate adequacy, conformance to local regulations...” but should be used adjacent to other types

of inspections. The second section is about educating the inspector and ensuring that rigorous criteria in regards to insulation installation and vapour and air barriers are followed (there are six criteria around installing house wrap). The inspector's responsibilities are "...essential for achieving energy efficiency in housing..." (Ternes, et al., 1997).

The renovation guide book model suggested and outlined in detailed by Ternes, et al., has the potential to be modified for use in Winnipeg. Such a guide has the potential to encourage and streamline energy efficiency retrofits in a cost effective manner for cash strapped organizations. By indicating the benefits of improving energy efficiency in housing these groups renovate, it would be hoped that some "buy in" to the concept would occur. One such model that attempted to integrate energy efficiency into housing associations [development corporations] was undertaken in the United Kingdom. The model demonstrated the benefits of energy labeling for housing associations and their tenants. The model wanted to:

1. Help design new housing with significantly improved energy efficiency at little or no extra capital cost, while at the same time, reducing management and maintenance costs and
2. Helping tenants enjoy homes that they can afford to heat. (Energy Efficiency Office, 1992).

In Winnipeg, both of these goals would be beneficial as our climate largely factors into the heating bills of all residents, especially for low income residents and development corporations and social housing providers have a mandate to improve the housing they supply to the community. The fact that it can be shown to be cost effective is an added bonus for groups when they apply for funding or supply the rationale for why they would want to increase energy efficiency in housing they provide.

The study involved fifteen housing associations (similar to development corporations) and had them tender two building packages, one with "low cost specifications" based on "little or no additional cost" specifications which had been identified in a previous study

and the other tender package included higher cost specifications [walls, roof insulation, floors] and building service measures (Energy Efficiency Office, 1992, 1992).

The housing associations used an energy labeling system to assess each package of measures to determine which package would provide the most energy efficiency for their investment. The study showed that the housing associations could “use energy rating systems as a technically feasible method of assessing the energy performance of their plans against improvement targets...” (Energy Efficiency Office, 1992). The energy labeling program used was the National Home Energy Rating Scheme (NHER) which similarly provides a numerical rating for a house (EnerGuide rating) or a component.

A critical finding in this model was that those housing associations which chose to require higher insulation levels in their first stage tenders were better off than the housing associations which chose to negotiate improving insulation levels in their second phase tenders. For example, increases of insulation values from 150 mm to 200 mm in the roof only resulted in an energy savings of three to five pounds per year; however, the associations received very low tender prices for the extra insulation which proved cost effective to increase insulation levels.

“...this strongly indicates that energy efficiency measures should be included as standard specifications in tender documents, rather than as “extras”, in order to get the best price...”(Energy Efficiency Office, 1992).

When the contractor was already selected, it was generally found difficult to obtain good prices on insulation, etc when negotiating additional measures during the second stage of the tender process (Energy Efficiency Office, 1992). Specifications were designed around the following areas to aid the housing associations in determining their tender packages:

- Space heating (associations had to agree to specify pipe insulation as standard and low thermal capacity boilers with programmers and room thermostats, storage heaters for electric schemes were also recommended, and condensing boilers were also recommended for larger spaces)
- Heating controls (concern with tenant ability to correctly use complicated electronic controllers—based on prior experience led to the recommendation of

the analogue controller for all associations). For the researchers, the association's recommendations in this area highlighted the need for consumer education for tenants about their heating system.

- Ventilation (Associations included heat recovery units in their tenders as an aid to deal with condensation problems)
- Low energy lighting (despite the success of low energy lighting in reducing CO₂, most of the Associations did not include lighting in their tenders due to a fear about high replacement costs, theft of the bulbs, and breakage, though some associations tendered efficient lighting for communal areas)
- Walls (Associations were wary of filling cavities full of insulation due to possible technical concerns)
- Roof insulation (tenders required 150 mm of glass fibre insulation in the roof)
- Floors (Associations specified 25 mm ground floor insulation in some cases, but questioned the durability of insulation placed beneath chipboard floor covering)
- Windows (double glazing with draught stripping was specified and tendered by all Associations)

(Energy Efficiency Office, 1992)

The study also found that housing associations were reluctant to adopt some of the above recommendations and "needed further reassurance with regard to cavity wall insulation and further information about mechanical ventilation systems with heat recovery" (Energy Efficiency Office, 1992). As well, housing associations were reluctant about adopting energy efficiency lighting and were also reluctant to specify lower cost reduced specification heating systems without more evidence that tenant comfort and efficiency were not being compromised (Energy Efficiency Office, 1992). The model noted that including energy efficiency as an upfront standard specification, rather than as an "extra" allows for obtaining the best prices (Energy Efficiency Office, 1992). The ability to increase energy efficiency in NGO organizations was viewed as being a voluntary commitment on the part of the organizations and regulation in this respect was not seen as being positive at this time.

2.10 Denmark and Energy Efficiency Policies

Since 1975 Denmark has implemented many energy conservation programmes that are concerned mainly with existing buildings, while their national building code is chiefly concerned with new residential builds (Economic Commission for Europe, Committee on Housing, Building and Planning, 1982). As in Canada, Denmark responded to the energy crisis in the 1970's by developing an energy plan. Canada responded by developing the R2000 program and Denmark put its energies into developing a much more comprehensive approach in the Danish Energy Policy of 1976. As part of the Energy Policy, Denmark attempted to encourage energy efficiency at the household levels through grant schemes, much as Canada currently does. An analysis completed by the Danish government circa 1982 of its granting programmes found one important issue at the home owner level that impeded larger energy savings:

Analysis of earlier grant schemes seems to show that householders do not always have the most profitable measures (from an energy point of view) carried out, often attaching considerable importance to improving the comfort and quality (appearance) of their properties, which in many instances results in a relatively long repayment time. (Economic Commission for Europe, Committee on Housing, Building and Planning, 1982).

Similarly, programs in Manitoba such as RRAP may increase the repayment time on improvements if homeowners opt for modest to minor energy efficiency improvements. Denmark, in re-evaluating its programming, opted to rectify the situation through the development of energy consultants, similar to Manitoba Hydro's in-house evaluators. The key difference between the energy consultant and Hydro's evaluators lies in the fact that the Danish consultants are responsible for

“...ensuring that the work was carried out correctly from a technological point of view in order to minimize the risk of damage resulting from insulating work and to ensure that grants were used for the most cost-effective measures from an energy point of view...” (Economic Commission for Europe, Committee on Housing, Building and Planning, 1982).

The Danish consultant's capacity was further increased until the consultant acted as an intermediary between home owners and municipalities and the consultant was also

responsible for part of the grant administration. This model of the energy consultant and the responsibilities ended in 1981, having been implemented in 1975. The energy consultants currently look much like Hydro's evaluators, carrying out heat inspections and preparing a heat inspection report.

The "full service" consultant model is intriguing because it created a "closed loop" of improving energy efficiency, with the recommendations, implementation and overseeing of the work, and funding of the improvements had involvement of the Danish government through its intermediaries. Peters, Row and Shymko (2003, p.22) note that there is a paucity of "skilled architects, renovators and trades people to deliver energy efficiency measures as part of housing improvements". For Canada, the Danish model may be useful for future programme design to encourage the further development of skilled trades in Canada.

2.10.1 Energy Efficiency and the Environment: Demand Side Management, Energy Efficiency, Climate Change

A common theme found in the policies both within Canada and abroad is the need for incorporating Demand Side Management (DSM) into all policies legislation and utility planning strategies (Jacobson and Kathan, 1991). Technologies may stagnate in terms of what can be achieved, but reducing energy use within individual households provides another example of how to decrease energy consumption. There is also further interest in improving energy efficiency—climate change. Predictions indicate that variable summer and winter temperatures could result in a "worsening of utility load factors" (Jacobson and Kathan, 1991). For utilities, investing in DSM may provide a safer cost-benefit return than investing in larger grid systems or production systems that would also be at the mercy of climate chaos and extreme weather events, such as record droughts or record precipitation.

Jacobson and Kathan (1991) argue that three major categories of policies should be improved if climate change is to be averted and energy efficiency improved. Each of

these three categories would have the potential to substantially improve DSM. The categories of policy include

1. Regulatory “push” mechanisms
2. Market “pull” mechanisms, and
3. Research, demonstration, and development activities.

Push regulations rely on “command and control” and focus on enforcing levels within a certain industry such as emissions from the automobile industry. Pull mechanisms are the incentive programs designed to encourage consumers of their own accord, to participate in energy conservation measures, while R & D initiatives are valuable for developing alternative energy sources, technologies, and sharing energy efficiency information with the wider public. In terms of DSM, developing the entire policy scope helps ensure that people are having to respond to energy conservation on many levels and may begin to accept energy conservation as a “part of daily life”. Jacobson and Kathan (1991) indicate that for greater increases in energy efficiency, “...greater research will be needed on customer behavior, end-use patterns, and new energy efficient technologies...existing utility conservation programs will have to be enlarged and enhanced...” The area of DSM from the customer’s point of view often remains a mystery and there is little literature related to DSM from an end-user point of view.

Demand-side management programs are pursued by every utility within Canada because “...these programs can increase capacity, save energy, and satisfy customer needs while reducing customer cost...” (Temchin, et al., 1991). The use of DSM as a tool for increasing energy conservation is indicated by the general rise in existing programming from a low of 130 programs in 1977 to over 1, 300 program in 1991 (Temchin, et al. 1991). However, is current programming addressing all sectors of society such as low income groups?

2.11 Energy Efficiency in the United Kingdom

Engaging the public about energy efficiency is an ongoing challenge. By itself, the term “energy efficiency” is a technical term that is abstracted from people’s daily lives.

Therefore, the U.K and Europe have expended energy in developing, educating, and marketing “energy efficiency” as a household benefit to people. The United Kingdom experience of marketing energy efficiency at the household level illustrates lessons that may be applicable to Winnipeg. The United Kingdom model of implementing efficiency at the household level relied on strong research into energy-related household behavior, the development of models of domestic energy consumption, monitoring of demonstration projects and the promotion of good practice through the dissemination of technical guides (Ward, 1991). The Building Research Establishment (BRE) is an agency in the U.K.’s Department of Environment (DOE) and is one of the world’s most experienced building research organizations, with a seventy year history (Ward, 1991). Domestic U.K. energy use patterns are similar to those found in Canada, with the U.K. residential sector accounting for approximately twenty five percent of energy consumption and space heating accounting for approximately half the energy use within the house (Ward, 1991). Canada’s residential sector represents eleven percent of energy use and space heating accounting for approximately sixty three percent of energy use in a household (enerInfo, Residential, 1997). Differences between the two countries can be attributed to the increased degree day need for heating requirements in Canada.

BRE determined that the construction, location, building services, and occupants (Ward, 1991) are factors that impact energy conservation/consumption patterns in households. Ward (1991: 9) notes that occupants “have a critical effect on domestic energy consumption”, indicating the relevance of understanding lifestyle, household composition, and income. The Energy Efficiency Division of BRE, (BEED), indicates that “...a household’s income is crucial in determining their energy consumption. If fuel bills are unaffordable the household will limit their energy use, whether through using less hot water or turning their level of space heating down, sometimes even to zero by switching the heating system off...” (Ward, 1991). Within Canada, and especially areas such as Winnipeg where extreme winter temperatures make turning the heat off a “non option”, the exact opposite occupant behavior can be found: people will go without food, but will not go without shelter and will choose to pay for services that lead them to have heat and shelter, (Miko and Thompson, 2004).

BRE acts in the same capacity of some of Canada's government departments such as NRCan or CMHC in that BRE are the technical advisors to the U.K. government. BRE research has indicated that higher levels of insulation, better controlled ventilation are important considerations when attempting to improve energy efficiency (Ward, 1991). BRE has also developed the non-mandatory "British Code of Practice" for the energy efficient refurbishment of housing (Ward, 1991).

BRE also have "BREhomes", which is an energy calculation that can be applied to boundary specific areas to determine the local energy consumption as opposed to the household consumption level determined by Manitoba Hydro's In-house assessment. BREhomes have four components and collect the following data:

1. Composition of the housing stock, by age, built form, tenure, heating systems and heat loss characteristics to give 400 typical house types found in the U.K. The model takes advantage of the relative uniformity of house construction, particularly within certain age bands.
2. Uses the BREDEM calculation [created by BRE] to predict domestic energy consumption for each house type, given various heating patterns.
3. Government data on the total delivered energy in housing. This sum is then reconciled with the BREDEM prediction of energy consumption to ensure accuracy.
4. A module which is used to predict changes in domestic energy consumption (Ward, 1991).

The module has proven useful for government policy design (Ward, 1991) based on how energy efficiency programming should be focused and adjusted as change (improvements in the energy efficiency of sectors) begins to occur. BRE has also developed energy consumption guides. While there are many energy efficiency "how to" guides in Canada that focus on home owners, contractors, and the commercial sector, Canada has been experiencing a "how to" guide gap for certain groups such as renters. By comparison, the BRE guides are aimed at a wider consumer audience, "...they are aimed to motivate

different categories of people, such as owner occupiers, tenants, and owners of housing stock..." (Ward, 1991). An additional benefit of the guides are that they describe improvement options in simple terms, indicate potential benefits, and have a section about where people may get more information from a variety of government programs. In this way, BRE attempts to close the loop on energy conservation by including the consumer and acknowledging that various residential housing types require more than one option for improving energy efficiency.

Another aspect of the BRE model is that they recommend that all stakeholders be educated about the need for improving energy efficiency so that the message is reinforced from design to end use. Building owners, designers, architects, builders and maintenance staff need a comprehensive set of authoritative targeted guidance on how to include energy efficiency measures in their work. The different categories require different levels of information: for example literature aimed a home owner would provide guidance on the financial cost and benefits and how to specify a job to technical people (Ward, 1991).

In this one instance, the literature from the U.K directly referenced low income households as a target group with unique energy efficiency challenges. The U.K has approximately six million low income households, which represents a substantial potential for lowering energy use. In response to issues of low income people "turning down the heat", which has associated problems such as human comfort and health issues, as well as building concerns such as condensation formation leading to mold growth in the interior of the houses, BRE indicates that the most cost effective solution was to, "provide affordable warmth through an appropriate package of energy efficiency measures..." (Ward, 1991). Ward, argues that the links between health and housing is an important consideration when considering improving energy efficiency.

There are many links between housing and health, particularly in poor communities, but warmer, cleaner houses will generally be healthier to live in...healthier occupants will make less demands on national health services (Ward, 1991). The Building Research Establishment's commitment and recognition of the energy efficiency needs of various

sectors of a residential population and to housing stocks of various ages and distinct building design periods is reflected in their publications (Ward, 1991):

- Refurbishment of High rise flats, 1990
- A Councillor's guide to affordable warmth for tenants, 1990
- A Tenant's guide to affordable heating, 1990
- A Homeowner's guide to affordable heating, 1990
- Energy efficiency in housing – low energy housing for little or no additional cost, 1990
- The energy efficient conversion of Victorian houses into self contained flats, 1990 (project profile)
- Incorporating energy conservation measures in urban renewal programs, 1986 (project profile)
- Higher insulation standards for small pre-1919 terraced housing, 1991 (project profile)
- Low energy housing for elderly people, 1990 (project profile)
- Energy advice to tenants, 1988
- Energy efficiency measures in an urban renewal programme in Birmingham, 1989
- British Standard Code of Practice for energy efficient refurbishment of housing, 1988

2.12 Contractor's Perceptions of Energy Efficiency Implementation

A survey of Canadian contractors in 1983 by Paul Allen and Associates Ltd. indicates that there are continual issues around contractor perception of their building abilities and their perception of energy efficiency. The study found that half of builder respondents felt that (in 1983) that they were building "air tight" housing and one in three respondents claimed that they always built "air tight" housing. Most of the builders from the Paul Allen study also felt that energy efficiency would become "...a fact of life in the relatively near future..." (Paul Allen and Associates Ltd., 1983). Indeed, of respondents,

three out of ten claimed that they would be building energy efficient houses by 1987 (Paul Allen and Associates Ltd., 1983).

Contractors also felt that consumers would perceive insulation as the most cost effective efficiencies measure that could be implemented, even though windows and doors are the most often quoted features to home owners looking to do upgrades (Paul Allen and Associates Ltd., 1983). As well, in the report (1983), builders claimed that "...they would install smaller high efficiency furnaces if [the furnaces] were cheaper...and that furnaces would become smaller over the medium term [to 1992]..."

The survey outlined contractor perceptions and practices in view of incorporating energy efficiency. Completed in 1983, this study is relatively old—over twenty years, but it does provide a useful counterpoint in understanding where energy efficiency is today, as opposed to what the contractor's expectations were. One respondent had a negative opinion of government intervention:

Expectations of people wanting to purchase new homes will have to decrease...The government should keep their noses out of subsidized housing. All it does is creates slums, it lowers building standards...our biggest problem is red tape...Let us come up with what is practical, then put it into bylaws (Respondent to question 15 in report by Paul Allen and Associates Ltd., 1983).

The respondent goes on to provide their opinion that there is a greater need to concentrate on training people to complete retrofits properly:

Technology for building new homes today is available...the problem is transmitting to the builder and explaining to the public that 80% of the homes that we will live in have already been constructed, therefore, the greater need is in retrofits...people who build homes have to be trained more carefully..." (Respondent to question 15 in report by Paul Allen and Associates Ltd., 1983).

These findings in 1983 indicate a need for further education for consumers as well as builders, but it also indicates a worrisome non-trend: energy efficiency did not, as the contractors assumed, "take off and become common place" as predicted. In fact, statistics from Natural Resources Canada's 1997 Survey of Household Energy Use and their 1995 Home Energy Retrofit Survey both indicate that only one in twenty five households

increased attic insulation, that one in ten home owners were replacing windows as “energy conservation” measures, and that contractors were still not incorporating energy efficiency measures as standard renovation practices. Where does this leave us in 2004? Obviously, needed changes and education around energy efficiency measures for various stakeholders has not become fully mainstream as predicted in 1983. While advances have been made since 1983 in educating home owners and other stakeholders, more work is needed as indicated by both the 1995 and 1997 reports in order to enhance energy conservation participation.

2.13 City and Local Government’s Role

A survey conducted in 1980 of American cities cite two main reasons for improving energy efficiency within their jurisdictions, one being to minimize vulnerability to energy shortages and secondly, to improve economic activity within their boundaries (Lee, 1980). The rationale Lee (1980) presents for improving energy efficiency within American cities can be applicable to Canadian cities such as Winnipeg. While Winnipeg could benefit from the economic activity resulting from improving energy efficiency and while mass energy efficiency upgrades within Winnipeg could also provide some energy security for Winnipeg, current legislation and practices in the City of Winnipeg are not reflecting Lee’s rationale, even today in 2005, twenty five years after Lee’s report.

European countries such as Denmark have prioritized energy efficiency. Denmark has developed an energy response that is based largely on demand side management and is enacted at all levels of government, including the municipal level. In the 1980s, the Danish parliament gave municipalities the authority to create energy use plans and aided in the design of district heating systems (Danish Board of District Heating, 2004). Denmark’s energy policy uses mandatory measures within municipalities to improve energy efficiency as a way to improve energy savings.

This [energy savings] will be done through a combination of various measures that will include the introduction of mandatory energy efficiency requirements for energy-effective procurement. In the public municipal and regional sectors, an energy-saving pool financed through

contributions from energy consumption in counties and municipalities [will also be undertaken] (Danish Ministry of Energy and Environment,1996).

The Danish government has worked with its municipalities and counties to establish mandatory measures such as the energy savings pool and has also worked with its municipalities and counties to help enforce other conservation measures within the local government. The following are a selection of measures Danish municipalities must incorporate:

- Improve the incentives to implement energy conservation in public buildings. Among other things, this can be achieved by ensuring that a proportion of the energy conservation achieved can be used to the benefit of individual institutions and their staff, as well as by making a special effort directed at public institutions in rented accommodation.
- Introduce regulations to ensure that only office equipment which meets given standards of energy efficiency is purchased.
- Ensure that counties and municipalities by their activities promote energy saving efforts at the local level, including by introduction of "green accounts".
- Promote the use of third party financing of the implementation of energy saving measures (Danish Ministry of Energy and Environment,1996).

The Danish government has recognized the usefulness of incorporating energy efficiency at the municipal level and has done so through taxes, building codes, education, and zoning. The Danish model of implementation of energy efficiency at the municipal level is similar to Lee's American model, however Canada has not followed suite with either the United States of America or Denmark. The following mechanisms for mandating energy efficiency—taxes, zoning, and building codes—are available within Winnipeg, but the opportunity they represent to improve energy efficiency have not been seized upon. Lee outlines three principles that cities may use to aid in encouraging energy efficiency within cities. These principles include:

1. tax incentives
2. utilizing zoning authorities to influence energy conservation and
3. local building codes

Lee states that tax abatement programs for energy efficiency can be effective tools for incorporating energy efficiency into local governments. Development and preference for projects that include and meet locally designed energy efficiency criteria are another way that Lee sees cities as being able to help create energy efficient cities. Lee does note that property taxes tend to "...be regressive and place a disproportionate burden on lower income people (Lee, 1980).

Lee (1980) indicates that linking property taxes to energy efficiency can only be done and embraced by local populations if other variables favorable to energy efficiency are also in place. For example, zoning is a land use regulating tool that is used to control how cities shape themselves. However, energy concerns have not to date been included as zoning objectives, therefore, zoning is still an underutilized tool in regards to improving energy efficiency. Lee (1980) states that:

Traditional uses of zoning authorities have evolved slowly, and it will be an equally slow process to adjust these traditional perceptions in order to substitute new goals, e.g., energy efficiency...also older cities tend to have more rigid perceptions of zoning goals than newer communities.

It is suggested by Lee that zoning options for improving energy efficiency at the city level are optimal given that many large cities are attempting to create high density housing neighbourhoods and more energy efficient transport grids. By having a city such as Winnipeg influence energy efficiency in all the major sectors—residential, commercial, transportation, and industry—the city helps acclimate local residents to an overall environment of sustainability. The role of zoning and taxes within the City of Winnipeg to encourage energy efficiency has not been embraced.

A Citizen's Perspective Survey, (City of Winnipeg, 2004) did not include energy efficiency in its environmental category, so it is difficult to assess Winnipegger's perspective on energy efficiency. In Plan Winnipeg 2020 Vision, the City of Winnipeg does indicate improving energy efficiency as a priority in the "Environment, Amenities,

Image” chapter, (City of Winnipeg, 2001). The City of Winnipeg indicates that the following will be used to promote energy efficiency:

- promoting education and awareness through customer information programs and other communication methods;
- implementing an energy management plan to improve energy efficiency, lower utility operating costs, and decrease emissions from civic buildings, structures, and City-operated vehicles;
- encouraging energy efficient design in the planning of future residential, commercial, and industrial subdivisions;
- encouraging energy efficiency in new construction and the retrofitting of existing homes as a requirement in neighbourhood revitalization initiatives; and
- reducing the reliance of the urban transportation system on non-renewable energy sources by providing realistic alternatives to single occupant auto use, by integrating land use and transportation planning, and by promoting compact urban form and mixed land use.

(City of Winnipeg, 2001)

Another publication by the City of Winnipeg, The City of Winnipeg’s Action Plan 2000 – 2002 also indicated that improving energy efficiency was a priority and indicated that in co-operation with Manitoba Hydro (access to information), the City was going to promote energy efficiency to Winnipeggers by:

- Providing electrical energy conservation advice to the public regarding global warming and greenhouse gas emissions,
- Providing energy audit assistance,
- Providing information on energy saving techniques and methods,
- Promoting energy efficient products through retailers, and
- Provide energy management consulting and advice to all civic departments.

(City of Winnipeg, 2001)

To date, there has not been any evidence that the City has implemented any of the above recommendations. In addition, it should be noted that these recommendations would prove potentially difficult for low income, inner city groups to access, due to the following challenges:

- Transportation issues to reach retailers providing energy efficient products—the advent of big box stores are conveniently located in the suburbs for consumers with higher income and more importantly, automobiles,

- Economic cost of energy efficient products may be out of range for low income groups,
- Communication issues as low income groups may be English as a Second Language, or have less education, making it difficult to understand the energy efficiency information, and
- Low income groups may not prioritize information about reducing green house gases in light of more pressing concerns such as paying the rent, buying food, and other daily life necessities.

The City of Winnipeg's Action Plan for implementing energy efficiency similarly reflects the challenges rooted in other energy efficiency programming, indicating that the City did not consider the needs of multiple user groups found within the residential sector. Another option that the City of Winnipeg should consider, but has not, as indicated by its omission in the Action Plan and Vision 2020 documents, is building codes and the opportunities that they represent for improving energy efficiency.

Lee (1980) suggests that local building codes present an opportunity for developing and encouraging local energy efficiency initiatives. While building codes necessarily deal with safety and structural stability, the National Building Code does not selectively reference energy efficiency as necessary to incorporate. Currently, there are some jurisdictions that are including energy efficiency in their local adaptations of the National Building Code. Both the National Energy and Building Codes are created by the Canadian federal government and adopted by the provinces. The wide variance in adopting aspects of both codes is due to the varying climatic and geographic requirements in each province (snow and wind loads for instance), in addition to the political will of each province to implement aspects of the code. Political will at both provincial and city levels to implement all aspects of the Model Energy Code or to go beyond the National Building Code and legislate stricter residential building practices such as R 2000 is low, mainly because "houses vote and businesses don't" (Anonymous, 2004). Home owners vote and if they do not appreciate stricter implementations, they will indicate their displeasure. The delineation between residential and industrial/business sectors is also reflected in available energy efficiency programming. Residential programming tends to be "soft" (not mandatory) with many incentives, while commercial programming also provides incentives to make changes—often in areas where the Building Code is going to

require changes in the future. The following tools and tool use areas are suggested by Lee (1980) as areas in which cities can influence positive energy efficiency trends. Part of Lees recommendations focus on policies and codes such as the National Energy Code.

Table 19 Tools for Positive Energy Efficiency

Area	Tool
Urban Development Patterns	Zoning ordinances to optimize layout of new subdivisions, develop criteria for energy efficiency in code, retrofits, and new builds
Energy Use in Buildings	Addendums to municipal codes that include energy efficiency as a prerequisite for project approval. Property tax incentives for energy retrofits, restrictions to outside lighted signs and decorative lighting—both residential and commercial, financial assistance for energy-related improvements.
Transport	Policy development for reducing transportation grids, commuter and traffic control activities such as car-pool lanes, commuter laws, etc.
Energy Production and distribution	Use of locally produced/recaptured methane from landfills, solar, wind applications.
Energy consumption by residents	Sales, income and property tax policies on energy conserving home improvements, education and energy information services, policies on building codes, transport, and land use.
Consumption by local government	Development of energy efficiency policies for all municipal buildings—rented or owned, new and for retrofits, energy conservation measures for street lights and improvement of public facilities, inclusion of energy as an explicit item in budget development.

(Lee, 1980)

Lee suggests that the above tools, when applied to various sectors, may set in motion a larger energy conservation mentality than measures carried out individually, and may therefore improve the overall energy efficiency of a city.

2.14 Barriers to Efficient Use of Energy by Low Income Groups

Market barriers to increasing energy efficiency are largely due to a lack of information about energy use and related costs and technologies available to reduce energy use (Unterwurzacher and McInnes, 1991). Customers also do not have access to the information about investing in general and energy efficiency technologies...they make decisions to meet their day to day requirements, of which energy efficiency related decisions represent only a small part..." (Unterwurzacher and McInnes, 1991). Other barriers as outlined in the West Broadway demographics section includes income levels, education levels, and comprehension abilities related to technical information regarding improving energy efficiency.

This situation [in America] is especially true in communities who perceive energy building codes as yet another regulatory barrier to local economic development" (Lee, 1980). For Canada, a potential support tool for improving energy efficiency in all buildings is Canada's National Building Code. In addition to Canada's National Building Code, incentives for local communities to implement a set of federally-mandated standards without appreciable federal monies are weak. For Canada to implement energy efficiency programming at the local community level, the federal government must harmonize and coordinate policies, regulations, codes, programming, and funding criteria.

2.15 Canada's Utilities and Energy Providers

In Canada, the provision of electric power is within the provincial jurisdiction and is organized along provincial boundaries. Current energy providers in Canada include Crown corporations, investor-owned utilities, municipal utilities, and industrial establishments that generate their own power such as some mining companies, (Linke, 2000). In most provinces, power generation, distribution, and transmission are provided by a few large utilities. Regulation occurs entirely at the provincial level. The federal regulatory role is restricted to nuclear energy and international and inter-provincial trade (Linke, 2000).

There are sixteen major electric utilities, seven are provincially-owned Crown corporations, five are investor owned, two are municipally owned, and two are territorially-owned Crown corporations. Provincial electric utilities owned about 83 percent of Canada's total installed generating capacity and produced about 79 percent of total electrical energy in 1995. The five investor-owned utilities accounted for 7.5 percent of all Canadian electric utility capacity and produced about 9.4% of total electricity. About half of the Canadian provinces are responsible for the majority of hydroelectric energy production in Canada, with Quebec being a market leader (Rothman, 1999). The largest producers are provincially-owned electric utilities are:

- Hydro-Quebec
- BC Hydro
- Manitoba Hydro
- Ontario Power Generation
- Newfoundland and Labrador Hydro (Natural Resources Canada, 2004)

Municipally-owned utilities accounted for 1.6 percent of capacity ownership, and produced 1.6 percent of total generated electricity. The two territorially-owned Crown corporations accounted for 0.3 percent and 0.2 percent of capacity and generation, respectively (Linke, 2000). In addition to these major electric utilities, there are about 60 industrial establishments generating electricity mainly for their own use. A few also sell energy to municipal distribution systems or utilities.

In addition to the major electric utilities and industrial establishments, there are about 364 smaller utilities across Canada, of which 87% are located in Ontario (Linke, 2000). In terms of programming to improve energy efficiency and energy consumption behaviors, the many utilities and energy providers creates some challenges in terms of program harmonization, especially since utilities are organized along provincial lines and some of the programming is organized by the federal government.

The following section provides an overview of existing residential energy efficiency programming in each of the provinces. The purpose of having an overview of all available provincial programming is to examine potential patterns of programming,

similarities or differences, or even the amount of available programming. The following charts provide a summary of the programming available by category across Canada. For information about a specific program in a specific province, please see the appendix. The following legend provides an explanation for the programming categories. Each province is also assigned a code as listed below.

Prince Edward Island = (E)
Newfoundland/Labrador = (Q)
Nova Scotia = (R)
New Brunswick = (S)
Quebec = (S) New Brunswick receives its programming from Quebec, so they share the same code
Ontario = (ZZ)
Manitoba = (M)
Saskatchewan = (N)
Alberta = (B)
British Columbia = (P)
Yukon = (Y)(Z)
Northwest Territories = (NT)
Nunavut = (Z)

Each program was evaluated to determine its main focus and priority. Based on an examination of programs, the following categories were developed for programming. Each category was assigned a number in order to easily organize charts.

Legend

1 = Information
2 = Education
3 = Incentive
4 = New home builds
5 = Rebate programs
6 = Retrofit program (building shell only)
7 = Retrofit, furnace and/or electrical system
8 = Home retrofit
9 = Complimentary products
10 = Contests with prizes
0 = online e.g. Q1-0 indicates that a program in Newfoundland is information (1) found online (0)

Eight categories were created in order to see what programming was available for any of the eight groups. The categories were defined as follows:

- All program (In order to determine how much programming was available by province)
- Programming that focused on household appliances, operating, and lifestyles
- Retrofits: Programming that focused on buildings shell retrofits (insulation, windows, large mechanical appliances, such as water heaters)
- Furnace retrofits/conversions: Programming that focused on upgrading existing furnaces to mid to high efficiency furnaces
- New homes: Programming specifically for new homes (Note that this chart does not include the R-2000 programming and lists programs that can be applied to new homes)
- Rural, remote, and First Nation: programming specifically for these groups
- Senior citizens and low income groups: programming specifically for these groups

Table 20 Available Energy Efficiency Programming across Canada

Type	PEI (E)	NFLD /Lab (Q)	NS (R)	NB (S)	Que (S)	Ont (ZZ)	MB (M)	Sask (N)	Alb (B)	BC (P)	Yuk (Y),(Z) NWT (NT) Nun (V)
Information	E1-O E2-O E3-O E4-O E5-O	Q1, Q2-O Q3-O Q4-O Q6 Q9-O X10-O	R1-O R3-O	S1-O	S1-O S2-O, S5-O S6-O S7-O	ZZ1 to ZZ36	M1-C-O M1-D, M2-O M3 M6-O M7-O M8-O M9-O	N1-O N3-O N4-O N5-O	B1-O, B2-O B4-O H1-O J1-O B5, B6-O B7-T B8-O B9-O B10-O B11-O B12-O	P07 (O) P08 (O) P10 (O)	Y1-O, Z1 NT1 V1-0
Education	E3-O E4-O E5-O	Q6, Q9-O X10-O	R1-O R3-O		S1-O S2-O S5-O S6-O	ZZ1 to ZZ36	M1-C-O M1-O M2-O M3 M4 M6-O M7-O M8-O M9-O	N1-O N3-O N4-O N5-O	B1-O, B2-O B4-O H1-O J1-O B7-T B8-O, B9-O B10-O B11-O B12-O	P06 (O) P09 (O) B5	Y1-O, Z1 NT1 V1-0
Incentive		Q5 Q6 Q7 Q8					M1-B, M5, M10 M12		B3	P02 P03	Z2,Z3
New home build							M4			P01 P05	
Rebate		Q5 Q6 Q7			S3-O S4		M10			P04	
Retrofit (shell only)							M1-B	N2			

Table 20: Continued: The following is a list of all current residential programming in Canada's provinces:
All programs

Type	PEI (E)	NFLD /Lab (Q)	NS (R)	NB (S)	Que (S)	Ont (ZZ)	MB (M)	Sask (N)	Alb (B)	BC (P)	Yuk (Y),(Z) NWT (NT) Nun (V)
Retrofit furnace/ electric system		Q7					M1-B M5	N2			Z2, Z3
Home retrofit							M1- A, M1-B M4 M5	N2			Z2,Z3
Free product							M3				Z1
Contest with prizes							M9-O				
Rebate		Q5 Q6 Q7			S3- O S4		M10			P04	
Retrofit (shell only)							M1-B	N2			

Table 21 Available Programming across Canada for Appliances and Lifestyles

Table 21: The following table summarizes the range of current residential programming in Canada's provinces for: Appliances/lifestyles											
Type	PEI (E)	NFLD/ Lab (Q)	NS (R)	NB (S)	Que (S)	Ont (ZZ)	MB (M)	Sask (N)	Alb (B)	BC (P)	Yukon(Y),(Z), NWT (NT), Nun (V)
Information	E1-O E-O E3-O E4-O E5-O	Q1, Q2-O Q3-O, Q4-O Q6, Q9-O X10-O	R1-O, R3-O	S1-O	S1-O, S2-O, S5-O, S6-O, S7	ZZ1 to ZZ36	M1-C-O, M1-D, M2-O, M3, M6-O, M7-O, M8-O, M9-O	N1-O, N3-O, N4-O	B1-O, B2-O, B4-O, H1-O, I1-O, J1-O, B5, B6-O, B7-T, B8-O, B9-O, B10-O, B11-O, B12-O	P07 (O), P08 (O), P10 (O)	Y1-O, Z1, NT1, V1-0
Education	E3-O E4-O	Q6, Q9-O X10-O	R1-O, R3-O		S1-O, S2-O, S5-O, S6-O	ZZ1 to ZZ36	M1-C-O M1-D M2-O M3, M6-O, M7-O, M8-O, M9-O	N1-O, N3-O, N4-O	B1-O, B2-O, B4-O, H1-O, I1-O, J1-O, B5, B7-T, B8-O, B9-O, B10-O, B11-O, B12-O	P06 (O), P09(O)	Y1-O, Z1 NT1, V1-0
Incentive		Q6, Q8					M12			P02, P03	
New home build											
Rebate programs		Q6			S3-O, S4						
Free products							M3				Z1
Contests							M9-O				

Table 22 Available Programming across Canada for Building Shell

Table 22: The following table summarizes the range of current residential programming in Canada's provinces: Retrofit (building shell—insulation, windows, large mechanical appliances such as water heaters)											
Type	PEI (E)	NFLD Lab (Q)	NS (R)	NB (S)	Que (S)	Ont (ZZ)	MB (M)	Sask (N)	Alb (B)	BC (P)	Yuk (Y),(Z) NWT (NT) Nun (V)
Information											
Education/ training											
Incentive		Q5 Q7					M5 M1 0				
Regulatory											
Policy											
New home build							M5			P01	
Rebate programs		Q5					M1- B, M1 0		B3	P04	
Retrofit program		Q5					M1- A M1- B M1 0	N2			

As can be seen in Tables 21, 22, and 23, there are many programs available throughout all of Canada that deal with improving energy efficiency. The programs are relatively evenly distributed throughout Canada and use a variety of mechanisms such as incentives, education, information, and rebates to convince customers to improve their energy efficiency.

Table 23 Available Programming across Canada for Furnace Retrofits/Conversions

Table 23: The following table summarizes the range of current residential programming in Canada's provinces: Furnace retrofits/conversions											
Type	PEI (E)	NFLD Lab (Q)	NS (R)	NB (S)	Que (S)	Ont (ZZ)	MB (M)	Sask (N)	Alb (B)	BC (P)	Yuk (Y),(Z) NWT (NT) Nun (V)
Information								N5			
Education											
Incentive		Q7					M5	N5			
Regulatory											
Policy											
New home build											
Rebate programs		Q7									
Retrofit program							M1- B, M5	N2	B3		Z2,Z3

As seen in Table 23, there is less programming available for furnace retrofits/conversions, even though research indicates that improving the heating system is one of the most cost effective energy efficiency upgrades.

Table 24 Available Programming for New Housing

Table 24: The following table summarizes the range of current residential programming in Canada's provinces: new housing											
Type	PEI (E)	NFLD Lab (Q)	NS (R)	NB (S)	Que (S)	Ont (ZZ)	MB (M)	Sask (N)	Alb (B)	BC (P)	Yuk (Y),(Z) NWT (NT) Nun (V)
Information											
Education							M4				
Incentive											
Regulatory											
Policy											
New home build							M4, M5,			P05	
Rebate programs											

Table 24 illustrates that there is some programming available for new homes. The programs listed here for Manitoba are the R2000 program and promote the adoption of the R2000 standard by contractors. In addition, Manitoba has the Earth Power Loan (M5) which helps home owners off set the cost of installing geothermal heating systems. The program in British Columbia promotes Power Smart houses as a building alternative for contractors and prospective home owners.

Table 25 Available Rural, Remote, and First Nation Programming

Table 25: The following table summarizes the range of current residential programming in Canada's provinces: Rural, remote, and First Nation											
Type	PEI (E)	NFLD Lab (Q)	NS (R)	NB (S)	Que (S)	Ont (ZZ)	MB (M)	Sask (N)	Alb (B)	BC (P)	Yuk (Y),(Z) NWT (NT) Nun (V)
Information											
Education											
Incentive											
Regulatory											
Policy											
New home build											
Rebate programs											

As can be seen in Table 25, there are programs focused on rural, remote, and First Nations groups. These groups are required to access programming as part of the larger, residential sector. Problems with including rural, remote, and First Nations groups in the wider programming categories include issues around language, access to internet (for information and to access programs only available via the internet), and ownership barriers. Not all First Nations groups own their own homes and due to unique band ownership laws and federal laws, they may not be able to make upgrades to their housing. Therefore, it is important to provide programming that focuses on rural, remote, and First Nations groups because these groups often pay more for heating while living in poor quality housing. For rural groups using wood furnaces, there is even less available programming that they qualify for.

Table 26 Available Senior Citizen and Low Income Programming

Table 26: The following table summarizes the range of current residential programming in Canada's provinces: Senior citizens, low income

Type	PEI (E)	NFLD Lab (Q)	NS (R)	NB (S)	Que (S)	Ont (ZZ)	MB (M)	Sask (N)	Alb (B)	BC (P)	Yuk (Y),(Z) NWT (NT) Nun (V)
Information							M3- S				
Education							M3- S				
Incentive											
Regulatory											
Policy											
New home build											
Rebate programs											
Complimentary products							M3- S				

L = Low income

S = Senior citizen

As indicated by Table 26, there are few programs focused on senior citizens and none specifically for low income groups. This table may reflect programmers ideas that low income and senior citizen populations are being captured by other programming and that there is no need for designing programming specifically for these groups.

Table 27 Available Programming for Apartments, Condos, and Multi-Family Dwellings

Table 27: The following table summarizes the range of current residential programming in Canada's provinces: Apartments, Condos, and Multi-family dwellings											
Type	PEI (E)	NFLD Lab (Q)	NS (R)	NB (S)	Que (S)	Ont (ZZ)	MB (M)	Sask (N)	Alb (B)	BC (P)	Yuk (Y),(Z) NWT (NT) Nun (V)
Information											
Education											
Incentive											
Regulatory											
Policy											
New home build											
Rebate programs										P04	

As indicated by Table 27, there was only one program that specifically targets and promotes energy efficiency in multi-family dwellings. The program is not tenant based. It targets property managers and owners to upgrade their apartment block's energy efficiency through the installation of new windows and/or insulation. Applicants must meet a variety of criteria in order to be eligible for the incentives.

What these tables illustrate is that while there may be a lot of programming available, none of it fully meets the needs of low income groups due to barriers such as technology requirements (access programming online), ownership issues (many programs require that the applicant own their accommodation in order to upgrade it), and language issues (need to be able to understand and complete paperwork to qualify for programming). It may be seen in each of the tables that Manitoba did have programming in many of the categories, but there is still a need to provide programming that focuses on sub groups within the

residential sector. The residential sector as a whole need to improve energy efficiency and low income groups are also part of this larger group.

While there are many programs in all provinces and territories that are focused on residential demand side management, the programming is considered to be “soft” because they are incentive based rather than regulation based. While the residential sector does fall into the Large Final Emitters Group (LFEG), it is the only group that uses incentives rather than regulating change. NRCan’s definition of LFEGs are “...companies that produce goods in emissions-intensive sectors including primary energy production, electricity production, and selected areas of mining and manufacturing production (NRCan, 2003). LFEGs are regulated by the federal government to reduce green house gas emissions to a pre-set level. LFEGs account for 46 percent of green house gas emissions (NRCan, 2002). As part of the LFEG group, the commercial, institutional, and residential sector only account for 11 percent of emissions (NRCan, 2002). However, reducing this sector’s green house gas emissions still requires attention.

A review of existing programming across Canada indicates that current programming is targeted to what is assumed to be a fairly homogenous group as indicated by the lack of programming specifically focused on apartments, apartment dwellers, low income groups, and First Nation groups. While there are some programs that are focused on seniors and rural residential groups, the majority of the programming falls into the catch all category of residential.

Other reasons that may influence the development of programming focused on the larger residential category as opposed to residential sub-sectors may include the following reasons: the cost involved in developing programming for specific needs groups may be higher and the lack of data/information surrounding these group’s energy behaviours patterns may be non-existent or difficult to assess. As seen in the previous tables, low income groups do not have programming specifically designed for them or for their housing providers.

The following table is a breakdown of Energuide for Houses delivery agents in each province and the number of delivery organizations in each province. Please note that the number of delivery agents is subject to change and this information is only valid for 2004.

	PEI	NFLD	NS	NB	Que	MB	SK	Alb	BC	Yukon	NWT	Nun	Ont
Average # of Energuide for Houses delivery agents/province	2	1	3	2	4	2**	1	4	7	1	1	**	20

Price range of Energuide for Houses assessment, not including taxes, but including, if any, subsidies from NRCan: Cost of assessments ranges from one hundred dollars to three hundred, with the majority at one hundred and fifty dollars and one at one hundred and twenty five. Prices for assessments are time sensitive and subject to change, therefore the following prices are current for 2004 only.

- PEI: \$150 to \$300
- NFLD/LAB : \$150.00
- Nova Scotia: \$150
- New Brunswick \$150 to \$350 (One delivery agent charges \$150 for houses 2,000 square feet and under, with an additional \$50 per 1,000 square feet of house to evaluate).
- Quebec: \$150 to \$300
- Manitoba: \$100 to \$150
- Saskatchewan: 150
- Alberta: \$150 to \$300
- British Columbia: \$150 to \$300
- Yukon: \$300
- Northwest Territories: \$125
- *Nunavut: N/A (No delivery agent at this time)
- Ontario: \$160 to \$350 (Several delivery agents charges a base fee of \$160 for houses 2,000 square feet and under, with an additional \$50 per 1,000 square feet

of house to evaluate. In addition, several agents also charge a higher rate if the house to be evaluated is outside of their delivery service area—therefore the base fee may start at \$175 or \$180 and then if the house is over 2,000 square feet, be adjusted accordingly).

****Manitoba Hydro:** A second delivery agent, AmeriSpec is now an EnerGuide for Houses delivery agent. AmeriSpec charges \$150 and Manitoba Hydro charges \$100. AmeriSpec became a delivery agent in October, 2004 in Manitoba. Manitoba Hydro did charge \$75 in 2004 with the price changing to \$100 in 2005.

2.16 Literature Review Conclusions

Programs available for low income groups are minimal in Canada, the United States of America, and in Europe. However, there are models that try to incorporate low income energy conservation needs. The BREhome concept from the United Kingdom does try to develop energy conservation strategies around housing stock age and household energy consumption. In the United States, Ternes et al., (1997) discusses the applicability of a military housing Renovation Guide to low income situations. However, in both of these models, there is no mechanism for anything beyond information transfer. In both models, there is no built in access to funds to complete upgrades.

The models and programming examined in this chapter focused mainly on information sharing and the opportunities for energy savings that energy labeling represents. It is evident that without mechanisms to complete energy efficient upgrades, low income groups will not be able to aid in energy conservation.

The Needs Based Model (Fitt, 1986), discussed earlier in this chapter would best be able to support low income groups choosing energy conservation measures. The Needs Based Model is a mathematical tool for developing energy conservation programming and targeting it to the areas of highest need. Therefore, dispossessed groups such as low income groups, First Nations, and other groups would fit the definition of “highest need”

and the argument could then be made to focus program development and funding in this sector.

Low income groups need mechanisms such as energy loans, support staff, and information to help these groups access the programming. In addition, the literature review also indicates that residential programming should be substrated and targeted for various groups within the residential sector because current practices of grouping all residents in one group is not working well for dispossessed groups.

Policies surrounding energy efficiency need to be inter-related and consistent from the federal to the provincial to the municipal levels in order to achieve energy efficiency in individual households. Connecting taxation, zoning, and mandated energy efficiency ordinances has been shown to work in parts of the United States; therefore, similar connections need to be attempted in Winnipeg at the municipal level in order to bring all stakeholders into the same energy efficiency paradigm.

An examination of available programming across Canada also identified a programming gap for low income groups. None of the utilities across Canada provided low income specific programming. There is a need for Canadian utilities to create programming for larger, sub-sectors of the residential population that current programming may be missing.

CHAPTER 3

METHODS

3.0 Introduction

Several methods were used to identify current program use by low income groups and to identify opportunities and challenges to access of energy efficiency programming by low income groups. In the conduct of this research, the following methods were used:

- Literature review of existing energy efficiency programming for low income groups in Canada, United States of America, and Denmark,
- Provincial survey of existing utilities and residential energy efficiency programming,
- Snowball sampling (expert opinion) of community experts at the community, city, provincial, and federal level,
- Focus group about existing Manitoba Hydro residential energy efficiency programming,
- Structured/semi-structured interviews/self selected sampling (used for the mail-in and email surveys) with Manitoba Hydro contractors and low income home owners,
- Direct observation of Manitoba Hydro contractors performing EnerGuide for Houses assessments and of home owners,
- Surveys of low income residents and low income housing providers,
- Community participation of the researcher in low income housing gatherings and conferences, and
- Ecological footprint survey of three types of housing dwellers in West Broadway.

3.1 Project Initiation and Development

Through the researcher's interest in the area of West Broadway, initial contact was made with West Broadway Development Corporation's Executive Director at the time, Paul Chorney, to discuss the feasibility of undertaking research in the West Broadway

neighbourhood. Initially, the researcher sought permission for undertaking research in the neighbourhood in order to develop and establish a good working relationship. It was deemed to be both necessary and beneficial to accessing neighborhood information and people because the researcher's preliminary research indicated that due to several unique characteristics, West Broadway residents and neighbourhood associations were experiencing "research fatigue" and were suspicious of researcher's coming into the neighbourhood and "never coming back and telling us what they learned..." (Anonymous West Broadway resident, 2003). Further to discussions with Mr. Chorney of the West Broadway Development Corporation and Dr. Shirley Thompson of the Natural Resources Institute, Clayton H. Riddell Faculty of the Environment, Earth, and Resources, University of Manitoba, about potential research topics, the researcher gained informal support from West Broadway Development Corporation to pursue her research interest.

Preliminary research and communication with Mr. Chorney confirmed the researcher's initial hypothesis—that few low income families or the Community Development Organizations working in the field of low income housing were taking advantage of Manitoba Hydro's PowerSmart Programming, programming whose objective it is to improve energy efficiency in both residential and commercial buildings. For people living in low income situations, the opportunity to lower their heating bills by improving energy efficiency was potentially passing them by—the situation that the researcher set out to explore.

A proposal was developed and submitted to Manitoba Hydro outlining the researcher's objectives of examining their PowerSmart Programming as its applicability to low income, inner city neighbourhoods. Development of the proposal was conducted through communication between Dr. Shirley Thompson of the Natural Resources Institute, University of Manitoba, the researcher, and Ms. Pam Vernaus, Marketing, Manitoba Hydro. This research used qualitative methods within an overarching paradigm of participatory action research paradigm as outlined in the following section.

3.1.1 Rationale for Using Participatory Action Research (PAR) Paradigm

As was mentioned previously, the West Broadway neighbourhood has been utilized in many previous studies and case studies, both from the University of Manitoba and from the University of Winnipeg, as well as City researchers and other NGOs such as the Social Planning Council. These studies have covered a variety of issues such as architectural history, social issues such as poverty reduction and incidence, energy consumption studies, gentrification issues, community gardening opportunities, and the development of walking tours to list a few.

Because of the intense focus and use of the general area and population of West Broadway for research purposes spanning many years, people living in West Broadway were indicating that they were “fed up” (Anonymous West Broadway resident, 2003) with researchers entering the neighbourhood, conducting research, and then never providing conclusions and recommendations back to the community. In response to the needs of the neighbourhood, I decided to use a Participatory Action Research (PAR) methodology as the overarching paradigm that would connect and relate all subsequent methods used in my research. It was hoped that the use of PAR as an “umbrella” would do two things: 1) Create and build a trusting relationship between the researcher and local organizations and individuals in the current research and 2) Act as an “ambassador of good research practices” to aid in improving the potential for future research and dissemination opportunities between the universities and neighbourhoods.

While PAR is commonly used in social work, there is no formal documentation of PAR being adopted for research into housing and/or energy efficiency research. The elements of PAR—communication, transparency, formal and informal opportunities for dissemination, and researcher bias recognition—are easily recognizable and are often implemented informally into research projects either singly or jointly; however this project wanted to ensure adoption of PAR elements by using PAR as the research foundation. It was felt that continual awareness of PAR elements would aid in dispelling some of the negative feedback of residents towards researchers in general and aid in rebuilding resident perceptions. Design charettes used in architecture focus on

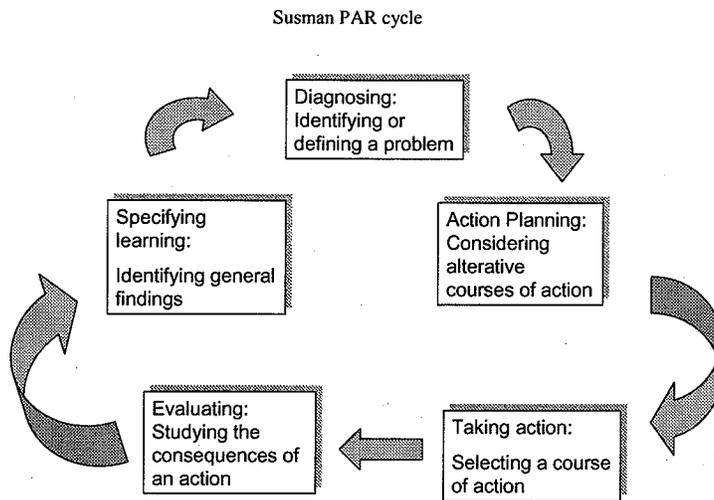
incorporating “non-expert” advice such as occupants, building services providers, etc. but does not, as a paradigm, have the same level of interaction as PAR. It should also be noted that design charrettes are currently used in the design of new buildings or spaces and as such did not have the same fit as PAR in creating a relationship with a well-established community neighbourhood to understand access and use of existing programming. The decision to utilize a modified PAR approach resulted in several positive outcomes and some unexpected unconstructive outcomes, both of which will be outlined further in the document—but what exactly is PAR and why is it an important research methodology?

3.1.2 What is PAR?

A succinct definition of Participatory Action Research, or PAR, would be, “...learning by doing...” (O’Brien, 1998). PAR is known by many other names, including participatory research, collaborative inquiry, emancipatory research, action learning, and contextual action research, but all are variations on a theme. While “learning by doing” is the essence of the approach, there are other key attributes of action research that differentiate it from common problem-solving activities that we all engage in every day (O’Brien 1998). A more detailed definition is,

“Action research...aims to contribute both to the practical concerns of people in an immediate problematic situation and to further the goals of social science simultaneously. Thus, there is a dual commitment in action research to study a system and concurrently to collaborate with members of the system in changing it in what is together regarded as a desirable direction. Accomplishing this twin goal requires the active collaboration of researcher and client, and thus it stresses the importance of co-learning as a primary aspect of the research process.” (O’Brien 1998).

PAR has five critical steps (Susman 1983), as outlined below:



As indicated in Susman's (1983) cycle above, this project's evolution and development of examining energy efficiency for low income groups was based on the five stages of PAR. For this project, responding to and identifying factors that impact access to energy management programming was key; and was undertaken by attending community meetings, conferences, and by following the overall demand side management practices of Manitoba, as well as examining initiatives and policy directions of the Canadian federal government.

PAR has several unique attributes that separate it from other methodologies—its primary focus is in turning the people involved in the research into researchers as well—people learn best, and more willingly apply what they have learned, when they do it themselves (O'Brien 1998). Also, PAR has a social dimension because the research occurs in the "real world" and aims to solve real problems. Finally, the researcher, unlike in other disciplines, makes no attempt to remain objective, but openly acknowledges their bias (O'Brien 1998).

In researching and evaluating Manitoba Hydro's PowerSmart programming, PAR is an excellent tool, as the problem of identifying and understanding the use of the PowerSmart programming by low income neighbourhood organizations and individuals is a "real world situation." Secondly, the researcher can openly acknowledge her research bias—namely that increasing energy efficiency in low income neighbourhoods is beneficial to various groups. For example, increased energy efficiency is beneficial for Manitoba Hydro (potential for lowering demand for energy and selling electricity elsewhere), for low income individuals (potential for lowered heating bills and improved human health), for the environment (potential for less energy production resulting in less pressure on ecosystems), and other stakeholders such as the City of Winnipeg by furthering their goals of sustainability.

It was felt that understanding PAR, its application, and challenges in other fields would aid in this research project; therefore, the researcher attended a two day workshop on PAR and its value, limitations, and benefits as a research paradigm and methodology. The workshop was attended by many researchers with interests in poverty reduction, research with disabled populations, research into women's issues, working with youth and/or Elders, and other topics, however, this research topic—housing and energy efficiency issues within low income groups was unique amid the myriad of projects. As a paradigm, PAR is still relatively 'new' to the environmental sciences, although it has a long history in other disciplines.

3.2 PAR and Study Objectives

By using a modified PAR methodology, the researcher was able to quickly make contact with and maintain relationships with key experts working in Winnipeg's inner city neighbourhoods. It also aided in access to existing listservs in order to keep abreast of housing activities, issues, and meetings in Winnipeg. For further information on types of participatory action research, please see appendix.

There are many data collection methods related to the PAR paradigm, however, these methods are transferable and are used in many different research models. In the conduct of this research, the following methods were adopted:

1. Finding and critical review of secondary data (literature review)
2. Provincial survey
3. Snowball sampling (expert opinion)
4. Focus group
5. Structured/semi-structured interviews/self selected sampling (used for the mail-in and email surveys)
6. Direct observation
7. Surveys
8. Ecological footprint
9. Community participation

It should be noted that gaining access [to a community network] is not necessarily a single event: something once gained which is never again an issue (Fox, 1998). Rather it is a continuing process which may involve many people from different stratas of the organization. For the purposes of this research, use of the PAR paradigm and the above methods allowed and encouraged continual communication and feedback with the local housing community in West Broadway and within the City of Winnipeg.

3.3 Provincial Survey

A program overview of all Canadian utilities and their residential programming was undertaken. The survey examined what other types of residential demand side management incentive programs were being delivered in each of the provinces, and the local residential power costs. This sampling was then used to set the context to evaluate the scope of Manitoba Hydro's PowerSmart programming in reaching a broad residential market and to understand current programming directions within Canada.

3.4 Snowball Sampling

Snowball sampling is a useful tool for determining and accessing social networks to gather qualitative data. Snowball sampling is a technique for finding research subjects. One subject gives the researcher the name of another subject, who in turn provides the name of a third, and so on (Flint, and Atkinson, 2001).

Snowball sampling or expert opinion gathering, is a method commonly used to reach an informal group of people using their own networks to reach them. Snowball sampling can be placed within a wider set of methodologies (Spren, 1992) which seek to take advantage of the social networks of identified respondents to provide a researcher with an ever-expanding set of potential contacts (Thomson, 1997). This process is based on the assumption that a 'bond' or 'link' exists between the initial sample and others in the same target population, allowing a series of referrals to be made within a circle of acquaintance (Berg, 1988).

Snowball sampling can be used for two main reasons: the first being that it is an effective way to informally reach a population without directly setting out a strict dichotomy between the researcher and the participant, and secondly, this method has practical advantages (Flint, and Atkinson, 2001). When used in a PAR paradigm, snowball sampling allows community members to organize communication between the researcher and residents thereby creating and strengthening bonds of trust—which would otherwise take more time to generate—by having community members introduce the researcher to other community recognized leaders. Snowball sampling allows for rapid construction of expert networks that the researcher may tap into. In the case of this research, snowball sampling provided rapid access to community residents, city employees, university professors, NGOs, community groups, First Nations individuals, and private organizations with expertise on inner city housing issues.

I spoke with approximately sixty people in Winnipeg and other areas of Canada. In many cases, our interaction has been ongoing. The individuals came from the federal, provincial, and municipal levels of government, and from departments such as NRCan

and City Planning. I spoke with local MLAs, ministers responsible for housing, local community economic development individuals and organizations, local construction contractors, housing authorities, housing support organizations, architects, low income households, non-profit housing funding organizations, and demand side management program delivery agents. The purpose of speaking with such a diverse group of housing experts was to develop a perspective on housing that encompassed as many stakeholders as possible in a way that could connect to as many stakeholders as possible.

Snowball sampling is used most frequently to conduct qualitative research, primarily through interviews. Secondly, snowball sampling may be applied as a more formal methodology for making inferences about a population of individuals who have been difficult to enumerate through the use of methods such as household surveys (Flint, and Atkinson, 2001). In the case of this research, snowball sampling methodology was used to compliment literature findings and to build on focus group findings and surveys. In this research snow ball sampling allowed the researcher to reach experts identified by recognized community members in a relatively short length of time. As well, snow ball sampling also helped create an information network with other experts in other community development corporations, NGOs, community members, government organizations, and city representatives.

3.5 Focus Group

A focus group was held on April 7th, 2004, the purpose of which was to determine and verify West Broadway program findings and needs as being similar to other inner city neighbourhoods. Usually focus groups are a small group (3 - 8 persons) whose members are brought together by the researcher for an in-depth discussion of a specific issue or topic. The researcher plans an interview schedule and organizes the time and place. The techniques of conducting the focus group are similar to conducting an in-depth interview; however, the researcher needs to be able to manage up to eight people talking about the issue or topic (Society & Culture Association 2004). A good session requires a small, but representative sample of 'expert' participants to discuss a topic. These 'experts' may be

potential or current customers (or users), lead users, extreme users or possibly recognized technical experts in the particular field (Fraser, et al., 2003).

For the purposes of this study, two housing expert types were defined: 1) housing providers and 2) residents. The delineation between *providers* and *residents* was actively designed in order to understand if there was any difference of opinion within these two groups. Furthermore, an attempt was made to include some experts who had previously used the programming and potential customers of the programming. As well, my communication with various people within the West Broadway area also indicated that residents resented being treated and viewed as “non-experts” by researchers, arguing that they lived in the area and knew a lot about their own housing conditions and needs. Therefore, when the focus group was announced, local residents were also informed about it. Invitations were sent out to approximately thirty organizations and individuals who were viewed as housing “experts” by their respective communities—either through their activism around housing, renovation and building of low income housing, or by a combination of housing and livelihood improvements in their respective areas.

For this group there were four main questions that were asked in relation to Manitoba Hydro’s PowerSmart programming:

1. What do people want to see in terms of improving and expanding Manitoba Hydro’s existing programming?
2. What do people want to see Manitoba Hydro provide in terms of new programming?
3. What issues/challenges are being faced by low income families in accessing current programming to improve their housing?
4. What are some of the challenges of improving housing?

With these questions in mind, participants were asked to provide their expert opinions in a one and a half hour session. In accordance with ‘best focus group’ practices, an attempt was made to set the “right tone” by having a central location, waiving parking requirements, and providing handouts and most importantly, providing lunch. During the

focus group, participants filled out a survey to outline baseline understanding and use of energy efficient programs in their daily lives. This was followed by the researcher presenting an overview of current inner city housing conditions and rationale about why energy efficiency should be considered for low income housing. Ms. Pam Vernaus, Manitoba Hydro, presented an overview of current Manitoba Hydro energy efficiency programming. After lunch, the focus group began. Ms. Vernaus did not stay for the focus group portion of the workshop as it was felt that participants would be more open with their ideas if a representative of Manitoba Hydro was not present.

There were sixteen participants not including the facilitator, Dr. Shirley Thompson and the researcher. Participants ranged in age from eighteen to over sixty. Representatives from the community, seniors, First Nations, both genders, and local property managers with apartment blocks in West Broadway were present. The following organizations were also represented at the focus group:

- NACC (Northern Association of Community Councils)
- SEED Winnipeg (Supporting Employment and Economic Development)
- Murdoch Management (property managers)
- WRHA (Winnipeg Regional Health Authority)
- North Point Douglas Women's Centre
- Spence Neighbourhood Association
- Interlake Tribal Council
- University of Manitoba, Disabilities Studies
- Aboriginal Council of Winnipeg
- Westminster Housing Society
- West Broadway Board of Directors
- West Broadway Community Land Trust

Participants were asked if they would like a summary of the focus group findings. The summary was mailed/e-mailed, or faxed to all participants to allow for feedback on any of the categories or dissemination of the findings.

3.6 Structured/Semi-Structured Interviews

Completion of the mail-in and email Home Comfort and Energy Assessment Guide was undertaken using a structured/semi-structured interview with 11 mail-in surveys and eleven email surveys completed. The structured aspect of the interview involved the participant filling out the survey while I watched, during which time I kept track of the time it took for the participant to fill out the questions and noted how many and which questions or sections that the participant was having trouble filling out.

After the participant finished filling out the information, the researcher spent the necessary amount of time helping to fill in questions that had been left blank. This process was completed as an aid to the participant for developing a complete energy profile. During the time taken to fill out the survey, notes were made of any of the participant's questions or observations about the survey. Once the findings were returned to the participant, they were asked if they would consider implementing any of the changes in the report and asked if they had any observations about the readability and understandability of the report.

Both structured and semi-structured interviews require face-to-face contact and are useful in a PAR paradigm because they provide the researcher with the ability to probe for more details, and help access hard to reach populations, such as low income households. "Certain groups, for instance the homeless or criminal offenders, are difficult or impossible to reach by any method other than personal interviews" (Rea, Parker, 1992).

For West Broadway, it was already known and felt by the researcher that reaching low income populations in regards to energy efficiency research would be challenging, therefore, both of Manitoba Hydro's Home Comfort and Energy Assessment Guide email and mail-in surveys were completed using a semi-structured/structured interview methodology where the researcher was present.

Recruitment for potential subjects was done by advertising the research through locally accessible and highly trafficked areas within the neighbourhood and its borders. Posters

were placed at West Broadway Development Corporation's office, and in their resource and training centre. Posters were also placed at the Broadway Community Centre, West Broadway Neighbourhood Housing Resources Centre, Cross Ways in Common, Art City (local, free art space for children), Spence Neighbourhood Association, and at Humboldt's Legacy. With the exception of Humboldt's Legacy (organic food store) located at the junction of the Broadway/Wolseley neighbourhoods, all of the other poster locations were located in the heart of West Broadway in buildings located on Young, Langside, Spence Street, and on Broadway Avenue.

These spaces were chosen as poster locations because they afforded access to the community and were located in high residential traffic zones and were in recognized community bulletin/information zones that community members accessed for other information and services. Some locations were chosen because of their direct involvement with low income households, in terms of providing housing or housing rights advocacy, while other locations were chosen because of their use by a wide range of groups (Art Space, Cross Ways in Common). Humboldt's Legacy was chosen because of its owner's strong community ties and corporate responsibility within the neighbourhood of Wolseley. Low income households may not frequent Humboldt's Legacy for its organic foods, etc., but the location is accessed by local residents who have strong community connections and are interested in promoting the well-being of West Broadway because of its proximity to the Wolseley area. At the time of putting up the posters (in all cases permission was sought and received before posting), employees at Art Space had the following comments:

"If you want people to fill out these, you'll have to pay them..."

"No one wants to take time, we've had lots of research come here...expecting people to fill out stuff and we're poor—what do we get?"

When asked how much they felt that people would have to pay in order to complete the surveys, one of the employees felt that twenty dollars was fair and felt that the value of the mail in survey (twenty dollars) and the value of receiving a free energy assessment

was not incentive enough by itself. Subjects were not paid, but were provided with a free high efficiency light bulb (eight dollar value) in addition to their results.

3.7 Direct Unstructured Observation

Direct unstructured observation was used in assessing the In-house evaluation in order to ensure that no preconceived ideas of what will be seen acts as an influence; there is no predetermined plan about what will be observed (Research Methods Glossary, 2004). Direct observation was used as a technique in order to understand the interactions between the home owner(s) and the evaluator in the in-house evaluation interaction. A primary characteristic of observation is that it involves the direct study of behavior by simply watching the subjects of the study without intruding upon them and by recording certain critical components of their natural responses to their environment (Rea, Parker 1992).

It should be noted that 'observation' does not imply solely watching—but also requires the *interpretation* of that sense data. This means that 'observation' is more than just recording of data from the environment. When we observe, we are active, not passive collectors of data (Fox, 1998). Our brains are engaged as well as our eyes and ears, organizing data so we can make sense of them. *Perception* is thus part of all human observation (Fox, 1998). This aspect of what is involved in observation is crucial to any efforts to use it as a method of research (Fox, 1998). Most of the time, however, it is not really feasible to become a participant as it may obstruct the relationships being observed (Fox, 1998). In the case of the In-house evaluations, a non-participant observer role was adopted rather than a participant observation role. (Note: Some authors do not accept this distinction, arguing that all observers participate to an extent. Hammersley and Atkinson (1989) distinguish a continuum between '*complete participants*' and '*complete observers*'.)

In some circumstances, the validity of data may be compromised, as the workers will not behave 'naturally'. (A classic example of this was a series of studies at the Hawthorne factory in the United States. Observers watched the production line workers in a bid to

find ways to improve efficiency. After the study was analyzed it was realized that the workers speeded up whenever they were observed, regardless of any other efforts to improve efficiency. This effect: the unintentional impact of observers on a setting is now known as the 'Hawthorne Effect'). In the case of the In-house evaluations, my presence as a non-participant observer was clarified beforehand during a telephone call with the evaluator and again when I met the evaluator in person. My presence as an observer was also communicated to the home owner(s) and appropriate consents obtained. In all cases, an attempt was made to remain solely as a non-participant observer, but sometimes home owners would attempt to engage the researcher through questions or commentary directed to myself rather than the evaluator. It is human nature to interact with people in close proximity, therefore, whenever home owners address the researcher observer with questions related to their evaluation, they were directed to ask the questions of the evaluator.

In the In-house evaluation setting, the researcher took notes on observations about the interactions between the evaluator and the home owner(s). The following guidelines were kept in mind during the note taking in order to focus the note taking. Spradley (quoted in Hammersley and Atkinson) suggests the following checklist of the kinds of things which could be recorded:

- Actor: the people involved
- Activity: a set of related acts people do
- Object: the physical things which are present
- Act: single actions that people do
- Event: a set of related activities that people carry out
- Feelings: the emotions felt and expressed (Spradley, 1980:78)
- **Space: the physical place or places.**
- **Time: the sequencing that takes place over time.**
- **Goal: the things people are trying to accomplish.**
- **Reflection: My personal thought response to any of the above (Added as per Fox 1998)**

For the purposes of this study, the last four items were focused on to provide structure to the observation and to allow the researcher to take additional notes. Notes were about unique observations found in either a single household or were about patterns that were developing.

In the case of the In-house evaluations, the researcher elected to note "space" or where the interactions were taking place in my notes. The location of the interactions were viewed as important because interactions at the kitchen table vs. in the exterior doorway vs. interactions "on the move" were felt as possibly influencing both the quality of the interaction, length of the exchange, and the exchange of information in varying levels of distractions.

Discrete time-keeping occurred and the researcher attempted to measure various time frames such as beginning and end of the evaluation and if evaluators had clear start and finishing times for various aspects of the evaluation such as speaking with the home owner, measuring windows and doors, and completing the blower door test, these time frames were noted. By measuring the time it took to complete various activities, it was felt that a better understanding of what happens and how much of "it" occurs during the In-house assessment.

In addition, questions and answers between the evaluators and the home owners were also recorded in order to understand if the home owner's goals and the goals of the evaluator were compatible. For example, goals of the home owner might include learning about high efficiency furnaces and the evaluator's goal is explaining how the blower door test works. This measurement would highlight how closely evaluators were listening to and responding to home owners questions. As per Fox (1998), the researcher elected to record any thoughts regarding the process and interaction at each of the In-house evaluations.

3.8 Validity and Reliability in Observational Studies

This study relies a great deal on observing home owner's, evaluators, and the interaction between the two groups. As well, observations are made about owner's interacting with their email or mail in surveys; therefore, it was important to ensure that the conditions were similar when participants filled in the survey for the research purposes. These observations are useful to determine if the home owners have any issues or questions as they fill out the surveys.

Rea and Parker (1992) suggest that reliability and validity are two important considerations for qualitative research. The reliability and validity of a piece of research indicate the extent to which study findings reflect the world that we are seeking to explore in our observation (Rea and Parker, 1992). Reliability is concerned with the measuring tools we use in research and whether they are consistent. In the case of each of the mail-in and email assessments, detail was paid to ensuring that the questions the researcher asked were phrased the same way and that the interview proceeded in the same fashion each time to attempt to achieve consistency in proceedings.

Rea and Parker (1992) state that reliability is linked to consistency and that validity is an indicator of the accuracy of the research or whether the research is giving a true picture of what it is exploring. For Rea and Parker, reliability is a pre-requisite of validity, but does not guarantee it. Because of the difficulty surrounding access to willing participants, survey sample sizes were small, with less than fifteen assessments completed for each of Manitoba Hydro's mail-in and email assessment. The small size of the samples meant that findings from the assessments could not, in themselves, be considered representative of West Broadway's population. However, when the findings were also examined in the context of other research undertaken and when compared to information at community group gatherings about housing issues, the self-assessment findings could be considered representative.

Lincoln and Guba (1985) suggest that several key questions be kept in mind when examining qualitative research:

- How consistent are the findings? (Validity)
- Can the findings be generalized? (Transferability)
- Could the findings be replicated? (Dependability)
- Can we rule out researcher bias? (Confirmability)

For this study, the researcher attempted to maintain consistency in the In-house evaluation observation and the guide observation by keeping conditions as similar as possible. As well, observation was used in conjunction with other methods, such as a survey. This approach was taken in the focus group where the surveys were administered initially to determine participant's baseline knowledge of energy efficiency and its applicability in their lives. Lincoln and Gupa (1985) state that this method, "Referred to as 'triangulation', can add to qualitative data credibility when findings from three sources agree and supports the conclusions from each." A triangulation between the observational findings (in-house assessments, evaluator survey, email and mail-in assessments) was used. The individual conclusions from each of these activities were used in support of a larger whole conclusion. Used in conjunction, each data set enabled the researcher to generalize about the use of Manitoba Hydro's programming within West Broadway's low income families.

The dependability of a study (Lincoln and Gupa, 1985) relates to the consistency of the measuring instrument, which in this case is the observer herself, and her capacity to make sense of the world. This 'instrument' should be able to draw the same conclusions from similar observations (internal reliability). As an 'instrument', the researcher relied on attendance at community events focused on housing as well as an extensive literature review to enable her to achieve what Lincoln and Gupa refer to as 'internal reliability'.

In terms of findings transferability, Lincoln and Gupa suggest that because the social world continually changes, that findings be contextualized with care. In this study the researcher acknowledges the need for care in transferring findings to too large of a population, and only tries to "predict what the data transferability to other populations

would be...” (Lincoln and Guba, 1985). In terms of research bias, Reas and Parker (1992) agree with one of PAR’s core principles—that

We have to accept that observer bias is a fact of life: we all have values and we cannot wholly avoid allowing these to colour the way we interpret data in a qualitative analysis. To minimise this bias, [researchers] need to recognise their biases, and seek to fault their own assumptions or ‘pet theories’ about what they are researching. (Reas and Parker, 1992)

In terms of West Broadway and energy efficiency for low income groups, this researcher acknowledged her own bias towards believing that improving energy efficiency through programming targeted at low income households was a ‘good thing’. As with PAR, the researcher acknowledged her bias, communicated it, and attempted to challenge it.

3.9 Quantitative vs. Qualitative

Research choices must be made in terms of what methods are appropriate to capture the data required. The methods must not only be examined in light of data capture, but also cost, time, user fit, researcher comfort, and innovation. Therefore, in West Broadway, an understanding of energy efficiency and program reach into low income households was attempted not through quantitative methods, but using qualitative ones.

Much of the literature surrounding energy efficiency and demand side management is presented in gigajoules or kilowatts of energy saved per household, region, or country. While valuable information, it was felt that the statistical approach to understanding energy efficiency programming for low income households would be better served using a qualitative approach. All research methodologies have limitations, and each has its own assumptions about the world which it seeks to explain or explore.

3.10 Surveys

In interpretive social science methodologies, observation and field research are useful for learning about personal motives and reasons that shape people’s behaviours and direct their actions (Weisberg, 1989). In this case, surveys were employed to understand

people's attitudes towards energy efficiency and to understand if their attitudes were reflected in their behaviour. Surveys are commonly used to understand four broad classes of questions, namely:

- the prevalence of attitudes, beliefs, and behaviour,
- changes to them through time,
- differences between groups of people in their attitudes, beliefs, and
- behavior and casual propositions about these attitudes, beliefs, and behavior. (Weisberg, et. al., 1989, page 14-15).

In order to understand people's prior knowledge of energy and water efficiency and their personal actions or the actions of their landlords to improve energy and water efficiency in their households, a survey was completed by individuals at the beginning of the focus group. Separate survey types were administered to housing providers and to residents. See appendix for surveys.

3.11 Ecological Footprint

A relatively new method, ecological footprinting, has been described as a "planning tool to help translate sustainability concerns into public action" (Wackernagel, Rees, 1996). The concept is analytical, educational, and comprehensive (Wackernagel, Rees, 1996). Footprints are decision making tools as well education tools. The ecological footprint is based on earlier carrying capacity models. Ecological footprint analysis was developed in the 1970's and refined by Dr. William Rees in the early nineties. This accounting tool

Enables us to estimate resource consumption and waste assimilation requirements of a defined human population or economy in terms of a corresponding productive land area. (Wackernagel, Rees, 1996).

"It [ecological footprints] account for the flows of energy and matter to and from any defined economy and converts these into the corresponding land/water area required from nature to support these flows" (Wackernagel, Rees, 1996). Ecological footprinting can be used at all scales—from world to country or to the individual. In the case of this research, the footprint was completed at the household level and detailed the footprints of a single

family dwelling, duplex, and a small apartment block. All of the buildings were on the same street in West Broadway.

3.12 Community Participation

'In many ways, gaining access is a thoroughly practical issue ... it involves drawing on the interpersonal resources and strategies that we all tend to develop in dealing with everyday life. But the process of achieving access is not *merely* a practical matter. Not only does its achievement depend upon theoretical understanding, often disguised as 'native wit', but the discovery of obstacles to access, and perhaps of effective means to overcoming them, themselves provide insights into the social organisation of the setting' (Hammersley and Atkinson 1989: 54).

As part of my research, I took an active role as both presenter (expert), an observer (direct, non-structured observer), and as an interested community member in the various housing-related meetings, conferences, and gatherings. Winnipeg has an active group of people and organizations, both non-government and government working in the area of housing improvements. Between September, 2003 and May, 2004, there have been over twenty housing related meeting, gatherings, and workshops (Miko, 2004). Each of these community events examined issues surrounding housing such as poverty reduction, employment, adequate housing needs, housing for Aboriginal populations, homelessness, underhousing, as well as other housing related issues. The researcher received updates about meeting she could not attend, but did attend several of the housing gatherings, notably the CED (community economic development) gatherings held in November 17, 2003 and March 18, 2004 and a public seminar 'Housing Solutions' held on April 3, 2004.

The CED gathering was a four part conference with housing as one of its themes (Pachal, 2003). The other themes were social enterprise, neighbourhood organizing, and employment development. The researcher was one of the "keepers" who helped summarized the housing workshop findings from November to be presented to the community in the March 18, 2004 gathering. Housing themes from this and the 'Housing Solutions' meeting were similar and included issues around adequate and affordable

housing, housing needs of specific groups such as people with disabilities, program delivery challenges, technical aspects of housing, sharing housing knowledge at the local level, homelessness, First Nations housing, lower rental rates, poverty/housing issues, and government and funding issues. It is interesting to note that at those housing meetings and gatherings the researcher did attend, Manitoba Hydro PowerSmart Programming was not considered as potentially part of the solution to improve Winnipeg's current inner city neighbourhood conditions. Nor was 'improving energy efficiency' voiced at any of the meetings. One community member at "Housing Solutions" was heard to state that high heating bills are costing people more and more money (Miko, 2003). Within the local network of organizations and groups working on improving housing conditions for Winnipeg's poor, there is limited perception and linkage to Manitoba Hydro's PowerSmart programming as a mechanism to improve housing affordability or to lower heating bills. Community members do not relate energy efficiency as a housing affordability tool.

Lincoln and Guba (1985) warn us that we must be very cautious when claiming transferability. In fact, they argue that no claims should be made about the applicability of the findings to other settings. If other researchers wish to generalize from a study to other situations, the onus must be on them rather than the original researcher to demonstrate a study's applicability elsewhere. For the purposes of this study, transferability and generalizations between finding in West Broadway and other inner city neighbourhoods can be made because of the similarity between the areas, age/condition of the housing, socio-economic demographics, and the City of Winnipeg classification of Housing Improvement Zones.

The use of PAR as an overarching paradigm allowed the researcher to acknowledge bias and aided in choosing those methods that would best result in access to information at the individual, community, and city levels. In chapter four, the use of PAR as a paradigm for working with low income groups will become self-evident as the methods used in this project required ongoing communication between the researcher, community groups, low income groups, and contractors at Manitoba Hydro.

CHAPTER 4

RESULTS, ANALYSIS, DISCUSSION

4.0 Introduction

This chapter is divided into five sections: 1) the findings from the focus group, 2) survey results, 3) ecological footprints, 4) results from the three types of house assessments, and 5) the findings of existing programs across Canada.

4.1 Focus Group Findings

A focus group was held on April 7th, 2004. Sixteen people attended. Attendees were from West Broadway, Spence, North End, Point Douglas, and the downtown core. Low income individuals, First Nations, seniors, and property owners from West Broadway were among the participants. Participants of both genders ranged in age from eighteen to over sixty years of age. Property managers from West Broadway had between six to 1,200 rental units within West Broadway. Only one of the sixteen participants said that they had taken advantage of Manitoba Hydro's PowerSmart programming. The participant indicated that he had upgraded windows (spent \$47,000) and had received back approximately \$3,000 through the PowerSmart program. He had also taken advantage of upgrading his apartment block's exit signs and lighting. When asked why he had upgraded the apartment block, he said that "...tenants get benefits...noise reduction, lower heating bills, improved comfort levels in the suites..." (Focus group participant, 2004). The purpose of the focus group was to determine current use of existing Manitoba Hydro energy efficiency programming by low income groups, as well as learn about what improvements to the programming could be made so that more low income groups could access it. The following questions were asked in the focus group:

1. What new programming do people want to see Manitoba Hydro provide for low income customers?
2. What do people want to see in terms of improving and expanding Manitoba Hydro's existing programming for low income groups?

3. What issues/challenges are being faced by low income families in accessing programming to improve their housing?
4. What other types of programs would people like to see developed?
5. What are some of the challenges of improving housing for low income groups?

Six categories of issues were developed from the focus group findings:

- A. Programming (subcategories are new programs, incentive programs, re-examining existing programs, programs for tenants)
- B. Policy (existing legislation, loan policies, policies extending to program criteria)
- C. Education/Awareness (Education of home owners, tenants, landlords, raising awareness of the importance of energy efficiency)
- D. Financing (Interest rates, program affordability, and ability to afford renovations)
- E. Developing memorandums of understanding between program delivery agents (partnerships)
- F. Human behavior (landlords, tenants, home owners)

Under each of the six categories there are sub-categories that provide further about focus group responses. While each category identifies issues that were perceived as pertinent to low income groups, there is cross over and overlap in some of the ideas and there is also sequencing issues, meaning that for some programs or ideas to develop, other ideas and/or programs must be already be in place.

It was felt that overall, the current family of programming was not meeting low income households and that, "...Hydro has to understand low income earners and from their current programming selection, you can see that they don't understand us..." (Focus group participant, 2004). Generally, it was felt that Manitoba Hydro is an integral part of the community, whether it is likes it or not, as evinced by the following comment: "...Manitoba Hydro has something to do with every house in Winnipeg..." (Focus group participant, 2004). The participant was voicing the group's feeling that Manitoba Hydro

has a responsibility to Manitobans and needs to respond to all sectors in need of energy efficiency programming.

A) New Programming

Participants felt that opportunities exist for Manitoba Hydro to provide and recommend products by indicating the cost/benefits of the products to consumers. New programming ideas focused on tenants and those about to have their utility service discontinued: One idea specifically related to improving the quality of life for renters was the development of an intervention program in partnership with public and private low income housing providers such as Manitoba Housing or some of the community groups. It was felt that low income people often have their utilities shut off because they cannot afford to pay them. The intervention program would begin when it was noted that an individual was going to have their utilities cut off. Instead of cutting off the utilities, Manitoba Hydro would do a less intensive in-house evaluation coupled with energy conservation education to help the consumer identify areas where they could lower energy consumption (this would be in addition to the repayment option that Manitoba Hydro currently has). In addition to identifying energy savings options, the individual would be provided with information about saving energy and a small incentive such as a high efficiency light bulb.

If renter is in position to have hydro cut off, hydro could step in to look at consumption rate to reduce consumption so hydro wouldn't cut them off...hydro can't come in with a 'we're going to cut you off' mentality.(Focus group participant, 2004).

Another option for tenants is tenant education to encourage energy conservation in apartments and rental units. Manitoba Hydro could develop an educational pamphlet focused on apartment or rental dwellers which would highlight ways to reduce their energy consumption. The handout would be provided to every new tenant and be a requirement under the Tenants Regulations Act. Included with the handout could also be a mail-in coupon for a high efficiency light bulb or a rebate on other energy efficient products.

A) Incentive programs

The focus group came up with the following list of new incentive programs that they would like to see delivered by Manitoba Hydro: incentive programs to purchase residential energy efficient appliances such as fridges, stoves, washers and dryers and specific incentive programming targeting commercial washers/dryers found in apartment blocks. In addition, the focus group also recommended an incentive program for installing low-flow toilets (commercial building or apartment blocks).

Have an incentive program for energy efficient fridges and stoves, especially to upgrade older apartment building...you know the ones...the ones with the golden yellow or the green appliances...they haven't been touched since they went in. (Focus group participant, 2004).

One participant in particular was very excited about the potential to have incentive programs for apartments because, "...when you change windows, insulation, doors...you have to get a permit and that takes time, but changing appliances is easy [no permits required]..." (Focus group participant, 2004).

Incentive programs for purchasing smaller energy efficient upgrades for residential houses were also recommended. Things like aerators, faucets, showerheads, and weather-stripping were also mentioned. It was also felt that money to develop these programs could come from the energy savings that Manitoba Hydro would experience if all households were becoming energy efficient.

Hydro encourages new weather stripping; more efficient faucets, etc...provide an incentive program—kickback on profits from savings from the energy efficient renovations. (Focus group participant, 2004)

For all incentive programs, it was felt that the consumer should be provided with a graphic representation (dollars chart) of the pay back period for each upgrade they were considering. One suggestion was made to set up incentive programs to work like

autopac—where merits are offered based on the type and amount of energy efficiency upgrades have been made would be applied to property taxes.

Set up an incentive program like autopac—offer merits and reduce cost with more merits for more energy efficiency....and the city should offer the same for property tax reduction...have reductions based on energy efficiency upgrades. (Focus group participant, 2004)

The “coalition to save the elms” was another model that a participant felt could be used to encourage and educate people about energy conservation measures. The coalition has had some success in changing people’s behaviors towards Dutch elm disease; therefore, it was thought that the same multi-stakeholder approach may be applicable to energy conservation programming.

A) Re-examining Existing Programming

Participants felt that the in-house evaluation offered by Manitoba Hydro is valuable, but that several barriers prevented low income households from using the service. Chiefly among these reasons was the cost—\$75 plus G.S.T. was seen as too expensive for low income families, therefore participants suggested that the assessment fee be waived for low income home owners. The fact that the assessment fee was “too much” or that it should be reduced was brought up by all participants at least once, and was reiterated by several participants. One participant suggested using LICO, the low income cut-off income level (commonly referred to as the ‘poverty line’) as determining the amount, if any, low income people would pay. As well, it was felt that low income households should receive a gradual release of funds to do the upgrades over time, so that low income groups are not waiting for their money. Removal of the EnerGuide for Houses rating was also recommended as people felt that they should, as low income groups, still be allowed to receive the money even if their upgrades did not result in a better EnerGuide rating.

\$70.00 is too much...[we] should not have to pay. (Focus group participant, 2004)

Waive fees for assessments—[we] can’t afford initial costs. (Focus group participant, 2004)

Remove the \$75.00 fee....it is a disincentive. To charge people to do a good thing is a bad thing. (Focus group participant, 2004).

One individual felt that if their house improved, meaning that it scored better and received a higher EnerGuide number, that they should be compensated both in the short term (existing payment through EnerGuide for houses program) and that they should also access longer term monies:

If I had an assessment done and was a "40" and became a "60", now that I was more efficient, I would like a kickback, say 20% of the energy sent to the U.S...You could model it after autopac, for each energy 'merit' you got, you would get a lower energy rate. (Focus group participant, 2004).

Focus group participants felt that the paperwork required to apply for programming is overwhelming and time consuming and that the application process should be simplified. Some participants shared stories of issues rising from receiving grant monies from other programs. Some contractors did not want to fill out the appropriate forms and the home owner did not understand how to fill out the form (was applying for RRAP funding). While the forms needed to apply to Manitoba Hydro's programming may be easy to fill out, current perceptions about applying for programming is based on past negative experiences, therefore, customers do not think they should even bother to fill out the forms. Streamlining paperwork would help encourage homeowners to use the programming. As well, existing programming was seen as being for a specific residential group, "...the folks who can afford it are riding the train...the programming is for the suburbs..." (Focus group participant, 2004).

A) Programming specifically for renters

Participants felt that there was no programming targeting renters or tenants as a specific part of the residential sector. The group felt that some mechanism should be developed so that tenants could make an "energy request" for an audit. Unfortunately, while the group did identify tenants as a programming gap, they were unable to come up with many solutions to deal with this unique residential sector. One other option to access tenants

was through information handouts coupled with a high efficiency light bulb when they sign a new lease. In addition, it was felt that Manitoba Hydro could work with landlords to increase energy efficiency in buildings, especially if Manitoba Hydro is aware that a customer is going to have their service disconnected—then they could set up an in-house/life style evaluation to determine if consumption could be lowered by improving energy efficiency.

A) Programming specifically for NGOs such as community development corporations

While it was agreed that programming could reach some low income groups, it was also felt that targeting programming, education, and support for community organizations would capture many more low income households.

“...if hydro wants to come along and come up with a category of NGOs to get a grant to make sure that they are thinking of doing energy efficiency right off the bat when they start renovating to give low income earners the best...” (Focus group participant, 2004)

Often community groups renovate a large portion of the available housing stock in inner city neighbourhoods, therefore, it was felt that educating and helping them incorporate energy efficiency into their retrofits at the time they are doing the retrofits.

B) Policy

Some participants felt that a senior's hydro rate should be developed. Hydro could offer a senior's rate to help stabilize people in their own homes. “The province and Manitoba Health would be interested in quality of life programs...[participant] recommends that people receive a subsidy to reduce costs rather than a decrease in costs due to fixed income...” (Focus group participant, 2004). Seniors are on a fixed income; therefore, any increase on expenditures such as heating may destroy their budget. For seniors, they make choose to maintain uncomfortably low temperatures in their housing in order to save money.

C) Education/Awareness

Participants felt that a range of education and awareness opportunities should be offered. Education and training of contractors and retail staff about energy efficiency was also thought to be needed. Energy efficiency education for first time home owners, tenants, and “rent to own” home owners would benefit from receiving energy efficiency education. A range of education topics was suggested, including information about how to hire contractors, how to maintain a house, how to choose energy efficiency upgrades based on cost-return, how to make home repairs, and how to set up a maintenance repair schedule, how to do proper caulking or how to properly install weatherstripping.

It was felt that investment in home owner and tenant education would elicit greater investment into energy efficiency, if people felt confident that their time and money investments were going to benefit them. Training people on how and what to look for in terms of simple and complex energy efficiency upgrades helps develop confidence in people and raises their awareness of what improvements are needed or what is done properly when they choose either their next home.

Some people did not grow up in homes as owners and therefore don't have knowledge as owners on how to care for their houses, how to repair their house, how to hire contractors, how to set up a maintenance schedule, how to do repairs themselves. (Focus group participant, 2004)

Emphasis was put on providing education for low income groups and inner city neighbourhoods, especially for the tenant population and the “rent-to-own” populations because both of these types of households were felt to be common in inner city neighbourhoods.

Educational programming was seen as potentially having community economic development possibilities because it participants felt that organizations such as Manitoba Hydro could provide funding and create the educational information and training information, but that information delivery could be completed by community groups in their local neighbourhoods. For example, it was felt that an “energy efficiency” checklist

could be developed and delivered by local community members to their local residents. By having local community groups help deliver Hydro's programming, local residents may be more trusting of local community members and may be more willing to listen to the community member's energy efficiency information. Local agencies and individuals may also have another advantage—more knowledge about the neighbourhood and its challenges and may be able to expedite information transfer.

Some participants felt that Canada Mortgage and Housing Corporation (CMHC) should also offer more education and training programs in regards to energy efficiency upgrades. There was a lot of debate over who and how energy efficiency education should be delivered—however, in the end the focus group established a consensus that education and training programs should be designed by organizations like CMHC and Manitoba Hydro, but that the delivery of programming in the inner city should involve more of the community. Participant's indicated that Manitoba Hydro should draw on existing skills and organizations found in the different neighbourhoods to help encourage energy efficiency.

The need for energy efficiency education in grade school was discussed as an approach to encourage conservation behaviours at younger ages. Precedents for conservation education exist in Winnipeg and across Canada; grade school education has been used to encourage recycling and healthy transportation options. Precedents in other countries exist as well: Denmark includes energy efficiency in curriculum of school age children (Danish Ministry of Energy and Environment, 1996).

It was also felt that the in-house evaluation provides an excellent education/training arena for the evaluator to bring an educator to demonstrate simple energy efficiency upgrades or to provide access to local training that would also provide education and training, perhaps in partnership with other groups or settings such as Rona, McDiarmid, or CO-OP. Education of retail staff such as those in Rona, McDiarmid, and CO-OP would be beneficial to getting more energy efficiency products into people's homes. The local hardware store staff are often the last individual spoken to before a home owner makes a

purchase for their retrofit (NRCan, 1997), therefore it is beneficial to have the staff trained and experienced with the importance of smaller and larger energy efficient upgrades.

It was recommended that PowerSmart education be developed specifically for First Nations groups and that education programs for First Nations people center around skill development for building houses and improving energy efficiency. Memorandums of understanding with First Nation groups, their housing providers, and low income housing providers was seen as both helping develop skills while improving the existing housing stock's energy efficiency.

Education and training pertaining to energy efficiency for community development organizations who deal with housing was also recommended. Raising awareness in new immigrant populations about energy efficiency was seen as valuable:

African families had a monthly budget [heating bill] and didn't understand what this meant...when they moved here, they kept it warm enough to wear shorts in the winter time to match the climate they left. They had to be educated about adding layers of clothing and what a 'budget' meant (Focus group participant, 2004).

Getting immigrant populations to understand the concept of energy efficiency and apply it to their own lives could help these populations save money, empower them to make smarter energy efficiency related purchases, and could negate any consumption tendencies that might arise due to cultural difference. Equating energy conservation with financial savings may help influence immigrant population's energy use.

People wanted Hydro to deal with mold issues and suggested having a training program outlining what community groups should look for in terms of mold. There was some discussion about who should be the delivery agent for mold training—Canada Mortgage and Housing Corporation (CMHC) or Manitoba Hydro.

Your house is a good place for learning—have highly trained councilors come into the homes...provide information in other languages ...make the information more accessible. (Focus group participant, 2004).

The need for consumer education was reiterated as being important and necessary to encourage conservation behaviors. The need for community involvement in the development and delivery of some of the energy efficiency education was also seen as important, "...train low income people from the community to go into the community to distribute information..." (Focus group participant, 2004).

D) Financing

Creative financing options—IDAs and Saving Circles: It was felt by several members of the focus group that more creative financing options would enable lower income families to take advantage of Manitoba Hydro's PowerSmart Programming. Two suggestions were made in regards to developing financing options. The first suggestion centered on adopting other financing models such as Individual Development Accounts (IDAs), the model program currently run by SEED Winnipeg, Inc. and the second recommendation centered on "Saving Circle", a program that is also managed by SEED, Winnipeg, Inc.

The IDA program was developed in response to the banking problems faced by lower-income residents in Winnipeg's north end, which experiences three times the poverty rate of that of the rest of Winnipeg (Driver, 2003). The program is designed to teach money management skills and to provide an opportunity to save an amount of money:

IDAs are special savings accounts that encourage clients to save a specific amount — usually \$1,500 over three years — for a specific goal such as housing, education or starting a small business. With the promise of a three-to-one matching grant at the end, clients can see their \$1,500 savings grow to \$4,500 (Driver, 2003).

Matching funds are provided through a number of organizations such as the Province of Manitoba, local foundations, and not-for-profit local organizations. Focus group participants felt that working with existing programming to highlight the importance of

adding energy efficiency to home renovations in terms of cost savings (lowered heating bills) would be beneficial to low income groups. Another suggestion was that a separate IDA program be set up that dealt specifically with energy efficiency retrofits. The program would have the same financial mechanism as existing IDA programs (3:1 savings ratio), but instead of the financial training provided through the current model, this new model would include training on why and how energy efficiency upgrades can save people money, information about hiring contractors, and other pertinent information about energy and water efficiency.

Focus group participants from SEED, Winnipeg Inc. indicated that there is currently a waiting list for the existing IDA program and that as of 2003, approximately 230 people have successfully gone through the IDA program saving almost \$90,000 and earning almost \$250,000 in matching funds (Douglas in Driver, 2003). Some participants have used their IDA monies for home retrofits:

Like Rushton, Brenda Jones is another low-income Winnipegger who has benefited. She purchased a small home which required a lot of fixing up. "I think I had about \$50 in the bank when I moved in," she says. She saved \$1,500 and was able to pay for new kitchen flooring, door and window repairs and repairs to the heating system. "There's no way I would have been able to do that on my own," she says. Jones hopes the renovations will help her start a home day care business soon. (Driver, 2003).

From the community's perspective, IDAs are successful because they follow the tenets of community economic development: empowerment, aid, and economic development—three things that help low income households better their lives and their livelihood options. "This can get other low-income people out and give them hope — that's what IDA gave me," she [Jones] says (Driver, 2003). Currently, there are plans within Winnipeg to develop other local IDA programs and local and provincial politicians are being asked to support this type of financing for low income groups (Driver, 2003). The second program is modelled after IDAs and is referred to as a mini IDA or Saving Circle.

It's for a shorter amount of time and more flexible in what people can save for" — training courses, eyeglasses, new furniture or other purchases that will improve their quality of life. A client who puts away \$170 can end up with \$520. (Douglas in Driver, 2003).

The Saving Circle could again be used as a short term model for people who want to save for smaller energy efficiency upgrades such as purchasing caulking, weatherstripping, etc.

D) Interest Rates and Loans

The focus groups felt that the current interest rate charged by Manitoba Hydro is too high and is not competitive with current lending rates found at banks and credit unions. One participant stated, "...Hydro's loan rates are too high...should be only charging rate they get and risk rate and administrative costs—but not higher than this..." (Focus group participant, 2004).

"...hydro rates for loans are too high, if you are doing something to lower your energy use to sell elsewhere—lower the cost of the loan to only the cost to cover the risk of giving out the loan...hydro shouldn't double dip [get energy to sell elsewhere and also get money from loan]..." (Focus group participant, 2004).

Two options discussed by the focus group included partnering with those banks and credit unions who can offer lower lending rates for energy efficiency upgrades or having Manitoba Hydro lower the rate it charges so that they only cover the cost of the loan and the administration fee. A way to connect customers getting energy efficient upgrades to banks or credit unions offering lower interest rates was also recommended. People wanted financing options, provided that Manitoba Hydro could vouch for their upgrades to the lender.

Some participants felt that Hydro's current programming did not apply to low income groups at all, stating, "...nothing is low income at hydro...if the work takes years to pay off in terms of money...then it will take years to see the payback...or if the housing residents are transient...then you don't see the benefits..." (Focus group participant, 2004).

It was recommended that the EnerGuide for Houses program be changed from a one time offer to a multiple offer whereby households could continue to implement larger energy efficiency upgrades as they had more income. .

A one shot deal only works for people with money to spend...change this one shot deal to more flexibility. (Focus group participant, 2004).

Allowing participants to re-apply for the EnerGuide for Houses program may be a disincentive: households may continue to put off large energy conservation measures because they feel that they cannot ever afford the short term cost.

D) Renovation costs

Initial renovation costs are too high for low income groups—nor can they afford to wait for the pay back period from implementing the energy efficiency upgrades. It was felt that energy efficiency upgrades are more attractive to home owners who are relatively ‘new’ to their house, meaning that home owners would be more willing to invest in their houses if they knew they were going to stay there long enough to benefit from the upgrades. Participants also felt that there was a shortage of skilled labour to do energy efficiency upgrades. One participant suggested that the savings in energy efficiency be based on the square footage of the building rather than on “...some number they come up with [referring to EnerGuide rating]...” (Focus group participant, 2004).

E) Co-partnerships

A lot of discussion about property taxes and energy efficiency upgrades occurred. Participants felt that upgrades to their house in terms of energy efficiency would result in higher property taxes, which would not be beneficial to low income groups, “...as taxes go up with renovations, this is a disincentive to upgrade energy efficiency....need assistance from the City of Winnipeg...” (Focus group participant, 2004). Further development of partnerships between Hydro and other agencies was seen as being beneficial overall by all participants. “...as hydro has something to do with every house

in Winnipeg, they have that relationship....Hydro should help with money management, home ownership, teaching about energy efficiency, money management in schools before they can get loans...have the money management focus on energy efficiency)...” (Focus group participant, 2004).

Local development organizations and neighbourhood associations were suggested as potential partners in encouraging/educating around energy efficiency. It was also felt that memorandums of understanding (MOUs) between Manitoba Hydro and First Nations groups would also be beneficial. The MOUs could be around developing Manitoba Hydro as an employer of choice, as well as around hiring and training First Nations people in the delivery of energy efficiency services to their communities. “Increasing employment within their mandate to become First Nation’s employer of choice...this would help with poverty issues” (Focus group participant, 2004). It was recommended that Manitoba Hydro should provide mentorship to community groups to encourage the use and proper application of energy efficient upgrades. In addition it was also felt that Manitoba Hydro should help community groups write proposals and/or offer management services to help groups access other funding sources to complete energy efficiency upgrades.

E) Partnerships with retailers and the City of Winnipeg

Suggestions were made that Manitoba Hydro should partner with hardware stores to deliver training and develop coupons/rebates for some energy efficient products. A partnership with the City of Winnipeg was recommended in order to potentially link property tax deductions to energy efficiency upgrades. It was also indicated that it is also in the interest of the city to improve and maintain housing in the inner city because they tend to have negative socio-economic issues such as higher crime rates, etc. resulting in more expenditures by the city on services such as policing in inner city neighbourhoods.

It is in the best interest of the city to have good housing in the core area.
(Focus group participant, 2004).

It was also suggested that the City of Winnipeg and Hydro should partner around taxes, energy efficiency and develop criteria that exempts energy efficiency retrofits. Taxes and

the barrier they represent to improving energy efficiency was discussed. Participants related housing renovations and/or improved energy efficiency with higher property taxes.

As taxes go up with renovations, this is a disincentive to upgrade energy efficiency....need assistance from city of Winnipeg. (Focus group participant, 2004).

Tax issue: If you want people to improve the houses, taxes go up. There needs to be a relationship between taxes for doing energy efficient stuff, taxes should not go up if you insulate/finish your basement (Focus group participant, 2004).

F) Human Behavior and Energy Efficiency

Participants felt that if people do not pay for a service such as their utility or water bill, they were not as concerned about conserving the resource. "...in rentals, people won't conserve if they don't pay for it (i.e., Landlords are paying [for] water, therefore [people] use an excess of water..." (Focus group participant, 2004). Energy conservation is often linked to who is footing the bill, largely due to the fact that most people do not wish to waste energy, but they are not paying the true cost of the energy or they are not aware of the costs of their over-consumption.

Heated debate around the issue of landlord's completing renovations and tenant's benefiting from the upgrades. Landlord's believed that tenants get renovations without paying the up front cost of the renovations and also do not have to pay the monthly interest on the renovation loan. Tenants felt that landlords were capitalizing on their investments by raising the rent while receiving incentive programs to undertake the renovations, and benefiting from low interest rates, the cost of which could be considered as tax savings for the next year's taxes. Based on the heated exchange about who benefits more from energy efficiency upgrades, it would be beneficial to develop a multi-faceted approach that covers lending policies, program criteria, and rental increase policies, and education around the benefits of improved energy efficiency to tenant and landlords.

When improvements are done, the landlords increase the cost of rent. (Focus group participant, 2004)

From a renter's perspective, improvements are beneficial when the tenant pays the cost of heating and electricity. (Focus group participant, 2004).

It was also agreed that changing human behaviors without some kind of incentives is difficult,

Unless you pay for it, you don't care—you don't see the direct impact and people aren't energy savers. I have tenants who shower four or five times a day because they aren't paying the cost of that energy...we need to educate people — eg. Use the blue box education model (Focus group participant, 2004).

Education for immigrants was also seen as a necessity especially if they have never experienced 'winter' or 'cold'. Educating people about putting on sweaters rather than keeping indoor temperatures at levels where they could wear shorts was also seen as important to help people develop better conservation skills. The use of power chips to monitor consumption in houses was also recommended so that people get a visual representation about how much energy they use.

F) Contractors and getting renovations completed in inner city neighbourhoods

Contractors do not like to work in inner city neighbourhood because of concerns about getting paid for their work, ability to do the work (smaller lots), and concerns about equipment theft. Contractors did not like using programming because the paper work cost them money and time. In speaking with one contractor about RRAP grants, he stated that he

Avoids doing work on houses using the grant because the paperwork ends up costing him money and time...I'd have to hire a full time secretary to fill out all the g...paperwork (Focus group participant, 2004).

One owner of a house in an inner city said that it is extremely difficult to get contractors to do work in inner city neighbourhoods and that those that do come and do the work, "take advantage and do poor jobs...my new roof was leaking..." (Focus group participant, 2004). There is a perception that people in inner city neighbourhoods cannot or will not pay for the work done. Also some inner city residents feel that renovations

completed through programming subsidies ends up being sub-standard or incomplete and that the contractor takes advantage of the money and gets away with it. (Focus group participant, 2004).

One contractor also explained that working in inner city neighbourhoods is difficult, especially if they are having to re-do roofs where they are working in smaller spaces (houses close together) and that they have to be more careful with tools going missing (they can't leave anything out). (Personal communication with contractor, 2004). Table 28 summarizes the focus group findings of what programming they would like to see created, who they think should be involved in program delivery, and the issue the new programming would respond to.

Table 28 Focus Group Requests for Different Programs

Focus Group Request	Program type	Issue programming responds to	Potential delivery agent	Potential delivery and development partners
Program to aid in appliance purchases, residential	Incentive	Households inability to afford energy efficient appliances	Manitoba Hydro	Local leasing retailers such as coin-o-matic
Program to aid in small energy upgrades such as weatherstripping	Incentive	Households inability to afford energy efficiency upgrades	Manitoba Hydro	Local retailers in the community and larger Canadian stores such as Rona, McDiarmid
Appliance purchase program, commercial	Incentive	Encourage landlords to rent energy efficient washers/dryers	Manitoba Hydro	Local commercial appliance retailers
Savings Program	Financial assistance	Inability of households to save and invest large portions of their income into renovations/energy efficient upgrades	Manitoba Hydro	SEED, Winnipeg, Inc., Community groups, Assiniboine Credit Union
Change existing cost structure for in-house evaluations	Existing	Fee removal enables low income groups to access programming	Manitoba Hydro	Manitoba Hydro
Develop home owner education	New	Some people have never been home owners and do not have enough knowledge to begin the process of energy efficient upgrades	Manitoba Hydro	Community groups, Property managers and owners in the inner city, CMHC
Remove \$75.00 in-house assessment fee	Re-examine existing	Cost of in-house evaluation too expensive for low income groups	Manitoba Hydro	Potential to have subsidies through other agencies
Cost/benefit of products	New	People do not have the knowledge to choose between all the energy efficiency products on the market	Manitoba Hydro, CMHC, Athena Group, City of Winnipeg	Develop relationships with organizations that deal with cost/benefit analysis of products
Linkage between property taxes and energy efficiency upgrades	New	People do not want to have higher property taxes based on efficiency renovations	Manitoba Hydro, City of Winnipeg	Develop relationship with issuers of taxes to develop taxation policy around energy efficiency upgrades
Current Manitoba Hydro's loan rates are too high	Re-evaluation of existing	Hydro's interest rates not competitive compared to rates at financial institutions	Manitoba Hydro lower interest rates	Partner with banks/ credit unions

Table 28 Continued				
Focus Group Request	Program type	Issue programming responds to	Potential delivery agent	Potential delivery and development partners
Co-partnerships	New	Integration with other programs, other organizations	Manitoba Hydro, City of Winnipeg,	Develop complimentary programming streams (e.i. energy efficiency loan through community partner, and education about what upgrades can be done—delivered by Manitoba Hydro
Focus Group Request	Program type	Issue programming responds to	Potential delivery agent	Potential delivery and development partners
Conservation education in grade school	New	Accesses youth early to help develop energy conservation behaviors	Manitoba Hydro, School system, existing conservation NGO's such as Resource Conservation Manitoba	Development delivery partnerships helps increase awareness of energy efficiency
Addition of education portion to in-house assessment	Revision/res structuring of existing	Help people learn about how to do energy efficiency upgrades	Manitoba Hydro	Partnership with other organizations capable of supplying educational component
Education of specific groups such as home owners, renters, landlords	New	Develop education around simple and complex energy efficiency upgrades for specific groups of people.	Manitoba Hydro	Manitoba Hydro partner with retailers, property managers, and money lenders
MOUs	New Policy	Work with First Nations communities to develop training, education, and jobs around increasing energy efficiency in their own communities	Manitoba Hydro	Manitoba Hydro partner with such agencies as the Southern Chiefs Council, Assembly of First Nations, Northern Association of Community Councils
Renovation costs	Restructure	High up front cost and long pay back periods for energy efficiency upgrades not affordable by low income groups	Lenders, Retailers of energy efficiency products	Credit unions, other community loan program providers such as SEED, Winnipeg, Inc., etc.
Working with renters to lower consumption	New	Develop intervention programming	Manitoba Hydro	Manitoba Hydro in partnership with low income housing providers (private and public)

Table 29 summarizes focus group thoughts about challenges facing lower income group's ability to access and invest in energy efficiency retrofits.

**Table 29 Focus Group Summary of Challenges Facing Lower Income Groups
Accessing Programming**

Challenges/Potential improvements highlighted in the focus group	Potential avoidance/implementation strategies	Strategy implementers
1. Doubledipping: landlords getting incentives to improve energy efficiency and then raising the rent	Develop criteria that charges lower rental increases over a longer period of time (after energy efficiency payback period)	City of Winnipeg, Residential Tenancies Branch (Residential Tenancies Act, Residential Tenancies Regulation, Residential Rent Regulation, Residential Tenancies Interest)
2. Neighbourhood gentrification	Develop criteria to control rental increases related to energy efficiency upgrades	City of Winnipeg, Residential Tenancies Branch
3. Improve energy efficiency in the neighbourhood without escalating gentrification	Develop criteria for larger rental units that does not allow for large rental increases based on energy efficiency upgrades	City of Winnipeg, Residential Tenancies Branch, RRAP delivery agents (CMHC)
4. Upgrading energy efficiency in the neighbourhood—bettering the neighbourhood	Educate and increase awareness around energy efficiency upgrades	Manitoba Hydro
5. Issues around high property taxes and efficiency upgrades	Develop criteria around property taxes and efficiency upgrades	City of Winnipeg, Manitoba Hydro
6. Improving quality of life for seniors	High heating bills force seniors to leave their homes	City of Winnipeg, Manitoba Hydro, Manitoba Health, Province of Manitoba
7. Alleviation of poverty through job creation	First Nations people have high rates of poverty, under/no employment issues	Manitoba Hydro, Assembly of First Nations, Northern Association of Community Councils, Southern Chiefs Council

Table 29 Continued		
Challenges/Potential improvements highlighted in the focus group	Potential avoidance/implementation strategies	Strategy implementers
8. Renovation costs are too high, payback period too long for low income people	The cost of upgrades is beyond what seniors, very poor, can afford	Manitoba Hydro, Assiniboine Credit Union, SEED Winnipeg, Inc.
9. Perception of tenants/landlords about who benefits from energy efficiency upgrades	Landlords believe that tenants are primarily benefiting and tenants believe landlords are primary benefactors of energy efficient upgrades	Manitoba Hydro, Property Managers Association, local Tenants and Landlord Associations
Challenges/Potential improvements highlighted in the focus group	Potential avoidance/implementation strategies	Strategy implementers
10. Government expenditures	Government spends more to upgrade a house than development corporations do	Move renovation programming and energy efficiency training to the community development organizations
11. Indoor air quality issues, mold	Poor people have more indoor air problems due to a variety of reasons	Hydro to develop training and educate development corporations on how to improve indoor air quality in low income housing
12. Creating community	Housing isn't just about renovations, it is about community building	Work with development agencies to incorporate energy efficiency into community building and strengthening of the community

Each point summarized in Table 29 is developed in the following section.

1. Participants felt that it is not fair that landlords who take advantage of existing programming to make improvements of their properties also get to raise rents based on those subsidized renovations. It was felt that “double-dipping” by landlords is currently happening and that increasing programming opportunities will only make life easier for landlords and not tenants. Therefore, it was recommended that before further programming is implemented, partnerships with the City of Winnipeg and the Residential

Tenancies Branch be developed in order to change some of the rental increase guidelines in regards to energy efficiency upgrades by landlords.

Landlord gets the incentive to do renovations, but can increase rent—landlords are getting a rebate and making money off the savings that are generated and then they also get to raise the rent based on the current law—improvements to a building allow for the landlords to put in for a rental increase. (Focus group participant, 2004)

One individual shared a story about a meeting that Manitoba Hydro had with building owners and property managers. The Hydro presentation was about why property managers would want to take advantage of energy efficiency programming. The individual said that once the Hydro representative left, all the property managers and owners began to ask each other, "...how much do you think we can raise the rent?..." (Focus group participant, 2004). This story was offered as a cautionary warning about how some sectors or individuals view incentive programming. It was stressed by the story teller that all programming should attempt to eliminate "double dipping" by program clients.

Therefore, how do you justify the programming to become more energy efficient, while avoiding 'double dipping'? (Focus group participant, 2004).

A lot of discussion was held around what was referred to as "double dipping" by participants. It was noted that under the Homeowner Residential Rehabilitation Assistance Program (RRAP), that landlords cannot raise the rent based on completing building improvements for low income tenants. Rental RRAP applicants must meet the following criteria to apply to Rental RRAP:

- The household incomes of their tenants are at or below the established ceilings (these vary based on household size and area of the country).
- The projects have pre- and post-RRAP rents at or below the median market rent for the local area. CMHC can assist with market rent information.

- The property lacks basic facilities or requires major repair in one or more of the following five categories: structural, electrical, plumbing, heating and fire safety.
- Tenants are not family relatives of the owner. (CMHC, Programs and Financial Assistance, 2004)

The assistance from Rental RRAP is a fully forgivable loan that covers up to one hundred percent of mandatory repairs with certain conditions attached. Landlords must also:

- agree to place a ceiling on the rents that may be charged after the repairs are completed
- limit rent increases during the term of the agreement
- agree to limit new occupancy to tenants with incomes at or below the income ceiling
- cover cost of mandatory repairs above the maximum forgivable loan available. (CMHC, Programs and Financial Assistance, 2004)

Unfortunately, energy efficiency upgrades are not specified in the Rental RRAP or the Homeowner RRAP criteria, therefore, if a landlord does undertake a large energy efficiency upgrade under RRAP, they could indeed as participants in the focus group fear, raise the rents of low income tenants.

Landlords are always being offered loans to do renovations so landlords can raise the rent. Governments and hydro programs that don't allow landlords to raise the rent based on doing energy/water efficiency would be a good idea. (Focus group participant, 2004).

2. Neighbourhood gentrification is a potential negative outcome from large scale energy efficiency upgrades in neighbourhoods. Without built-in policy, regulatory, and loan criteria that anticipate and prevent substantial rental increases, focus group participants fear that as landlords re-invest in their buildings, low income tenants may be forced to move because they cannot afford the higher rents. Some participants felt that improvements in the inner city were already forcing low income households into even less desirable areas.

Rent going up—tenants moving out [in West Broadway]. It has happened before—in Wolseley—it increased in value so people moved to West Broadway, now the North End is becoming the dumping ground for poor people. (Focus group participant, 2004).

3. However some participants also felt that energy efficiency upgrades could also help stabilize and improve inner city neighbourhoods, thereby making “undesirable communities” safe and appealing to live in. It was felt that by developing programs and criteria that do not allow energy efficiency upgrades to result in higher rents that people would want to stay longer in the neighbourhood and be less transitory and also felt that it would help people’s ability to afford housing.

4. Some participants felt that renovations lead to single family dwelling neighbourhoods rather than mixed housing types, therefore they were not in favour of any upgrades that lead to single style housing units. In terms of energy efficiency, participants would want written assurance that mixed housing neighbourhoods would remain.

5. One participant felt that high property taxes were impacting inner city neighbourhoods and that “...people didn’t have the courage, time, health, language, and transportation to fight high taxes...” While this statement is strictly speaking about taxes, the feeling evinced by the participant about inner city people lacking time and ability to understand and protest their situation could be construed as reflecting why more inner city neighbourhoods do not invest in efficiency upgrades. In addition, it was felt that higher property taxes would result from energy efficiency renovations. For low income groups, small increases in property taxes can be difficult to deal with. In this case, Manitoba Hydro and the City of Winnipeg should partner to ensure that people are not penalized for upgrading their housing.

6. Seniors are often categorized as low income because they are on fixed incomes. As such, they are hit hard when the cost of living risings and necessities such as heating rise in price. The City of Winnipeg, Province of Manitoba, and Manitoba Hydro were thought

to be important stakeholders who should work together in order to ensure that seniors can afford to live in their housing.

7. It was felt that job creation through energy efficiency upgrade training and education of First Nations people would help alleviate poverty and some of its associated problems. Key stakeholders for creating training and education for First Nations groups included Manitoba Hydro and existing First Nations organizations such as the Assembly of First Nations.

8. Energy efficient upgrades cost money and the poor cannot afford to pay the up-front cost of renovations, nor can they afford to wait for the pay-back period. Therefore, the challenge facing program delivery agencies such as Manitoba Hydro is devising the programming so that low income groups can afford both costs, either through lower interest rates, shorter payback periods, or a combination of both. Generally, the focus group agreed that the 'newer' the home owner was, the more incentive there was to do energy efficient upgrades (the longer someone is going to stay in the house, the longer the time period is that they will reap the rewards of investing in energy efficiency). A participant noted that, "...the cost of lumber does not change if you renovate or if you build new...you still have to pay..." (Participant, focus group, 2004). The Assiniboine Credit Union and other credit unions and banks were thought to be important stakeholders.

9. In rental situations, it was felt the benefits from energy efficiency upgrades accrue either for landlords or for tenants and that the impacts (higher rents, risk) also accrue for one or the other. Landlords felt that they must experience the risk of undertaking the renovation, the up front cost, and the long term cost of the upgrade (through interest on loans), while tenants reap the majority of the benefits such as (improved comfort, less financial risk, and no up front costs). Tenants were of the opposite opinion, stressing that the landlords experienced the majority of the benefits (lowered heating bills, tax deduction, ability to raise rents, ability to take advantage of programming, and ability to take advantage of low interest loans). What this debate highlights is the need for energy

efficiency education in both groups, so that both parties can understand the costs and benefits they will experience. Stakeholders included Manitoba Hydro, Tenant/Landlord Associations, and Property Manager Associations.

10. People felt that there was a lot of waste and/or surplus spending by the government on housing projects that community organizations could have managed: "...government is the worse for spending money...they renovated a house spending three times as much money as a development corporation would use to renovate the same house[referring to a house on Kennedy street that was redone in 1998]...they [government] spent \$370, 000 on this house and we could have renovated it for a 1/3 of the cost...the government's goal of renovating houses and still have low rents won't happen this way..." (Focus group participant, 2004) Distribution of funding to undertake energy efficiency upgrades or renovations in general was felt to be unfair. Development corporations felt that they were providing a "better bang for the taxpayer's dollar". Manitoba Hydro is an important stakeholder to help streamline energy efficiency costs.

11. Indoor air quality issues in renovated housing or housing that needs renovations was listed as a community concern that the poor face continually. It was felt that training and education on indoor air quality and ways to improve it would help the situation. It was felt that such training should be focused on housing providers already working in the area of low income housing. People wanted Hydro to deal with mold issues and suggested having a training program outlining what community groups should look for in terms of mold. There was some discussion about who should be the delivery agent for mold training—Canada Mortgage and Housing Corporation (CMHC) or Manitoba Hydro.

12. People felt that too much emphasis was being put on energy efficiency as a stand alone value or solution and that it should be emphasized to people as an avenue to stabilize and aid in building communities where people feel "safe and want to live there..." (Focus group participant, 2004)

4.2 Why People Felt that Manitoba Hydro Programming was Valuable

It was felt that any programming that helped reduce heating bills and allowed poor people to keep more money in their pockets was beneficial, however, the fit between the programming and low income households had to be such that it allowed low income groups to participate. Reasons why people wanted to learn about Manitoba Hydro's programming:

- Interested in learning about how to lower high heating costs: "...I want to learn about the program [hydro program] because energy costs are crippling..." (Focus group participant, 2004) Note: This individual is responsible for several housing co-ops in the inner city.
- First Nations housing issues that span both the City of Winnipeg and First Nations communities in other parts of Manitoba. A specific issue they have is that as a housing provider in Winnipeg (have 219 units), they cannot afford to pay for the natural gas in the units. This participant wanted Manitoba Hydro's programming to "...integrate the social aspects of housing, such as being without hot water, with the economics....90% of the time the gas bill is higher than the rent and the cut off date of March 15th for heat or water is hard on poor people..." (Focus group participant, 2004).
- Housing providers were interested in learning about Manitoba Hydro's programming because they have "...people calling about problems with too high heating bills..." (Focus group participant, 2004).
- Another housing provider was interested in learning about how to make their housing more affordable for them and more affordable for their tenants. They were interested in hearing about safe/affordable housing issues and employment assistance and how poverty limits housing choices.

4.3 Survey Questions for Residents and Housing Providers

As part of the focus group, participants filled out a survey beforehand. Two surveys were distributed, one for residents and one for housing providers. The purpose of the two

surveys was similar. Each survey was used to establish baseline information about knowledge of existing energy efficiency programming, its application by home owners, tenants, and landlords and how these groups rated energy efficiency and water efficiency in regard to cost. The resident's survey was further broken into questions specifically for home owners and tenants. The questions for tenants focused on understanding if tenants were able to identify existing energy efficiency programming and if they felt that their landlords/property managers invested and valued energy efficiency in the buildings they were responsible for. For the home owners, the questions were the same, but in their case, the survey questions were designed to judge program awareness, value of improving energy efficiency, and to see if they had implemented any energy saving measures in their own homes.

Sixteen surveys were filled out—seven by home owners and nine by tenants. The first three questions in the survey were general questions designed to learn the age of participants, where they lived, and time lived in their current residence. The following graphs outline survey responses. Please refer to appendix for 12 and 13 for surveys.

The oldest respondent was over sixty years old and the majority of respondents were between the ages of twenty one to thirty years old, followed by the thirty one to forty year old age group, as indicated in Table 30 and Graph 1.

Table 30 Age and Number of Survey Respondents

Age category	Number of respondents
21-30	6 (38%)
31-40	4 (25%)
41-50	None (0%)
51-60	5 (31%)
Over sixty	1 (6%)

Graph 1 Age Range of Respondents

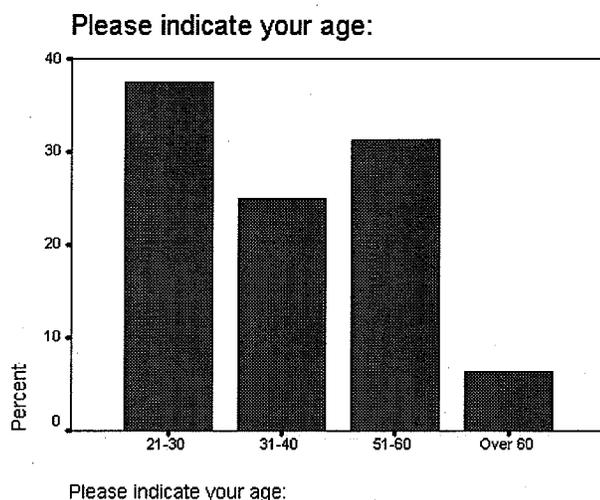


Table 31 Respondent Breakdown by Neighbourhood

Neighbourhood	Number of respondents
Seven Oaks	1 (6%)
North Point Douglas	2 (13%)
Spence	1 (6%)
River East	1 (6%)
Fort Garry	1 (6%)
Exchange District	1 (6%)
North End	1 (6%)
West Broadway	6 (38%)
River Heights	1 (6%)
Downtown	1 (6%)

Table 31 indicates that the largest group (six) of the respondents lived in the West Broadway neighbourhood, a neighbourhood classified as a Major Improvement Area. Three, or eighteen percent of respondents reside in Spence and North Point Douglas, two neighbourhoods also classified by the City of Winnipeg as Major Improvement Areas. The rest of respondents come from neighbourhoods within Winnipeg, some of which have areas with some inner city characteristics. Therefore, it can be determined that the majority of focus group participants were from inner city neighbourhoods or who provided housing in inner city neighbourhoods.

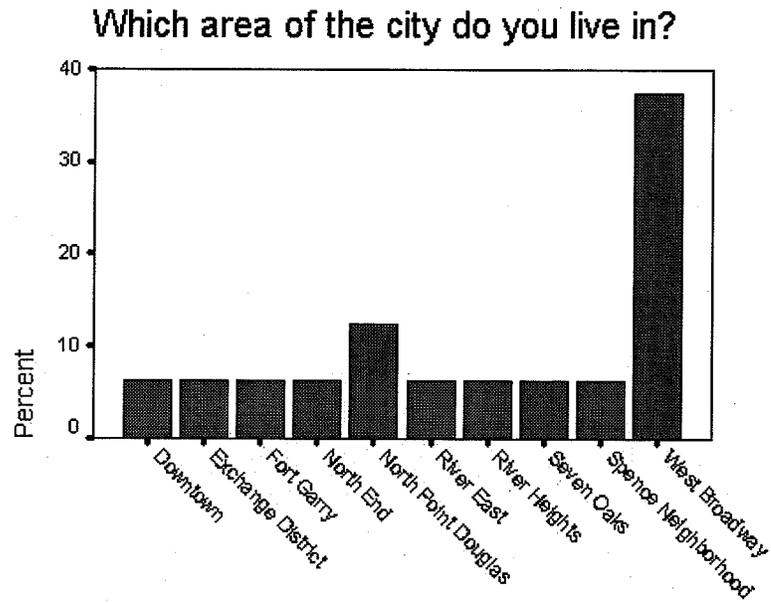
Respondents were next asked how long they had resided at their current residence. There were two categories of responses—those who described living in their current residence in terms of months and those who described their living arrangements in terms of years.

Table 32 Respondent and Length of Time in Residence

Time lived at current residence	Number of respondents
1 month	2 (13%)
8 months	1 (6%)
9 months	2 (13%)
1 year	1 (6%)
2 years	1 (6%)
3 years	3 (19%)
5 years	2 (13%)
8 years	1 (6%)
10 years	1 (6%)
21 years	2 (13%)

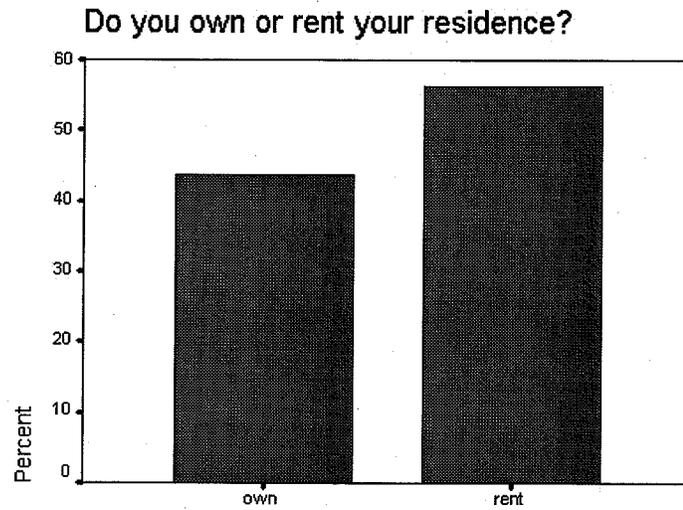
Respondents who were at their residences for a longer time period were owners rather than tenants and ownership did correspond with energy efficiency programming awareness. However, programming awareness did not correspond with actions to improve energy efficiency.

Graph 2 Neighbourhood Breakdown of Respondents



Which area of the city do you live in?

Graph 3 Ownership Type



Do you own or rent your residence?

Table 33 Ownership, Age, and Neighbourhood Classification

Time lived at current residence	Age	Neighbourhood	Own/Rent
1 month	31-40	Seven Oaks	own
9 months	51-60	Spence Neighbourhood	own
1 year	31-40	West Broadway	own
3 years	21-30	West Broadway	own
10 years	Over 60	North End	own
21 years	51-60	West Broadway	own
21 years	51-60	North Point Douglas	own
1 month	31-40	North Point Douglas	rent
8 months	51-60	West Broadway	rent
9 months	21-30	Exchange District	rent
2 years	21-30	River Heights	rent
3 years	21-30	Fort Garry	rent
3 years	31-40	Downtown	rent
5 years	21-30	West Broadway	rent
5 years	21-30	River East	rent
8 years	51-60	West Broadway	rent

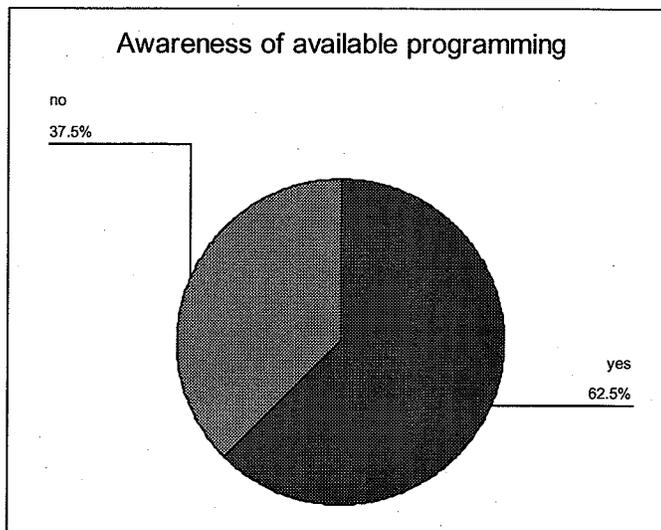
On average, respondents who own their homes tend to be older with most home owners being over the age of thirty and are have remained in their homes for longer period of time, averaging eight years in their homes (one month being the shortest and twenty one years the longest). The majority of tenants are between the ages of twenty one to thirty years of age, with only one participant between the ages of fifty one to sixty. The average length of time spent in their residents is three years (one month being the shortest time and eight years being the longest).

Question four asked respondents to rate the importance of energy and water efficiency. The question was asked in order to determine if people valued being energy and/or water efficiency to their lives. In addition, results for tenants vs. owners were also examined in order to ascertain whether or not tenants and owners differed in their valuation of energy/water conservation.

The findings were not significant and the correlation between energy efficiency and home ownership is negligible, being less than one percent.

Question five asked respondents if they were aware of any programming available in Winnipeg that encourages energy and water efficiency. 62.5 percent of respondents were aware of existing programming in Winnipeg, while 37.5 percent of respondents did not know of any programming that encouraged energy and/or resource efficiency. Graph 4 provides an illustrated representation of these findings.

Graph 4 Programming Awareness



Of the 62.5 percent of respondents who responded "yes", 56 percent of them were tenants and 86 percent of them were home owners. Graph 4 indicates a significant amount of program awareness. The majority of respondents who did know about available water and energy efficiency programming were home owners. The difference between the two groups may be accounted for in that current programming about energy and resource efficiency is targeted towards home owners, therefore, it is more likely that home owners are more aware of available programs. In addition, home owners are often more aware of heating and water costs because they must pay the bills, whereas, for some tenants, their heating bills and water bills are included in their rent.

Question six proceeded to ask respondents which programs they were aware of.

Table 34 Breakdown of Programming Awareness

	EnerTrend	Power Smart Design Standards	New Homes/R2000 program	Home Comfort Initiative	MB Hydro/United Way initiative
Yes	6.3%	50.0%	12.5%		18.8%
No	87.5%	43.8%	81.3%	93.8%	75.0%
None of the above	6.3%	6.3%	6.3%	6.3%	6.3%

Table 35 Breakdown of Programming Awareness

	Home Energy Calculator	In-Home Energy Audit	Power Smart Loan program	Efficiency Manitoba	EnerStar for Appliances
Yes	18.8%	31.3%	43.8%	6.3%	6.3%
No	75.0%	62.5%	50.0%	87.5%	81.3%
None on the above	6.3%	6.3%	6.3%	6.3%	12.5%

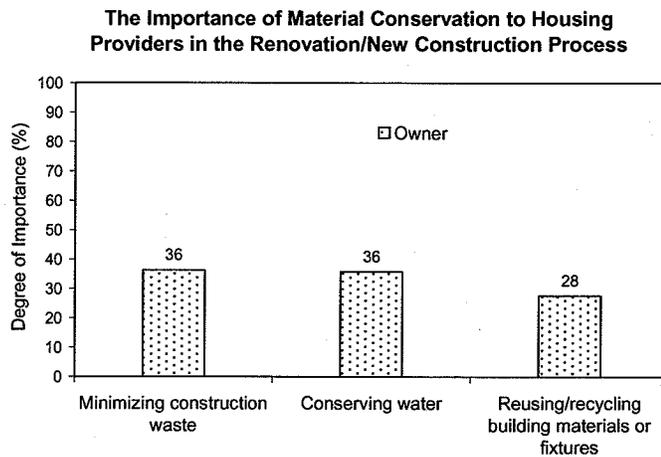
The best known program was the Power Smart Design Standards, as indicated in Tables 34 and 35. 50 percent of respondents claimed awareness of this program. The above two tables indicate that 6.3 percent of respondents did not recognize any programs in the list. The least known program was EnerTrend and Efficiency Manitoba, which only 6.3 percent of respondents knew about. A third of respondents, 31.3 percent, knew about the In-home energy audit. 6.3 percent of respondents knew of programming other than what was on the list and the program mentioned was EnerStar for Appliances. 43.8 percent of respondents knew about Manitoba Hydro's Power Smart Residential Loan. It is difficult to determine why half of respondents would know about the Design Standards and not recognize other programming. The following is a definition of the Design Standards:

Manitoba Hydro has developed design standards that new or renovated buildings must meet or exceed to be considered Power Smart. The standards take the form of Power Smart efficiency requirements, prescriptive measures by building type, eligible products and systems, and recommended good practice. The Power Smart Design Standards are design standards that new or renovated buildings must meet or exceed to be considered Power Smart. The standards take the form of Power Smart efficiency requirements, prescriptive measures by building type, eligible products and systems, and recommended good practice. They were prepared to help owners and engineering/ architectural teams develop building designs that qualify their proposed new or renovated buildings for designation as Power Smart. (Manitoba Hydro, 2004)

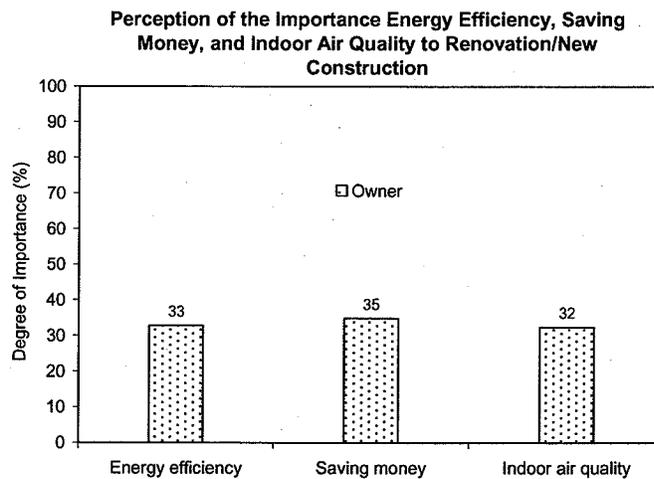
While the Design Standards are for new and renovated buildings, the standards refer to specific commercial buildings such as small retail stores, large big box stores, strip mall retail stores, small offices, and small hotels/motels (Manitoba Hydro, 2004). Therefore, it may be that participants recognized “Power Smart” and responded to the name brand and confused the Design Standards with other flagship programs such as the R2000 program or Power Smart in general.

Graph 5 provides a visual representation of participant’s responses about conservation measures. The graph indicates the importance of minimizing construction waste, water conservation, and reusing/recycling building materials or fixtures to building owners. Building owners rated conserving water and minimizing construction waste as being slightly more important than recycling materials. One reason for this result may be that property owners may associate cost with water and waste: they have to pay water bills and they have to pay fees to have their construction waste hauled away.

Graph 5 Housing Providers, Minimizing Construction Waste, Water Conservation, and Re-Using Materials



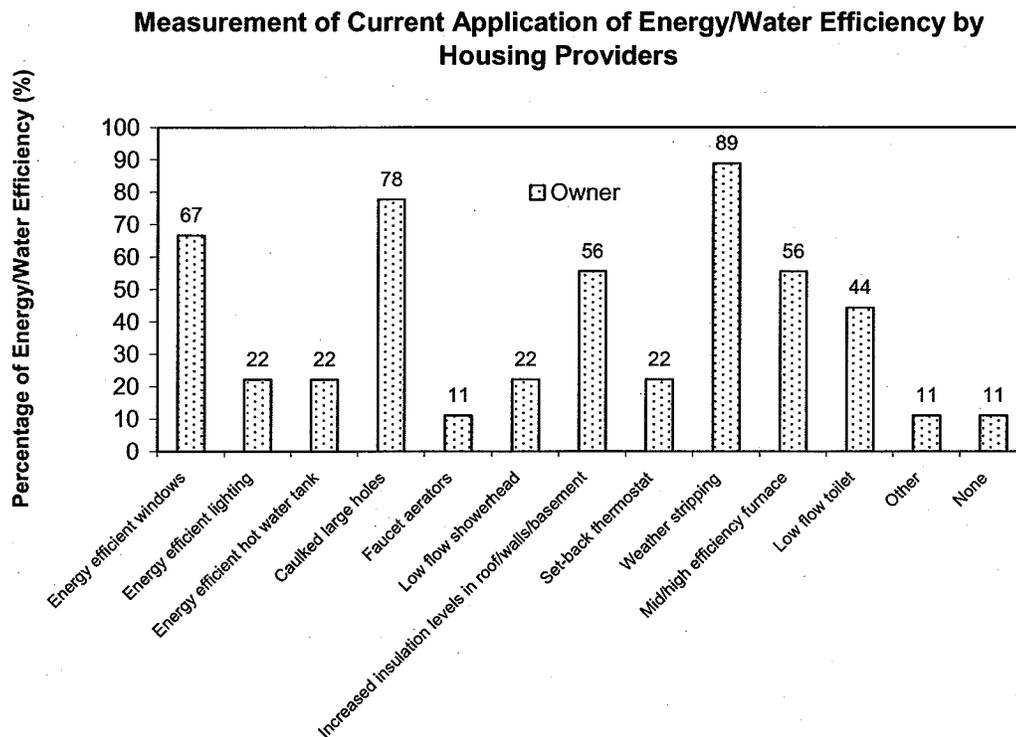
Graph 6 Importance of Energy Efficiency, Saving Money, and Indoor Air Quality



Graph 6 indicates the importance of energy efficiency, saving money, and indoor air quality to property managers and housing providers. The difference between the three categories was negligible: Fewer than 40 % respondents felt that minimizing construction waste, conserving water, and/or reusing materials was a priority.

As indicated in Graph 6, saving money is still the most important issue when compared with saving energy or with indoor air quality. As yet, property owners do not see energy efficiency upgrades as a mechanism that will lead to further economic saving. The following graph indicates landlord's and property owners/manager's application of energy and water efficiency.

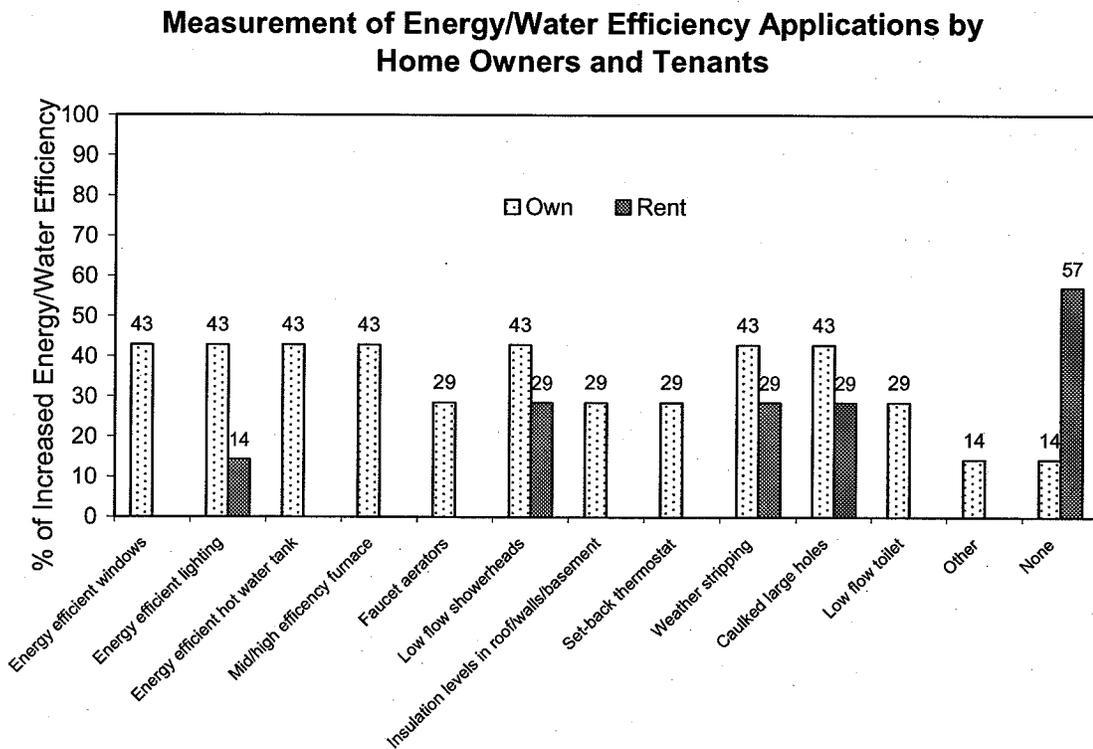
Graph 7 Measurement of Application of Energy/Water Efficiency by Housing Providers



Graph 7 indicates that property owners are investing in non-structural upgrades that are easy to access and complete. Items such as installing weatherstripping and caulking large holes are examples of what they are doing. Almost 90 % of property owners invested in weatherstripping. Windows are also a costly upgrade that property owners are pursuing. They have also chosen to upgrade insulation levels in basements, probably because of the easy access to the space. The choice to complete weatherstripping and caulk large holes may reflect a response to air seal to improve human comfort.

Graph 8 illustrates current conservation measures applied by home owners and tenants in their residences. As graph eight indicates, owners tend to implement more conservation measures than tenants.

Graph 8 Measurement of Energy/Water Efficiency by Home Owners and Tenants

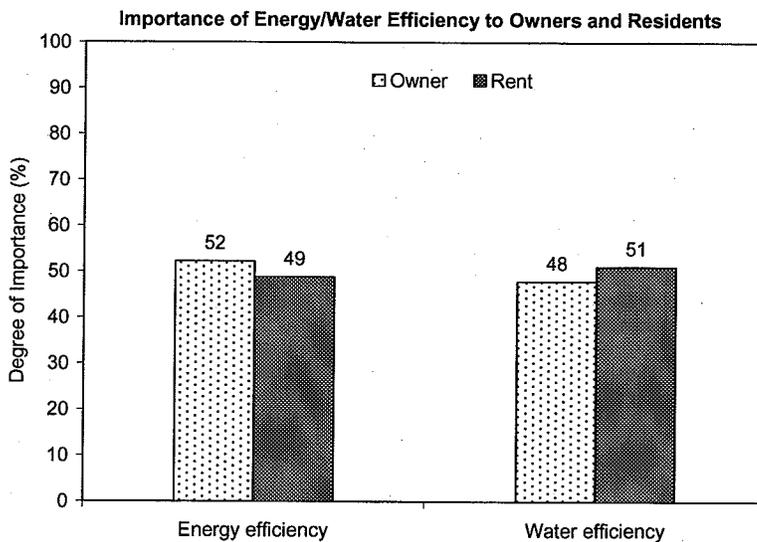


Graph 8 clearly reflects the fact that tenants do not invest in structural upgrades such as insulation because they do not own their residence. Almost 60% of tenants did not complete any upgrades. This significant amount of non-investment directly reflects a lack of ownership. Tenants in this case invested in non-structural upgrades such as energy efficient lighting, low flow shower heads, and caulked large holes (air sealing). Property owners were investing in a range of non-structural and structural upgrades as illustrated in graph 8. Almost half of the property owners indicated that they had installed mid/high efficiency furnaces, lighting, windows, and hot water tanks as structural upgrades. Half of the property owners also indicated that they had engaged in non-structural activities such

as weatherstripping, caulking large holes, and installing low flow shower heads. The larger overall investment by property owners in both structural and non-structural upgrades can be attributed to the fact that investment in their buildings will help save them money, results in tax write-offs and helps maintain the building.

Graph 9 illustrates the importance of energy and water efficiency to home owners and tenants. Landlords valued energy efficiency slightly over water efficiency, while tenants slightly valued water over energy efficiency. Landlords may value being energy efficient and water efficiency more highly due to the fact that they must pay the higher cost of heating apartment buildings and water. Tenant valuation of water efficiency may be partially due to the fact that they do not pay their heating bills and can relate easier to water because they have a visible reminder of it—they can see water running down the drain while they cannot see their heat source.

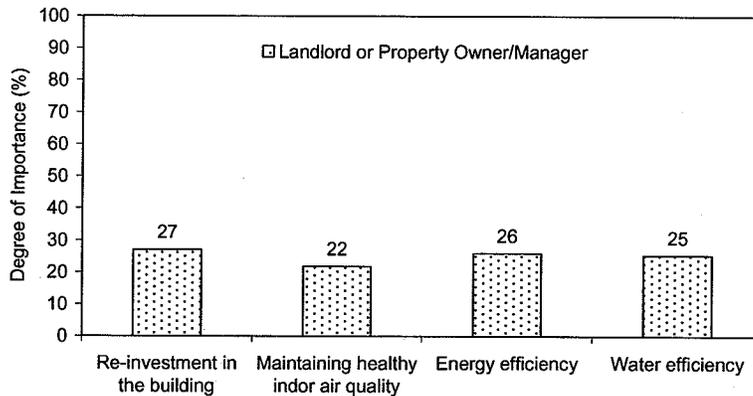
Graph 9 Importance of Energy/Water Efficiency to Owners and Residents



Graph 10 illustrates landlord's perceptions of their prioritization of building re-investment, maintaining healthy indoor air quality, and energy and water efficiency.

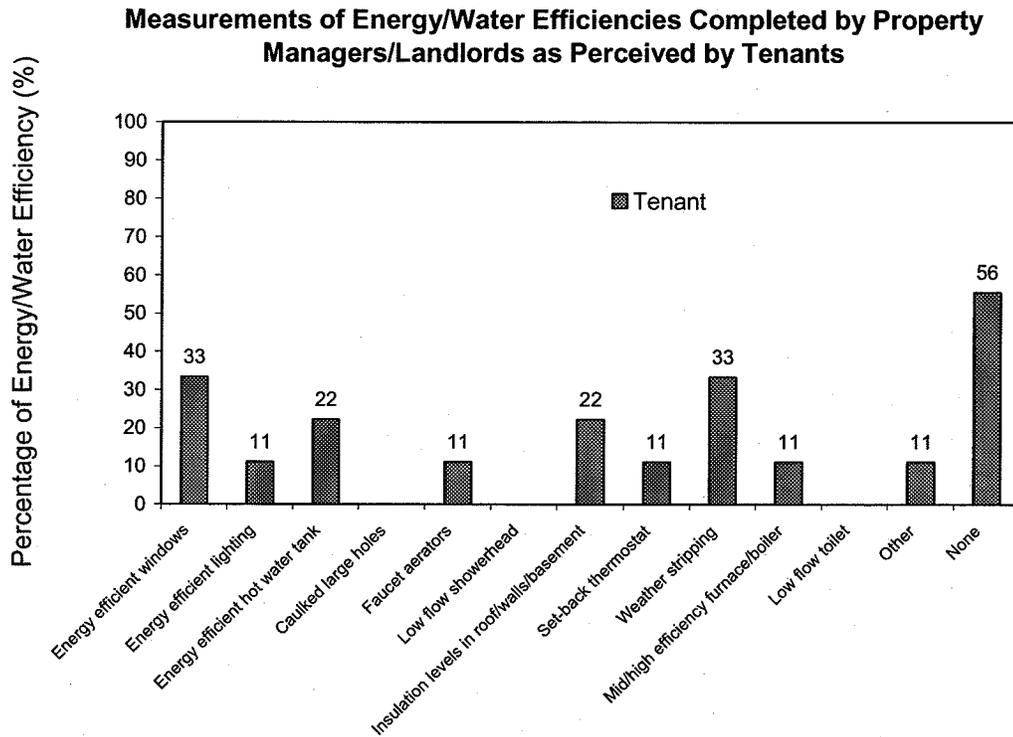
Graph 10 Perception of Energy/Water Efficiency by Landlords

Residents Perception of the Importance of Investing in Efficiencies by their Landlords or Property Owner/Managers



Graph 10 indicates that slightly less than 30 %landlords rate re-investment, indoor air quality, and energy and water efficiency as a priority in their buildings. Landlords and property owners perception's of their re-investment priorities reflects tenant perceptions that landlords are not re-investing in their buildings (see Graph 11). Both groups held the view that landlords do not invest in their buildings. This lack of re-investment may present an opportunity to design incentives, programming, and education that focuses on encourages all property owners to complete structural and non-structural energy upgrades. In addition, the lack of re-investment by property owners may reflect current municipal codes and by-laws which may be less stringent than they could be.

Graph 11 Tenant Perception of Landlord Energy/Water Efficiency Investment



Graph 11 illustrates tenant's perceptions of their landlord's prioritization of building re-investment, maintaining healthy indoor air quality, and energy and water efficiency.

Graph 11 indicates that tenant's perception of landlords/property manager's building upgrades was low. Slightly less than 30 % of tenants felt that their landlords were doing any upgrades to their building. Tenants did not believe that their landlords/property managers do not complete many structural or non-structural upgrades with almost 60 % of tenants responding that their landlords did no upgrades. In comparison, landlords/property managers indicated that they were completing upgrades in their buildings (Graph 7). The high degree of disagreement between what tenant's perceive is going on and what landlords indicate they are doing may be explained in several ways. Tenants may rate landlords lower because they cannot see all upgrades that a landlord may do (install high efficiency furnace). Secondly, tenants may be correct, and landlords are not pursuing all the upgrades they indicate they are. For the purposes of this research,

landlords may have exaggerated the amount and type of upgrades they have completed or the data may be correct, but the sample size and composition may not be a representative sample. The difference between tenant's and property owner's perceptions of upgrades provides an educational opportunity that landlords may wish to pursue. For each upgrade they complete, they could provide their tenants with a rationale and the cost savings that have occurred.

4.4 Ecological Footprints

Three ecological footprints were completed in West Broadway. A single family household, duplex, and a small apartment block were chosen for the footprints. Based on their responses to questions about their home, food choices, transportation, purchases, and waste production, an ecological footprint was developed for each household based on a rating scale (Please see Appendix 11 for ecological footprint survey). In completing the ecological footprint, multiple ethnicities and income categories were represented. The dwellings were all located on the same street in West Broadway.

The sample included one single family dwelling, families from both sides of a duplex, and an 83 percent response rate from an apartment block (10 out the 12 households responded). A variety of ethnic groups and age groups participated. Respondents included university students, several government assistance households, individuals with minimum wage jobs, and retired individuals. Within this diversity there was also English as a second language households. Table 36 summarizes the findings from the ecological footprints.

Table 36 Summary of Household Ecological Footprint

Household Type	Response (See following page for ranking)	Hectares Conversion
Single family dwelling	550 points	6.0 to 7.8 hectares (Canadian average)
Duplex side "A"	440 points	6.0 to 7.8 hectares (Canadian average)
Duplex side "B"	515 points	6.0 to 7.8 hectares (Canadian average)
Household 1 (Apartment)	600 points	7.8 to 10.0 hectares
Household 2 (Apartment)	635 points	7.8 to 10.0 hectares
Household 3 (Apartment)	240 points	4.0 to 6.0 hectares
Household 4 (Apartment)	360 points	6.0 to 7.8 hectares (Canadian average)
Household 5 (Apartment)	590 points	6.0 to 7.8 hectares (Canadian average)
Household 6 (Apartment)	530 points	6.0 to 7.8 hectares (Canadian average)
Household 7 (Apartment)	350 points	6.0 to 7.8 hectares (Canadian average)
Household 8 (Apartment)	255 points	4.0 to 6.0 hectares
Household 9 (Apartment)	265 points	4.0 to 6.0 hectares
Household 10 (Apartment)	590 points	6.0 to 7.8 hectares (Canadian average)

The following information provides the hectare equivalent of the respondent's answers.

If your score is less than 150 your Ecological Footprint is smaller than 4.0 hectares.

If your score is 150-350 your Ecological Footprint is between 4.0 to 6.0 hectares.

If your score is 350-550 your Ecological Footprint is between 6.0 and 7.8 hectares (i.e., **the Canadian average**).

If your score is 550-750 your Ecological Footprint is between 7.8 and 10.0 hectares.

If your score is more than 750 your Ecological Footprint is greater than 10.0 hectares.

1 hectare = 2.2 acres = 100m X 100M

7.8 hectares = 15 football fields (Krause, 2000).

For each question (See Appendix 11 for ecological footprint survey), points were allotted to the least “environmentally friendly” option. Addition of all points provided the total score which represents the hectares of productive area required to sustain that individual household.

The single family dwelling, duplex, and slightly less than half of the apartment households consumed the Canadian average of food, goods, and services as designated by the world ecological footprints, while thirty percent of the apartment households used more than the Canadian average and twenty percent of the apartments used less than the Canadian average. For the two apartment households that consumed more than the Canadian average, one individual was newly divorced and establishing his household (purchasing many large consumer goods such as electronic equipment, beds, etc). The second apartment household that also had a higher footprint than the Canadian average was an immigrant household new to Canada. This household was not interested in eating locally grown foods as foods here did not reflect their dietary and cultural choices. The majority of foods purchased by this family were not indigenous to the area and they also purchased goods (traditional clothing) and services (air travel to their homeland) that also increased their ecological footprint. For this family, the need for maintaining cultural identity through food, clothing, and family contact was the most important factor directing their purchases.

People who were within the Canadian average did not make any commentary about the survey and did not comment on the tip sheet they received. One individual who was higher than the Canadian average was defensive of his current consumption, stating that he was recently divorced and had had to purchase all new household appliances (television, VCR, radio, microwave, bed, couches, etc.) For the households that consumed less than the Canadian average, they expressed anger with the survey, stating,

How many times a week I eat meat or fish? I wish I could afford to buy meat or fish...” and I can’t afford to buy this local stuff...I buy

whatever is cheapest...I don't care where its from or whatever...its got to be cheap (Ecological footprint survey respondent, 2004).

These household perceived that they had less than the average Canadian and were more interested in learning about how they could get more, rather than consume less. In terms of buying "local" foods, it is a matter of perception. For a newly arrived person, "local" food found in our stores looks like foreign food and what might be classified as "ethnic" food in the supermarket aisles becomes "local" food for the new Canadian.

Buy locally food? This is hard...my foods are not available here...it comes from a long way away, but it is from home for me...it is local...I do not understand what is local...I use it all the time at home [country of origin]. (Ecological footprint participant, 2004)

While the footprint's use of local is about the distance the food traveled from field to store, local has social and cultural meanings as reflected in the above quote. "local" becomes a matter of socially connecting with heritage, cultural roots, and for some individuals, with the family they have left in their country of origin.

While the ecological footprint is expressive of current consumption habits, both at a local and a global scale, the footprint methodology is not necessarily socially or culturally viable for low income groups. Some low income households who filled out the survey found it disrespectful as it made them feel bad—low income subjects perceived their lifestyles as "lacking": personal transportation, access to meat, electronics, access to yearly vacations, access to road trips each weekend, etc. They did not equate using public transport with being "kind" to the environment or equate it with lowering C4 emissions. Instead they equated using public transit with being poor, their lack of a single family dwelling was also equated with affordability, and questions about home cooking, positively rated in the survey, was felt to reflect negatively; they cannot afford to go out to eat and therefore must make food and eat it at home.

Those households that were classified as being within the Canadian average were surprised and felt that they didn't have enough goods and could not afford the lifestyle they wished.

The ecological footprint also raised social questions. The ecological footprint is graded to provide better scores for households with higher numbers of individuals in their household than with lower household numbers. Therefore, according to the footprint used, people with four or more individuals in their households were perceived as being better for the environment than those households who have two or less. The ecological footprint does not calculate square footage per individual, instead linking numbers of individuals with a score. Because the footprint does not determine square footage per individual, it creates a false dichotomy: it artificially gives a better score for the low income individuals surveyed, even though the living conditions for six people in a two bedroom apartment is overcrowded, and is socially and psychologically damaging to the health of these individuals. In addition, the footprint does not properly reflect those same six individuals if they were to move into a residence with ten thousand square foot house. Therefore, the ecological footprint does not reflect the reality of overcrowding in low income households. Ecological footprints may be better at reflecting the footprints of other groups and other levels.

Footprints in lower, middle, and upper income countries vary, with wealthier countries having larger footprints. The majority of the footprint is expressed by the burning of fossil fuels followed by land used in the production of food (Venetoulis, et al., 2004). Venetoulis, et al., 2004 indicates that there is a country correlation between the Gross National Product (GNP), economic and energy consumption: "GDP and energy use tend to be highly correlated, and globally Footprints are dominated by the consumption of fossil fuel (Venetoulis, et. al., 2004).

Energy use increased according to country wealth with energy use of the wealthy countries accounting for half of their ecological footprint. Energy accounted for forty percent of middle income country's ecological footprints, and accounted for 18 percent of

the poorest country's energy needs. In comparison, low income households within Canada mimic the lower income countries in that they do not consume a lot of energy in comparison to their wealthier Canadian counterparts. In addition, the energy type and amount is often pre-designated by their landlords or housing providers, indicating that for low income groups, lowering energy consumption must begin with housing providers such as the landlords, property managers, and government housing authorities.

In speaking with one of the households in the footprint survey, I was challenged on the meaning of recycling: one of the last questions asks if the household recycles paper, boardbox, etc. Under the conventional idea of recycling—putting the paper, etc into the blue box, this household did not recycle, but from their cultural perspective, they were recycling.

Waste? I don't want to waste...no problem for Chinese people. We always try—we don't waste...little bit of old clothing, we wear it...I don't understand why people waste...Paper, we pay for in China. Can't find a box anywhere...if I could take all these boxes to China, I would make money. Pay for them in China...not throw out like this...everything in a box here....so many boxes. We recycle paper. (Ecological Footprint survey respondent, 2004).

I asked how he recycled since he had mentioned that he did not use the blue box.

He responded that

I use paper everyday to cover table, use as plates, put food on paper and have a plate, then throw it out. No dishes, don't have to wash, is easy, is fast (Ecological Footprint survey respondent, 2004).

While this participant did not follow what the footprint classified as recycling, he was in his own way, recycling and felt that his way of recycling was as useful or more useful as the idea of throwing the paper directly into the blue box—an idea that he was shocked by.

When asked about transportation options used for work or school, one individual replied that he knew there was a nearby bus route. While he knew it was better for the environment, he still chose to use his vehicle to drive to work. He provided the following insight for his choice:

I buy car to visit friends outside Winnipeg, get out of the city...see the countryside...but I move here recently[to West Broadway]...not good area...many cars stolen, broken into each week....glass always on the streets...so I don't want my car to get stolen. Sometimes I come outside and there is a man peeing on wall by my car. He says, "Give me money". I say, "I have no money. I have to work hard for money. You must work." So, maybe that day, if I take bus to work, maybe he get angry with me...maybe break into car...so I take car to work. Now I always take car to work... my car is safer here. (Ecological Footprint survey respondent, 2004).

While the individual knows that driving is not good for the environment, he still takes his car to work. His living environment impacts his choice to drive or leave the vehicle at home. The overriding consideration for this respondent is between protecting his private property and lowering his environmental impact. Individual's daily lifestyle choices and therefore their consumption levels are a complex reflection and interaction of where they live, their culture, age, gender, socio-economic status, and other factors. For ecological footprint analysis to work well with low income groups, footprinting must acknowledge and identify people's consumption levels and then analyze the footprint in terms of their income levels and the larger socio-economic factors that would have to be improved—such as lowered crime rates, square footage of space, cultural heritage, etc.—in order to make a change within the individual's household.

One of the key considerations of ecological footprint analysis is that the individual must already have a moral or environmental ethic within them that can be used to help respond to the ecological footprint findings.. If the individual does not have a pre-existing sense of obligation or responsibility for lowering their consumption, or perceives themselves as already doing the "right thing", or as being entitled to "more", then the results of the individual footprint will have limited impact on their behaviors and ideas. In fact, it may have an opposite effect by confirming to the person that they have less than the average Canadian and should be getting more, even though Canadian's consumption levels are the third highest in the world (Venetoulis, et al., 2004).

4.5 Energuide for Houses In-house Assessment

In each of the eleven in-house assessments, three trends emerged. These trends related to the recommendations found for each house, the home owner's retrofit decision, and the reasons why/or why the home owner chose to undertake a specific recommendation.

House age and square footage is indicated in Table 37.

Table 37 Square Footage and Time Spent Completing the In-House Assessment

House #	Year Built	Square footage	Time Spent on Evaluation
1	1909	1200	2 hours
2	1946	1000	2 hours, 10 minutes
3	1923	1152	2 hours, 45 minutes
4	1915	2800	4 hours
5	1908	1400	1 hour, 45 minutes
6	1911	1388	1 hour
7	1908	3200	3 hours, thirty minutes
8	1895	895	1 hour
9	1906	2000	2 hours
10	1905	1200	25 minutes (B evaluation)
11	1905	1600	40 minutes duplex (could not evaluate)

From observations of evaluators completing the in-house assessments, I have observed that the following steps are integral to completing an in house assessment. Each EnerGuide for houses In-house assessment has thirteen key identifiable parts which include the following:

1. Asking what the home owner's main issues/concerns are
2. Getting the homeowner to sign their payment sheet
3. Measuring window and door size
4. Measuring room size/volume
5. **Examining furnace and other heating/cooling equipment**
6. **Determining insulation types and amounts**
7. **Blower door "walk about" with evaluator and home owner**
8. **Answering home owner questions as they come up**

9. Entering data to create a report
- 10. Creating home owner report on site**
- 11. Going over the report with the home owner**
- 12. Giving and home owner the booklets and information sheets (package)**
- 13. Going over the package with the home owner**

The steps indicated above are important as they identify crucial aspects of the evaluation which can be divided into two main groups: data collection and information exchange and education. While not every evaluator did the above steps in that specific order, two evaluation styles emerged—the “moving and talking” style and the “stop and talk”. It is the evaluator’s responsibility when completing the above steps to view several key steps as educational opportunities. Steps five to thirteen provide natural learning opportunities useful for educating home owners and increasing their energy consciousness. For each of the eleven evaluations observed, the eight learning opportunities that are identified above were examined in order to understand evaluator’s interaction with home owners.

Table 38 Summary of Recommendations vs. Home Owner Upgrades

House #	Heating equip.	Insulation types	Blower door walk about	Answering owner questions	Report generation on-site	Going over report with owner	Handing over complete package (booklets)	Going over package with owner
1	Y	N	N	N	Y	Y	Y	N
2	Y	N	Y	Y	Y	Y	Y	Y
3	Y	Y	Y	Y	Y	Y!	Y	Y
4	Y	Y	Y	Y	N	N	Y	N
5	N	Y	Y	Y	Y	Y	Y	N
6	N	N	Y	Y	N	N	Y	N
7	Y	Y	Y	Y	N	N	Y	N
8	Y	Y	Y	Y	N	N	N	N
9	Y	Y	Y	Y	Y	Y	Y	Y
10 *	N/A	N/A	Y	Y	Y	Y	N/A	N/A
11 **	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Legend:

Y! = Exceptional communication by evaluator

* = B evaluation

** = House did not qualify for assessment

Y! = exceptional communication by evaluator. One evaluator in particular exceeded in communicating the report findings to the customer. The evaluator excelled due to the fact that he was not always multi-tasking (putting away computer, tools, etc.) and he took the time to go over each individual recommendation with the home owner. On the two priority items, he went over the information at the end of the session and stressed the importance of, in this case, replacing the furnace with a mid to high efficiency furnace and for insulating the basement and attic. The evaluator listened to the home owner's questions and rephrased the answers when it became evident that the home owner did not understand the initial answer.

* This was a B evaluation, therefore, in the current in-house assessment format; there are no booklets handed over and the evaluator does not go over the report. In addition, the heating equipment and the insulation types were already determined from the A evaluation and I could not observe what the evaluator did in this case. In the post assessment interview with the homeowner who had the B evaluation, I asked if the owners had read their booklets, to which the owner responded,

Men don't read anything...I looked at them...looked at some more quickly..." The home owner found the "walk about" with the evaluator to be the most valuable section of the in-house assessment, "...The blower door test was useful and the running around with the evaluator confirming where air was coming in was also good (In-house evaluation respondent, 2004).

This household did not consider using the Hydro loan because the interest rates were too high. I also noted that the home owner had approximately four more months before they had to get a B evaluation completed and that they had wanted to completely air seal the upstairs and finish the main floor. The home owner indicated that lack of finances and a shortage of time forced him to get his B evaluation completed earlier,

We needed the money. We have a family and a mortgage...we couldn't afford to wait...any money we get now will help us... (In-house evaluation respondent, 2004)."

** This house was not evaluated because it was a duplex that did not qualify for the evaluation (lacked a common air space such as a window, door, or hallway between the two sides). However, the evaluator did take the home owner through the house and spent forty five minutes going over areas that could improve: insulate basement, air seal around windows, weatherstrip doors, and installing a set back thermostat. In follow up with the individual who could not get her duplex assessed, she had the following comments:

Wished that she could have had the evaluation...then at least could have got a little back...she may caulk around two basement windows....

Even though this home owner did not qualify for an EnerGuide for Houses assessment, leaving a package containing all the booklets would have been a positive educational opportunity. The home owner was upset because she had already explained the mechanics of her house when she called in to Manitoba Hydro and was assured that her house did qualify. The evaluator did a walk through her house for forty five minutes to indicate areas that she could upgrade in order to maximize her energy efficiency. Unfortunately this homeowner later indicated to me that she is not going to do any upgrades because she had wanted to get some money back.

The following section will elaborate on the eight required steps of In-house assessments as seen by the researcher during the observations of the In-house assessments.

The previously identified eight requirements will be examined in the following section:

- 1). Examining furnace and other heating/cooling equipment
- 2). Determining insulation types and amounts
- 3). Blower door "walk about" with evaluator and home owner
- 4). Answering home owner questions as they come up
- 5). Creating home owner report on site
- 6). Going over the report with the home owner
- 7). Giving and home owner the booklets and information sheets (package)
- 8). Going over the package with the home owner

1.) Heating equipment:

Each evaluator observed did examine the heating system of the house. However, even though upgrading the heating system was a priority in every report generated for homeowners, there was a range of information provided by the evaluators to homeowners. When speaking with customers about their furnace upgrade options, two evaluators responses were biased against high efficiency furnaces,—a) that high efficiency furnaces for residential applications did not exist (only for commercial applications) and b) that there is no real difference between getting a high or mid efficiency furnace. Current data does suggest that there is performance differences between mid and high efficiency furnaces.

Excerpt from observational data: In response to the homeowner's question about what furnace to upgrade to, the Evaluator recommends mid efficiency not high efficiency saying that there is no such thing as a high efficiency furnace for houses...just for commercial (In-house evaluation observation, 2004).

Excerpt from observational data: In response to homeowner's question about what kind of furnace to get, should they get a high or mid efficiency furnace, the evaluator told them, "nah, just go with a mid efficiency furnace. There isn't too much difference between the two." (In-house evaluation observation, 2004).

In addition, when all evaluators were examining the furnace, hot water tank, and other heating/cooling equipment, they did not mention complimentary lower cost options for the heating system such as insulating the pipes (to reduce heat loss) and/or using an hot water tank insulating blanket (reduce heat loss) or installing a set back thermostat. In addition, only one evaluator mentioned to customers the importance of lowering their hot water tank temperature when they are on vacation or to lower it in general (some home owners stated that they had kept their hot water temperature very high). While these are only low cost heat loss solutions, these solutions also cost less than purchasing a new furnace or hot water tank. In situations where the home owners out rightly indicates that they will not purchase a new furnace or in situations where they already have installed a high or mid efficiency furnace, evaluators should be responding with further information to get home owners to take the next steps—such as insulating pipes and/or insulating their

hot water tanks. For all newly installed furnaces, mentioning the benefits of installing and using a set back thermostat to lower/raise temperature is an important component for encouraging long term savings—even if a customer installed a high or mid efficiency furnace, their return is also impacted by the temperature they keep their house set at. Therefore, all evaluators should be encouraged to recommend a set back thermostat as part of the heating system upgrade.

Excerpt from observation: Hot water tank is set high—customer didn't know could set it down when away on vacation or that they could keep the water cooler than 140...evaluator did not mention that they could insulate pipes or insulate hot water tank...(In-house evaluation, 2004).

Excerpt from observation: while the home owner had already installed a high efficiency furnace into their house, the evaluator did not take an opportunity to suggest further upgrades, such as pipe insulation for the hot water pipes, insulated blanket for the hot water tank, or a set back thermostat to increase energy savings. These items were not explained verbally or in the home owner's report. (In-house evaluation, 2004).

The evaluator discussed insulating the attic space with the home owner. The only type of insulation that the evaluator discussed was fibreglass pink, with no mention of blown in cellulose, rigid, etc. (In-house evaluation, 2004).

1A.) Mid and high efficiency furnaces: myth or fact?

Residential high efficiency furnaces do indeed exist. It is critical that all evaluators are aware that these furnaces exist, are knowledgeable about high efficiency furnaces and are comfortable communicating the information to customers. In addition to providing better information to the customer about their furnace options, ensuring that evaluators are knowledgeable is also important for knowledge transfer because informal knowledge transfers between evaluators occur. This may inadvertently spread invalid information to other evaluators and create further misinformation. From interviews, evaluators indicated that they do ask questions/get information from each other. Therefore, it is possible that

less experience evaluators may receive misinformation and share this information with customers.

1B.) Working furnace is an efficient furnace. Myth or fact?

Each evaluator asked home owners what their main reason for getting an evaluation done was. There were many variations on a common theme, which was “high heating bills.” All customers indicated that paying high heating bills was the main reason why they contacted Manitoba Hydro to get an evaluation. However, when it came time to reading the recommendations or when the evaluator was examining furnaces, home owners often responded that they would not upgrade/replace their existing furnace with a new mid or high efficiency furnace, citing that they could not afford the cost of replacing the furnace. When customers asked evaluators to ballpark the cost of a mid or high efficiency furnace, evaluators would provide an estimated cost and home owners would respond that the cost was too high. Evaluators must strive to clearly explain that upgrading a furnace will in fact be a cost saving measure.

Another interesting disconnect also occurred: it was apparent that some customers equated a running furnace producing heat with a furnace running at 100 % efficiency. The same customers who had indicated that they were concerned about paying high heating bills moments before, balked at the idea of replacing a furnace that was “still running fine...I have it serviced every year and the guy says that its good for a lot more years...”(In-house evaluation respondent, 2004). Home owners believed furnace technicians and seemed incapable of accepting the evaluator’s recommendation to replace their furnace—they could not/would not equate high heating bills with ancient, inefficient furnaces. Based on the In-house evaluations the researcher say, the following statements summarize home owner’s thought processes in regards to replacing their furnaces:

High heating bills = less money for home owner

and that an

Ancient, functioning furnace and assurance from a furnace service technician = no upgrade to mid or high efficiency furnace,

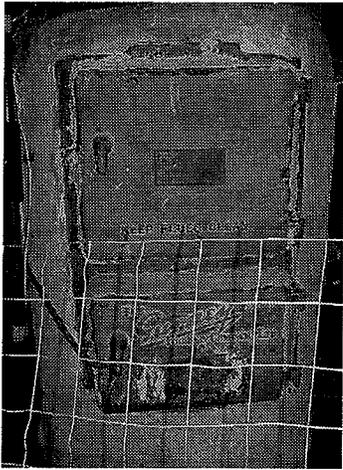
Even though upgrading to a mid/high efficiency is recommended as saving the most money in the long term, upgrading a furnace has the highest short term costs of all the priorities.

However, all home owners whose furnace no longer functioned, did upgrade to a high efficiency furnace:

Therefore Ancient, non-functioning furnace = upgrade to mid or high efficiency furnace

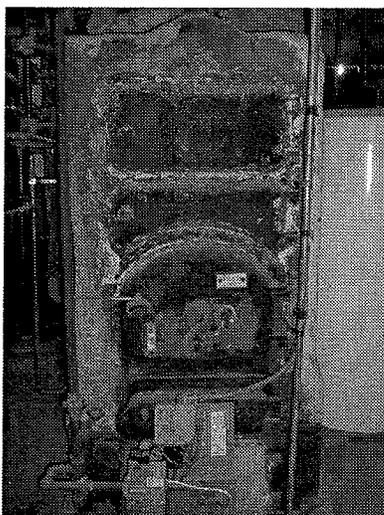
Those customers whose furnaces had stopped working were the only customers who reported upgrading their furnaces. For all other customers, they did not choose to replace their furnaces, even though replacing their furnaces was a priority recommendation in their report. Targeted education and awareness of both home owners and service technicians from maintenance companies needs to be undertaken to help both parties understand that a running furnace is not necessarily a fully functioning furnace. Again, when dealing with their furnace needs, if the last person they see is the furnace service technician who tells them that their “furnace will go another twenty years no problem...don’t waste money on putting in a new one...” (In-house evaluation respondent, 2004). Residential customers tend to follow this advice even if their reports indicate that a new furnace would in fact save them money in the long term. When thinking about furnaces, customers look at short term cost and do not consider long term savings.

Photograph 4 It Still Runs—But is it Efficient?



Both Photographs 4 and 5 illustrate the reluctance of home owners to replace their furnaces. The furnace in these two photographs has been converted from coal to oil and now to natural gas. The home owner viewed the current conversion (oil to gas) as being a more cost effective measure than replacing the furnace. This rationalization was probably also used by the previous owners who did the original conversion from coal to oil. Because furnaces represent a large investment for most people, they are hesitant to invest their money.

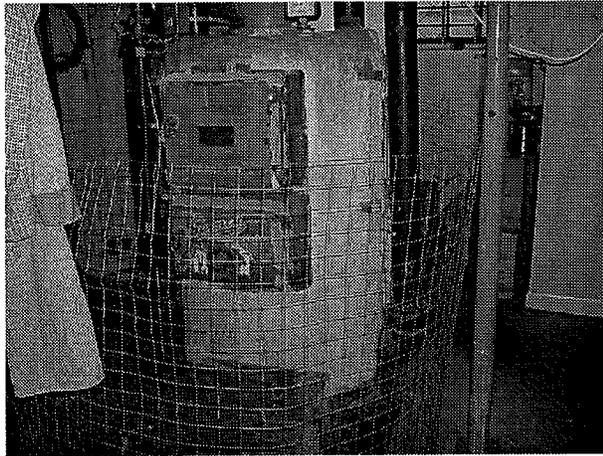
Photograph 5 The Home's Original Furnace



The following section provides photographs of various issues witnessed during the In-house assessments.

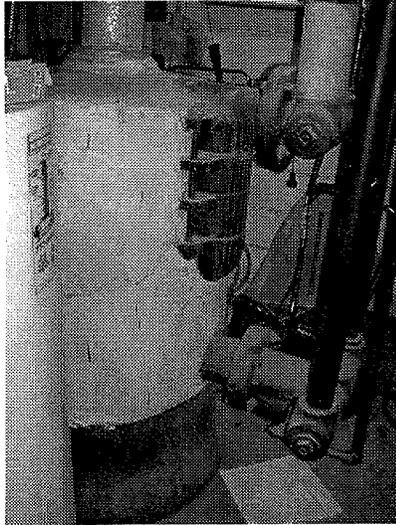
1B.) Asbestos remediation

Three separate cases of asbestos insulation were noted during In-house evaluations. One home owner had it professionally removed at an additional cost when they replaced their furnace. Two out of the three home owners knew that they had asbestos. One home owner was going to remove the asbestos themselves and take it to the hazardous materials disposal site (home owner indicated that cost for profession removal was prohibitively high for such a short length of pipe—approximately four feet of asbestos covered pipe and the second homeowner was not going to do anything about it as they were choosing not to replace their furnace. The third home owner did not know that they had asbestos and were unaware of the potential additional costs for removing it.



Photograph 6 Fence Used to Keep Children Away from Asbestos Covered Furnace

The furnace pictured in Photograph 6 is very old and has been converted twice—from coal to oil to natural gas. In talking to the homeowner, the evaluator discovers that the furnace looks to be the originally installed furnace from 1906. The photographs also indicate that the home owner has erected a fence around the furnace because the home owner is worried about the safety of people who may touch the asbestos on the furnace.



Photograph 7 Older Furnace in Another Home

As can be seen in the photographs, the average age of furnaces is relatively old and many of the furnaces have been converted several times. Furnace conversions are seen as a cheaper alternative to purchasing a new furnace. The age of furnaces is a good indication of what is wrong with customer's perceptions about their furnace and its efficiency. Many of the customers equated working furnaces with efficient furnaces. This viewpoint was further strengthened for those home owners who receive annual furnace check-ups by their technicians who also indicate that the furnace is fine.

In each of the two home owner's reports, there was no mention of asbestos, asbestos remediation, or any warnings about associated health risks for self-removal of asbestos

Important note: when the evaluator stopped and talked about the furnace—they discussed the asbestos around and on it, but there is no note in the home owner's report and no caution was given to homeowner about removal—home owner did know that it was asbestos (Notes from house with furnace in photograph number four and six, 2004).

When I asked the second owner what he was going to do about the asbestos—he said that he would take it out himself to a hazard place – would wear safety equipment –said it was too expensive to hire contractor to take out [home owner with four feet of asbestos covered pipe] (Notes from In-house Evaluation, 2004).

The home owner with the furnace fence had decided not to replace the furnace and that the furnace fence and asbestos would remain.

2.) Insulation types

In each of the customer reports, insulation was prioritized for basements, attics, and main walls or for a combination of all these areas. However, it is important to note that there is a range of information being communicated to home owners about their insulation options. One evaluator consistently referred to fibreglass pink batt insulation as the only option to home owners. This evaluator recommended pink insulation even in situations where other insulation types such as blown-in cellulose would be equally effective or more effective, such as in roofs, stuccoed exterior walls, houses with newly refinished interiors, or houses with hard to insulate areas such as small wall joints, multiple gabled roofs, and house additions. This evaluator did not seem to be comfortable and knowledgeable about insulation types other than fibreglass pink insulation. Insulation such as rigid foam panels, loose or dense pack cellulose, and reflective foil insulation were outside the evaluator's knowledge. Ensuring that evaluators are knowledgeable and comfortable expressing insulation options is critical for ensuring that customers receive the best information possible. In discussing insulation options with home owners, a simple guide may be appropriate, such as the one listed in tables 39 and 40 in helping understand insulation options relative to their applications. By adding pictures to these insulation charts, customers may be better able to understand and recognize their insulation choices, and feel more aware and empowered to complete this critical upgrade.

Excerpt from evaluation observation: 11:15 going over report...explaining what they should do...homeowner is listening. Evaluator saying to insulate basement, 11:20 we leave

Note: evaluator did not go over insulation options for basement. Homeowner asked evaluator, "Do we have to insulate the floors? Evaluator, "no just do the walls and joists [evaluator didn't go downstairs with them during blower door test, only when measuring ...did not tell homeowner what a joist is] and did not take and show either. (In-house evaluation, 2004).

Excerpt from another observation: [evaluator] didn't recommend insulated electrical gaskets for electrical outlets (air leakage through them), didn't recommend hot water blanket or pipe insulation, did not mention weather-stripping for doors—they could use some, both front and side doors. Also this evaluator when talks about insulation options, only mentions pink batt insulation as being viable? Why? (In-house evaluation, 2004).

Excerpt from another observation: Evaluator talking about poorly insulated attics/basements and how they lose lots of heat through them. Evaluator says it is difficult to ascertain the insulation amounts in the attic because there is no where to access it—all painted nicely, and attic hatch blocked with personal belongings in front of most of it. Home owner says he insulated ½ of the flat part of the roof with pink batt as far as he could “throw them”! and thinks that the flat part has R28 and the sloped part has R12ish for insulation (In-house evaluation, 2004).

Excerpt from another observation: The beams are cast in (poured into place) homeowner says this method makes it difficult to insulate from the inside—ho says he is going to insulate from the outside of the house. Home owner talked about insulating from the inside for cold floor phenomenon. Homeowner says that a rubble foundation insulates from the outside (home owner says info from CMHC) (In-house evaluation, 2004).

Excerpt from another observation: Evaluator says that he doesn't have defaults for shiplap. Says inside wall insulation is wood shavings, frame 2 x 4 16 ' ' space insulation layer 1 + 2 = 0 lath and plaster shiplap stucco = 3.83 for an R value (In-house evaluation, 2004).

These excerpts point to the fact that both home owners and evaluators struggle with insulation. Evaluators struggle to find the correct default in their computer program and home owners struggle to implement proper insulating techniques.

Table 39 and 40 provide examples of insulation types and recommended applications. Such table may provide a clear idea about insulation choices for home owners when used in conjunction with the booklets Manitoba Hydro already provides. Considering that insulating a house provides the “biggest bang for the buck”, making it easier for home owners may encourage them to pursue an insulation upgrade.

Table 39 Insulation Types and Common Uses

Insulation Types	Common Uses
Molded or Expanded Polystyrene (White Bead Board)	<ul style="list-style-type: none"> • Exterior sheathing • Interior basement walls • Suspended ceiling panels • Siding backer board
Extruded Polystyrene (Blue or Pink Board)	<ul style="list-style-type: none"> • Exterior foundation • Wall sheathing • Interior above-grade applications
Polyurethane and Polyisocyanurates	<ul style="list-style-type: none"> • Vinyl-faced for beam ceilings • Impregnated-asphalt for hot-mopped roof applications
Semi-Rigid Fiberglass Panels	Foundations below grade
Fiberglass	Fiberglass Insulation milled into small pieces and blown into place. Use anywhere.
Cellulose	Shredded paper (usually recycled newspaper) treated with fire retardant chemicals.

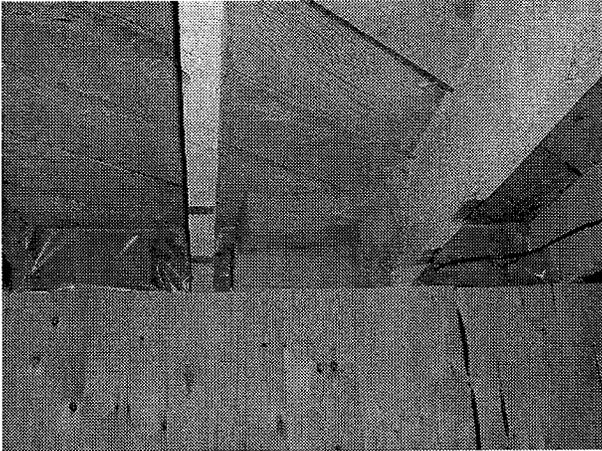
(Learn about insulation, 2004)

Table 40 Insulation Applications

Area to be Insulated	Type of Insulation to Use
Unfinished attic (with vapor barrier on warm side)	Loose-fill blown-in or poured-in insulation. Fiberglass batts or blankets laid between and over joists.
Finished attic (with vapor area on warm side)	Fiberglass batts or blankets stapled between rafter cavities.
Beam ceiling (cathedral)	Rigid foam panels glued to underside of roof sheathing on warm side of rafters and covered with wallboard, paneling or other finish material.
Wood frame wall (new construction)	Fiberglass batts or blankets stapled between stud cavities, with facing directed towards warm side of room. Blown-in cellulose (professional installation only)
Wood frame wall (retrofit)	Loose-fill insulation blown into walls (professional installation only).
Floor over unheated crawl space	Fiberglass batts or blankets installed between joist cavities, with vapor barrier facing up against underside of floor.
Floor over heated crawl space	Fiberglass batts or blankets hung side by side over crawl space wall, attached by cleats to rim joist above vapor retarder on ground, such as 4 to 6-mil polyethylene.
Concrete slab floor (finish floor above)	Rigid foam panels laid between 1x4 or 2x4 sleepers (seal floor against moisture before installing insulation) covered with 6-mil polyethylene vapor retarder, then plywood or OSB subfloor.
Finished basement (masonry wall)	Rigid foam panels glued between furring strips and covered with 1/2-inch drywall. Or fiberglass batts or blankets stapled into stud cavities (seal wall against moisture before installing insulation).
Exterior foundation wall perimeter	Extruded polystyrene held in place with backfill. The foam can be coated with a latex-modified cementitious coating to make it look like concrete.
Exterior wall	Fanfold foam applied directly over old siding, covered with vinyl, aluminum, hardboard, wood or steel siding.
Exterior sidewall	Housewrap applied to sidewall reduces air infiltration, permits water vapor to escape.
Sill plate/foundation wall (new)	Foam sill plate gasket fills gaps between sill plate and top of foundation wall, reducing air infiltration.

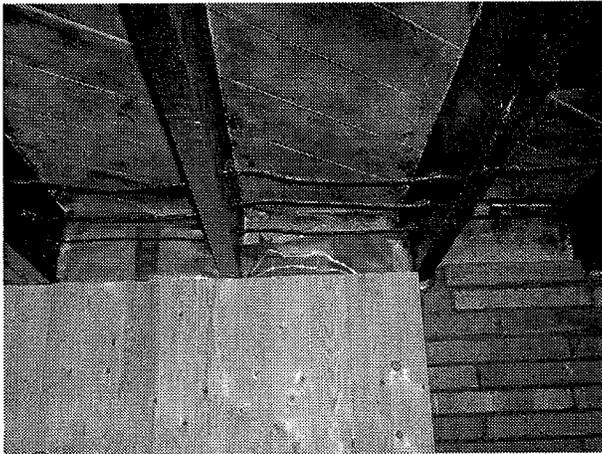
(Learn about insulation, 2004)

The following photographs are taken inside houses where in-house assessments occurred and show some of the “do-it-yourself” initiative undertaken by well meaning, but under-skilled home owners in attempt to insulate their houses. The photographs illustrate the general need for having follow-up visits occurring during the process of upgrading the housing to ensure quality upgrades are completed.



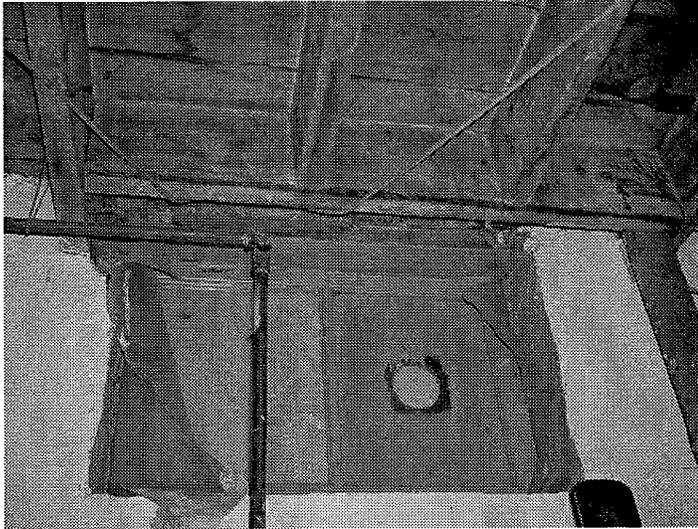
Photograph 8 Poorly Installed Home Owner Insulation in the Header/Joist Space

Note: Incomplete vapour barrier and insulation (centre) has no vapour barrier over it.



Photograph 9 Home Owner Completed Insulation

Note the use of duct tape (top left) used as air sealant on vapour barrier, no insulation (far right) in that joist/header: “It was too hard to reach that area, so I didn’t insulate it” (Home owner, 2004)



Photograph 10 Home Owner Completion of Insulation and Vapour Barrier

Note Incomplete vapour barrier from chute opening to joist space in photograph 10.



Photograph 11 Home Owner Installation of a New Door

Note the open spaces around the door and the incomplete insulation in the surrounding walls—see Photograph 12 for close up of insulation amounts around sides of door.



Photograph 12 Wall Surrounding New Door has No Insulation

Note the empty wall cavities beside the door. The walls in the house were devoid of insulation, except some wood shaving and shredded paper found settled in the bottom of one wall section. The home owner explained that they chose to put in a new door because they could feel a draft coming from the sides and bottom of the door. While installing the new door has improved the home owner *comfort*, they indicated that it has not reduced their heating bills.

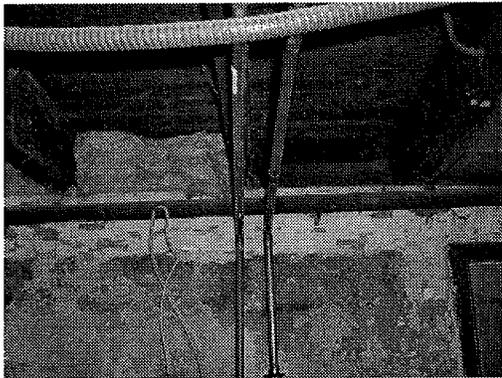
The following three photographs are a series showing home owner insulation methods and materials in the following order: (nothing—no insulation used, fibre glass insulation, and jute bags used for insulation). These photographs illustrate home owner completed upgrades that clearly indicate that home owners require further, ongoing information about insulation techniques, types, and applications. As well, monitoring is necessary to ensure that home owners are installing energy efficiency upgrades using best practices to help receive the best value for their effort.



Photograph 13 Illustration of Insulating Challenges in Older Home Joist Spaces

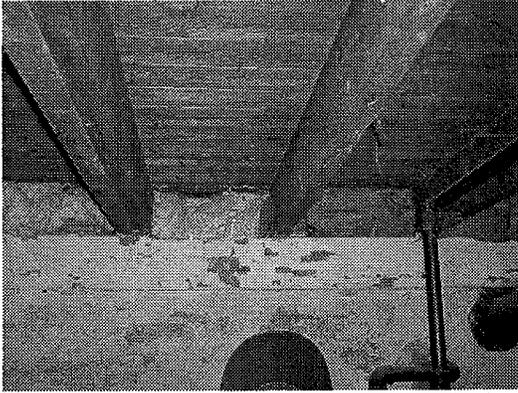
The poured concrete in the joist space pictured in Photograph 13 makes it a challenge to add insulation to uneven spaces that do not have room for insulation, which requires that home owners “doing it themselves” improvise.

Photograph 14 Concrete Wall with Partially Insulated Joist Space

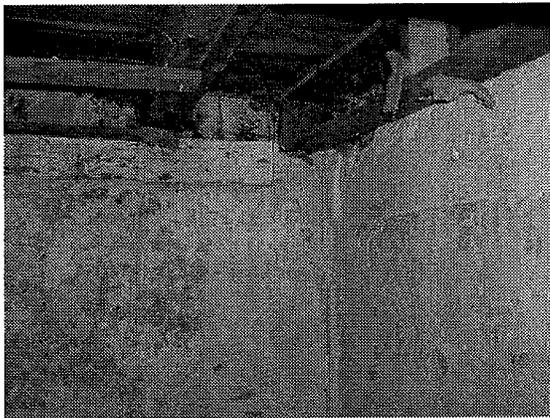


In Photograph 14, the home owner insulated the joist space pictured on the left, but did not insulate the last joist space—“I did not have any more insulation, so I left it bare”(In-house evaluation respondent, 2004). This cavalier attitude to completing home insulation is troublesome, considering the implications for the rest of the basement.

Photograph 15 Home Owner Insulated Joist Space



Photograph 15 demonstrates a home owner's use of insulation. In the top left and top centre joist space the home owner used insulation, while in the top right and far right joist space, they chose to use jute bags for insulation. The home owner chose not to insulate the bare concrete wall or add a vapour barrier. In response to my enquiry about why they used jute bags for insulation, the home owner said, "I thought if I stuff some rags up there, it would work just as well [as insulation]." (Home owner, 2004).



Photograph 16 Exposed Basement Walls without Insulation.

Photograph 16 is typical of houses seen in the West Broadway area by the researcher during observations of EnerGuide for Houses assessments. This house was built in 1923 and had some settled wood shavings in the attic and walls for insulation. The house had recently been sold and the new owner was determined to lower his heating bills.

The following three photographs (17 to 19) are from one house and illustrate home owner completed insulation jobs. While this home owner was very proud of his insulation job, it is questionable whether the home owner will see the full cost savings of his investment and effort.



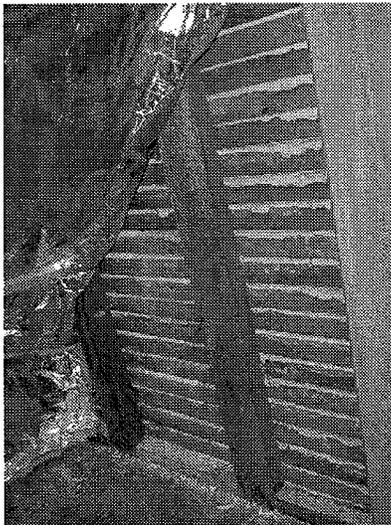
Photograph 17 Example of Home Owner Completed Insulation.

This example of home owner completed insulation was seen during the B (final assessment) in the EnerGuide for Houses assessment process. Note the use of plywood nailed into the insulation to hold the insulation against the attic wall (the use of nails to secure the vapour barrier destroys the vapour barrier by creating holes for air movement). Furthermore the insulation was not resting against the exterior walls, but had air pockets between itself and the exterior wall. The plywood strips were supporting and holding the insulation against the walls.



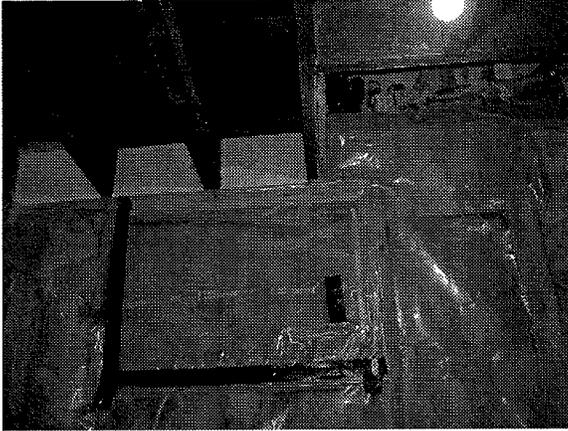
Photograph 18 Detail of Attic Insulation Completed by Home Owner

This photograph is the same B assessment house as in Photograph 17 above. The home owner had completed insulating their attic, again using plywood strips (right side) to affix the vapour barrier to the exterior wall.



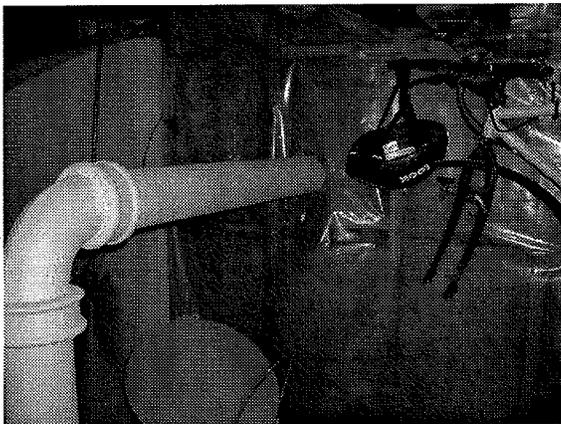
Photograph 19 Detail of Owner Insulation Completed for B Assessment

Note the partial insulation of the space (Only 50% of roof insulated) prior to B evaluation.



Photograph 20 Owner Completed Basement Insulation—B Assessment

Pictured in Photograph 20 is another insulation job. This insulation job was seen in another house. Note the use of duct tape as sealant on the vapour barrier. Also note the torn vapour barrier hanging in the middle left side of the photograph near the black duct tape. While this home owner did do a better job in insulating, there could still be some improvements, such as using proper air sealing tape, rather than duct tape and not allowing his young children to rip the vapour barrier down (this is their play space and his personal storage space).



Photograph 21 Owner Completed Basement Insulation—B Assessment

Note the lack of sealing around the pipe through the vapour barrier. This photograph is from the same house as is depicted in Photograph 20. This home owner could have benefited from information about sealing.

3.) Blower door test walk about

All the evaluators completed walk throughs with the homeowner(s), however, one evaluator did not seem especially happy to take the owner on a walk through.

Excerpt from a walk through: Evaluator has started blower door test. No talking during the set-up, no explanation of what is going on. Now started. Home owners are watching. Evaluator says they should go around and look for drafty areas. nothing happening. Evaluator says home owners should go around and look for drafts. Evaluator is not moving from this room...is not telling home owners what to look for. Home owners wandering around...third time...evaluator asks if home owners want evaluator to take them around...home owners say yes. We are going to windows. Evaluator not saying how to look for the draft, just to look for air movement. We did not look at any doors, wall/floor joints, and the evaluator did not come with us into basement...there is air moving around windows and off a foundation crack. When back upstairs, evaluator took homeowner to attic door and spent some time there. Did not seem like evaluator wanted to go around with owners...

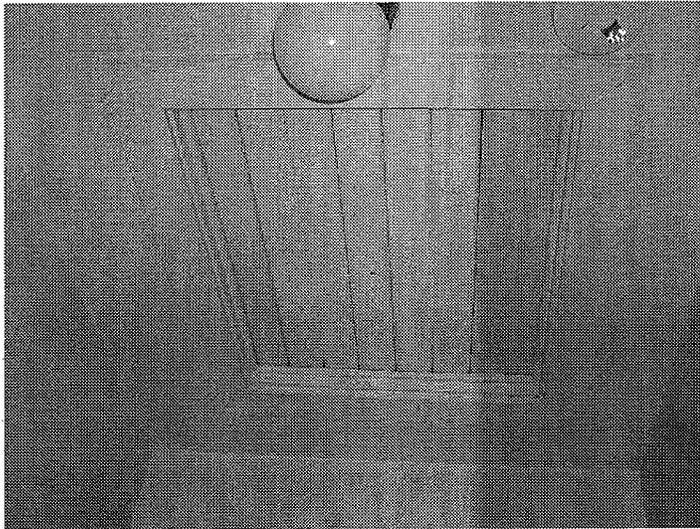
The home owner gets their strongest understanding of air leakage during the blower door test “hands on” component occurs. Failure of evaluators to take customers on the walk through or explain what remediation steps can be taken is a lost educational opportunity. In addition, it is critical for the evaluator to clearly show and tell the home owner what they are looking and feeling for during this section. It would be useful for the evaluator to provide a sheet where home owners can indicate which areas they need to complete air sealing. It may be difficult for home owners to remember where there was air movement. In addition, this self-made list might encourage home owners to complete their air sealing. Evaluators should provide a minimum of one clearly communicated (visually and by touch) air flow example of at least one window, one door, one crack, one floor/wall joint, and at the fresh air intake. In addition, evaluators should draw attention to unique leakage areas such as fireplaces, unused vents, etc. it is important to refine this education opportunity because in effect, the evaluator is training the home owner to complete work that will help them save money, improve human comfort, and lower their heating bills—all objectives of Manitoba Hydro.



Photograph 22 Blower Door Readied for Depressurization Test

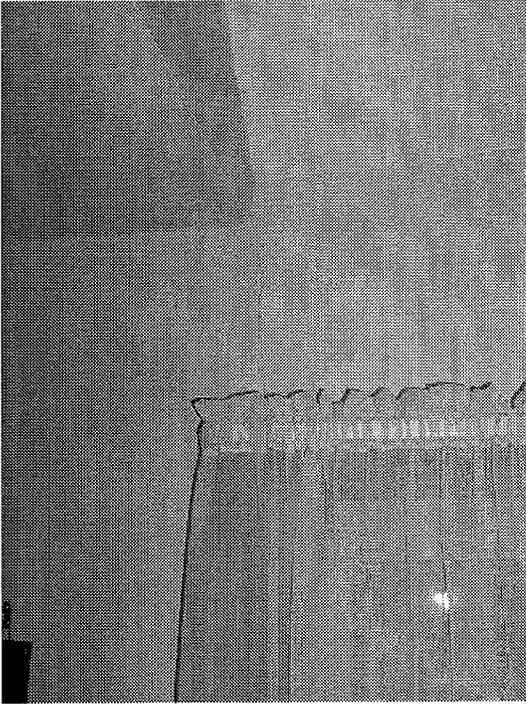
The following photographs (twenty two to thirty) illustrate common areas of air leakage observed in older homes—access hatches, cracks in ceilings and walls, and in doors.

Photograph 23 Access Hatch to Attic



Example of a common area with high air movement—the attic hatch.

Photograph 24 Cracks, Another Example of Common Air Leakage Areas



Photograph 25 Another Example of Cracks as Air Leakage Areas



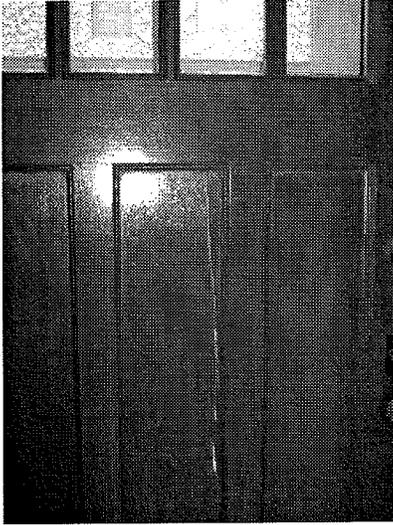
Photograph 26 Example of Window/Wall Crack with A Lot of Air Leakage



Photograph 27 Door/Wall Crack Example of Air Leakage



Photograph 28 Exterior Door with Large Crack



Photograph 29 Basement Window with Lots of Air Movement





Photograph 30 Window with Plastic Covering—an In-Expensive Way of Draft Proofing

The previous photographs provided visual examples of the challenges of incorporating energy efficiency into older housing stock and the “challenge” of ensuring that energy efficiency upgrades completed by home owners will in fact be energy efficient. The following section continues to expand on the remaining five necessary key steps of In-house evaluations as identified in by the researcher (examine heating equipment, determine insulation types, and explain the blower test and look for air movement have already been examined). This section continues to examine the key steps of answering home owner questions, generating the report on-site, going over the report with the customer, and going over the package with the customer.

4.) Answering home owner’s questions

All the evaluators answered home owner’s questions. However, one evaluator dealing with English as a second language home owner did not fully comprehend that there was a language barrier.

Excerpt from observation: When observing this home owner, it is apparent that English is not their first language and that they were having problems understanding and comprehending what was going on. After speaking with the home owner, the evaluator did confirm that if

the home owners did not understand something, they should ask. They have accents, quiet voices, grammar and sentence structure is somewhat off....they speak another language rapidly and more comfortably to each other. The wife has stronger language skills—is easier to understand her...husband is really hard to understand...is easy to understand the children...Sometimes the evaluator would repeat questions to the home owners at least twice the same way before rephrasing and trying to communicate. Evaluator not explaining...anything....not talking while setting up blower door...only talked at the beginning (Excerpt from In-house evaluation, 2004).

During the evaluation it was apparent that the home owners did not fully understand what was going on when they whispered to me, “Do you know what is going on?” (Home owner, 2004). This whisper occurred when the evaluator ran out to their vehicle to get something. I indicated to the home owner that they should direct their questions to the evaluator. The home owner’s did not direct any questions to the evaluator after the evaluator had come back inside. For some cultures and people, the evaluators represent authority and knowledge and as such, may be perceived as being unavailable to talk to. In the above case, the long silences and the lack of interest on the part of the evaluator to do a blower door walk through or to go into the basement with the home owners did not feel welcoming and may have felt intimidating for the home owners. It is necessary that all evaluators try as much as possible to respond to verbal cues (language skills) and other customer cues in order to provide their technical recommendations and other information in language that is most suitable for the customer.

For low income groups who often deal with authority figures in order to get food, shelter, and other life necessities, having an evaluator that may not respond or is not aware of their perceived authority may intimidate owners and impact the likelihood of the owner completing the work.

In addition, highly technical language can also be intimidating. Home owners might choose to remain silent and seem knowledgeable rather than ask for clarification. Terminology such as blower door, leakage area, joist (context of insulate in joist space), etc. may be difficult for home owners and as such, decrease the likelihood of their ability to complete the work or to know where to do the work. For low income groups with less

education such as found in West Broadway, having technical terms used may limit their ability to understand what is going on and may cause them to “tune out.”

5.) Report generation: On or off site?

Four out of ten times, the home owner’s report was not generated during the assessment. For each of these times the same two evaluators were involved. Both evaluators said that their computers were getting upgraded and when I next saw them, one commented that “he’d rather mail the report out and spend time answering home owner’s questions.” (Evaluator, 2004). The second evaluator commented that “it takes less time to produce the report and mail it out...but I do provide my card they want to call if they have any questions.” (Evaluator, 2004). While entering the data does take time, the report that is generated provides a focal point the evaluator can use to talk to the home owner while going over their priority areas and commenting on remediation actions owners can take. By leaving without producing a report and taking the time to talk about the results, the evaluator leaves home owners empty handed. While these evaluators do mail the reports out to home owners, there is a lost opportunity for sharing information.

For low income groups who may not speak/understand English fluently or who may have limited reading/comprehension skills, mailing the report to them may not be enough to encourage them to do the upgrades and any questions they have about the report may not be answered in a timely fashion. Completing the report on-site should be considered a priority by evaluators and they should view the report as an educational opportunity and not as a time consuming task that keeps them from completing another evaluation. While evaluators may provide their cards for home owners to get in touch with them for questions, the onus is being put on the home owner to take the initiative and call with their questions. In situations of low income, the onus to call for additional information may not be taken due to factors of limited comprehension, language abilities, accessibility to a phone, and unfamiliarity with the topic area—upgrading to increase energy efficiency—may be far outside the scope of their understanding and home owners may not even know that they have questions or should have questions.

6.) Going over the report with homeowners: an opportunity to educate

On-site report generation leads to evaluators going over the report with home owners. For those four reports that were mailed out, the one evaluator does attempt to “go over the report” (Evaluator, 2004) and tells the homeowners to “Insulate, upgrade your furnace, and air seal” (Evaluator, 2004). While these items are usually listed as priorities, the detail provided by the evaluator is extremely limited in scope and does not address details such as where home owners should insulate, their current rating and what they could achieve by implementing the recommendations, and there is no time for clarification as the home owners do not know what to ask. Mailing out the report should be avoided and evaluators should be encouraged to arrange an additional half an hour to come back if they cannot complete and produce the report on-site. The report is the culmination of the assessment and should be treated as the main priority of why the evaluator is in the home owner’s house.

7.) Handing over the booklets and going over them with customers: another educational opportunity

All evaluators, with the exception of one, handed out complete packages which include multiple booklets and information sheets about how to hire a contractor, insulation options, furnace information, etc. The evaluator who did not hand out a complete package on the one occasion also happens to be an evaluator who prefers to mail out the report. When he looked in the package, he commented, “...all the booklets aren’t here...who ever puts these together screwed up”(Evaluator, 2004). While errors may occur, the response to the error is important. In this case the evaluator indicated that he would mail out the information as he did not have another package with him.

In cases where the evaluator has not gone over the report with the client and is unable to go over the booklet information with the client, the loss of an educational opportunity is compounded and makes it more difficult to determine if customers will comply with the recommendations they are given. In addition, many of the evaluators hand the package over and state that it “contains good information about how to hire a contractor and information about how to do any of the upgrades, if you are going to do them” (Evaluator,

2004). The booklets contain valuable information and evaluators should at least pull the booklets out of their package to show owners what information they are getting. One evaluator is exceptional as he gets the homeowners to look at the booklets while he is entering the data to create the report. What is unique about this evaluator is that he does not hand the package over and say, "Here is some stuff you should read", instead he pulls each booklet out and says a line or two about each booklet to indicate why the home owner may want to read the booklet. Then while entering the data, the home owner is engaged and is looking through the booklets. It should be noted that this evaluator had the most issues with getting his data entered and working in terms of entering the blower door test data. Having the home owner examine the booklets gives them time to think of questions they might have or to ask about clarification of items in the booklets.

By preparing the report onsite and using the time to get the home owners to read and look through the booklets, the evaluators are creating one more chance for the homeowners to ask questions and learn more information. This information sharing is important as it also indicates to the home owner that the booklets are worth looking at and not something that the evaluator offhandedly provided: often importance of information is ranked in the manner it is received, therefore, getting the home owner to look at the booklets while the evaluator is still in the house sends the message that these booklets are valuable.

8.) Conflict of interest/potential liability issues: booklets and other information sources

One contractor consistently handed out two lists of his own creation. One list contained names of contractors who did blown-in cellulose and the second list was based on information found on NRCan's website and related to the chimney effect. The evaluator's name is also on the list of insulation contractors, but he does draw a line through it and mentions that it would be a conflict of interest if he were to do the work.

The eight steps that the researcher outlined and detailed as being important to a successful In-house assessment for home owners had one overriding theme: each of the eight listed steps had an educational component that could be used to easily share information with home owners.

Table 41 Assessment Recommendations vs. Home Owner Choice of Upgrades

Assessment Recommendations: EnerGuide in-house assessment			Home owner choices			Home owner rationale
Furnace upgrade	Air sealing	Insulation	Furnace upgrade	Air sealing	Insulating	
# 1	# 3	# 2 Basement	√	X	√(will do attic)	Furnace failed, emergency replacement
# 3		# 1 Basement # 2 ceiling insulation	X—Maybe new furnace	X	Maybe insulation in attic	Easy to access part of the attic, furnace is getting old
#4		#1 main wall insulation # 2 ceiling, #3 basement insulation	√	√	√	Homeowner is a handyman and wants to do everything
# 1		# 2—basement insulation, #3 wall insulation	X	√	√Did basement	Furnace is too expensive, insulated two walls in basement
# 3		# 1 Basement insulation, #2 attic insulation	X	X	X	Home owner purchased all new windows
# 1		# 2 Basement insulation, #3 main wall	√	X	Did attic	Friend insulated her attic, emergency furnace replacement, no money to do anything else
# 1	#2	# 3 Basement, #4 wall, #5 attic, #6 upgrade windows	X—will not replace...furnace technician indicated that furnace is "fine"	X—may do some	X	Became unemployed owner cannot afford to do upgrades
# 4	#2	# 1 Basement, #2 ceiling, #3 main wall	X	√	? Don't know yet	Waiting for father choose recommendations
# 4	#1	# 2 Basement insulation, #3 ceiling	X	X	√-will do basement—easy access	Cannot afford to complete other recommendations

Legend for Table 41:

X = chose not to complete the upgrade

√ = chose to complete the upgrade

#1, 2, 3, etc. is the upgrade priority as illustrated in the home owner's report, with one being the most important, two being second in importance, and so on.

4.6 In-House Assessment Recommendations Compared to Owner Upgrades

Table 41 summarizes the In-house assessment recommendations and the home owner's choice of upgrades. The table lists report recommendations on the left side and the home owner's choices are listed on the right side. What is notable about the chart is the range of home owner upgrades and the reasons that they did not choose to complete an upgrade or why they did choose to complete an upgrade.

Respondents indicated in Table 41 that economic reasons are cited for why owners choose not to replace their furnaces. In addition, home owners also often follow the advice of their furnace technicians who annually provide a furnace inspection. If the furnace inspector indicates in any way that the furnace is functioning, then the home owner considers upgrading the furnace to a mid or high efficiency to be a "waste of money", regrettably forgetting that the investment cost of a new furnace will pay in future savings, while keeping the old furnace will only continue to result in continually higher heating bills.

In terms of air sealing, home owners were split 50/50 when choosing to do it as indicated in Table 41. Those that chose to do it cited that it was a low cost option that they could do themselves to save money for doing larger projects, while those home owners who chose not to do it indicated that it would take a lot of time and would result in negligible savings.

In terms of insulation, the table indicates that owners were split 50/50 again on insulating. Some home owners chose to insulate areas that were easy to access, while others relied on friends and family to help determine insulation type, amount, and area to insulate. In

addition, a few home owners got second opinions on their reports and were receiving information from friends, family, and industry experts such as furnace technicians and/or company estimators of non-prioritized upgrades such as windows. In one instance, a friend was allowed to make all insulation decisions—type, amount, and area. The homeowner also relied on her friend, who is not a carpenter, or a recognized tradesman, to install her insulation. She hired her friend to install the insulation in order to save money, but her choice may end up negatively affecting her potential savings.

One individual home owner's report indicated that he should replace one window as it had a large hole to the exterior. When I visited the owner after the assessment, it was to find out that the homeowner had had a window estimator in who had convinced the home owner to replace all windows at a rough cost of six thousand dollars. The owner was pleased with the information he had received from the estimator and assured the researcher that the window upgrade would improve the energy efficiency. His report was examined for such information, but insulation was one of the main priorities, not window replacement. The following information is from the interview with the home owner, post assessment:

Excerpt from interview: Owner was very proud of the fact that he was already working on his house—got a bank loan for \$10,000 which was the maximum that he could borrow. When I asked him what he was doing with the money, he said that he has already spent between \$5 and \$6000 on windows. When I asked him why he chose to do that, he said that when the “window guy” came to measure the window/do an estimate on the one window, the window guy looked at his other windows and said that it would be cheaper for the home owner to get all the windows done at once—that way the window guys only have to charge once on labour and only charge once for coming and measuring. NOTE: in this house, the evaluator only recommended that one window be changed/replaced as it had a big crack in it and the frame was open to the outside.(Excerpt from home owner/researcher communication, 2004).

The homeowner said that he was spending the remainder of the money on insulation to finish insulating the basement—which was part of his recommendations. Note: the home owner was only doing about thirty percent or one to two walls of insulation as the

remaining \$4,000 had to cover the framing costs and labour, as well as the insulation. When I asked how the homeowner felt their rating would be improved by replacing the windows, he said,

Oh, XXX from the XXX (window company) said that the windows would provide us with a lot of saving. I think that we will improve our house a lot for the next evaluation. The homeowner is not doing any of the other recommendations—no air sealing, cannot afford to replace the furnace (said, why would we replace it? We have the guy in once a year to check it and he says it is working fine.”), and not insulating more of the house, cannot afford to do attic and rest of basement (Home owner, 2004).

4.7 Post In-House Assessment Questions for Home Owners: Are Their Priorities the Same as the Ones Provided During the Assessment?

In order to ascertain what the homeowner’s learned from the evaluation, what they felt could be improved, and the upgrades they chose to complete, I arranged a second meeting with them. This meeting was approximately ten minutes to thirty minutes in length. The following questions were asked at the meeting which was arranged approximately two weeks after the initial assessment. Please see appendix 10 for questionnaire.

All home owners indicated that they had their reports. However, three home owners did not know where they were. Based on information gathered, home owners did have their reports and had read them. Because the priorities are included in the report, it is critical that home owners retain the information in order to aid in decision making.

1. Do you have your report? When asked if they had read their report, home owners were split on the issue. This split is possibly due to the fact that approximately half of all reports were mailed out to customers, rather than generated at the house. Home owners make an effort to be at home at the time of the evaluation, often taking time off from work or scheduling a day off from their busy lives. In the time that the evaluator has the home owner, if the report is not produced, then the home owner may rush back into their busy days filled with children, work, and other responsibilities and not really take time to

examine and understand the report when it is mailed to them, when they may not care about the report as much, "I have it here somewhere".

2. Have you read it? Two of the individuals who had received their report in the mail stood out because they did not seem to have read the report, again underlying the importance of having evaluators produce the report in the home. The following two comments are from home owners who did not read their reports:

Um, we looked through it and read the recommendations (Home owner, 2004)."

Haven't read it, I haven't had time (Home owner, 2004).

Other home owners responded that they had read the report and found it useful, even though some of them reported that it had been some time since they had last looked at their report.

Not looked at since evaluation (Home owner, 2004).

The report was really useful (Home owner, 2004).

I went over it (Home owner, 2004).

I went over it again (Home owner, 2004).

My husband has...I will read it later (Home owner, 2004).

3. Are you planning to do any of the recommendations? If yes, which ones and why?

The following excerpts indicate that customers did try to complete some of the priorities in their reports. However, no one indicated that they would be completing all their priorities due to factors such as employment loss, lack of funds, lack of time, and aesthetic considerations, such as they had painted the house recently and did not want to wreck their paint finish. The main reason (100 percent) for home owners upgrading to an energy efficient furnace is that their old furnace was not working any more. In contrast, those home owners whose ancient furnaces had not broken down reported that they would not upgrade their furnaces because they were still working. Homeowners equated the ability of their furnace to work with being efficient. Without visual signs, home owners

could not comprehend that a working furnace does not always equal an efficient furnace. Non-expert advice was also used to determine insulation choices and non-experts were often used to complete upgrades. Economic cost was the main determinant for choosing to complete upgrades. The following excerpts provide insight into home owner's choices:

Did already do the furnace [furnace had broken down prior to the evaluation and was okayed to replace by Manitoba Hydro]...maybe do some caulking. (Home owner, 2004).

Upgrade water heating, energy efficient lighting, mechanical ventilation, insulate main walls with blown in cellulose, air seal, basement insulation, moisture proof basement, upgrade space heating equipment, change some windows (bathroom)—have moisture problem with that window and will change all fixed windows. (Home owner, 2004).

I will do the air sealing...I can do that myself...I don't think I will replace the boilers until they quit...it is too expensive to buy new ones...I am not sure if I will insulate...I spent a lot of money and time painting this house and I don't want to wreck my paint ...so I will have to see...if I feel that the air sealing is enough, I won't insulate...Also I don't have the money to insulate [the attic and walls] (Home owner, 2004).

Some insulation, my friend is going to put some in the attic for me. How much is he putting in? I don't know. What kind is he putting in? I don't know. What is the cost of this? He said around 1500 to 2000 [labour included]. Does your friend install insulation for a living? No. What does he do? Well he does stuff around his house and he'll know what to do. He is a "home handy man."

How did he pick the insulation amount to put in? I don't know, he just knows"

How did he pick the type? He knows what he is doing.

[note did not go on with questions---owner getting defensive with me asking what the friend does. He is just a friend]

"He knows how much to put in."

Are you going to do any other insulation or air sealing or any other recommendations? No, I can't afford to do anything else. (Excerpt of home owner/researcher conversation, 2004).

Not all of them, maybe just some caulking. We are down to one income and we can't afford to upgrade the furnace or insulate right now. (Home owner, 2004).

No [I ask-what about upgrading the furnace—it was the number one recommendation in your report?] owner: no, we don't have the money...also, we had the furnace guy in last year...we have them come in every year to look at the furnace...and he says that it is fine...it isn't going to break down...it will keep working...so I don't see the need to replace it if it is working...it is fine. (Excerpt of home owner/researcher conversation, 2004).

4. Are you planning to do anything else? This question was asked to determine if home owners were aware of other options they could include. One home owner who was a carpenter was going to upgrade all his insulation and attempt to get a complete air and vapour barrier in all sections of the house. The following are responses from other home owners. Many of the home owners indicated that they were not going to do any upgrades as it was expensive.

No...maybe put new windows in kitchen and living room...the furnace is too expensive...when we bought this house we did not know how expensive it was to heat...very expensive...maybe it will be better now. (Home owner, 2004).

Home owner is going with a condensing boiler unit from Europe... cost is \$6000 and he will do installation. Is insulating outside whole house, insulating basement, changing some windows (bathroom and two bedrooms three windows total) new doors, caulking, vapour barrier, adding insulation to attic. (Excerpt of home owner/researcher conversation, 2004).

I might try and fix the crack in the outside door and maybe fix those vents...do you remember what he said to do to them? [me: I don't remember...maybe you should call the evaluator and ask him]. (Excerpt of home owner/researcher conversation, 2004).

“No, I am not going to do anything”. (Home owner, 2004).

Well, we would like to do geothermal, but that is too expensive...we are going to add some insulation...my dad knows what to do...he'll put some in the attic...and we are going to replace the upstairs windows...we don't know if we can afford to replace the furnace...we might leave it ...but it makes a lot of noise...my dad will take a look and see what we should do....we are also going to fix

the roof [when looking into the attic...the evaluator noted that in a corner of the roof that you could see daylight and that there was water getting in—he did explain why they did not want to get their insulation wet once they added it]. (Home owner, 2004).

Already done the insulation...my friend did it...[it is in the attic] I already did the furnace[furnace had broken and Hydro okayed an emergency installation]...I can't afford to do anything else. Home owner, 2004).

Nothing else [me: what about the recommendation to get a high efficiency furnace? Do you see yourselves doing that?]. (Home owner, 2004).

We aren't doing the furnace...the guy was in last year and he says it runs well and we won't replace it until it stops(Excerpt of home owner/researcher conversation, 2004).

No. I can't afford it right now...[me: what about the air sealing?] I don't have the time to do it...and I'm not going to pay to get it done (Excerpt of home owner/researcher conversation, 2004).

Again, economic cost was cited as the main reason that home owners were not implementing more of their recommendations. One home owner was going to install an expensive furnace as they planned to live in the home for a long time and therefore recapture their initial investment.

5. How useful did you find the booklets? Owners were asked if they had read the book and if the books had helped them make better decisions. For the majority of home owners, the booklets were too technical or they just were not interested in reading them. The following are home owner comments about the booklets.

“They look nice.” (Home owner, 2004).

“Did you read through any of the handouts that came with the booklets?” No. “Could you tell me why not?” Ithey were sort of duplicates of what is in the booklets, right?” (Excerpt of home owner/researcher conversation, 2004).

When I asked the homeowner if he had read the pamphlets that were given to him, he said, "No, I didn't look at them (Home owner, 2004). [This home owner was very excited and disregarded the rest of my questions. Instead, he took me on a short tour of the outside of his house and pointed out the new windows that he was going to get. He explained how much he was going to pay and how it would improve the value of his house and help with his next evaluation.]

Yes we did get them...I don't know where they are...really haven't read them...my dad is pretty handy and he's going to help do this stuff [me: what does your dad do?] home owner said that his dad is some kind of engineer. (Home owner, 2004).

Have read booklets...I didn't know terminology on windows it was too much detail and I didn't understand...(Home owner, 2004).

Home owners used their reports as their main reference source for what upgrades they should do. The majority of home owners did not find the booklets useful at this time. If the booklets were combined with other measures, such as a self-completed guide for all air movement areas, etc. home owners may use the booklets more. The following question attempted to understand the factors surrounding home owner use of the booklets.

6. Why or why not did you read the booklets? By asking home owners this question, I was attempting to determine if home owners were not interested in reading the books, did not understand the information and therefore stopped reading the books, or if there were other reasons that influence owners reading the booklets. The following are comments from home owners regarding why they did or did not read their booklets.

"Is hard to read and don't know what it is about." (Home owner, 2004).

Ah not bad...don't have a lot of time to read them....I can do the caulking myself...(Home owner, 2004).

No reason...lazy I guess...(Home owner, 2004).

My husband read the one about insulation...he wants to see if he insulate the basement/crawl space. (Home owner, 2004).

My husband read the one about insulating...he wants to do it himself. (Home owner, 2004).

No, I haven't. (Home owner, 2004).

They're here somewhere. I haven't read them because I am too busy looking for work...maybe later. (Home owner, 2004).

I looked through them. Researcher: "What do you mean by looked through them?" Home owner: I read some pages and flipped through them...too much duplication...they repeat a lot of stuff so I stopped reading. Me: "Which ones?" (Home owner, 2004).

Have you read your booklets? [I]Am familiar with them ... I have seen earlier booklets like this, but I have not read these ones...I flipped through them. Why haven't you read them: I just wanted a ball park of my house's efficiency. I have knowledge of what should be done (Home owner, 2004).

Of what you read, are there any areas that you found difficult to understand: "for someone completely inexperienced they are difficult. The words they use are terminology and people need simpler language...Subject matter is straightforward. (Home owner, 2004).

"No, I have them [booklets], but haven't read them" Why not? "I don't know." (Home owner, 2004).

Yes, have them [booklets], haven't read them...too hard to read...don't know what they are talking about..."(Home owner, 2004).

Homeowner: I can't find them[booklets]. They are not very useful...
[Insert by Roselle after leaving the house]:I tried to find out which booklets the home owner had read and without creating an antagonistic dialogue, I feel from my questioning that the ho had read portions of the booklets and/or the title pages off the pamphlets.
Also note that he did not in the two weeks know where they were (Home owner, 2004).

Information “overload” was cited a number of times; home owners were overwhelmed with the information, some found it too technical, while others did not understand it all. One individual was frustrated with the booklet layout and felt that there was duplication—he wanted information to be in one area. For example, the home owner wanted insulation information to be in one booklet rather than in several of them because it takes time to find the information.

7. Do you have any other questions or comments? Home owners were asked what else they wanted to learn from the assessment. There is a wide range of suggestions that can be summarized in the following points. The ideas can be grouped into information gaps, information organization changes, and new programming suggestions. The following recommendations revolve around information gaps that home owners mentioned:

- Provide a heat loss calculation
- Make the annual estimated energy consumption number relevant to something such as the heat loss calculation
- Provide the current Hydro loan rate to home owners
- If a blower door test cannot be completed due to wind conditions, ensure that the customer can get one done on another day
- Include information in the hand outs about ratings for houses of similar size, of similar age, and in similar weather conditions so that home owners can make comparisons of their house to those with similar circumstances
- Make the recommendations more specific—eg. Instead of saying add insulation to the attic, indicate that insulation should be added to bring the current R value to R50, etc.

The following recommendations focus on information organization of the booklets and report:

- Have one single binder that contains all the booklet information (less likely to lose the report and booklets)
- Have binder information organized by topic rather than splitting up information—eg. Keep insulation information together, rather than spreading it through a few books.

- Lower the interest rate on the Hydro loan, offer more financing options, and/or provide materials

Home owners also voiced their ideas about new programming that they wanted Manitoba Hydro to develop:

- Electrical wiring retrofit program
- Furnace rental plan for mid to high efficiency furnaces
- Offer solar and wind options
- Allow customers to put wind turbines on their houses

The following excerpts are from home owners with comments about the In-house assessment and its technical components, the blower door test and heat loss calculations. One home owner was frustrated that he could not get a heat loss calculation and felt that this was important information to provide to home owners. This home owner was a tradesperson and so had a strong need for more technical information to be provided as part of the In-house evaluation. His commentary is listed below as it was beyond the scope of commentary that the other home owners provided.

“Yes, why don’t I get a heat loss calculation with the report? Why don’t I get a BTU per hour heat loss calculation?” I want to know how many BTUs / hr the house uses so I can properly size my furnace...so they don’t try to sell me a furnace that is too large....[he placed emphasis on this last statement]...why wouldn’t we be told that?...I paid 75 bucks but I didn’t get a heat loss calculation....I don’t understand the estimated annual energy consumption.

Home owner asked about if he can get the heat loss calculation from the evaluator: evaluator says no: you must get that from a contractor who understands what a heat loss calculation is.

Home owner: I don’t know any contractors who do know what it is or who will use it. They just size the furnace by looking at how many BTUs you currently have and just put in the same thing, or they size it by just thinking in their head about what you need. They aren’t going to calculate to reflect that I have now insulated, done vapour barrier, or have air sealed. (Excerpt of home owner and researcher discussion, 2004).

They couldn't do a blower door test at my house because they said it was too windy...I paid for that.

[homeowner asked me if that can be done for him...I have called the evaluator to find out...](Home owner, 2004).

Follow up: evaluator said they are not allowed to do the blower door test after the fact—homeowner was very disappointed that he could not get a blower door test done and put on his evaluation.

The homeowner was wondering how he can get an evaluation done without having a blower door test—he thinks that the blower door test is the most important part of how they determine his number.

Update: Entered July 18: Homeowner phoned me and said that he was getting another inspection done... one of NRCan's random re-evaluations... asked if I wanted to see this one, but I could not attend. (Excerpt of home owner and researcher discussion, 2004).

Home owners generally wanted information that is not too technical and is easily organized into one binder. They also wanted new programming for older homes with older wiring as well as innovative programming around wind and sun.

4.8 Do Customers Understand the Language?

As part of their post assessment interview, owners were casually asked if they understood some common words used by evaluators. Customers were asked if they knew what weatherstripping is and where to put it and what caulking was. Of the eleven customers who were asked these questions, all but one home owner could either a) define what weatherstripping and caulking were or b) indicate where you would use these items. One home owner did not really know what weatherstripping was, nor did she know what caulking was or where you would put either. For this home owner, the booklets were difficult and she found the terminology to be challenging. While customers indicated that they knew what caulking and weatherstripping was, it did not automatically mean that they were going to implement these recommendations.

4.9 Evaluator Recommendations Provided During Observation

Some evaluators provided recommendations on hiring contractors. Home owners often wanted this type of information. Some evaluators recommend project management and that they be able to recommend contractors who are good at renovations, "...Which is a

lot of what we see and that someone who specializes in renovations will know all the tricks for all the years that older houses were built in..." (Evaluator, 2004). Project management was seen as a tool for encouraging home owners to complete their priority upgrades using best practices available.

4.10 Evaluation Styles

There are two assessment styles used by evaluators: the "walk and talk" and the "stop and talk". While both of these styles do impart information to the home owner, the "walk and talk" can be overwhelming or it can be similar to the "stop and walk" style:

Excerpt from observations: Things I noticed: this evaluator uses the "talk and walk" style but isn't as frantic as some of the others. He will be measuring stuff, but if he notices something or if owner asks something, he stops and talks about whatever it is eg. In basement, they were measuring from joist to floor and homeowner asked about the furnace. Evaluator stopped and they stood there talking for at least 10 minutes about the furnace, heating systems. Evaluator also uses this method when was upstairs looking in attic. He did his measures and then stopped and while they were poking around in attic with flashlights, were talking and looking (Excerpt from In-house evaluation, 2004).

Alternatively, the "walk and talk" style can be overwhelming and hard to keep up with, both physically as well as mentally being able to process information quickly. The following excerpt is from a walk and talk that does not work as well:

Excerpt from observations: Evaluator in a hurry to get assessment done—told home owner as we walked in that he had a lot of appointments to go to that day! Rushing around from room to room—measuring and talking—pointing out cracks and looking at everything—not interested in what home owner is saying—especially in regards to her new vs. her old furnace. She had pulled out her last two years of heating bills. Evaluator did not look at them and has dismissed her papers, saying that he does not need to see them. Did not explain about insulating basement at all—1 quick comment—this house needs insulation in basement and main and upper storeys. Home owner is stopped talking now....

Home owner was interested in learning about things, asked questions, but I found that the answers were vague and did not go into detail. Home owner asking evaluator to stop and repeat that please, but is not happening...We are out of this house in forty five minutes, no report generation (Excerpt of home owner and researcher discussion, 2004).

Some evaluators can make the evaluation appear haphazard and confusing (as indicated above) to owners because they are trying to do too many things at once. By measuring a room, writing down numbers, walking to the next room, and talking to home owners at the same time, it becomes easy for evaluators to miss answering questions or to not answer questions in depth. An alternate style I call "stop and talk" can be a variation of the "walk and talk" with evaluators pausing along the way while they are measuring to stop and talk to the home owner about very specific questions and issues. This variation gives the home owner a sense that the evaluator is listening to them and provides the evaluator time to fully consider the question and respond to it, without having the evaluator keeping half of their mind on the last measurement numbers they had just taken. Some evaluators use a full "stop and talk" style. One evaluator in particular, whom I have seen on several occasions, has a scripted evaluation from which he does not vary much. He covers the same information in the same order and goes through the same processes in the same sequence. For example, he always asks home owners what their concerns are as soon as he walks through the door. Next, he sits down and sets up his computer while listening to the home owner and getting the home owner to fill out the payment schedule. While entering data, he always begins by providing a one to two line summary of the booklet and then asks that the homeowners look through the booklets (he also suggests some that might be more relevant). This evaluator's creation and use of a routine to complete the evaluations instills confidence for home owners and also ensures that evaluator does not miss important aspects of the evaluation.

Because every house and home owner's needs are different and because every evaluator's presentation style is different, there will be variations to the assessment styles. However, the assessments should still convey information and provide time for home owners to talk to the evaluator without the evaluator being distracted. The in-house assessment is only one of three assessment options offered by Manitoba Hydro—with the mail assessment

option providing a low (twenty dollar processing fee) cost and the email assessment providing a no cost option for home owners who are not ready/do not wish to use the EnerGuide for Houses in-house assessment. The following sections provide information on how the mail and email assessments were viewed by participants in this research.

4.11 Mail-In Assessment: An Educational Opportunity

The mail in assessment is completed by home owners and sent in to be processed to Manitoba Hydro. For the most part, this exchange of information by mail is the only communication between Manitoba Hydro and the customer (unless Manitoba Hydro requires more information). While the survey does have a section at the end where customers can indicate whether or not they wish to receive more information about energy saving ideas and Manitoba Hydro initially sends out energy saving information with the results, regardless of whether or not the individual has requested to receive more information or not. Customers receive applicable booklets from Manitoba Hydro.

I recommended that Manitoba Hydro include their background information sheet about "hiring a contractor" and an informational sheet that might include a "next steps" section that details how and where the home owner should be looking to learn more about undertaking their energy efficiency upgrades (loan information, etc). Also, including a voucher for an energy efficient light bulb would reinforce a positive connection in the home owner's mind between Manitoba Hydro and energy conservation.

4.12 Mail-In and Email Customer Assessments

Manitoba Hydro also offers customers a "do it yourself" mail in or email assessment. For the email assessment there is no charge, while there is a twenty dollar charge for the mail in assessment. Both assessments require the customer to fill out information in the following ten categories:

Section 1) your home which includes background details about their house in general (age, square footage, main heating system, occupancy, structure, window type and

number, insulation levels, basement type, projects that the homeowner will be undertaking in the next three years, and problems with their house,

Section 2) heating system,

Section 3) ventilation and air quality for your home,

Section 4) air conditioning,

Section 5) hot water,

Section 6) major appliances,

Section 7) hot tub, sauna, pool,

Section 8) vehicles,

Section 9) other billing information, and

Section 10) household demographics.

Both the mail and email assessments are similarly organized. Accuracy of the mail and email assessments is completely dependant on home owner's responses to the questions and the accuracy of the report recommendations that Hydro then produces will reflect any inaccuracies the home owner may have unknowingly filled in. Therefore, it is in the best interest of Manitoba Hydro to provide as many cues as possible to aid home owners and their assessments. The following section summarizes areas/questions that could be better improved to aid in better data collection. Each issue is elaborated on after Table 42.

Table 42 Summary of Issues with Email/Mail-In Assessments

Issue #	Issues with questions in the assessments	Location in assessment	Customer recommendations
1.	Wording of inclusion/exclusion criteria for completing mail in assessment	Front page under "Completing this survey" Note:	Make the exclusion criteria easier to understand--if you do not have your own heating system you are excluded. Add a phone number.
2	Section 1 Your Home, mail in assessment	2 nd page Question 1	Add information for the duplex, apartment, and condominium answer
3	Section 1 Your Home, mail in assessment	Question 6, 7	Add information about where people can access information about the age/size of their house.
4	No comment section--in either the mail-in and email assessment	All questions	Add a comments section at the back of the surveys where people can provide further feedback
5	Email assessment: insulation options	Questions 10, 11	Add "no insulation" option
6	Email assessment: determining hot water tank temperature settings	Question 2, section 5	Add hot water tank temperature conversion option

Issue 1. The mail-in survey has a section, "Completing the survey" where an exclusion/inclusion note is provided to help customers determine if they qualify for the survey. The survey is not applicable to cottages, apartments that do not have their own electrical service meter, or duplex buildings serviced by only one electrical service meter.

The wording for the apartment section proved to be unclear because several apartment dwellers equated receiving a utility bill with qualifying for the assessment. The assessment states:

Note: This survey is not applicable to cottages, apartments that do not have their own electrical service meter, or duplex buildings serviced by only one electrical service meter. (Manitoba Hydro, 2004).

Wording the statement in the positive may make it clearer, e.g.:

Note: This survey is not applicable to cottages. It is only applicable to apartments that have their own electrical service meter, or duplex buildings serviced by only one electrical service meter.

This rewording may help some applicants with the decision to apply for the programming and save Manitoba Hydro time and money by not having to go through assessments which do not qualify. In addition, a phone number to contact Manitoba Hydro should be added below the statement with the following statement, "If you have any concerns about whether you qualify or not, please contact Manitoba Hydro at X phone number. While there is a contact number at the back of the booklet, placing the contact information in this section may be more useful to customers.

Issue 2. In section one, Your Home, Question one asks customers to select "what best describes your house." One of the selections, Apartment/Condominium should have additional information that reads "Please see bottom of this page". The reason for this additional information would be to ensure that customers qualify for the assessment and having the information about apartments that do not pay for their own heat do not qualify would ensure that customers do fit the inclusion/exclusion criteria. This information could be similarly or exactly worded as the information added in the previous question.

Issue 3. Question six and seven deal with the residence's size and square footage. Some people filling out the survey did not know this information. In order to receive accurate information from home owners, Manitoba Hydro could include the City of Winnipeg property assessment website where home owners can access the square footage and age of their property or the telephone number for the City of Winnipeg Property Assessment Branch.

Issue 4. Add a comments section to the back of the email and mail-in survey. The section can be used for customers to provide additional feedback on the survey itself or other issues that the customer is interested in. Commentary sections can provide useful data to help Manitoba Hydro understand what their customer's expectations are and may provide valuable insight and/or data on other areas.

Issue 5. For the email survey, add a "no insulation" to the defaults to questions ten and eleven as currently you must choose some option, with ten percent being the lowest insulation option. This inability to respond with no insulation can be misleading as there are houses that do not have any insulation in their basement or in their attics or in their walls. The year of construction for many of the houses in inner city neighbourhoods was in the day when little to no insulation was used. Therefore, in order to provide better accuracy, the "no insulation" option should be adopted.

Issue 6. In the email survey, customers are asked to indicate the current hot water setting on their hot water tank. The email and mail-in survey both ask this question. However, mail-in customers can use the temperature gauge that Manitoba Hydro provides to determine their water temperature setting. For email customers, the gauge is not available; therefore, a screen option or a conversion option should be part of the email survey. Including the conversion option is important because some of the older hot water tanks do not have a Celsius or Fahrenheit read out and only indicates whether the hot water tank is set to vacation, hot, or very hot. All home owners who completed the email assessment could not translate the meaning of "hot" on their hot water tanks into Celsius or Fahrenheit as required by the email assessment. In short, these home owners were guessing their hot water temperature setting. By guesstimating their temperature setting, the home owners were already beginning to skew the results of their assessment. Therefore, to help collect accurate data, it would be in Manitoba Hydro's better interest to include a conversion chart for home owners filling out the email survey.

Participants who filled either the mail-in or the email survey did not have a lot of concerns or recommendations other than those listed above to improve the surveys. The following sections discuss the email and mail-in survey respondent's answers to whether they will implement any of the upgrades their assessments recommended.

The following section deals specifically with those individuals who completed mail in assessments. There were ten participants who completed the assessments, but only eight assessments could be processed by Manitoba Hydro, as listed in Table 43. While the

results from two participants could not be analyzed, their feedback about the mail assessment is included.

Table 43 Summary of Mail-In Assessment Commentary

Mail-in Assessment Recommendations					Home owner choices				
Resident #	Heating system upgrade	Air sealing	Insulate	Faucet aerator, pipe insulate, showerheads	Heating system upgrade	Air sealing	Insulate	Faucet aerator, pipe insulate, showerheads	Owner rationale
1	√	√	√	√				√	This is inexpensive
2	√	√	√	√					Will not do anything
3	X	√	√	√					Will not do anything
4	√	√	√	√				√	This is inexpensive
5	X	√	√	√				√	This is inexpensive
6	X	√	√	√				√	This is inexpensive
7	√	√	√	√					Will not do anything
8	X	X	X	√					Will not do anything
9	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Did not qualify--apartment dweller
10	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Did not qualify--no history

4.12.1 Mail-In Assessment Commentary and Observation: Filling out the Assessment

Each household's choices are discussed in the following section.

Resident 1. This home owner was knowledgeable about energy efficiency and was interested in learning more about it. He commented that "our area needs more of it. We should have information that is specific about the houses we live in [period of construction]"(Mail-in participant, 2004). This individual chose to implement non-structural upgrades such as pipe insulation and installing a low flow shower head.

Resident 2. This home owner was concerned about lowering his heating bill and wanted to learn more about his energy saving options. He was worried about adding insulation to his house as he felt that it might

Wreck my house...the look of it...we have put a lot of money and time in here to restore this house and make it like it was (Mail-in participant, 2004).

The home owners did not feel that they could afford any upgrades at the moment because they had three young children and had recently invested in aesthetic upgrades such as paint, flooring, and hard wood refinishing and had also purchased a second hand washing machine. While voicing concern about high heating bills, this home owner chose not to do any upgrades.

Resident 3. This home owner required that the assessment be read aloud to him as English is not his first language. He felt that the assessment

Was not worth his time and he didn't think that he wanted to do any upgrades...he was helping out because his neighbor said that that I was a nice kid (Mail-in participant, 2004).

He was interested in the section about insulation, saying that he

Had never thought about adding more insulation to parts of his house and he wondered how it could be done (Mail-in participant, 2004).

This resident was also not doing any upgrades.

Resident 4. These home owners were keenly interested in learning about energy upgrade options because they felt that their house was badly in need of them.

"We were told when we bought this house that it had more insulation than is normal and that it was "better". We have lots of cold spots and cold rooms...we have to keep the heat on and add little heaters to the kid's rooms because they are so cold....I wish we had known what we were getting into when we bought this house...now we have a mortgage...how will we afford to do the upgrades we need?" (Home owner, 2004).

Affordability of structural upgrades was an issue for these home owners and they chose to complete non-structural upgrades only.

Resident 5. English was not this participant's first language and the assessment questions were read aloud to her. She indicated that she was skeptical about energy efficiency and didn't believe that it would save her money. She also indicated that she was a landlord and owned several houses that she rented in West Broadway (she had subdivided them into suites and into rooms). She indicated upfront that she did not think that the assessment would "tell me anything I don't already know". This home owner indicated that she may complete some non-structural upgrades such as adding pipe insulation, but she was not sure if she would complete these upgrades.

Resident 6. This participant was also English as a second language and required me to read the questions aloud to her. She required a lot of assistance when describing the questions and indicated that she "would not be doing this assessment if I was not helping her." She was interested in learning about her house and asked,

Why didn't they tell me these things when I bought my house? I didn't know that my hot water heater has a vacation setting...how come no one educates us [home owners]....why don't they explain this or give us a manual when we buy the house? I learned a lot today (Mail-in participant, 2004).

She was also concerned about what the cost of the upgrades would be and how she could afford them. She also indicated that she may have some of the non-structural upgrades completed, but indicated that even for these relatively in-expensive upgrades, that the cost may prevent her from completing them.

Resident 7. This resident did not own their house, but indicated that the house was "very cold in the winter and the windows were cold"(Mail-in participant, 2004). The house was a rental house and the resident wanted to know how to keep it warmer in the winter. The landlord also was interested in receiving a copy of the report and the tenant was agreeable to that request. While not overly concerned with lowering the heating bill (does not pay

for heat), the tenant was interested in learning how they could lower their electrical bill (lights, appliances). Because the tenant does not own their house, they were not going to do structural or non-structural upgrades. The property owner indicated that they would consider upgrading the furnace, "if it broke" (Property Manger, 2004).

Resident 8. This home owner was not very interested in lowering his energy consumption because he can "afford to pay for what he uses right now"(Mail-in participant, 2004). He did not think that making changes to his house was a priority as he had "other stuff he had to deal with that was more important "(Mail-in participant, 2004). This resident was not going to complete any upgrades.

Resident 9. Subject did not qualify because she lived in an apartment. She was interested in learning about ways to reduce her electrical bill. She thought that

Girls should be taught this stuff in school, otherwise how do I know...maybe in shop or something it should be added...especially us [First Nations]...we get crappy housing...its cold and you get used to it...(Mail-in participant, 2004).

The questionnaire was read aloud to her at her request. This subject did not qualify.

Resident 10. This individual was interested in the assessment because he wanted to use the assessment to get help for his home reserve. Once he realized that there was no funding attached to completing the assessment or that he would be responsible for applying the energy efficiency upgrades, he was disappointed.

Maybe it can be done on the reserve...we got lots of mold....you know what I am saying? Every house is like that and we got no good windows and doors...they're always broken...how come this can't be fixed...why is there no money for this? One more form to fill out and nothing changes. (Mail-in participant, 2004)"

For the last two individuals listed at nine and ten, no follow up could be completed because the one participant was an apartment dweller and attempts to reach her by phone to inform her of this status were futile due to her phone being dis-connected and a change of address. The last participant's information could not be processed because he had an

incomplete billing history. At the time of the assessment return, he was no longer living in the city, having gone back to his home reserve, but his whereabouts were unknown (source: family member) and he could not be reached by phone to inform him of his status.

4.13 Summary of Issues Raised by Home Owners Who Completed the Mail-In Assessment

The ten home owners provided insight into why they chose not to complete their recommended upgrades and also provided some recommendations about how they needs could be better served. Their input is summarized into the following categories:

Upfront Cost of upgrades

Homeowners felt that the upfront cost of completing upgrades was beyond their ability to pay. Half of the home owner's reports advised that they upgrade their furnace, but none of them were going to do it, citing the large financial outlay of the upgrade as being the deterrent. All home owner's reports recommended that they invest in water conservation/energy conservation by installing faucet aerators, pipe insulate, and low flow showerheads. While these items are inexpensive to purchase and easy to install (each item costing below seventy five dollars), only half of the home owners indicated that they might install it. Reasons for not installing it were that people felt that they did not know how to do it, they did not have time for it, and that it would not save them any money. Reasons for installing it included the fact that it was inexpensive.

Lack of awareness

Seven out of the ten participants wanted to learn more about energy efficiency conservation options. Several of the participants also indicated that they felt that education about energy conservation should be included into school curriculums and should be emphasized, especially for women. Further energy conservation education of

First Nations groups was also suggested as a way to help improve the current status of housing in First Nations communities.

Available programming

Increasing access to loan and other programs for currently disadvantage groups, such as First Nations was also recommended.

English and comprehension issues

Three out of the ten respondents required that the survey be read aloud for them. Two individuals were clearly English as a second language participants and the third person's reading ability was difficult to discern--however, their responses were clear. For one of the English as a second language speakers, the questionnaire was very difficult to understand and she would not have been able to complete the assessment without anyone around. For English as a second language groups or for those groups whose reading skills are sub-par, completing the questionnaire without help would be impossible. The need for increasing programming reach and ensuring that mechanisms are in place to help all residential customers apply their recommendations to their housing was highlighted by the mail in participants. Support systems are necessary if lower income groups are going to complete their energy efficiency upgrades.

4.14 Email Survey Results

There were a total of ten participants in the Home Comfort and Energy Assessments (email version), however, two participants did not qualify and therefore did not receive results; one participant was an apartment dweller and did not have individually metered gas billing and the second individual had not resided in their residence for the entire year, having purchased and owned the house for approximately six months. Another participant prematurely ended the assessment before completion as they were concerned about security issues and did not feel comfortable having their hydro and natural gas account number entered on the internet.

The email Home Comfort and Energy Assessment includes a report that outlines home owner's annual energy usage and a breakdown of the cost of individual components (windows, exterior walls, basement walls, general air leakage, foundation floor, ceiling, doors, and crawlspace walls). Each component is represented as both a bar graph of the total dollar energy cost of the space heating requirements and as a percentage of the total dollar figure of the net annual space heating energy use. The home owners also receive a chart of recommendations in addition to the estimated annual savings of each recommendation and the average cost of the upgrade. For the purposes of this research, I have created generalized categories to capture the main recommendations that were common throughout the customer recommendations. Results are captured in Table 44 on the following pages. The following section deals specifically with those individuals who completed email assessments. There were ten participants who completed the assessments, but only seven assessments could be processed by Manitoba Hydro, as listed in Table 44. While the results from three participants could not be analyzed, their feedback about the mail assessment is included.

Table 44 Summary of Email Recommendations vs. Home Owner Choices

Email Assessment Recommendations					Home owner choices				Owner rationale
#	Heating system upgrade	Air sealing	Insulate	Faucet aerator, pipe insulate, showerheads	Heating system upgrade	Air sealing	Insulate	Faucet aerator, pipe insulate, showerheads	
1	X	√	√	√	X	X	X	X	Does not have the money to complete any upgrades
2	√	√	√	√	X	X	X	X	Does not have an interest—skeptical about upgrades lowering costs
3	√	√	√	√	X	X	X	X	Homeowner is elderly and cannot afford to complete upgrades—fixed income
4	X	√	√	X	X	√	√	X	Thinks that they may do these recommendations—if they can find the money
5	X	√	√	√	X	√	X	X	Always puts plastic on windows each year for winter
6	X	√	√	X	X	X	√	X	Maybe will insulate basement
7	√	√	√	X	X	√	X	X	Always puts plastic on windows for winter...replaced furnace because it broke
8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A (apartment dweller)
9	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A (Lived at current address for only six months)
10	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Did not complete assessment—personal information security issues

Resident 1. While the first home owner was interested in improving their energy efficiency, or as they saw it, “lowering their heating bill”, they did not feel that they were able to undertake any improvements at this time due to the upfront financial cost and the “...limited and unsure amount of the return on their investment dollar...” (Home owner,

2004). The home owners felt that it was cheaper and easier for them to continue to pay their heating bills because they also felt that “you don’t know what is in the walls when you open them up and surprises could cost a lot more than you think...” (Home owner, 2004). This home owner discussed how they had, in a previous house, decided to do some upgrades and ended up doubling the cost of the retrofit because of other issues found at the time they were wall insulating. The home owner did not see the value in purchasing and applying a faucet aerator, pipe insulation, or a hot water blanket. “Why don’t hot water tanks come with a blanket when I buy it? Why should I have to go out and buy it?”

Resident 2. The second home owner who received their email results was skeptical of the recommendations and felt that there was not enough information provided on how to do the upgrades and what to avoid when undertaking the upgrades. This home owner wanted concrete evidence from houses of a similar size that had been upgraded—insulation added and a furnace added—so that they could “really see if this is going to help save me money or just cost me lots of money...” (Home owner, 2004). As well, the home owner indicated that they were completing the assessment because

I know who you are and you are always around in the neighbourhood...I trust you telling me that this could be a good thing...I’m just doing it to help you out more than anything. I think that putting in aerators and insulating pipes would be a good thing, but why don’t they just make the aerators in the first place so I don’t have to replace them (Email survey respondent, 2004)

Resident 3. The third home owner who completed an email assessment did not think that she could afford to complete any of the recommendations because she was on a fixed income (senior citizen) and felt that it was not worth her time because she felt that she would be moving into a retirement home within the next ten years. In addition, her principal language was not English and she found it difficult to read the recommendations and understand them. She required that I read them aloud to her to help enable her to understand what the recommendations were. She also wondered that if she did complete the recommendations, if her property taxes would go up. She felt that if taxes did go up, it would be unfair and a penalty for trying to improve her house. She did not know what a

faucet aerator was and when I explained how she would determine the flow rates of her faucets; she laughed, and said that, “that is too much work for an old woman.”

Resident 4. The fourth household felt that they could do the air sealing themselves and that they might insulate part of their house as they could afford it. The home owners were very keen to learn how to lower their heating bills (young family), but were unsure on how to begin. They did not really know what areas they should be air sealing, what products they should use, how to do it, and when to do it. They wished that the assessment came with more information about doing the air sealing or told them where else they could access more information. In terms of insulation, they knew that their basement needed to be insulated and felt that they would be able to do it, if they were provided with some information on how to do it.

“How hard can it be? I should be able to figure out what I need to do and I’ll ask my dad or ask at Revy. They can help me (Home owner, 2004).

Resident 5. The fifth home owner “always puts plastic on their windows” because the windows will ice up on the inside if they don’t do that. The home owner felt that Manitoba Hydro should cover the cost of the plastic that they put on the windows. The home owner did not think that they could afford to pay for the other upgrades and felt that they did not have the credit to get a loan to do any retrofits. In terms of installing energy efficient shower heads, adding pipe insulation, adding a hot water tank blanket, or installing faucet aerators, the home owner indicated that they thought that there should be payment for doing this:

If they [Manitoba Hydro] wants us to do this, why don’t they give us some of this stuff...can’t they buy it in bulk? It would be nice to help us out (Home owner, 2004).

Resident 6. The sixth home owner felt that they might do some insulation in the basement if they had further information. They were unsure about the cost of insulating and were wondering if I could suggest someone to provide an estimate (I did not recommend

anyone, but provided them with Manitoba Hydro's "how to hire a contractor" informational pamphlet. In addition, this home owner felt that

Why don't they teach us this stuff when we are young? Why didn't I learn about this when I was in school? They need to teach us girls. I don't know what needs to be done, this is stressful. I guess I'll ask dad what to do..." (Home owner, 2004).

Resident 7. This home owner did replace their furnace because it had quit. They did upgrade to a mid efficiency furnace, but did not feel that they could afford to insulate. When they purchased their furnace a year ago, they were unaware of Manitoba Hydro's loan program or the EnerGuide for houses program. In addition to the furnace, this home owner feels that they already air seal (plastic windows each year) and that "we need to do more, but we don't have the time and we only sort of think of it in the winter...we like the holes in the summer" (Home owner, 2004).

Resident 8. Resident number eight did not receive a report as he was an apartment dweller. The home owner was upset because they wanted to know how they performed. The individual felt that they were misled by the online assessment:

If apartments don't qualify, how come a pop up screen or something didn't show up and tell me that I don't qualify. Why did it let me go on to finish entering the stuff? I went to our boiler room, looked at the insulation levels, I looked at what the hot water was set at and the care taker and I had a fun few hours running around answering the questions. We learned a lot about our building (Resident, 2004).

Instead of a report, this individual received a one page letter that indicates that they do not qualify because they do not have a separate electrical meter.

Resident 9. This home owner also received a letter indicating that they did not qualify for the email assessment because they had only lived in their residence for six months and therefore, did not qualify (must live in the residence for a year or more). This homeowner wanted an estimate of his residence's energy consumption so that he could use the information to complete the upgrades himself. This homeowner was disappointed that he did not qualify for the email assessment.

Resident 10. This home owner completed approximately half of the email assessment and then decided that they did not want to continue due to personal information security issues. The home owner did not know and could not find evidence at the beginning of the online assessment that the site was a secure sight that used encryption. The home owner was uncomfortable providing their electrical and natural gas account information online without assurance of encryption. Furthermore, the home owner was suspicious about who would see her information and asked repeatedly if the City of Winnipeg would have access to the information, specifically the information about potential upgrades to the house in the next three years. She felt that her information could be used by the City of Winnipeg to raise her taxes if she indicated that she was going to undertake some home upgrades. As the home owner continued through the assessment, her agitation increased and the decision was made to abort the assessment, but to also note her concerns.

4.15 Summary of Issues Raised by Home Owners Who Completed the Email Assessment

The ten home owners provided insight into why they chose not to complete their recommended upgrades and also provided some recommendations about how they needs could be better served. Their input is summarized into the following categories.

Upfront Cost of upgrades

Home owners who participated in the email assessment raised several issues about why they would not consider implementing the upgrades to their houses. Upfront economic cost was the chief reason cited why home owners did not think that they would complete the recommendations, with 60 percent of home owners citing cost as the restriction. These home owners did not feel that they could afford to take on additional risk even though some of them realized that it would help them save money in the long term. Home owners were also not familiar with loans and other incentives offered by Manitoba Hydro or with other incentives they might qualify for such as RRAP or through a senior's incentive.

The initial cost of upgrades is a commonly mentioned barrier to completing energy saving upgrades and has been mentioned in all areas of this research—focus group, evaluator interviews, conference notes, personal interviews, and survey findings, and in the mail-in assessments. Economic cost can act as a limiting factor in terms of energy efficiency upgrades and negatively impacts low income user groups.

Lack of awareness

Four out of the ten respondents expressed a need for greater education around energy efficiency and wanted additional information about how to air seal, how to hire a contractor, and how to insulate. There was also apprehension about personal information being provided to third parties such as the City of Winnipeg and how their upgrades might influence their property taxes. In each case, a lack of information or pre-conceived information prevented the individual home owners from undertaking their upgrades. This lack of awareness or in a positive sense, this educational opportunity has also been mentioned by previous individuals in the focus group, survey, and by evaluators. Knowledge is empowering and can help home owners implement their energy saving recommendations.

Available programming

Respondents also felt that there should be more incentives for completing smaller upgrades such as pipe insulating, water blankets, or shower head replacement, or faucet aerators. This request for an increased range of incentive programming also held true with previous groups who also requested that additional programming be developed.

English and comprehension issues

Some respondents would not be able to understand their recommendations without help. Therefore, to help facilitate their understanding, a phone number where they could access an individual who would be able to help them understand their recommendations would be advisable. Previous data indicates that there is a need for communication between

home owners and Manitoba Hydro when they receive their recommendations, even for mail-in and email survey respondents. The ability to understand what the recommendations mean and how to implement them is a critical phase. If the momentum is lost or if the home owner loses interest due to lack of comprehension or frustration, they may not complete their recommendations and Manitoba Hydro would lose the opportunity to help facilitate energy conservation.

Privacy concerns

Respondents were also concerned with internet security and there was one individual who chose not to complete their assessment due to fear about personal information being accessed on non-secure sites. While Manitoba Hydro's site may have security encryption, it may be advisable to publicize this information on the site to help facilitate customer comfort.

4.16 Email Assessments: Educational Opportunities

Email assessments do not involve one on one personal interaction between the customer and Manitoba Hydro personnel as is found in the EnerGuide for Houses In-house assessments, therefore it is important to take every opportunity to raise the customer's awareness and educate them about current incentive programs because they will not have an chance to discuss their issues one on one as is done in the in-house assessments. Currently, the email assessment is not utilized to its fullest as an energy conservation opportunity by Manitoba Hydro.

For customers completing the email assessment, the one pager informational sheets about how to hire a contractor should be included. While Manitoba Hydro already includes applicable information booklets, they may want to also include the one pager on how to hire a contractor as hiring and choosing a contractor has been mentioned as a difficulty facing home owners and their decisions to do the upgrades.

For those customers who do not qualify for the email assessment, sending them the "you do not qualify" letter is not educational in itself. By completing an email assessment,

customers are signaling their willingness to begin examining energy conservation options; therefore, *not* providing these customers with any energy saving tips or additional information may act as a limiting factor to future energy saving behaviors.

It is suggested that those groups who are disqualified for one or another reasons from receiving an email report, should be sent a one pager with simple energy saving tips and a voucher for an applicable energy saving device. For example, apartment dwellers might receive a voucher for energy efficient lights or for a shower head, while non-qualifying home owners might receive a voucher towards a hot water blanket, electrical gaskets, or for caulking (air sealing). In this way, Manitoba Hydro keeps these non-qualifiers engaged, rather than frustrated. The choice for Manitoba Hydro is whether they want non-qualifying groups to remember Manitoba Hydro negatively (could not receive an assessment) or in a positive light (could not receive an assessment, but we did receive something). The commitment to these non-qualifying groups may also afford future benefits: non-qualifying apartment dwellers and ineligible home owners may become eligible home owners at a later date and access Manitoba Hydro's programming. By providing small incentives to these groups, Manitoba Hydro is underlining its long term commitment to residential demand side management. In addition, many people who had in-house assessments relied on "word of mouth" to access the programming and it is conceivable that email respondents would also share their assessment stories—both positive and negative, and could persuade individuals to use or not use programming, depending on their personal experience.

4.17 Summary of Three Assessment Types

Manitoba Hydro currently provides three assessment types—the In-house EnerGuide for Houses, mail-in, and email assessment. Only EnerGuide for Houses provides an opportunity for the customer to speak with a Manitoba Hydro representative in their own home about their own housing issues. The mail-in and email surveys provide telephone contact only. While each of these three assessment types includes various interaction levels, there was a similarity between all three when it came to the reasons why people chose to or did not choose to undertake the recommendations in their reports. The main

reason households provided for not completing upgrades was the cost of implementing the upgrade. The main recommendations made in each of the three assessment types included:

1. upgrade to high energy efficiency furnace
2. insulate basement/attic/walls
3. air sealing (caulk the areas around windows, doors, walls, etc)

In each of the three assessment types, upgrading furnaces, insulating spaces, and completing air sealing were prioritized. What is different about these recommendations is the level of interaction the customer has with Manitoba Hydro. The EnerGuide for House In-house assessment provides the most interaction with a Manitoba Hydro representative, while there is no contact between customers and Manitoba Hydro in either the mail-in or the email assessment (unless a customer calls in to ask Manitoba Hydro a question). The customers who received the EnerGuide for Houses In-house assessment chose to complete the most structural and non-structural upgrades out of the three assessment groups, while individuals who completed the email and mail-in assessments chose to only complete non-structural upgrades if they chose to do any upgrades at all.

Reasons for this difference between the two groups may include the fact that there is a correlation between being able to afford the assessment itself and being able to afford the upgrades. Home owners who know that they cannot afford to complete the necessary energy efficiency upgrades will not get an In-house EnerGuide for Houses assessment completed because they cannot use the data. Therefore, those home owners who cannot afford to pay for the EnerGuide for Houses assessment may opt, if they qualify, for either the email assessment, if they have internet access or the mail-in survey if they can afford twenty dollars and may not have internet access. What the home owner's who chose to go this more "affordable" route will find is that they still receive recommendations to upgrade their furnace, insulation levels, and complete air sealing. However, these recommendations still remain unattainable given the economic cost of completing them. Therefore, improving access to funding to complete upgrades would enable more home

owners to improve their energy efficiency. In all three assessment types, the economic cost of upgrades was cited as the chief reason why home owners could not complete their upgrades. Many home owners are aware of their financing options, but do not want to take on additional debt. Therefore, making financing attractive to home owners by lowering interest rates and providing continual support for recommendation completion may help increase the numbers of home owners who implement their energy efficiency recommendations.

4.18 Semi-Structured Interviews with Manitoba Hydro's In-House Evaluators

The purpose of my questions were to understand, from an evaluator's point of view, if there was any improvements that could be made to the existing in-house evaluation to make it easier for evaluators, better for existing user groups, and if evaluators felt that the programming should be/or is addressing lower income households and their energy efficiency needs. Evaluators were asked a total of twelve questions (see Appendix 9), but due to the overlap and similarities in responses for some questions, the data will be combined. Questions one and five and questions two and three, respectively, will be combined. The following section will outline evaluator's responses. Interviews took between forty five minutes to one and a half hours, with an average time of one hour for each interview. At the conclusion of the interview, each evaluator was offered three dollars in Tim Horton's coupons as a "thank you" for their valuable input. To maintain confidentiality, information that may identify evaluators has been adapted and names have been changed and the assumption was made that all interviewed evaluators were male.

Question one asked if evaluators felt that the in-house evaluation covered all types of residences and question five asked if there were any challenges to performing evaluations in older residential buildings or other buildings. Table 45 summarizes evaluator's comments to questions one and five. Following Table 45 is further information that expands on the information found in Table 45.

Only one of the eight evaluators felt that the current In-house assessment covered all types of housing, while the rest of the evaluators felt that the current programming had gaps, both technical and in the programs reach. Many of the evaluators reported technical limitations of the existing computer program as the biggest factor impacting their ability to work in all residential housing types and a few evaluators thought that the current In-house assessment did not meet the needs of the entire residential sector. Responses largely focused on technical improvements to the Hot 2000 program to enable better air volume calculations and insulation value determination. One evaluator did not think that older buildings represented any challenges as opposed to buildings of other ages. The remaining seven evaluators responded with technical improvements they wish to see implemented/changed/addressed. Table 45 provides a summary of the evaluator's concerns: The challenges listed in Table 45 are elaborated on in the next section.

Table 45 Summary of Evaluator Commentary about Challenges to Completing Evaluations

Computer program (Hot 2000) limitations reported by evaluators
1. Inability to perform blower door tests
2. Inability to enter multiple insulation values found in one wall
3. Does not have all insulation types in the system
4. Accuracy of determining R values in poorly insulated areas
5. Defaults that cannot handle more than one crawl space/four level splits: have to average out basement heights
6. Air conditioning and why a house gets hot
7. No defaults for combination gas/electric heating systems
Residential sector limitations reported by evaluators
8. Does not cover rental houses
9. Does not cover apartments

1. Blower door tests: Evaluators indicated that their inability to run blower door tests on some duplexe styles such as duplexes and four-plexes lacking common doorways was problematic. Evaluators noted that without the ability to open up a common air way, the

blower door cannot be performed and the evaluation cannot be completed. I did attend one in-house assessment where the duplex shared common water and heating systems but did not have adjoining doorways. In cases where larger homes have been turned into rental suites, the EnerGuide for House's blower door test cannot be completed and those owners lose their ability to access the federal money available for upgrades, the expertise and knowledge of the evaluators, and the long term economic and human comfort benefits of improving their energy efficiency. In addition, without the report stipulating and prioritizing energy savings, the home owner may be less inclined to perform energy efficiency upgrades because of a lack of expert information.

In one case, the evaluator reported that a home owner had cut a hole in the wall adjoining the duplex that he owned in order to have the evaluator perform the blower door test. For duplexes and four-plexes that do share common heating and water and have a common air space (doorways that can be opened) the blower door test and the In-house evaluation can be completed. Duplexes or four-plexes which do not share a common air space such as a doorway (to fit the blower door), do not qualify for the EnerGuide for Houses in-house assessment and are therefore not eligible to receive money through the EnerGuide for Houses program. Unfortunately, one of the most common reasons that houses become subdivided into "duplexes", rental suites, or shared accommodation in neighbourhoods such as West Broadway is the home owner's inability to pay high heating bills in the first place.

As well, the blower door test was not thought to work well in older houses "...that are so run down that the air flow is very strong..." ("Sam", 2004).

2. Multiple insulation values in one wall: The evaluators found that in some cases, home owners have elected to use multiple insulation types in the same wall/attic space in order to ensure that they are getting insulation into all the areas of the walls. Evaluators reported that having such multiple R values in the same wall is extremely difficult to enter; therefore the R rating they come up with is not as accurate as it could be.

3. Does not have all insulation defaults: In addition, evaluators reported that the current version of Hot 2000 lacks defaults for newer insulation types and therefore it is difficult for them to accurately calculate R values. Examples of newer insulation types include polyurethane (spray foam useful for insulating hard to reach areas such as knee wall joints) and reflective insulation (Reflective insulation is fabricated from aluminum foil with backings applied to provide a series of closed air spaces (Gilliand, 2004). Its insulating value is derived from the heat-reflective surfaces separated by air spaces into which the radiation is reflected —commonly used in attics). The following evaluator observation summarizes their challenges when dealing with the insulation defaults in the program.

Tough to have a program that covers all the bases. Need years and years of data to do a proper evaluation of each house. Doesn't cover all insulation types such as polyurethane insulation, reflective foil insulation. Doesn't have all the insulation types as defaults. Also, it is hard to calculate R values in areas where the home owners have used more than one type of insulation to insulate walls or even used more than one type in one wall. ("Ted", 2004).

Evaluators felt that the Hot 2000 program should contain more insulation values to better reflect what they were seeing in real houses. In answering the question, one individual indicated that the current Hot 2000 program covered all types of residential housing. Some other evaluators conceded that Hot 2000 is good for both rural and city, and properties of all sizes. Another evaluator indicated that the computer program worked well for bungalows under 1100 square feet and that the program was not as good as processing information for larger residences. The evaluator also indicated that they can always send their file away to have a complex house analyzed by an expert with a more complex version of the program. The same evaluator also felt that increases in computer program accuracy would result in longer amounts of time required to complete the evaluation.

For the two percent in accuracy we would get if we had that program [referring to the more complex version they can send complex files to], it would not justify the time it would take us to do the evaluation." ("Sam", 2004).

Three evaluators spoke of a second computer program that an evaluator had created to process houses. It could not be clarified what the program did, if it was sanctioned by Manitoba Hydro and if evaluators were using it as a supplementary program. It was indicated that the evaluator/designer of the program was charging 100 dollars per version.

Overall, evaluators would like to see the computer program, Hot 2000, keep pace with changes such as including newer defaults for insulations and creating defaults or a mechanism for calculating R values of walls/attics/knee walls with multiple insulation types. Evaluators felt that the current Hot 2000 program was adequate for most residential types, but acknowledged that there were residential housing types that the Hot 2000 program and the Energuide program did not cover.

Accuracy of determining R values in poorly insulated areas: Determining initial insulation levels is important because this information is used to help determine the house's initial rating. Evaluators noted that in some cases, the R values can vary drastically in home owner completed renovations and in some cases; the R value may vary in the same wall. While the evaluators are aware that they are calculating an average for the walls, they were uncomfortable with the accuracy and wanted to know if something could be done to improve accuracy. Three evaluators mentioned difficulties associated with determining insulation types and R values in some homes. However, not all evaluators were concerned with getting an accurate R value and viewed the process of calculating R values to be secondary to what the larger goal is:

The computer program is always evolving. What is more important? Getting an accurate R value in insulation or getting people to move in the right direction? If they start out with R10 or R12 in their walls, will it really matter to where they should be? Does a difference of two in R value matter in the final rating? I try to move people along. ("Joe", 2004)

Insulation in the main walls is important to determine: I am interested in the main walls. I usually goes by year of construction for default insulation levels. Is there a better way to get a sense of insulation levels? Asking the homeowners doesn't work, they don't know. What

is a better way to verify insulation levels in walls (without puncturing holes in the walls).” (“Sam”, 2004).

The main walls are always a question of what is in there [insulation] You have to ask the home owner if it is drafty, what their heating bill is and if they had a \$500 dollar heating bill in a month, but it can be hard to tell if there are localized cold spots Sometimes you can see holes in the outside of the house. (“Kevin”, 2004).

Specify/have contractors you can suggest for people who really know old houses. Eg. How to insulate properly behind a knee wall. (“Ted”, 2004).

Evaluators who had completed more In-house evaluations tended not to worry as much about determining exact R values, whereas, newer evaluators were more worried about precisely determining insulation values. Having more insulation default choices would help newer evaluators feel more comfortable with the program and allow the evaluators to spend more time focusing on customer service and less time worrying about if they have entered the right insulation amount. One evaluator stated that a key point of energy efficiency is getting the main systems valued correctly and that

Some guys do ‘guessestimates’ of R values. I want to get it right. Every point counts. I try to do it fairly accurately (“Ted”, 2004).

The evaluators focus a lot of their energy in an in-house evaluation in calculating air volumes and determining insulation levels, therefore, it is reasonable to expect that they want to be produce accurate R values when determining insulation values.

5. Defaults that cannot handle more than one crawl space/four level splits: Evaluators noted that the current version of Hot 2000 could not process multiple crawl spaces and could not calculate for houses with more than three floors (default currently set for three floors).

Under foundation, it only does main walls/joists. It defaults back to un-insulated floor if you try to enter carpets, etc. Four level splits: you have to average out basement heights [default is set from three floors]. Should be no limit on height, eg. Crawl space was un-insulated, rest of

basement was insulated. Had to average the crawl space as it was completely underground (“Carl”, 2004).

My challenges are multiple crawl spaces. Also when houses have shifted and there are major cracks in the foundation and damage to the house—that is a challenge for the blower door test. Computer defaults hold us back. (“Bob”, 2004).

Challenges: My challenges are multiple crawl spaces. Also when houses have shifted and there are major cracks in the foundation and damage to the house—that is a challenge for the blower door test. The computer defaults hold us back. (“Bob”, 2004).

The last challenge that evaluators spoke about was the challenge of completing an evaluation in older homes with more than three levels. The computer program is not able to process houses that have more than three levels; therefore, the evaluators use three storey houses as the default for any house that has more than three floors. Evaluators also commented that calculating air volume is challenging in some houses with complex ceilings and multiple levels.

Calculating the volume [air]. Four level splits are tough. Cathedral ceilings are difficult because you have to figure out the height of the ceiling above grade and you have to average it out. I still think it [air volume calculations] are accurate (“Steve”, 2004).

Sloped incline, we have to average the grade. More difficult, eg. Garage under second level. Program wouldn’t allow that. I had to change numbers to get basement numbers because I had a basement with second floor on top and sunroom and main floors jutting out. (“Bob”, 2004).

Split levels need to be handled a little differently. We need a four level split on the computer. I usually go with a three storey house in that case. You have to work within the program limitations to get an accurate air volume. (“Sam”, 2004).

Use of the Hot 2000 program in addition to carefully taking calculations is critical for the evaluators to develop an energy profile of a house. Consequently, improving the program has the potential to enable evaluators to spend more time educating home owners and responding to specific issues.

6. Air conditioning and why houses get hot: One evaluator commented that when he goes to an evaluation, he tries to educate the home owner about their house as a system, which is why he addresses air conditioning and why houses get hot, something which the current in-house evaluation does not currently address. The evaluator felt that teaching home owners about their house as a ‘system’ would lead to better decisions by the home owner when it came to upgrading energy efficiency in their house.

7. No defaults for combination natural gas/electric heating systems: One evaluator indicated that in approximately 15 to 20 percent of houses he was seeing, had a combination of electric baseboard heating with natural gas—usually in houses that has an addition attached. The evaluator felt that the current programs default position of requesting the heating system that provides seventy five percent of the heating is creating inaccurate assessments and should be improved.

Evaluator’s also commented on two areas that they felt was lacking coverage: rental homes and apartments. The following two sections summarize the evaluator’s comments.

8. EnerGuide for Houses programming coverage of rental property: One evaluator noted that the current EnerGuide for houses program does not cover rental homes as the program stipulates that, “Recipients are eligible for a grant under the EnerGuide for Houses Retrofit Incentive provided that at the time of application, they own and live in the house for which the grant is requested” (Natural Resources Canada, November, 2003). The evaluator felt that this criterion was exclusionary and that “...it wasn’t fair...” (“Carl”, 2004). The evaluator felt that some mechanism should be in place to allow renters to access the program and that,

[Evaluators] understand that it should be the owner, but in core areas, if they want to fix them up, should have the incentive offered (“Carl”, 2004).

While evaluators felt that tenants should have a mechanism to request an EnerGuide for Houses assessment, they did not provide any mechanisms for changing this fact. In order

for tenants to access EnerGuide for Housing programming, there would have to be programming changes at the federal level.

9. EnerGuide for Houses programming coverage of apartment blocks: One evaluator commented that the current EnerGuide for Houses program did not, he felt, cover apartments because tenants “Won’t invest in what is not theirs” (“Steve”, 2004). While this statement may be true, the evaluator did not consider any mechanisms to induce the property manager or owner to upgrade energy efficiency in apartments. For apartment blocks and/or rental suites to be included into the EnerGuide for Houses program, eligibility criteria would need to be changed. Another option which may help with this issue is to create a similar program that targets apartment blocks and rental suites, or another option may be to develop mechanisms to get the property managers and social housing providers—the owners of the buildings—into existing programming.

Question two and three asked about evaluation gaps around other energy efficiency points and other types of efficiencies such as water.

In question two, evaluators were asked if they felt the current In-house evaluation covered all key points of energy efficiency and any other types of efficiency. One of the less experienced evaluators in terms of the amounts of evaluations they had completed, felt that the current In-house assessment did cover all key points of energy and other types of efficiency. Only one of the eight evaluators thought that the in-house evaluations should be covering aspects of water efficiency, while the rest of evaluators focused on improving the current programming in terms of energy efficiency. One other evaluator mentioned that he tells home owners to think about water efficiency. Evaluators suggested that there were programming gaps in terms of addressing energy efficiency. Evaluators responded in two ways to the question, answering about programming gaps that the in-house assessment misses and also talking about the technical aspects of the Hot 2000 program that are difficult. Table 46 summarizes programming gaps that the evaluators spoke about.

Table 46 Summary of Programming Gaps

Energide for Houses programming gaps
1. Current program is missing appliances
2. Inability to reach the industry that deals with renovations
3. Inability to change home owner's behaviors and perceptions
4. Add water efficiency * (one evaluator only)

1. Include energy efficiency of appliances: When examining programming gaps in the current EnerGuide for Houses In-house assessment, evaluators also felt that including appliances in the evaluation would be positive because many people have “really old appliances” (“Carl”, 2004) and that “people always ask if their [light bulbs, fixtures, appliances] are included in the assessment and when I say ‘no’, people are disappointed” (“Ted”, 2004). Currently Energide for Houses is set up to capture the main point of energy efficiency in terms of the larger systems within the house, namely the heating system and the insulation/wall system. The evaluators felt that adding “smaller” points of energy efficiency would be beneficial and would create a better overall assessment for the home owner:

If you are putting an Energide label on the house, maybe it should be an incentive to add appliances, fixtures to the evaluation to increase attractiveness of the house for re-sale. But then [Manitoba Hydro] would have to change the in-house evaluation and it would take more time (“Ted”, 2004).

While EnerStar ratings are available on new appliances, the current in-house evaluation does not include information about upgrading appliances, nor does the package given out to the customer contain information about the value of purchasing EnerStar appliances or upgrading older appliances.

2. Reach the industry that eventually completes the home owner's renovations: Evaluators also indicated a that there is a strong need for educating retailers, contractors,

and the industry that provides the products and services for the energy retrofits *after* the evaluator is no longer onsite. The renovations industry was viewed as a weak link and that,

“[Hydro] must go after the industry—they do a lot of houses and there are a lot of guys with the wrong ideas (“Steve”, 2004).

It was felt that the report provided to the home owner is only one step of a large plan and that the implementers of the recommendations can impact an energy retrofit and make or break it. Manitoba Hydro needs to create a closed loop system and work to penetrate the post-evaluation period in order to ensure that its sub-contractor’s recommendations are completed using best available practices and that home owners are exposed to a minimum of information validity issues. By educating the renovation industry, Manitoba Hydro will help eliminate issues of less legitimate information being passed along to customers.

3. Inability to change home owner’s behaviours and perceptions: Evaluators also felt that more home owner education should occur and that education in the schools for school aged children should also be addressed.

Need to change the attitudes and behaviors of home owners and a need to get Hydro into schools talking about energy efficiency. For home owners, the in-house evaluations are climate related—people think about energy efficiency more in the winter [in Canada] because they have to pay the money for heating bills (“Steve”, 2004).

The evaluators also spoke about windows and home owners attitudes towards them:

Maybe some points are not clear or people don’t get it. For example, people have upgraded all of their windows [only needed to do three]. According to the home owner’s perception, their furnace was not coming on as much. They felt that their house was much warmer. When it came to the air leakage test, at the B audit, their air leakage was only reduced twenty square inches...their rating did not change...Are we missing it? Is this really saving the customer money? Is there something more to tell the customer to explain? I try to explain in the simplest terms possible. (“Joe”, 2004).

The evaluators are discouraged by people changing windows when their recommendations include caulking around windows or replacing one or two windows.

The evaluators feel that in some respects, the home owners are not listening and that the urge to replace all windows is symptomatic of larger issues of customer behavior and lack of knowledge, as well as excellent marketing on the part of window manufacturers.

4. Adding water efficiency to the current EnerGuide for Houses In-house assessment:

One evaluator that mentioned that water efficiency should be included stated that the current in-house assessment covers the

The current assessment covers the envelope and the 'guts': insulation, heating, but it could cover small details such as the following: I get lot of questions about 'how much will I save if I put in a new natural gas stove or a new fridge? How much does my hot water tank use for heating? I understand the program is based on a family of four. Water differences are vastly different from family to family. Water would be interesting but difficult to do using or current program." ("Sam", 2004).

Overall, evaluators did not feel the need to expand outside of energy efficiency to include water efficiency. They do recommend expanding the scope of the existing programming to include the "smaller" energy efficiency details such as fixtures and appliances. Evaluators also stressed the importance of continued education of home owners, the need for early energy efficiency behavior patterns to be developed by school children, and the need to educate the industry that provides renovation services to home owners. One evaluator indicated that he did not have enough experience to answer the question and three evaluators felt that the current evaluations should not be expanded to include any other forms of efficiency, though two evaluators qualified their answers by stating that, "The in-house evaluation takes water/ electricity into account [in terms of looking at hot water heater]." ("Bob", 2004) and a second of the three replied that "People ask if appliances/fixtures are included in the rating. I don't see why you would include anything else {water conservation}." ("Ted", 2004). There is limited knowledge or will to implement other forms of efficiency evaluations by the evaluators at this time. This is partially because evaluating water efficiency would require more time and because the evaluators do not consider this form of efficiency as critical, as they are responding to what the EnerGuide for Houses requires them to examine in the in-house evaluations. It should be noted that in this case, the less experienced evaluators were two of the people

who responded in the negative, while the third evaluator was a more experienced evaluator. Other evaluators suggested that water efficiency should be evaluated and that they themselves as well as home owners needed more education about water efficiency.

Should evaluate water efficiency and should advertise more around water awareness and also do education about it. I need more experience in the field to answer this question fully. So far, I see little innovation in the houses I have seen.” (“Steve”, 2004).

Evaluators mentioned that Manitoba Hydro was exploring the possibility of including water efficiency by examining shower head and toilet flow:

Water should be covered they were talking about that low usage toilet’s and low flow shower heads. They had mentioned they were going to give us a bag to give to the client to see how much water they use (“Steve”, 2004).

Dye pills for toilets and checking water flow in showerheads was also mentioned by one evaluator as something that Manitoba Hydro was going to implement. Evaluator’s answers focused on having the existing EnerGuide for Houses program expand to include more forms of energy efficiency. While some evaluators mentioned water efficiency as something that would be beneficial for home owners, they did not feel that the lack of water efficiency represented programming gap.

Question four asked if evaluators had suggestions on how the programming could be improved for existing user groups and for reaching groups such as low income earners or inner city neighbourhoods. Table 47 summarizes the evaluator’s ideas for reaching existing residential programming users. Following Table 47 is further information about each of the four suggestions.

Table 47 Evaluator Suggestions for Home Owner Follow-Up

Suggested Follow up with home owner includes the following:
1. Initiate a third stage of the evaluation/ project management
2. Home owners and replacing windows
3. Marketing strategies
4. Improve Hot 2000 to include more insulation types

1. Initiate a third stage of the current evaluation/project management: Evaluators felt that there had to be follow-up with existing groups and that the follow-up should be continual. Evaluators suggested that the Energuide for Houses program follow-up with what home owners are doing and provide a mechanism for home owners to confirm their contractor choices and retrofit choices with Manitoba Hydro's energy efficiency advisors. It is felt that doing this would create a closed loop system for information delivery where there would be less chance for home owners to follow and apply erroneous information. Evaluators are seeing a gap in terms of information and trust of home owners. Home owners are often influenced by the last person they speak to, usually contractors, and are receiving contractors' opinions about what to perform/not perform in terms of certain retrofits.

Have project management like the program in Ontario where homeowners get the evaluation done, they [homeowners] find contractors and can get us to look at the quotes of the contractors or even find the contractors off a list. Or we could be available for each stage to either meet with or talk to the homeowner. Maybe have a meeting once they have their quotes in. Hydro should be offering this service...since most of us already do offer some project management ourselves The last person the homeowner sees is the contractor who usually is pushing something different than what our report says...report says "put in an high efficiency furnace"...and the contractor says, 'this house doesn't need a high efficiency furnace, a mid efficiency is good enough', so the homeowner goes with what the contractor says. We need to help them make the decision. ("Joe", 2004).

A logical outcome of providing follow up for the customer would be to formalize it and market as a third stage of the in-house assessment. The follow-up would continue an

evaluator's relationship with the customer and would provide the customer with the ability to reference the evaluator's knowledge about what they recommended against what contractors are recommending. Setting up an official communication channel between home owners and Manitoba Hydro's experts would help ensure that energy retrofits undertaken by the home owner would be most cost effective for them and would indeed be energy saving. The following are evaluator's perspectives about what they see as some of the challenges of getting home owners to complete their recommendations and solutions to the challenge:

In a report, I can recommend that a homeowner put R50 in their attic, but the contractor will tell them that R40 is enough...it is psychological...there is a lot of resistance in the trades to what we say. Homeowners need unbiased help [in making contractor/product decisions] ("Sam", 2004).

Often there is an --and I hate to say this-- a gender issue--, or its an age issue when it comes to dealing with contractors. The contractors are like, "hey little lady...don't worry...I will take care of everything" (Kevin", 2004)

We need to do follow-up to ensure that the findings are being implemented. ("Carl", 2004)

We say one thing and the contractor says another...Who is the homeowner going to believe? The difference between the cost of R40 and R50 is nothing. It comes down to what the contractor believes. They have vested interests in swaying a customer one way or the other. They can see that a customer is cheap and want to come in with a lower bid...so they say 'I've been doing this for thirty years and I know that R 40 is enough or they will push stuff the homeowner doesn't need—like all new windows. We need to do follow-up to ensure that the findings are being implemented. ("Joe", 2004)

For home owners and evaluators, project management would enable a continual flow of information which the home owner could use to compare to contractor's recommendations. Project management or customer follow-up of the kind that the evaluator's are recommending is a feature of some programs in parts of Canada, the United States, and in European countries such as Sweden and Denmark. Project

management would be a linkage to securing “good” energy retrofits that are based on the findings that Manitoba Hydro’s evaluators produce.

2. Home owners and window replacement: some of the best marketing can be seen around encouraging people to upgrade their windows. While window replacement may be necessary, other energy efficiency retrofits provide more savings on the investment than windows. Windows are often very expensive in comparison to such upgrades as insulation, but people persist in replacing all of their windows. The practice of replacing windows is so common amongst customers, that one evaluator suggested a “window clause” be added to every in-house assessment report. In recommending the “window clause”, this evaluator admitted that he often recommended replacing windows when he first started, but has since changed his practice since coming to understand why windows would not be a first priority when beginning energy retrofits. The following quote is from an evaluator who has seen many people install windows rather than insulation:

Have a “window clause” in each of the reports—have a standard clause talking about why the evaluator did not recommend upgrading windows and/or doors. Homeowners always ask if they should do their windows. Maybe when I first started,—the first 10 maybe homes I did—I might have recommended changing windows—this is when I didn’t fully understand all the things...the program (“Steve”, 2004).

The request for a window clause also indicates that education about energy efficiency, while reaching customers may not be impacting their decisions significantly or this information may seem less valid once a home owner has spoken to a renovation expert who wants to sell them windows. As well, the “window clause” request also indicates a need for further, ongoing education of a larger population that not only includes home owners, but also includes contractors and the larger renovation industry. A best case scenario would be a system in which everyone the home owner comes in contact with when making renovation decisions was knowledgeable about energy efficiency retrofits. Currently, window upgrades are an accepted energy efficiency upgrade under Manitoba Hydro’s Power Smart Residential Loan.

3. Marketing strategies: Evaluators also suggested increasing marketing of the EnerGuide for Houses program in order to engage more of the residential population.

I don't think they are getting to enough of the population. Is it the marketing? A lot goes by word of mouth [people refer each other to get in-home evaluations] "Bob",2004)

For home owners, awareness of the program is the first step to considering applying for an in-house assessment, therefore, it is critical to market the program in venues commonly used by home owners, such as local newspapers, local hardware stores, and by re-enforcing existing marketing measures at Manitoba Hydro. The request for more energy efficiency education of contractors, home owners, etc. could be part of the cornerstone of a marketing program aimed at expanding the residential sector. Continual education through a variety of means presents the best possible way to reach people. One evaluator was not even sure that home owners were reading the information in the package they provided to home owners, saying,

I don't think that people read the brochures [evaluator feels brochures are informative] ("Carl", 2004).

I don't think that many people do the B evaluation. "10% of homeowners do 100% of the recommended work and 40 to 50% of homeowners do half the work. [At this point, He has not done any B evaluations yet]" ("Steve", 2004).

Another evaluator felt that Manitoba Hydro was not reaching all groups and that the marketing of the program had to be increased in order to reach the larger group.

[Manitoba Hydro] should try to reach more groups. Everyone gets information in hydro bills/gas bills about the programs ("Joe", 2004).

4. Improvements to the Hot 2000 program: One evaluator felt that an overall improvement to the Hot 2000 program would benefit all residential users. The evaluator wants the program to include more insulation defaults for newer types of insulations and wanted the program to produce graphs that provide a dollar estimate for savings on heating. In the current in-house evaluation, the report produced by Manitoba Hydro's

evaluators is the final official contact between Manitoba Hydro and the customer until the B evaluation; therefore, it is important that the report and its findings be as clear for the home owner as possible to increase the chances that the home owner will implement the recommendations.

For some insulation types we have to go with other info other than what Manitoba Hydro and/or Natural Resources Canada provides. For example, some of the foam insulations are very new. They've [Manitoba Hydro and Natural Resources Canada] have provided a limited range of insulation values. Even in the pull down, you cannot combine insulation types in the program to get one R value. ("Sam", 2004).

Need NRCan to do more work on this program [computer program].I can't put insulation combos/types of insulation. The default insulation values seem incorrect. For the homeowner, provide better graphs on reports that include the heating system. The homeowner needs something that involves the heating system as it is a good percentage of the loss/gain on the Energuide scale ("Ted", 2004)

In response to part two of question four, evaluators also came up with recommendations about how the in-house evaluation and other aspects of the programming could be improved for low income groups. Their recommendations centered around reducing the cost of the evaluation, providing an up-front renovation assistance grant, partnering in the delivery of programming with other agencies, education, and using programming to address issues common to all low income groups. Each of these recommendations was similar to those voiced by community experts at the focus group. The needs of low income groups are not being fully met by existing programming and Table 48 summarizes how the evaluators and community experts think the existing programming could be improved.

Table 48 Evaluator Recommendations—Reaching Inner City Neighbourhoods

Evaluator’s recommendations: How to reach low income, inner city groups
1. Upfront renovation grant: Ability of low income groups to afford renovations
2. No interest loans for energy efficiency upgrades
3. Free evaluations for low income earners
4. Grant amounts higher for qualifying low income groups
5. Program delivery partnership/piggybacking
6. More education of home owners
7. Expand/incorporate new aspects to program (mold issues, ventilation, upgrade wiring)

1.) Renovation affordability: Because low income groups are at a financial disadvantage—poor credit ratings, insufficient credit, inability to access a second mortgage, etc., evaluators recommended that low income groups could qualify for an upfront renovation grant that would be applicable to sanctioned energy efficiency retrofits. Half of the evaluators also qualified their statements about renovation affordability for low income groups and indicated that loan rates and assessment fees would also hinder low income groups access to the current EnerGuide for Houses programming.

Give something, a grant, upfront, to start the improvements for low income groups. Lots of the time it is the money that holds people from getting the recommendations done. Have criteria based on the point system that would give them back money/have other loan program for low income people. Have a PowerSmart program geared towards low income people (“Carl”, 2004)

Low income [people] don’t have the cash necessary to do the upgrades.” (“Sam”, 2004),

While “Sam” did feel that low income groups do not have the incomes necessary to do energy efficiency upgrades, he did feel that the cost of the evaluation, seventy five dollars plus tax, was a reasonable price and should not be waived. “Carl” felt that low income groups should be supported and helped through a variety of mechanisms

including programming specifically for low income groups and by changing the rating system so that it includes low income groups.

2.) Low or no interest loans: The idea of a low and/or no interest loan was also discussed in the focus group. Both evaluators and focus group participants felt that Manitoba Hydro's current interest rate for their loan—6.5 % percent (Manitoba Hydro, 2004), was unacceptably high given that current bank and credit union loans have interest rates beginning at 3.34 % to 6.0 % (Royal Bank of Canada, 2004). While, Manitoba Hydro provides flexible credit approval and low monthly repayment options (minimum of fifteen dollars monthly), the 6 % interest rate is too high given today's loan options. The function of the upfront grant would help low income groups invest in energy savings that could significantly improve the quality of their lives by lowering their heating bills. In addition to upfront grants, evaluators also felt that no interest loans would also have the potential to increase the number of low income people who implement energy efficiency upgrades.

Have no interest loans – no interest loans would be great....give the money to do the renovations. For example, one customer went to Sears too do their windows because they [Sears] have a no interest loan for two years. ("Carl", 2004).

Most low income people can't afford the renovations so they don't try the programming. Maybe for low income people, have eight equal payments of eight dollars each. Have it set up so that when we hand in the money, they get the money right away, so it will not get tied up. Have super minimal payments in the Manitoba. If you have an income below \$20, 000, the loan will be given at prime and one percent. ("Joe", 2004).

3.) Free evaluation for low income earners: Some evaluators felt that the cost of the EnerGuide for Houses in-house assessment was prohibitively high for low income groups and that the cost should be lowered or waived based on criteria designed specifically for low income groups. Similar findings about waiving the assessment fee/lowering the cost was discussed and recommended by focus group participants.

Maybe provide the evaluations free to low income earners or cut the price of the evaluation in half if they can prove that they are low income earners, but the renovation costs are too expensive for low income earners (“Steve”, 2004).

In addition to low interest/no interest loans, another evaluator suggested that the seventy five dollar fee could be repaid in smaller incremental payments and another evaluator suggested waiving the assessment fee for low income groups: 75.00 is too much for some in need. To get anything for low income, need subsidies to pay to improve their housing (“Mike”, 2004).

4.) Grant amounts higher for qualifying low income groups: One evaluator recommended that the amount a home owner received from the program once they have instituted the upgrades should be prorated based on income levels:

Maybe class certain neighbourhoods for different returns on the grant. Maybe for a poor neighbourhood, if you spend more, then maybe the return could be based on what the rating is plus a percentage of what they spent on the upgrades (“Ted”, 2004).

While reclassification of grant amounts for different income levels may be seen as preferential treatment by some individuals, another way to access additional monies for low income groups could be achieved by partnering the Energuide for Houses program with other agencies and programs that provide renovation monies to qualifying low income groups. Grant classification could be done in partnership with the City of Winnipeg using their Housing Improvement Zones as neighbourhood boundaries. Fine tuning of the grant amount within the neighbourhood could also be undertaken using Fitt’s (1986) Needs Based Model calculation.

5.) Program delivery partnership/piggybacking: While it may not be feasible for Manitoba Hydro to provide all the necessary programming to encourage low income households to improve their energy efficiency, other groups such as the City of Winnipeg, social housing providers, the Affordable Housing Initiative, and the Province of Manitoba could also work at developing and delivering programming. It may be necessary to first educate the other stakeholders on why energy efficiency would be a valuable tool for improving low income people’s lives.

To get anything for low income, need subsidies to pay to improve their housing. Use low income category/ Energuide rating to feed into another loan program such as RRAP (Residential Rehabilitation Assistance Program) or to the City of Winnipeg. ("Mike", 2004).

Only "Mike" mentioned partnering with agencies that already delivery programming to low income people in some fashion. Focus group participants mentioned that partnering, creating memorandums of understanding and co-delivery of programming and education between several key stakeholders would help low income group's access energy efficiency programming. It was felt that combining energy efficiency upgrades would be relatively easy with programs such as RRAP because the program has eligibility criteria for determining who qualifies and also has renovation criteria in place for eligible retrofits (currently, energy efficiency is not one of the criteria). Therefore, educating agencies that currently supply programming to low income groups about the benefits of energy efficiency for their clientele may help synchronize program delivery to low income groups.

6.) Education of home owners: Educating home owners, regardless of income levels was suggested by evaluators. It was felt that ongoing education would help home owners make informed decisions about what energy efficiency upgrades they should undertake, rather than relying on the opinions of the last person they spoke with. It was also felt that construction industry that provides services to home owners should also be educated, as some of their practices and opinions vary from the energy efficiency recommendations made by Manitoba Hydro. These suggestions were echoed by focus group participants, who also felt that energy efficiency education needs to be aggressive and must encompass a far greater group such as renters, property managers, home owners, contractors, hardware stores, and youth. Previously mentioned issues such as home owners choosing to upgrade windows when windows were not necessarily the best value, home owners not reading or the assumption that home owners are not reading their information packages, or not fully understanding their reports, clearly indicates the need for a comprehensive education program that is not dependant on one time information sharing, but is a *process* of information sharing that connects the home owner from the moment they walk into a

“Revy” to purchase insulation to the moment they hire a contractor to install it and *continues* as an energy conservation relationship with all stakeholders. The following quote by an evaluator highlights the importance for continually educating all stakeholders.

The last person the homeowner sees is the contractor who usually is pushing something different than what our report says. If our report says “put in an high efficiency furnace” and the contractor says, ‘this house doesn’t need a high efficiency furnace, a mid efficiency furnaces is good enough’, the homeowner goes with what the contractor says. We need to help them make the decision. (“Joe”, 2004)

7.) Expand/incorporate new aspects to existing program: Some evaluators suggested that the current EnerGuide for Houses program could be improved to address issues unique to older houses. Evaluators also felt that programming designed specifically for older homes would be good. Programming that dealt with electrical upgrades and installing insulation in older homes would help home owners of older housing.

It is in Manitoba Hydro’s best interest to help people get their electrical upgraded as well. Doing the electrical comes after getting the place insulated.

People in this area [inner city] wouldn’t think of upgrading the electrical. Manitoba Hydro should have a program for this If you are an immigrant, the electrical could be better than where they come from—so they think it is better, but it isn’t. They have large families and don’t have the income to upgrade (“Carl”, 2004)

Getting households to upgrade their electrical wiring may also present an educational opportunity around energy efficiency and why that is something a home owner may want to consider. Another evaluator mentioned that new programming should focus on issues that come up repeatedly in some houses, namely mold:

Mold is another issue. In one house I smelt mold...one wall and a quarter of the basement was covered in mold. People were asking me about humidity levels [if the program could tell them that] and how to get clean air. I didn’t know what to tell them. (“Steve”, 2004).

“Steve” also felt that education and the program should be more comprehensive in terms of ventilation, its importance, and how materials and furnishing commonly found in housing can offgas.

Ventilation issues should be made more relevant to homeowners...for example, the offgasing of materials in the home should be included somehow.” (“Steve”, 2004).

Evaluators felt strongly about developing a closed loop of information/implementation of their findings. One evaluator also evinced discouragement about ever getting low income home owners to change if programming and/or grants to complete the renovations are not provided:

I think the consensus is from the evaluators that low income earners don't take the program seriously. You get into a house and you just know that they aren't going to follow through with the recommendations. You can tell by the house, it has little maintenance, etc. and you have to wonder how serious they are about doing the recommendations. Some people expect you to come to the door with a cheque and when you don't, they yell at you (“Steve,”, 2004)

Part two of question four asked evaluators to make recommendations about how existing programming could be improved for low income groups. The seven categories summarized in Table 48 provide a starting point to examine programming opportunities for low income groups. Table 49 compares evaluator and focus group recommendations on improving programming access for low income groups. It should be noted that the same categories of recommendations were voiced by both the evaluators and focus group participants about how to improve low income groups access to the Energuide for Houses program. Both evaluators and focus group participants make recommendations about further education of home owners, fee reduction/removal for in-house evaluations for low income groups, expansion of programming to include more issues, and increasing/targeting marketing strategies. The column on the left side of Table 49 summarizes the evaluators' recommendations for improving program delivery. The column on the right is a summary of some of the focus group findings and is included to

highlight some of the similarities in the recommendations between the two groups, Hydro experts and community experts

Table 49 Evaluator Recommendations vs. Focus Group Recommendations

Evaluator's recommendations: How to reach low income, inner city groups	Focus group recommendations: Low income groups and energy efficiency issues
1. Upfront renovation grant: Inability of low income groups to afford renovations	Renovation costs are too high for low income groups
2. Create no-interest loans for energy efficiency upgrades	Current Manitoba Hydro's loan rates are too high
3. Expand/incorporate new aspects to program (mold issues, ventilation, upgrade wiring)	Mold was an issue discussed in the focus group
4. More education of home owners around certain areas such as ventilation	Education of specific groups such as home owners, renters, landlords, Conservation education in grade school, Addition of education portion to in-house assessment
5. Higher grant amounts for qualifying low income groups	Savings Program (Ability of low income people to access renovation funds)
6. Free evaluations for low income earners	Free evaluations for low income earners
7. Program delivery partnership/piggybacking	Partnerships with other agencies

The information in Table 49 was discussed in the previous section and the focus group findings were discussed in Chapter 4, 4.1. Table 49 compares the recommendations of industry experts, Manitoba Hydro's evaluators to those of community 'experts' and finds that the two groups have analogous recommendations. Therefore, it is important not to discount the information that can be gathered through the use of community 'experts'.

Question six asked evaluators about their training in becoming EnerGuide for Houses In-house assessors. For question number six, dealing with training provided to the evaluator, a verbal prompt was added after the evaluator's initial reply. Each evaluator received the following prompt: "Could you tell me if you received training related to how to tell the customer about the information you provide them with? If the evaluator said "yes", I

prompted them to elaborate their answer if possible. The prompt was added because each of the evaluators interviewed spoke about the technical training they had received. All information in this section is based on training information evaluator's recalled.

For most evaluators, their training would have occurred as recently as four months ago (from the time of their interview) and as long as a year previously for some. In this time range, I hoped to learn what aspects of the training evaluators recalled the easiest, using this as an indicator of what aspects of their jobs had been emphasized during training and therefore, was easier for the individual to recall. Every evaluator answered about their technical training without any hesitancy. However, when prompted at the end of their response, to see if they had received any customer service instruction, every evaluator had a noticeable pause before answering and a vague answer. The difference in recall about technical vs. customer service training is not conclusive evidence about evaluator training. However, it does indicate that training provided to evaluators stressed technical aspects and was easier to recall than customer service training. This ability to recall technical training rather than customer service training may provide some insight into why some of the evaluators were more technically inclined during in-house evaluations that the researcher witnessed.

Each evaluator, except for one, who did not answer this question, see Table 50, indicated that they had received two types of training: classroom training and training held "in house". Training in the classroom included learning the Hot 2000 program and calculating air volume. Each evaluator recalled that a significant portion of time was devoted to learning the Hot 2000 program..

Table 50 Evaluator Training

Evaluator	Time spent learning Hot 2000 program	Number of “job shadowed” evaluations completed, ‘ride along evaluations’	Number of solo evaluations completed as part of training	Other training mentioned, prior to prompt
Carl	3 days	8	5	Did not respond to question
Bob	5 days	12	10	4 days of general information about the program
Mike	Can not remember	4	5	Did not respond to question
Kevin	2 days	5	5	20 hours in the classroom
Steve	5 days	4 or 5	5	64 hours in classroom
Ted	4 days	3 or 4	2+	One week in classroom
Sam	Can not remember	4	Could not recall	4 days
Joe	Did not respond to question	Did not respond to question	Did not respond to question	Did not respond to question

All evaluators received training that was similar in duration. Training was spent in learning Hot 2000, the required program they would use, trainees went on ‘ride along’ evaluations, and finally they completed, on average, five evaluations by themselves (friends and families houses). What is noticeable from each interview is that no evaluator mentioned any type of customer service training that specifically focused on explaining how they should interact and disseminate information to the customers. Evaluators indicated that their training was mainly technical. They felt they learned to interact with customers while observing other evaluators during “shadow evaluations. While technical skills are extremely important to the evaluator’s position, it is also important that they be able to clearly explain the information to a variety of home owners. The following excerpts are from evaluators answering the question of their training. What is noticeable in all quotes is the ease with which they remembered their technical training and the lack of detail surrounding their customer trainings. This trend was true for all evaluators interviewed. The following quotes are by some of the evaluators. In each quote,

evaluators discuss their technical training and discuss what they learned about the customer service part of their job.

First ten houses, they double checked my files. Had four days of in-classroom about the program in general. Also given binder to read material. Did twelve “ride alongs” with evaluators where I did some “hands on”—setting up the blower door test, talking to the homeowner. (“Bob”, 2004).

40 hours in classroom and we covered the software, Energuide for houses software, different types of homes, how to do a one or two storey, which measurements are critical the basics of building science. 5 homes: I went with someone and observed on five and the first five I did myself, someone was there for my first one. They said we had to spend a minimum of 15 minutes explaining the homeowner report. I do not recall going over the booklets, we really didn’t read those, we were told to read them ourselves. I have skimmed them and then I can refer to parts of the booklets that refer to home owner issues. (“Kevin”, 2004).

We learned about making sure that we called the customer beforehand to ensure that they were home. We went over the package given out to the customer. We were supposed to read it and we looked over some diagrams that are useful to helping the customer understand our recommendations [diagrams in the pamphlets handed out to the customer] (“Sam”, 2004).

Remembers that XXX went over the manual with them—but flipped through two chapters because they weren’t relevant. The booklets? XXX went over a few from the customer package—maybe one or two of them. Most of the training we received related directly to the computer program and calculating air volume (“Steve”, 2004).

They didn’t go over the customer package with us, but we are supposed to read it. I have used those pamphlets at some time or other in my past. We sort of went over how to tell the customer about what the report meant. We have to understand the technical aspects of the program in order to tell the customer. (“Joe”, 2004).

One week training which included: how to enter the data properly, heating systems and calculating R values, and three days of more training on specific topics. Shadowed three or four evaluators too and watched the evaluations, then did two [cannot remember exact number, was two plus] evaluations with the evaluator watching him. I do not

remember talking about/learning about the package they give to the customer. ("Ted", 2004).

Current training of evaluators is highly technical and evaluators perceive their training in a technical light, based on their responses. While technical ability is a requirement of this position, customer service training would also help evaluators learn to convey information to a variety of home owners, which might have the overall impact of improving home owner upgrades. While customer service training might be deemed unnecessary if individuals had a customer service background, answers to question seven indicated that individuals in the position of evaluator mainly have technical backgrounds.

Question seven asked evaluators what their educational backgrounds were. Responses to this question indicated that evaluators were from technical backgrounds, as indicated in Table 51.

Table 51 Evaluator Educational Backgrounds

Educational background
Two Certified R2000 builder
First level of carpentry through Manitoba Home Builder's Association.
Partially completed university
HRAI certified
Informal electrical plumbing/heating skills
Civil engineer
Aircraft maintenance technician
Some informal training in heating, ventilation, best practices for energy efficiency. Partially completed Certified Engineering Technologist program.
Civil Engineering Technologist

Each of the evaluators had strong technical skills prior to entering their position and the training they received to become an evaluator enhanced these skills. There is no indication of a formal background in customer service for any evaluators. When completing an evaluation, the technical skills are required for determining measurements and figuring out air volume and knowing how to enter the data into the program in order

to produce a report. Customer communication skills are then required in order to produce a home owner who knows how to read the report and how to apply the recommendations. For evaluator's with already strongly developed technical skills, building customer service skills in a formal manner may provide further clarity for customers receiving the EnerGuide for Houses In-house evaluations.

Question eight asked evaluators if they had anyone come on an evaluation and evaluate their skills: When asked this question, all but one of the eight evaluators indicated that they had not had anyone come and observe their skills while evaluating. The one evaluator indicated that he had "some quality control come out and watch him (Evaluator, 2004). When asked what was meant by "quality control", the evaluator said that he did not know what it was about. When I then asked if the evaluator had received any feedback, written or verbal after the "quality control" individual had processed their house, the evaluator indicated that they had not received any feedback. From the lack of information, it is difficult to determine what was occurring. Evaluators referred to being observed on the training evaluations as their customer service skill's evaluation. One evaluator also indicated that if you get the answers to create a report, then there is no need for anyone to come and watch you. The evaluator indicated that for tricky houses with difficult air volume calculations, someone in charge of the program could be asked to look at your file to ensure that everything was alright. While double checking the files is important in order to create an accurate report and initial EnerGuide for Houses rating number, double checking evaluator's customer service skills should also become a priority. It is important to learn if evaluators are forgetting some aspects of information to share, if they are good at it, or if they need a refresher course in how to communicate with customers. There are many programming examples that use monitoring as a mechanism to ensure quality. While it may provide a logistical nightmare to find evaluators, it may be advisable to conduct unannounced, drop in observations of evaluators to monitor their technical and customer service skills.

Question nine asked evaluators to indicate on average, how much time evaluations take and if there is enough time to complete them.

Table 52 Average Time to Complete an In-House Assessment

Name	Average time evaluators think they spend at each evaluation	Average time evaluator think they spend talking to customer about report	Average time of entire evaluation, including time talking to home owners	Average time spent talking to home owners
Carl	2 - 2.5 hours average.	Half an hour talking with customer	1.5 hours	15 – 20 minutes
Bob	2 - 3 hours	Half an hour to forty five minutes	1.5 hours	20 minutes
Mike	3 - 4.5 hours	Tries to talk the entire 3 hours to the customer	2 hours for entire evaluation, does not every stop to talk to customer, but constantly talks as is walking around	
Steve	2 - 4 hours, four level split 4 - 5.5 hours, average sized bungalow, 2 - 2.5 hours	10 - 25 minutes to half and hour	1.5 hours	10 – 15 minutes
Kevin	2 - 2.5 hours	20 minutes	1.5 hours	15 – 20 minutes
Joe	1.5 - 3 hours	Half hour	1 hour	15 to 25 minutes
Ted	2.5 hours for average, complicated can take 3 hours to do and 2 hours to calculate	+45 minutes. Usually tries to take data home, enter it, and mails it out to customer	2.5 hours	15 – 20 minutes
Sam	2.5 - 3 hours	45 minutes to one hour	1.5 hours	10 – 15 minutes

What is important to note from Table 52 is that each evaluator over-estimated the average amount of time it took them to complete an average sized bungalow (1,200 square feet) and that they also perceived that they spent more time talking to customers. The majority of the evaluator's time is spent gathering the necessary data to generate a report and the remainder of their time is spent discussing the report with the home owner. While evaluator's strive for excellence in completing the evaluations, they should be made aware of the ratio of time they spend collecting data vs. speaking with home owners and be encouraged to make a conscious decision to spend time communicating with home

owners. The evaluators should be encouraged to spend a minimum amount of time while not multi-tasking, to speak with home owners. This focused attention on the home owners may better help home owners understand what the evaluator's are communicating.

Question ten dealt with the evaluator's ability to access and share information with each other. It was felt that understanding who they turn to when they have questions could aid in determining if the information they are using to make decisions is based on some one's personal opinions, facts, or other information sources. Seven of the eight evaluators indicated that they meet each other only at formal training functions held at Manitoba Hydro. All eight of the evaluators indicted that they do have an informal communication network where they discuss issues with each other. They usually have an informal network of one to five evaluators that they speak to. Evaluators tended to speak to other evaluators who were hired at the same time as they had been. Only two of the evaluators indicated that they would first speak with Manitoba Hydro contractors, who were in charge of the sub-contractor evaluators. Reasons for limited contact with their supervisors included that the supervisors "very busy" and "hard to get a hold of" and that they could just as easily call another evaluator.

The evaluator's engaged Manitoba Hydro's services to access their training, schedules, computer repairs, and to pick customer packages. One evaluator indicated that he contacts one or two other evaluators once a week to go over things and to see how they deal with specific problems with data entry, specific scenarios where they are having difficulty determining insulation values, or if they want to see what the other evaluators think about new computer program upgrades. Evaluators also contact each other to make scheduling changes. While evaluators are engaging in informal communication amongst themselves, they did request that training sessions held at Manitoba Hydro include some extra time for evaluators to speak to each other informally. They also indicated that they would like to have the email addresses of the other evaluators and would like to be able to download upgrades for their computers through the internet.

Sometimes, training time is wasted on stupid stuff—the trainers spend time on stuff they [other evaluators] should already know. Sometimes

guys ask stuff that takes too long to answer. Not all evaluators know what they were doing, otherwise they wouldn't ask the question ("Ted", 2004).

Further development of evaluator's ability to access each other and key people at Manitoba Hydro is recommended. One simple way to facilitate contact is by providing the evaluators with each other's email address, as they requested. Even though they now have each others phone numbers, they still feel that the email address would aid their communication. In addition, it cannot be confirmed what evaluators offer as their opinions to each other—while this communication is important to aid in evaluator skills—a formalized version of their informal communication network is recommended in order to ensure that all evaluators are "on the same page" and to aid in Manitoba Hydro's delivery of the EnerGuide for Houses program—if common issues are being discussed informally amongst evaluators and Manitoba Hydro does not know about it, delivery and/or quality of services may be hampered. Therefore, it is recommended that Manitoba Hydro request evaluators to submit a weekly log of challenges/solutions—technical or customer service related—so that Hydro can determine if there are patterns, gaps, or creative solutions that it may choose to address en masse. Some evaluators are keen to share their knowledge and to learn more about what other evaluators are facing.

Question eleven asked how many evaluations each individual had completed, their breakdown of A/B evaluations, and their start date.

Table 53 Number of Completed A and B Evaluations

Name	Start date	A Evaluation completed	B Evaluation completed	Total Evaluations
Carl	July 2003	300	30	330
Bob	mid January 2004	129	5 or 6	134 or 135
Mike	February 2003	450	35 to 40	485 to 490
Steve	November 2003	274	10	284
Kevin	July 2003	445	65	510
Joe	July, 2003	183	10	193
Ted	November 2003	193	20	213
Sam	October 2003	233	20	253

As indicated in Table 53, eight evaluators have seen on average, 276 houses for “A” evaluations and have completed on average, twenty five “B” evaluations. The lowest number of “A” evaluations completed by an evaluator was 129 and the highest number was 445. The highest number of “B” evaluations completed was 65 and the lowest number completed was six. The number of “A” and “B” evaluations completed was based on evaluator’s responses and only include the numbers of completed evaluations up until mid April, 2004. Seven of the eight evaluators started in 2003 and one of the interviewed evaluators began in the early part of 2004. The range of completed evaluations is highest for those evaluators who have been working the longest, both for “A” and “B” evaluations. “A” evaluations are the initial assessment to determine the house’s current EnerGuide rating. The “B” or follow-up evaluation is performed to determine the new rating based on the home owner’s upgrades to their residence.

Table 54 Ratio of A to B Evaluations Completed

Evaluator (No particular order)	Ratio of A to B evaluations
1	10:1
2	20:1
3	10:1
4	25:1
5	7:1
6	16:1
7	10:1
8	10:1

As Table 54 indicates, the lowest ratio of “A” to “B” evaluations is a 10:1 ratio and the highest ratio is 25:1. Several factors influence the high ratio of completed “A” to “B” evaluations. These factors include a large number of customers accessing the EnerGuide program in a small timeframe between January and April of 2004, some homeowners are not having the “B” assessment completed and/or the evaluators interviewed were not a representative population. In examining the three factors listed above, the third one—a non-representative sample—should be omitted as the evaluators I spoke to ranged in age, experience, time on the job, and number of “A” and “B” evaluations completed. Another

factor that influences completion of “B” evaluations is the percentage of home owners who do not take advantage of the “B” evaluation. It should be noted that the correlation between evaluators and start date (meaning how many houses they could have potentially completed) was not a significant factor in determining their A/B ratios, with one of the highest ratios (25:1) belonging to an evaluator who had been hired in 2003. The ratios also reflect how many houses the evaluators choose to complete each day and week, as those who increase their weekly amount of “A” evaluations increase the potential for more “B” evaluations to be completed. What is very important to note about the ratios, was that in all cases, the lowest ratio was 10:1, indicating that there is a lag between “A” and “B” evaluations, which is normal.

Question twelve asked evaluators how many houses they did in an average week in order to understand if the number of evaluations completed by an evaluator influenced their perceptions about the program, home owners, and also to see what the average number of evaluations, “A” or “B”, are completed. When compared with answers provided in question nine about the average length of time each evaluation takes, it became apparent that if evaluators are completing more than three houses per day, then they cannot be spending the time at each evaluation they perceive they are spending.

Table 55 Average Number of Houses Evaluated Per Week

Number of Evaluations/day	Number of evaluations per week (5 day work week)
3	13
2 – 3	8 – 12
2 – 3	9 – 10
3 a day in a 7 day period	21 (based on 7 day work week)
2 – 3	12
2 – 3	12
2 -3	12
2	10 plus 1

Table 55 lists the averages for the fall and winter months when there are more people having in-house assessments completed. On average, evaluators are completing a minimum of eight in-house evaluations per week (one or two a day for five days), with a one evaluator peaking at twenty one houses completed on average per week (three houses a day, seven days a week). The majority of evaluators complete an average of twelve houses per week, averaging two or three houses a day for five days. The majority of evaluators felt that two, maximum three houses was all they could complete in a day, with variables such as complexity of the calculations, home owner availability influencing their ability to complete the in-house evaluation. The one evaluator who completed, on average, twenty one evaluations per week said he was influenced to do as many evaluations as he could because of two factors, that these evaluations represented his "bread and butter" and that the slow down in evaluations in the summer months would decrease how much money he could make, and secondly, he had heard a rumor that they were going to end the in-house assessment program ("Steve", 2004). The evaluator's need to complete as many in-house evaluations as possible may have an impact on the quality of the assessment and the quality of the information that the evaluator imparts to the home owner. Therefore, I recommend that a monitoring system be developed to ensure that evaluators are consistent in the performance of their duties.

This chapter examined data collected from a variety of trained experts and community "experts". The data collected indicated energy efficiency programming does not currently exist, but that many different stakeholders had valuable ideas about how to incorporate energy efficiency into low income group's housing. For those groups who can take advantage of current programming, the financial cost of the upgrades was the main determinant of whether or not households would pursue the upgrades. Tenants and landlords had markedly different views about what landlords were doing in terms of energy efficiency. Tenants did not feel that landlords were implementing energy efficiency upgrades, while landlords indicated that they were. The ecological footprint survey data indicated that culture and socio-economic status are important factors to consider when applying ecological footprints to populations. Evaluators provided

recommendations similar to those of the focus group participants. A variety of new programming for low income groups as well as the involvement of more stakeholders in partnership with Manitoba Hydro was felt to be the best way to deliver energy efficiency programming to low income groups.

CHAPTER 5

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

5.1 Summary of Project Findings

Canada's 12,548,588 households (Statistics Canada, 2001) represent an opportunity to improve energy efficiency at the local household level and to reduce green house gas emissions at the national level. For these reasons, there must be an aggressive re-evaluation of available programming and targeted market expansion. The current energy policy focus of energy experts, policy makers, federal government, and program delivery agents focuses on implementation in new home construction. Instead, there is a greater need for policies to address mandatory or semi-compulsory energy upgrades in all existing housing stock. There are no distinct policy requirements or energy efficiency programs available for groups such as First Nations or low income groups. Indian and Northern Affairs Canada does not include energy efficiency as a renovation criteria in First Nation housing and energy efficiency is also not a requirement for social housing providers. The federal and provincial governments of Canada must take action to include energy efficiency as a requirement in all renovations of all housing they are responsible for. In spite of the rising cost of home heating and the age and condition of Canadian housing stock, Canada has no distinct policies at either the federal or provincial levels that examine energy efficiency within the parameters of low income housing.

This is partly because: (1) Incorporating energy efficiency into the design and construction phases of a building is easier to do than attempting to incorporate it into the occupancy phase of the house, (2) The general state of housing varies in condition and age. For low income groups, their housing is often in poor condition, is often poorly constructed—particularly the frame and foundation and these houses often experience heavy wear with limited to no maintenance or poor maintenance, and may receive modifications to the original structure, (3) Adding energy efficiency considerations at the beginning of construction rather than in a renovation phase is often less costly, (4)

Potential legal liability arising from providing energy efficiency recommendations to a renovation project or the inability to achieve said recommendations in the renovation project make agencies hesitant to deal with energy efficiency policies for the renovation market, and (5) New construction programming as opposed to existing housing programming provided for low income families does not have the same number of involved parties—such as development corporations, municipal bureaucrats, delivery agents, contractors, occupants, etc. For example, in relationships where only a builder and homeowner are involved in decision making, there is less opportunity for someone to “drop the ball” because not as many people are involved in the process. Creating programming for low income groups has an increased number of people involved in producing the final product and may cause energy efficiency to be dropped as a consideration either through design or accident.

Current energy policies within Canada are not as aggressive as they should be. There is a discontinuity between what the national energy policy mandates and what happens within the provinces and municipalities. This discontinuity needs to be addressed and a comprehensive, all encompassing energy policy needs to be created. This new policy would involve all stakeholders and pre-stakeholders, such as the energy policy found in Denmark. The Danish energy policy model provides a template for a forward thinking energy policy that does the following: 1) Incorporates energy conservation education for all stakeholders and pre-stakeholders and provides information in formats that are applicable for school age pre-stakeholders, contractors, home owners, and every individual 2) Mandates the need for an energy certificate (or an EnerGuide for Houses rating in Canada) for every house prior to resale, and 3) Provides support to municipalities and counties to create and implement programming that fits the larger energy conservation vision.

The Danish model outlined above provides a useful starting point for improving energy efficiency policy within Canada. The Canadian federal government has a responsibility to create and implement an energy policy that is as at least as far reaching and as comprehensive as the Danish energy policy. The Canadian equivalent, EnerGuide for

Houses is currently a voluntary program and should be mandated similarly to the Danish model. Models exist both in Denmark and in the United States that should be used to further expand the EnerGuide for Houses rating system to make it inclusive of all residential dwellings designations including multiple family dwellings, etc. In Canada, municipalities and cities should be creating and implementing harmonized energy policies, bylaws, and regulations in order to synchronize energy expectations of Canadian citizens, businesses, and governments across Canada.

Demand side management of residential customers is still in its infancy and programming should continue to expand in scope. Current programming is targeted at the entire spectrum of residential households. Currently there is no delineation within available residential programming. There is no programming that targets sub-sectors of the larger residential groups. Delineation and program focus will enable programmers to capture user groups that might not otherwise qualify for the current, generalized programming. Key to understanding Manitoba Hydro's range of programming was placing Manitoba Hydro's programs in context with other Canadian utilities. It was found that Manitoba Hydro had programming similar to what is found in other provinces and in some instances, had more programming available than the national average. Low income specific programming was not available in any province. There was also no evidence that any utilities were developing programming tailored to specific sub-sectors of the residential sector such as low income groups.

In addition to this program overview, this project also examined the existing EnerGuide for Houses program as delivered by Manitoba Hydro. I also examined customer's application of their EnerGuide for Houses recommendations. As well, low income housing providers and low income people were interviewed about how to improve the existing programming and how to develop new programming that would be more inclusive and accessible for low income earners and low income housing providers. In speaking with each of these groups, a picture emerged of the overall uptake of Manitoba Hydro's existing residential energy conservation programming. Study findings indicate that program delivery by Manitoba Hydro must be made more accessible to low income

earners and low income housing providers. Energy assessment sub-contractors also felt that access to the EnerGuide for Houses program should be broadened through a variety of economic, managerial, and educational mechanisms. Existing policy and code mechanisms such as the National Building Code and National Energy Code must also be used to direct and develop low income friendly energy efficiency measures. A range of stakeholders is required in the design, development, delivery, and monitoring of energy efficiency programming for low income groups. Stakeholders include Manitoba Hydro, the City of Winnipeg, Province of Manitoba, federal agencies such as NRCan, social housing providers, and low income advocacy groups.

5.2 Conclusions

The primary purpose of this study was to understand and evaluate existing residential energy conservation programming in order to understand whether current programming was inclusionary and accessible for low income groups. Project conclusions to the specific objectives follow:

- 1. To determine current use of existing Manitoba Hydro programs by low income groups (accomplished by three types of assessments, surveys, focus groups, observation, and interviews);*

Observations of the EnerGuide for Houses assessment, information gathered from the mail-in, email survey, focus group, and surveys are contained in chapter four. The data confirms that current energy conservation programming is not easily accessible to low income earners or low income housing providers. Summarized observations include:

- The cost of the in-house evaluation is too high for low income earners.
- There is a broad range of customer interaction between in-house evaluators and residential customers.
- Paying for the recommended upgrades (from the in-house assessment) is felt to be beyond the scope of low income earners. Both low income earners and in-house evaluators felt this way.

- The timeline to accomplish the recommended work in the in-house assessment is too short for low income groups and/or their housing providers to meet.
- The payback schedule for the in-house assessment is too rigid. Currently, payment is issued as one payment after the successful completion of the “B” evaluation. For low income groups, waiting for money to be issued involves a further financial strain.
- More options need to be developed in terms of adding energy efficiency as eligibility criteria in existing low income emergency housing repair funds, energy policies, social housing policies, and within the City of Winnipeg’s planning activities.
- Existing low income models for saving money need to be examined in terms of their applicability to saving for energy efficiency upgrades. These models could be run on a pilot basis within the City of Winnipeg to further evaluate their effectiveness and applicability.
- There is no Manitoba Hydro *sanctioned* mechanism for in-house evaluators to conduct formal follow-up, or make either sub-contractor or product recommendations to customers who have received an in-house assessment.
- Generally, Manitoba Hydro needs to be *seen in the community* rather than be seen as *making the community come to it*—Manitoba Hydro must establish a long term commitment to working with low income housing providers and low income individuals.
- More energy conservation programming needs to be designed that creatively responds to the needs of low income earners. Programming that can address short term savings activities such as installing weatherstripping, putting plastic on windows in winter, and installing hot water blankets needs to be developed in conjunction with a strategy to support long term, higher cost energy efficiency activities.
- There is no available assessment mechanism or program that is accessible or applicable to apartment dwellers, duplexes without adjoining openings, and rental

properties (for those renters who wish to access energy conservation programming).

- Opportunities to engage/educate apartment dwellers by providing apartment specific energy efficiency literature have not been undertaken, but needs to be carried out.
- Opportunities to engage/educate school age children about energy use within the school and their home environment have not been undertaken, but needs to be carried out.
- Not all sub-contractors follow the guidelines about product or contractor endorsement stipulated by Manitoba Hydro.

These observations support the need for this research and also support the recommendations listed at the end of this chapter. Improvements to energy conservation programming will benefit both low income groups and Manitoba Hydro's need to conserve energy.

2. *Evaluate the performance and scope of these programs in comparison to other provincial programming (accomplished by literature review);*

The literature review indicated that energy conservation programming specifically targeting low income groups is limited, both within other Canadian provinces and in other countries such as the United States of America. In comparison to world leaders in energy conservation such as Denmark, Canada falls behind in maximizing demand side management activities. While residential energy conservation programming exists in all of these countries and in every Canadian province, programming within Canada has not progressed to levels that would include low income earners. A few programs single out sectors of low income earners such as seniors and market their programming accordingly. There are a variety of international models that indicate how energy efficiency can be incorporated to help low income groups. Fitt's (1986) Needs Based Model and Residential Energy Conservation Ordinances provide useful examples of how energy efficiency can be incorporated at the municipal level.

Objective three stated:

3. To promote and make recommendations about the adoption of those mechanisms that encourage energy efficiency in housing (based on other programming, ideas from evaluators, focus group, surveys, interviews, community meetings, etc...)

All data sources indicate that focused energy efficiency programming needs to be developed for low income groups. Manitoba Hydro should take a lead role in developing programming for low income groups and for modifying existing programming. Improvements that should be undertaken by Manitoba Hydro include lowering the price of the EnerGuide for Houses Assessment, creating a project manager relationship between the assessor and the customer to ensure that EnerGuide for Houses recommendations are completed correctly, lowering the interest rates on various Manitoba Hydro loans, and educating a wide range of stakeholders including customers, technicians, and trades people. Educational areas would be based on a “house as a system” philosophy, providing all stakeholders and pre-stakeholders (children, youth) with an appropriate level of information about how the main components of a house (heating, cooling, ventilation, etc) work together and how improve energy efficiency by choosing better systems and by modifying household energy behaviours and energy use patterns.

5.3 Recommendations

The following recommendations are based on the conclusions listed in 5.2. These statement summaries are expanded on immediately following this section.

1. Restructure the three assessment types (In-house, mail-in, and email) so that it includes other dwelling types beyond the single family or duplex style residence.
2. Develop a sliding payment scale for assessments and loans through Manitoba Hydro along with a mechanism to provide partial refunds for low income earners.
3. Broaden the scope of assessments to target First Nations, low income earners, and rural home owners so that the EnerGuide for Houses reaches a larger population base.

4. Create a national energy policy that includes mechanisms for improving energy efficiency in all levels of society and government.
5. Harmonize existing energy policies and programs at all levels including the federal, provincial, and municipal levels.
6. Develop educational opportunities targeted at low income earners, people working in the industry, and youth.
7. Develop/expand the evaluator role to include project manager function for low income earners
8. Examine current customer service training provided to evaluators.
9. Develop a long term relationship with low income housing providers by meeting with them and attending community conferences to learn about their housing perspectives.
10. Provide increased and more focused programming for low income earners that includes lower interest rates, easier to read paperwork, and more resources in order to help low income groups access the programs
11. Identify community champions that can partner with programmers by examining current housing and low income group's housing needs.
12. Integrate/connect with the grassroots community groups of Winnipeg and area by attending, participating, and actively contributing to local community housing conferences. Participate and educate by placing information about programs, energy saving tips—both structural and non-structural—in local neighbourhood newspapers.

Each recommendation is based on having one or more identified stakeholders take a lead role for implementing the recommendation. Possible lead stakeholders will be identified, but implementation strategies and activities will necessitate the co-operation of many stakeholders. Stakeholders that should be involved in implementation and program design include but is not limited to the following: Manitoba Hydro, the City of Winnipeg, Province of Manitoba, federal government departments such as NRCan, Canada Mortgage and Housing Corporation, Social housing providers, low income housing advocacy groups, First Nations groups, existing provincial and federal energy and climate change groups, commerce, and the principal players in the education system. The following sections provide more detail on the summarized recommendations.

1. Manitoba Hydro should aid the federal government in restructuring the delivery of the EnerGuide for Houses assessment, the mail-in assessment, and the email assessment. Low income housing providers and low income housing advocacy groups should also be involved in an advisory capacity for program development, delivery, and monitoring. Delivery aspects that need to be restructured would include accessibility to some type of assessment for renters, apartment blocks, condos, and duplexes that do not qualify (don't have an adjoining opening) under the current program. Inclusion of these groups creates a two-fold benefit that is both short and long term. By creating an assessment for interested members in these groups, Manitoba Hydro may potentially save more electrical energy in the short term, while the long term benefits include increased energy awareness and the education of potential future home owners of single family dwellings. In terms of the mail-in assessment and the email assessment, follow-up with the customer should be completed by a Manitoba Hydro employee to determine if there are any questions or areas of the recommendations that the customer has questions about. In this way, Manitoba Hydro can strengthen its bonds with customers and help facilitate further energy efficiency investment on the part of the customer. The federal government should incorporate low income programming considerations across Canada in view that there are incidences of low income households in all provinces.

2. Manitoba Hydro in conjunction with NRCan should reduce/remove the cost of the in-house assessment for low income groups. The economic cost of the in-house evaluation is considered prohibitively high by low income earners and low income housing providers. Therefore, a sliding payment scale should be adopted for the initial assessment fee, in addition to lowered interest rates for securing a renovation loan through Manitoba Hydro for low income earners. In order to qualify for the pro-rate loan options, Manitoba Hydro could stipulate that its in-house assessors provide a pre-inspection to be completed during the improvements.

3. While the above two recommendations address improvements to the financial strictures of the assessments, the customer base eligible to receive an assessment should

be broadened. Low income groups, rural, and First Nation groups need to be incorporated into the assessment process, especially since this population is both “high” needs in terms of requiring access to lowered energy bills and also because the populations of these groups represent a large number of Manitobans. The stakeholder composition responsible for broadening the programming base is complex. This complexity is due to unique housing ownership for some low income groups and for some First Nations groups. Therefore, providers of social housing and the Department of Indian and Northern Affairs, in conjunction with Manitoba Hydro should work together to expand existing programming within Manitoba.

4. Revise the Canadian National Energy Code so that it includes mechanisms for improving energy efficiency at all levels of society and in all levels of government. Denmark’s energy policy encompasses more tools and mechanisms for implementing energy efficiency than Canada’s energy policy and the Danish example should be used to model current Canadian energy policies. Furthermore, the Danish model actively works to support its counties and municipalities in improving energy efficiency through funding, information, and access to technical information. This model works to coordinate all government levels in reaching one energy conservation goal and should be tried as a pilot project within Canada. The Danish model should be examined in order to learn the mechanisms for coordinating Canada’s policy at the federal, provincial, municipal, and household, level. Development of a stronger Canadian National Energy Code will make implementation of new programming easier for other stakeholders such as the City of Winnipeg, Province of Manitoba, and Manitoba Hydro.

5. Harmonize existing energy policies and programs at all levels including the federal, provincial, municipal, and city levels. It is the federal government and provincial government’s responsibility to ensure that they create and implement a strong energy policy. This strong energy policy will act as the basis for local municipal governments, Manitoba Hydro, and social housing providers to build on. Energy conservation needs to be in the forefront of all housing related policies, codes, and programming. The creation of a stronger energy policy will allow for and encourage social housing providers and

other stakeholders to incorporate energy efficiency as a criteria for allocating project funds for programs such as HOP (Housing Opportunity Partnership Fund, RRAP (Homeowner Residential Rehabilitation Assistance Program), and the Affordable Housing Initiative (AHI).

6. Further, appropriate educational advances need to be developed by Manitoba Hydro, federal departments, and the province of Manitoba. A previous recommendation by Nesdoly (2001) indicated that

Agencies and government departments should limit the output of energy saving literature and should coordinate their efforts to encourage understanding among customers of priority upgrades and energy efficiency.

Nesdoly's recommendation is only partially applicable to low income groups because the low income research completed in this study also indicates that there is a need for targeted, focused energy efficiency literature for low income groups. Agencies, Crown Corporations, and government departments that develop energy efficiency literature should develop information targeted at several educational streams. Educational streams would include literature for grade school, colleges, universities, low income housing providers, landlords, tenants, low income individuals, and contractors and housing support services that also work with low income groups. Literature that is focused and tailored for groups will help deal with Nesdoly's (2001) concern that more customers understand their upgrade options when viewing their EnerGuide for Houses report. As part of its energy policy, Denmark includes the education of all stakeholders and pre-stakeholders as a national priority. Danish energy conservation literature is disseminated in all forms, at all levels to everyone in their model. This model needs to be explored for application in Canada. This educational model should also flow out of Canada's energy policy.

Educational opportunities should not only refer to literature as being the only media for disseminating information. Manitoba Hydro, the City of Winnipeg, and low income groups must develop new ways for information sharing. Educational energy curricula

needs to be developed for school age children and can be modeled after the City of Winnipeg's "Slow the Flow" educational chapter for teachers. The teacher's kit includes hands on learning activities that can be incorporated into the science curriculum, informational quizzes, crosswords, and interesting facts. In addition, low cost educational pieces for renters addressing why they would want to lower the temperature and use conserve energy should also be developed. Focus group participants wanted sheets to hand out to renters and new immigrants in order to help educate them on the cost of electricity and how to conserve it. In addition "routine" educational opportunities need to be developed. Routine educational opportunities should include local energy efficiency articles in local neighbourhood newspapers, an informational/question columns in the Winnipeg Free Press, or monthly workshops held in local hardware stores (Revy, Rona, McDiarmind, CO-OP) or in local community halls for lower income earners. Workshops could cover how both low and higher cost energy efficiency upgrades such as how to caulk, using weatherstripping, proper insulation techniques, air sealing, etc. Formal invitations could be sent out to customers on Manitoba Hydro's list who have recently had an in-house assessment completed and informal invitations could be posted in the host venues. Manitoba Hydro should place language appropriate information in neighbourhood papers and should attend neighbourhood meetings. Development of community energy ambassadors, similar to the Energy Ambassador program for university undergraduates should be developed for neighbourhoods.

7. The in-house assessor's current role of completing the assessment and providing the customer with the report is limited in scope. Based on other models investigated, the role of the evaluator should be expanded and developed into a support/advisory role for each house assessment they complete. By providing access to knowledgeable staff, Manitoba Hydro can help increase energy savings by guiding customers to those upgrades that save them the most energy and therefore the most money in the long term. The support role is important to develop so that customers trust their recommendations and do not rely on other biased parties such as companies selling windows, or other non-experts. Manitoba Hydro would be responsible for implementing this recommendation.

8. In addition, it was found that Manitoba Hydro evaluators have a range of customer interaction skills and methods. While evaluators do receive customer service training in order to become an evaluator, the need for clearly communicated, unbiased, non-personal opinion based, information should be addressed. Current emphasis on understanding the computer programming and getting accurate measurements is overshadowing the customer interaction aspect of the evaluator training. Manitoba Hydro must make customer service training for its evaluators an integral part of their training. Evaluators should receive updated customer service training as often as they receive training to learn their upgraded computer program.

In addition, a one page customer checklist/reminder list that both the evaluator and the customer checks off should be developed to encourage and remind the evaluator to speak with customers. During this mandatory time period the evaluator will be stationary and *not multi-tasking* (not taking measurements, looking in crawl spaces, setting up/putting away the computer or blower door equipment, and will not be entering data), and will *focus only* on talking with the home owner about their priority recommendations. This focus on emphasizing the priority recommendations should be required as part of the evaluations in order to fully educate owners on their choices and ensure that they understand the importance of completing the priority upgrades. At this time, the evaluator would also answer questions related to the priority upgrades. If the report is mailed to the customer, the evaluator should be required to phone and arrange an in-person follow-up if possible. Manitoba Hydro should use unannounced quality assurance visits to evaluate their In-house evaluators in order to aid in monitoring customer service.

The assessors are “SPOC”—Single Point of Contact for Manitoba Hydro and its EnerGuide for Houses In-house assessment, therefore assessors should be trained to provide follow-up and support to customers to increase the likelihood of customers completing their upgrades and completing quality upgrades. It is also recommended that Manitoba Hydro ask its evaluators for feedback on Hot 2000 program requirements and, customer relations in order to continual service improvements. Based on the information provided by evaluators during their interviews, the current skill sets of the evaluators can

be further utilized to provide better service. When delivering and developing programming, Manitoba Hydro needs to consider the needs of low income housing providers and gain input from these groups into their programming.

9. Developing connections with housing providers throughout Winnipeg will provide Manitoba Hydro with insight into all inner city neighbourhoods and their issues. Manitoba Hydro, the City of Winnipeg, and social housing providers need to develop ongoing communication around improving energy efficiency for low income housing. Strong communication between the City of Winnipeg, Manitoba Hydro and social housing providers will provide opportunities for coordinating existing programming and for creating new programming. In addition, Manitoba Hydro should create ongoing relationships with the development corporations and community groups. This relationship would allow for input into existing programs and would also allow the groups to provide feedback on how Manitoba Hydro's programs are meshing with funding opportunities. In addition, community groups could provide information about opportunities for program piggybacking. Manitoba Hydro, with its well developed networks, could then take this information to the appropriate stakeholder to negotiate how energy efficiency could be incorporated.

10. Low income housing providers and low income individuals requested more focused programming that can be delivered by local individuals. Easy low and no cost energy saving ideas can be shared by trained local people with other community members. Training for local people should be completed by a combination of stakeholders, with Manitoba Hydro taking the lead, and other stakeholders such as the City of Winnipeg, Province of Manitoba, Efficiency Manitoba, and local community groups also providing input into content, delivery style, language, funding, and monitoring.

11. Identify local community organizations that can partner with Manitoba Hydro in the creation and delivery of programming most suitable for low income groups. For example, the saving circle or the IDA concept used by SEED, Winnipeg, Inc. to help individuals save for purchases, could be replicated in order to help low income earners save for

energy efficiency upgrades. In addition, Manitoba Hydro should partner with other housing and housing renovation delivery programs such as RRAP in order to include energy efficiency as an eligibility criterion for emergency home repairs or for receiving financing through other upgrade programs. A canvas of existing non-energy conservation programming within Winnipeg and Manitoba should be developed by Manitoba Hydro with support from the City of Winnipeg, Province of Manitoba, and social housing providers. Each non-energy conservation program identified should be examined for opportunities for incorporating energy efficiency within them and the appropriate stakeholders/programmers contacted. Local champions in the form of individuals, low income advocacy groups, low income housing providers, and community groups should be identified. They should be provided with the opportunity to have meaningful participation and active input into creating energy conservation programming for low income groups and for creating an overarching energy conservation policy that can be used to unify all stakeholders involved in low income program development.

12. Increased active and passive communication with marginalized groups such as First Nation, low income, and rural groups should be embarked on by Manitoba Hydro's marketing and program division. Connecting to the community by receiving local community newspapers such as the Broadcaster and becoming part of WIRA (Winnipeg Inner City Research Alliance) should be part of Manitoba Hydro's passive communication strategy to engage larger community. Engaging with the community in this manner can provide Manitoba Hydro with insight into inner city sustainability issues; grassroots organized events and conferences, as well as new research about housing issues within Winnipeg. As part of engaging in active communication, accessing community tools such as community newspapers and accessing the WIRA listserv will enable Manitoba Hydro to determine other roles it would like to take on within the community. Manitoba Hydro would then be kept abreast of the many locally organized housing forums and would provide presentations or representatives to these community events. As well, Manitoba Hydro should develop strong relationships with development corporations in order to provide technical expertise to help facilitate energy efficiency upgrades within inner city neighbourhoods. Manitoba Hydro could also place educational

information specifically targeted for low income groups in community newsletters. Information could cover a range of topics such as simple energy saving tips for apartment dwellers, seasonal-related information regarding any promotions Manitoba Hydro had, seasonal-related information about how to properly install weatherstripping or why customers may want to install plastic film over their windows, etc. Other informational articles could be developed jointly by Manitoba Hydro and other stakeholders such as community groups and the City of Winnipeg.

Achieving more effective rebate programs and policy changes depends on the given community or area. Creating a successful mix of policy and rebate programs will have many factors impacting their development and success, including political and financial considerations and restraints, as well as the “openness” of the community to energy efficiency upgrades, and ongoing communication of the need for energy efficiency upgrades to occur. There are three key measures that need to be implemented/re-tooled: (1) interest rates, (2) mandating energy efficiency in some cases, and (3) incorporating all existing and new housing into an energy rating system such as the EnerGuide for Houses rating system. These three measures are described below.

1. Interest Rates on Loans: One of the key findings of this research focused on the home owner’s ability to pay for energy efficiency upgrades. With the cost of forced air furnaces ranging from two to five thousand dollars and the cost of condensing boiler systems ranging from five to ten thousand dollars in addition to the cost of insulating, energy upgrades are expensive. Therefore, it is important to provide loan programs because they shift the first-cost barrier and provide a cost effective means for consumers to pursue energy efficiency upgrades in their residence. However, current loan programs have interest rates that are out of reach of low income groups, therefore, this must change. Available financing programs to upgrade energy efficiency in low income households and inner city neighbourhoods are limited and cost prohibitive for low income groups. Other than the PowerSmart Residential Loan, no other loans have improving energy efficiency as a loan criteria (HOP, RRAP, etc. do not include energy efficiency as a criteria for receiving funding). Available financing rates for low income groups should include zero

interest or low interest (below bank prime) or interest rates that are based on the cost of delivery of the loan. In the United States, "These programs [low interest, zero interest loans for energy efficiency] are gaining renewed attention and focus as the electric utility industry restructures...and utilities shift their energy conservation efforts from rebate programs." (Suozzo, et al., 1997).

2. Residential Energy Conservation Ordinances (RECOs): A policy and regulation shift is required in Canada such as has been undertaken in the United States and Europe. RECOs require home owners to implement specific low-cost energy efficient conservation measures at the time their house or rental property is being sold or renovated (Suozzo, et al., 1997). RECOs are designed to bring existing housing stock to a pre-determined minimum standard of efficiency. Some states within the United States have referred to RECOs as "weatherization standards" to make them more palatable to consumers. For RECOs to work well, consumer and stakeholder buy-in is critical, therefore a large number of stakeholders are required to work together. A large number of stakeholders would have to work together in order to make RECOs law here in Winnipeg. The City of Winnipeg, with support from surrounding jurisdictions and the Province of Manitoba would be the most feasible stakeholder to initiate RECOs in Winnipeg. Other stakeholders such as funding agencies, home owner associations, residential property owners association, home builder's association, community groups, etc., would have to be involved in order to help develop RECOs for the City of Winnipeg.

3. Home Energy Rating Systems and Energy Mortgages: The onset of the EnerGuide for Houses rating system would work well with energy mortgages, in which mortgage incentives, designed around energy efficiency, are offered to consumers to improve energy efficiency in existing homes, and to aid consumers in purchasing a new home. While the EnerGuide for Houses Rating System provides for a numeric comparison for two houses of the same characteristics, it is then difficult for the consumer to understand the cost and/or access funds to bring a house up to a comparable EnerGuide standard as a similar house. Suozzo, et al., (1997) states that, "without a clear link to financing products, home energy ratings cannot significantly penetrate a housing market". As such,

energy mortgages which are used to finance energy upgrades in inefficient homes, and to “stretch” the debt-to-equity ratio above the maximum loan limits for houses rated as energy efficient, would be beneficial. These types of mortgages and financing options are becoming readily available in the United States.

Poor quality housing that is energy intensive (inefficient heating system due to older furnaces and/or lack of or minimal insulation) can potentially have a greater impact on lower income groups due to the limited housing options within the City of Winnipeg. Low income people often have to make hard choices between what necessities they will allocate their money to—food, shelter, clothing, etc, and low income groups potentially do not have the control/influence to effect change in their housing. In addition, low income earners may have lower education and comprehension levels, and may have English as their second language, making it harder for them to access and understand information about energy efficiency. For low income earners, filling out forms to qualify for incentive programs may be a secondary priority in light of daily struggles to access life necessities such as food, basic shelter, and finding ways to make their money go farther.

Many communities, both rural and urban, are facing housing challenges similar to those in West Broadway – lack of energy efficient building systems, high energy costs, and a lack of healthy housing. Developing more models of healthy, sustainable housing in our neighborhoods is important to Canada in light of increasing resource and energy costs. Energy demand is growing: between 1990 and 1998, Canadian energy consumption grew by 13 percent (Environment Canada, 2002). This project was designed to understand current low income group’s access to energy efficiency programming and learn about what can be done for low income groups to access programming in greater numbers. As part of this project, policies and laws within Canada were examined to learn about barriers, if any, to energy efficiency exist, and how they can be removed. Policy and programming barriers were identified and recommendations about barrier removal were made. Models from the United States and Denmark were examined for their value in implementing energy efficiency for low income groups. These models provided

information supporting potential pilot program changes that should occur at the federal and local municipal level. Energy efficient programming needs to be designed and delivered to all groups within the residential sector, notwithstanding perceived difficulties in reaching the various sub-groups.

Improving energy efficiency for low income groups is a complex issue that requires the expertise and support of many stakeholder groups if it is going to be a successful venture. Improving energy efficiency in low income households in Winnipeg, Manitoba may provide a model for improving energy efficiency in other cities and will provide low income groups with better accommodation that is less costly to heat. We do not exist in a vacuum; our local housing decisions and programming for low income groups have ramifications for our region, country, and the global/international community.

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Appendix 1 Programs Available by Province

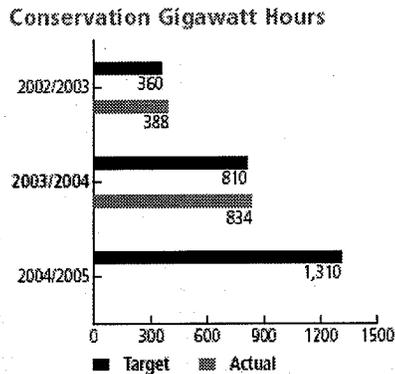
Energy efficiency programming for residential customers changes as existing programs are either fine tuned or new programming is created, therefore, the following listing of provincial energy efficiency programming is based on programming available in 2004 and may no longer be current.

British Columbia Program Profiles

- P01 Power Smart
- P02 Fridge Buy-Back Program
- P03 Compact Fluorescent Light Bulb Give-away
- P04 Renovation Rebate Program
- P05 New Homes
- P06 Analyze My Home
- P07 Appliance Calculator
- P08 Power Smart Tips
- P09 Energy Library
- P10 Shop Power Smart

Highlights of B. C. Hydro include exceeding their Power Smart targets by saving 834 GWh of electricity, which was achieved by low cost methods such as the distribution of 1.6 million energy-efficient compact fluorescent light bulbs to over 530,000 customers. Energy gains of 460 GWh were put into service, exceeding the target of 411 GWh (2004 B.C. Hydro Annual Report).

Chart 1 Conservation Hours Achieved by B.C. Hydro Programming.



Definition: Conservation Gigawatt Hours (GWh) is the cumulative GWh saved as a result of economic demand-side management. The targets are based on net savings from current Power Smart programs and programs expected to come on stream. The targets include both residential and business demand-side management.

Program name: Power Smart (P 01)

Applicable Sector: All

Utility/Province: B.C. Hydro, British Columbia

Program objectives: Decrease current energy consumption loads in order to meet current and future demand. As part of being Power Smart, B.C. Hydro is looking at decreasing current demand, examining alternative energy technologies and examining the feasibility of getting power from independent power producers (B.C. Hydro, 2004).

Program description: Introduced in 1989. B.C. Hydro has a ten year plan focused on achieving their energy efficiency goals (plan was implemented in 2002).

Eligibility: All residences

Program name: Fridge Buy-Back Program (02)

Applicable Sector: Residential

Utility/Province: B.C. Hydro

Program objectives: The program encourages residential customers to dispose of old, energy in-efficient second refrigerators. The argument is couched in three ways for the customer: save money, save energy, and save the environment.

Program description: Residents can have B.C. Hydro pick up their old refrigerator for disposal and receive thirty dollars from B.C. Hydro. B.C. Hydro arranges for pick up and environmentally sound disposal of the refrigerant. Criteria for the refrigerator pick up: The refrigerator is the resident's second refrigerator, measures between ten and twenty four cubic feet, and works. There is a maximum of two refrigerators per residence.

Eligibility: All customers

Note: B.C. Hydro's goal was to recycle 25,000 fridges to save 23 GWh of energy annually by August 2004. At the end of fiscal 2004, 20,000 fridges had been recycled (2004 B.C. Hydro Annual Report).

Program name: Compact Fluorescent Light Bulb Give-away (03)

Applicable Sector: Residential

Utility/Province: B.C. Hydro

Program objectives: The program encourages residential customers to replace standard light bulbs with compact fluorescent light bulbs (CFLs). Reasons provided why residents would want to take advantage of this program: Saving money (life time savings of money over the bulb's life time), saving time (less bulb replacement), and saving the environment (use less energy).

Program description: Different areas of the province of British Columbia are eligible for the program for as long as six months and smaller geographic areas are eligible for shorter periods of time (one to two months). Each residence is eligible for two free light bulbs (while supplies last). Customers can receive their light bulbs at any B.C. Hydro booth with valid i.d. (electricity bill and second piece of i.d. confirming address) or they can pick up the light bulbs in their community on specified dates at a range of specified community partners (partners include Wal-Mart, Zellers, Canadian Tire, True Value

Centre, Home Depot, London Drugs, etc.) Information is also provided to customers about choosing where to install the light bulbs to receive the best cost savings option and what a CFL light bulb equates in terms of wattage to aid customers choose the right lighting levels for areas.

Eligibility: All households

Involvement of other government(s)/agencies: Local community partners aid in delivery of the light bulbs to residents.

Program name: Renovation Rebate Program (04)

Applicable Sector: Residential single and multi family dwellings

Utility/Province: B.C. Hydro

Program objectives: Reduce the amount of energy being used for space heating in residences. The program provides customers with information about their heat loss and provides rebates for reducing the heat loss through specific actions

Program description: The program is divided into two sectors and is not for new builds: houses and townhouses and multi-family housing such as apartments and condos. The main source of heating in both sectors must be electricity.

Eligible renovations for houses/townhouses include:

- Windows (\$1.00 for every square foot of window area installed with low-e or \$1.25 for every square foot of window area installed with low-e and argon fill.)
- Crawlspace insulation (\$0.20 for every square foot of R12 insulation installed on crawlspace walls, or for every square foot of R28 insulation installed on the floor above a crawlspace)
- Basement insulation (\$0.20 for every square foot of R12 insulation installed in basement walls).
- Attic insulation (\$0.15 for every square foot of insulation installed in an open attic to equal a total R40 value. For flat or vaulted ceilings, BC Hydro will pay you \$0.10 for every square foot of insulation installed to equal a total R28 value).

- NRCan EnerGuide for Houses program (BC Hydro provides a rebate of \$50 for providing copies of both the pre and post EnerGuide for Houses reports to them).

Each of the above sections has its own information page that includes information about why such upgrades would save money for the home owner and how much money the rebate provides for each of the above improvements (rebate amounts listed in brackets beside each potential improvement).

Eligibility: Houses/Townhouses: To be eligible for this program, customers must have spent \$900 (15,000 kWh) or more in heating bills in one year. Materials must be purchased and upgrades must be completed between October 15, 2003 and March 31, 2005 with the rebate paper work submitted by April 15, 2005.

Eligibility: Multi family dwellings (apartments/condos): Electricity must be the main heating source, the program does not apply to new builds, and if there are individual gas fireplaces in individual suites or apartments, then the building is not eligible. Upgrades must be completed between March 1, 2004 and March 31, 2005.

Eligible renovations for apartments/condos include: Windows (\$0.75 for every square foot of window area installed with low-e or \$1.00 for every square foot of window area installed with low-e and argon fill).

Program name: New Homes P05

Applicable Sector: Residential

Utility/Province: B.C. Hydro

Program objectives: To encourage home owners and multi-home developers to choose to build a Power Smart house to save energy, money in the operation of the house, and to save the environment.

Program description: The program provides rebate packages for home owners who build their own house and for contractors who build multi-family dwellings. The following rebate packages may be taken advantage of by both home owners and contractors:

- Power Smart Appliance Package: New detached homes/duplex homes/townhouses with gas as the main source of heating, and new apartments/condominiums:

\$50 rebate for installing any two of the following ENERGY STAR® appliances: refrigerators, dishwashers, or clothes washers

New detached homes/duplex homes/townhouses with electric space heating by electric baseboard, electric forced-air furnace or electric radiant heating in areas where natural gas is/was not an option: \$200 rebate for installing all three ENERGY STAR® labelled components of the Power Smart appliance package: refrigerators, dishwashers, and clothes washers.

- Power Smart Heating Package: New detached homes/duplex homes/townhouses with gas as the main source of heating: \$150 rebate when a furnace with both a variable speed motor and a programmable thermostat is installed.

- Power Smart Lighting Package: New detached homes/duplex homes/townhouses: \$50 rebate for installing at least two fluorescent tubes in the garage and a minimum of five ENERGY STAR® labeled compact fluorescent light bulbs (CFLs) indoors or outdoors in each housing unit. We will also offer a \$5 rebate for each additional CFL installed in each housing unit, to a maximum of \$100 per housing unit in total.

New apartments/condominiums: \$20 rebate for installing two ENERGY STAR® labeled CFLs in each housing unit. We will also offer a \$5 rebate for each additional CFL installed to a maximum of \$20 per housing unit in total.

- Power Smart Ventilation Package: New detached homes/duplex homes/townhouses/apartments/condos: \$25 rebate per ENERGY STAR® labeled

bathroom fan connected to a timer or dehumidistat to a maximum of three fans or \$75 per housing unit.

- Power Smart Window Package: New detached homes/duplex homes/townhouses with electric space heating by electric baseboard, electric forced-air furnace or electric radiant heating that are built in an area where natural gas is/was not an option:

Rebate you:

\$1.00 per square foot of windows installed with low-emissivity (low-e) coating, or

\$1.25 per square foot of windows installed with both argon fill and low-e coating.

- Power Smart R2000 Package: New R2000 certified and registered duplex homes/townhouses with electric space heating by electric baseboard, electric forced-air furnace or electric radiant heating that are built in an area where natural gas is/was not an option:

Customers receive a rebate of \$500 for sending a copy of the R2000 Certificate

New R2000 certified and registered detached homes with electric space heating by electric baseboard, electric forced-air furnace or electric radiant heating that are built in an area where natural gas is/was not an option:

Rebate customer \$1,000 for sending a copy of the R2000 Certificate

Program name: Analyze My Home P06

Applicable Sector: Residential

Utility/Province: B.C. Hydro

Program objectives: To provide home owners with a breakdown of their annual energy use, teach home owners how much it costs to run major appliances, how much it costs to operate their current heating system, and to receive a custom report about their potential energy savings.

Program description: This is an online report aimed at the residential sector. The site provides customers with an online sample report to indicate the type of information they will receive, it allows home owners to save their information and come back to finish it later, and it allows the customer to revise their data and save it again.

Eligibility: Must have access to the internet, be a home owner

Program name: Appliance Calculator P07

Applicable Sector: Residential

Utility/Province: B.C. Hydro

Program objectives: To provide a personalized estimate of the energy used by a customer's appliances such as refrigerators, freezers, dishwashers, clothes washers and/or dryers, water heating, lighting, and home office appliances. These options are available for both gas and electric.

Program description: The program is online.

Eligibility: Residents, need access to the internet.

Program name: P08 Power Smart Tips

Applicable Sector: Residential

Utility/Province: B.C. Hydro

Program objectives: To provide information sheets about simple ways home owners can save energy and money in their residences.

Program description: Tips center around heating tips that include information about draftproofing and insulating, using energy efficient appliances, using energy efficient lighting, and turning off computers when they are not in use.

Eligibility: All residences with access to internet.

Program name: Energy Library P09

Applicable Sector: Residential

Utility/Province: B.C. Hydro

Program objectives: To provide residential customers with access to reliable home energy information by using easy to understand terms and illustrations provided by energy experts.

Program description: The program provides information sheets on the following areas: common questions, structural information, thermostats and ducts, air conditioning, lighting, home heating, water heating, and home appliances. Each section provides information about how much energy and money the customer can save, provides a diagram on the product or how to install the product, and in some cases, how the product works to save energy/money.

Eligibility: Residential with access to internet.

Program name: P10 Shop Power Smart

Applicable Sector: Residential

Utility/Province: B.C. Hydro

Program objectives: To teach home owners about the features and benefits of energy-efficient technologies using an interactive model.

Program description: The program allows customers to do an interactive walk through a Power Smart house with options to click on appliances in every room and options to further learn about products/appliances that are Power Smart. Each product/appliance has an overview, benefits, and features section in its overview.

Eligibility: residents with access to internet.

Overview of Electrical Energy Consumption in Northwest Territories, Yukon, and Nunavut

Electrical energy use and production in Nunavut, Northwest Territories, and Yukon is secondary to the use of diesel fuel, which is the main fuel used in the north. The northern areas of Canada represent unique energy challenges in that modern building require a lot

of energy to maintain comfortable temperature levels indoors when outside temperatures may range well below zero. In addition, high cost of transporting energy to the north and the inability to produce energy due to climate factors is a main determinant in fuel types used in the north. Therefore, more diesel fuel is used for heating purposes in the north, but there are still programs available that promote energy conservation behaviors. For the purposes of this review, programs in the north that encourage energy conservation will be included, even if they are not from a utility. Northern Canada shares more of its programs throughout the territories and provinces due to factors that make duplication of programs prohibitively expensive: low population numbers in large geographic locations with difficult climates, cost of developing programs, and ability to implement programs.

Yukon., Northwest Territories, Nunavut: Program Profiles for Nunavut Power

Program name: Tips on Reducing Energy Consumption (V1)

Program name: Tips on Reducing Energy Consumption (V1)

Applicable Sector: Residential

Utility/Province: Nunavut Power

Program objectives: To provide no-cost and low cost energy saving tips for use of home appliances.

Program Description: Energy saving tips are provided in the following areas: clothes dryers, insulation, timers, hot water, refrigerators, and lighting. The net address is also provided for the Artic Energy Alliance if customers want additional information.

Eligibility: All residents with internet access and grade nine English reading/comprehension skills. (NOTE: The comment about language is added because their web site does indicate that customers can receive some information, such as their utility bills in Inuktituk, but not the energy saving tips).

Yukon Energy
Program Profiles
Energy Saving Tips (Y1)

Program name: Energy Saving Tips (Y1)

Applicable Sector: Residential

Utility/Province: Yukon Energy

Program objectives: To provide no cost tips for customers to decrease their energy consumption.

Program Description: No cost tips on the following areas are provided: your house, hot water, appliances, lighting, and oil heating systems.

Eligibility: All residents with internet access.

Yukon

Program Profiles

House Calls 2000 (Energy Efficiency Initiative) (Z1)

Residential Energy Management Program (Z2)

Home Repair Program (Z3)

Program name: House Calls 2000 (Energy Efficiency Initiative) (Z1)

Applicable Sector: Residential

Utility/Province: Canada-Yukon Energy Solutions Centre

Program objectives: Designed to promote energy efficiency in the home and raise public awareness of climate change due to emissions of greenhouse gases.

Program Description: 2000 rural Yukon homes receive a free, installed hot water tank blanket and an energy saving light bulb.

Eligibility: All Yukon homes served by utility diesel-generated electricity are eligible.

Involvement of other government(s)/agencies: Jointly funded by Yukon Development (EEI) and Natural Resources Canada, delivered by Yukon Conservation Society.

Program name: Residential Energy Management Program (Z2)

Applicable Sector: Residential

Utility/Province: Yukon Housing

Program objectives: This program encourages home owners to supplement their electrical heating systems with alternate heating systems to reduce peak demand during winter.

Program Description: This program provides low interest loans (1.5%) to home owners to replace or supplement electric heating systems with alternate systems to reduce peak winter demand.

Eligibility: Must have electric heating in the house. Must consume at least a 1000 kilowatt hours in six out of twelve months. Must own the property, do not have to live in it.

Involvement of other government(s)/agencies: Funded by Yukon Development Corp (EEI), delivered by Yukon Housing.

Program name: Home Repair Program (Z3)

Applicable Sector: Residential

Utility/Province: Yukon

Program objectives: To help customers reduce their electrical consumption, improve human comfort, and help off-set energy demand during winter month energy peaks.

Program Description: The program provides up to thirty five thousand dollars per house to aid home owners in making energy efficiency upgrades. Once the home owner is approved for financing, a technical advisor comes into the house and makes repair and upgrade suggestions, which may or may not be energy efficiency related. The home owner can choose from the approved upgrade list and make the changes. The interest rate for the loan is locked in at 1.9 percent over ten years. Low income households, as

determined by shelter costs, debt load, and geographic location are eligible for monthly loan payment subsidies.

Eligibility: Must be a home owner, occupier with approved credit rating.

Northwest Territories Power Corporation

Program Profiles:

Energy Wise North: A Basic Guide to Energy Conservation for Residents (NT1)

Program name: Energy Wise North: A Basic Guide to Energy Conservation for Residents (NT1)

Applicable Sector: Residential

Utility/Province: Northwest Territories Power Corporation

Program objectives: To provide low and no cost energy conservation strategies for residential customers.

Program Description: Northwest Territories Power Corporation provides a six page booklet with energy saving tips in the following areas: dryers, fixing air leakage, hot water, refrigerators, lighting, and insulation. The tips are no to low cost "do it yourself" tips.

Eligibility: All residents.

The Artic Energy Alliance

Program Profiles

The Artic Energy Alliance is a not-for-profit group situated in the Northwest Territories. The goal of the group is to reduce the monetary costs and environmental impacts of energy and utility services in the Northwest Territories (Artic Energy Alliance, 2004).

The Alliance works to reduce energy consumption and to reduce environmental impacts by increasing use of wind and solar energies.

Created in 1997, the Artic Energy Alliance is composed of the following six organizations:

- Municipal and Community Affairs (MACA)
- NWT Association of Municipalities (NWTAM)
- NWT Housing Corporation (NWTHC)
- NWT Public Utilities Board (PUB)
- NWT Power Corporation (NWTPC)
- Public Works and Services
- Resources, Wildlife and Economic Development (RWED)

While the Artic Energy Alliance does provide a residential energy tip sheet, the bulk of their programming is distributed to customers through the above organizations.

Newfoundland and Labrador Program Profiles

Hydrowise (Q1)

Energy Calculator (Q2)

Brochures (Q3)

Energy Calculator (Q4)

Wrap Up for Savings Program (Q5)

Electric Water Heater Financing Program (Q6)

Electric Heat Financing Program (Q7)

Thermostat Rebate Program (Q8)

Program name: Hydrowise (Q1)

Applicable Sector: Residential

Utility/Province: Newfoundland and Labrador Hydro

Program objectives: A program to help customers use energy wisely through small changes throughout their homes. Hydrowise was launched as a program in April, 2003.

Objectives of the program include creating an ongoing dialogue with customers to help them develop energy conservation habits.

Our challenge is to educate and inform customers over time in a continuous and consistent manner through an ongoing and open dialogue," Conservation is not a one-time effort, it is something that has to be integrated into everyone's way of thinking. We are committed to providing consumers with the information they need to make wise decisions and take action to lower their energy costs. (Wells, 2003)

- Program description: Through a series of eight tip sheets, low cost energy saving tips are provided for customers. There are tips on the following categories: heaters, drapes, thermostats, kettles, lights and appliances, hot water, timers, and light bulbs. The tip sheets are short, usually three to four lines with limited cost saving information and environmental information. The following example from their tip sheet indicates features on the tip sheet:

An electric kettle uses less electricity than a kettle that's heated on an electric range. In addition to saving energy, an electric kettle will boil the water faster too! (Newfoundland and Labrador Hydro, 2004).

Eligibility: All residents with internet access

Program name: Energy Calculator (Q2)

Applicable Sector: Residential

Utility/Province: Newfoundland and Labrador Hydro

Program objectives: To provide customers with a method to calculate energy costs in their homes and determine the energy costs of individual appliances.

Program description: Calculator is currently under development

Eligibility: All residential with internet access

Brochures (Q3)

Newfoundland and Labrador Hydro also have five PDF documents available online for customers. These files are not part of any program, but do provide information for energy savings. The following list is the titles of the five files:

- How much Electricity are Your Appliances Using?
- You Can Reduce Your Hot Water Energy Costs!
- Hydrowise Tips!
- Draft Sealing – It's a breeze
- New Twist on Lighting – Compact fluorescent lighting

Each tip sheet is two pages in length and contains generalized reasons about why customers would want to improve energy efficiency.

The sheets are available to anyone with internet access.

Program name: Energy Calculator (Q4)

Applicable Sector: Residential

Utility/Province: Newfoundland Power

Program objectives: To help customers understand how energy is used in their home is the first step toward managing your energy costs.

Program description: The energy calculator provides an approximate monthly energy costs for many household appliances found in various rooms such as the kitchen, bathroom, dining and living room, family room, and bedroom(s), and outside their house. The customer has the option to print out their worksheets.

Eligibility: All residents, access to internet

Program name: Wrap Up for Savings Program (Q5)

Applicable Sector: Residential

Utility/Province: Newfoundland Power

Program objectives: To help home owners lower their heating bills by adding insulation to their walls, ceiling, and/or attics.

Program description: Electricity must be the primary heating source in order to be eligible for program. Customers can borrow up to \$2500 to cover the labour and material costs of insulation upgrades and repay the loan in monthly installments on electricity bills. Upgrades can be financed over a 48 month period. Insulation must be installed to National Building Code Standards and a signed loan agreement must have an official invoice and/or receipt for materials and/or labour. The interest rate for the loan repayment is floating and fluctuates. The interest rate can be found online at the website and customers can calculate loan repayment costs with a loan calculator as well. The repayment amount per insulation type is provided online. Repayment amounts vary from width, thickness and insulation type.

Eligibility: All homeowners _____

Program name: Electric Water Heater Financing Program (Q6)

Applicable Sector: Residential

Utility/Province: Newfoundland Power

Program objectives: To help customers reduce the amount of energy and money they spend on heating water for domestic use.

Program description: Financing limits for the combined purchase and installation costs of the new electric, hot water tank are:

\$375 for 30 and 40 gallon electric water heaters;

\$450 for 60 gallon electric water heaters, and

\$1200 for long life electric water heaters with a minimum 15 year manufacturer's warranty.

The heaters can be financed over a twelve to thirty six month period. The section about hot water tank efficiency also has educational information about cost savings from

lowering water consumption, energy savings tips, and electric hot water tank maintenance tips.

Eligibility: Must be registered owner of the property in which the efficient hot water tank is going in and must have an active account with Newfoundland Power. Customers can fill out the application themselves or have their plumber apply for them. A list of contractors is available online for customers

Program name: Electric Heat Financing Programs (Q7)

Applicable Sector: Residential

Utility/Province: Newfoundland Power

Program objectives: To aid customers in upgrading and switch existing systems to electricity. System upgrades can include switching their furnace to electric, upgrading their electrical systems, and/or installing a heat recovery unit in new or existing homes.

Program description: Up to \$10,000 of financing is available for the purchase and installation of:

- Electric home heating systems- Including baseboard heaters, wall mounted heaters, panel convactor heaters, electric forced air furnaces, electric hot water radiation systems and heat pumps.
- Wiring and associated material- Including the addition of general use outlets, heavy appliance outlets and ground fault interrupters, high performance thermostats, and wiring for heating, appliances and lighting.
- Electric service upgrades for new and existing homes- Including amperage upgrades, voltage upgrades and relocation of panel and meter.
- Heat recovery ventilation systems –An energy efficient ventilation system to control moisture and improve indoor air quality in your home.
- Electric fireplaces and mantle

- R2000 upgrades- Finance the cost difference between a conventionally constructed home built to the National Building Code Standard and the same house built as a registered R-2000 home.
- EnerGuide for Houses financing - Finance the cost of your EnerGuide for Houses assessment and the recommended improvements up to \$5000 to save energy and improve the comfort of your home.

Eligibility: Home Heating and Electrical Services loans are available to residential customers who have an active account and own the premises for which the loan is required. Customers who are renting or have a rental purchase agreement are not eligible for financing. A list of contractors is available online for customers.

Program name: Thermostat Rebate Program (Q8)

Applicable Sector: Residential

Utility/Province: Newfoundland Power

Program objectives: To encourage people to install high performance, programmable thermostats to help lower their heating bills and improve comfort levels for the occupants.

Program description: The incentive program is designed to offer a four dollar rebate on each installed thermostat. Customers have a choice between two designated high performance thermostats (Honeywell models T4398 and T4098) which range in price between eighteen and twenty five dollars. Customers receive their cash rebate from participating dealers who are selling the thermostats.

To get your cash rebate, visit a participating dealer in your area. Customers also have the option of accessing financing from Newfoundland Power through the electric heat financing program (no money down and thirty six months to pay, floating interest rate).

Eligibility: Residential customers who own the property, renters with purchase agreements and tenants are not eligible.

Involvement of other government(s)/agencies: The rebate can be accessed through participating dealers throughout the province.

Program name: Energy Efficiency Tips (Q9)

Applicable Sector: All

Utility/Province: Newfoundland Power

Program objectives: Provide information about various large and small energy efficiency upgrades a home owner may consider. The following areas are covered in the tips section: water heating, lighting, cooking, laundry, heating, refrigerators/freezers, and miscellaneous.

Eligibility: All customers with access to internet

Program name: Energy Efficiency Tips (X10)

Applicable Sector: Residential

Utility/Province: St. John Energy

Program objectives: Provide information about no cost energy saving tips a home owner may consider. The following areas are covered in the tips section: appliance usage tips, heating, and lighting.

Eligibility: All customers with access to internet

Nova Scotia Program Profiles

Energy Tips (R1)

Energy Calculator (R2)

Home Energy: Facts on Home Energy Use (R3)

Program name: Energy Tips (R1)

Applicable Sector: Residential

Utility/Province: Nova Scotia Power

Program objectives: Provides a link to Natural Resources Canada's Office of Energy Efficiency

Program description: Provides a range of money saving energy tips that home owners can apply. The following areas each have a tip sheet: insulation, moisture control, wood heat, ventilation, water heating, windows, and lighting.

Eligibility: All with access to internet

Involvement of other government(s)/agencies: Linkage to Natural Resource's Office of Energy Efficiency information.

Program name: Energy Calculator (R2)

Applicable Sector: Residential

Utility/Province: Nova Scotia Power

Program objectives: To help residential customers understand their energy use in their residence based on a two month calculation.

Program description: Customers enter all applicable appliance information and amount of time used and the calculator determines the cost of the appliance over two months at a residential energy cost of 9.9 cents (includes taxes) per kilowatt hour. Appliances are divided up per room and a total cost is provided for all listed appliances.

Eligibility: All residents with internet access

Program name: Home Energy: Facts on Home Energy Use (R3)

Applicable Sector: Residential

Utility/Province: Newfoundland Power

Program objectives: To educate people on simple energy saving tips.

Program description: The tips are separated into the following six areas:

- Heating Solutions
- Heat Pumps
- Electric Thermal Storage (ETS)
- Electric Heat Water Heaters
- General Information

Each of the areas has a downloadable tip sheet.

Eligibility: All residential customers with internet access.

New Brunswick Program Profiles

Energy info (S1)

Note there is a gas utility, Enbridge which has a rebate program that provides 600 to have customers change their heating system over to gas (1/2 from Enbridge, the remaining 300 from Natural Resources Canada)

Program name: Energy info (S1)

Applicable Sector: Residential

Utility/Province: Energie NB Power

Program objectives: To provide customers with basic information about how to save money and electricity by performing upgrades.

Program description: The utility provides several tip sheets related to these areas: thermostats, appliances, and tips and myths. The sheets provide minimal information and are general in nature.

Eligibility: All residents with internet access.

There is another electrical utility, Emera Energy Systems, which operates in both New Brunswick and Nova Scotia. Emera Energy Systems also provides energy to Prince Edward Island. Emera does not provide any energy conservation programming.

Prince Edward Island Program Profiles

Appliance Usage and Costs (E1)

Surge Suppressors for the Home (E2)

Energy Efficiency in the Home (E3)

Standby Power, the Quiet Use of Electricity (E4)

Calculating Your Energy Usage (E5)

Program name: Appliance Usage and Costs (E1)

Applicable Sector: Residential

Utility/Province: Maritime Electric Co.

Program objectives: To provide customers with information on the average cost of running their home appliances.

Program Description: Maritime Electric Co. provides a chart listing appliances by rooms in a typical house and provides each appliance with an approximate number of hours of use, average kilowatts per month used, and the monthly average monetary cost of running the appliance. The chart provides averages only and does not allow the customer to input any data.

Eligibility: All residents with internet access.

Program name: Surge Suppressors for the Home (E2)

Applicable Sector: Residential

Utility/Province: Maritime Electric Co.

Program objectives: To provide customers with information about why they would want to use a surge protector for specific electrical equipment.

Program Description: Information is provided on how to choose a high-quality surge protector, the causes of electrical surges, and the cost of surge protectors.

Eligibility: All residents with internet access.

Program name: Energy Efficiency in the Home (E3)

Applicable Sector: Residential

Utility/Province: Maritime Electric Co.

Program objectives: To provide customers with simple energy saving tips regarding home appliances.

Program Description: Simple tips regarding lighting, appliances, refrigerators, freezers, stoves, clothes dryers, dishwashers, and a “general tips” section are provided. The tips are designed to provide customers with low cost/no cost energy saving tips such as “turn off the lights” as you leave a room.

Eligibility: All residents with internet access.

Program name: Standby Power, the Quiet Use of Electricity (E4)

Applicable Sector: Residential

Utility/Province: Maritime Electric Co.

Program objectives: To educate customers about the “hidden” cost of appliances with standby power.

Program Description: The utility provides a tip sheet that explains what standby power use is, what type of appliances use it, and energy use approximations.

Eligibility: All residents with internet access.

Program name: Calculating Your Energy Usage (E5)

Applicable Sector: Residential

Utility/Province: Maritime Electric Co.

Program objectives: To provide customers with an opportunity to determine energy consumption in their personal household appliances.

Program Description: Customers input the number of appliances they own according to pre-determined categories which include heating and cooling, personal care and comfort, kitchen appliances, laundry/utilities, home entertainment, outdoors, farm equipment, and miscellaneous. By inputting the number of appliances in each category, the calculator determines the average number of the customer uses daily and monthly. There is no monetary estimate of the cost.

Eligibility: All residents with internet access.

Quebec Program Profiles

The Energy Wise home diagnostic (S1)

Consumption Profile (S2)

Energywise Discount Coupons (S3)

Pool timer rebate (S4)

What influences your consumption? (S5)

Appliance Consumption Chart (S6)

Recycling to protect the environment (S7)

Program name: The Energy Wise home diagnostic (S1)

Applicable Sector: Residential

Utility/Province: Hydro-Quebec

Program objectives: The home diagnostic test allows customers to see where their energy dollars are going and provides options for reducing or optimizing consumption.

Program description: Customers with a valid account enter in their personal data and fill out an energy use survey online to receive personalized recommendations on how to

make their homes more energy efficient and a breakdown of the customer's main uses (energy).

Eligibility: All residential with a valid account and access to the internet.

Program name: Consumption Profile (S2)

Applicable Sector: Residential

Utility/Province: Hydro-Quebec

Program objectives: To show people how much energy they use in several different ways to elicit a consumption lowering response.

Program description: It provides a customer with their annual consumption and allows customers to view their consumption in kilowatt hours and in dollars and also allows the customer to make year to year comparisons. It also provides the average temperatures for the geographic location of the residence and also provides an estimate of the electrical heating component in kilowatt hours.

Eligibility: Residential customers with internet access

Program name: Energywise Discount Coupons (S3)

Applicable Sector: All residential, all commercial

Utility/Province: Hydro-Quebec

Program objectives: To help people upgrade their existing thermostats to electronic thermostats.

Program description: The rationale behind upgrading thermostats, how to change the thermostats, and cost savings are provided for the customer in order to convince them to upgrade. Each residence, which includes commercial, single family, duplexes, triplexes, condominiums, and multiple units (apartments) are eligible. The customer can purchase up to five electronic thermostats and receive up to forty five dollars back from Hydro-Quebec. For the sixth and seventh thermostat, the rebate is ten dollars in total. A savings

maximum of one hundred and thirty dollars is set per single family dwelling, condo unit, or business establishment.

Eligibility: All residences and businesses with access to the online coupons. Customer must own their residence/property to receive rebate.

Program name: Pool timer rebate (S4)

Applicable Sector: Residential

Utility/Province: Hydro-Quebec

Program objectives: To aid customers in installing timers for swimming pool filters to reduce pump running times and thereby reduce electrical consumption and lower customer's electricity bills.

Program description: Information is provided to the customer about how to choose a timer for their pool and the money savings aspect of installing a timer is provided. Each customer receives a ten dollar rebate for purchasing a timer from one of the following retail partners:

- Canac Marquis Grenier
- Club Piscine
- Coopérative fédérée de Québec
- Groupe Patrick Morin
- Maître Piscinier
- Matériaux à bas prix
- Réno Dépôt

Eligibility: Residents with swimming pools.

Program name: What influences your consumption? (S5)

Applicable Sector: Residential

Utility/Province: Hydro-Quebec

Program objective: To help customers understand factors that influence their energy consumption behavior.

Program Description: The program provides customers with information on five areas that influence energy consumption, namely temperature, house characteristics, living habits, number of occupants, and electrical appliances. The information does not extend to including tips for lowering energy consumption.

Eligibility: All residents with internet access.

Program name: Appliance Consumption Chart (S6)

Applicable Sector: Residential

Utility/Province: Hydro-Quebec

Program objectives: To provide customers with a money and energy cost breakdown per household appliance.

Program Description: Customers enter individual appliance's wattage (in W or kW) and number of hours of use to determine the kilowatt hours used and the monetary cost bases on Hydro-Quebec's residential energy rate.

Eligibility: All residents with access to internet.

Program name: Recycling to protect the environment (S7)

Applicable Sector: All sectors—both residential and commercial

Utility/Province: Hydro-Quebec

Program objectives: To provide customers with information on where, how and why they should recycle and/or reuse items.

Program Description: Items from the following categories: thermostats, construction and renovation materials (including insulation), pool timers, fluorescent (conventional and

triphosphorous) tubes, incandescent or halogen bulbs, household appliances, and showerheads are listed as items that customers can recycle and/or reuse.

Eligibility: All customers with internet access.

Manitoba Program Profiles

Program name: Home Comfort Energy Savings Program (M1)

Power Smart Residential Loan (M1-A)

Power Smart EnerGuide for Houses In-Home Energy Evaluation (M1-B)

On-Line Energy Assessment (M1-C)

Mail-In Energy Assessment (M1-D)

Power Smart LED Seasonal Lighting (M2)

W.I.S.E. Home Program for Seniors (M3)

Manitoba R-2000 Program (M4)

Earth Power Loan (M5)

Home Energy Calculator (M6)

Power Smart Appliances (M7)

Home Heating Cost Comparisons (M8)

Power Smart Newsletter (M9)

Power Smart Home Insulation Program for Electrically Heated Homes (M10)

Power Smart New Home Program (M11)

Power Smart Compact Fluorescent Lighting Program (M12)

Home Comfort Energy Savings Program (M1)

Applicable Sector: Residential

Utility/Province: Manitoba Hydro

Program objectives: An umbrella program that is designed to help customers achieve home energy savings and create a more comfortable living environment through five components.

Description: There are five component options that residential customers may choose to apply to. They include: Power Smart Residential Loan, Home Comfort Information Initiative, Home Assessment Options (Power Smart EnerGuide In-Home Energy Assessment, On-line Energy Assessment, and Mail-in Assessment). Each of these options will be organized as program sub-categories of the Home Comfort Energy Savings Program. In addition, basic information about energy efficiency upgrades is provided for free.

Program name: Power Smart Residential Loan (M1-A)

Applicable Sector: Residential

Utility/Province: Manitoba Hydro

Program objectives: To aid customers in making their residence more comfortable and energy efficient.

Program Description: The loan covers the following measures: adding insulation, installing ventilation, sealing air leaks, replacing windows and doors, lighting, electrical service and wiring, and upgrading the efficiency of your existing furnace or water heater. Customers can borrow up to \$5,000 per residence; minimum loan amount is \$500. No down payment is required and the term is for sixty months maximum, with minimum monthly payments of fifteen dollars at a rate of six and a half percent on approved credit.

Eligibility: Applicants must have a valid Manitoba Hydro account and be the owner of the home in which the improvements are occurring. Upgrades must meet Manitoba Hydro recommended levels.

For each of the above listed upgrades, Manitoba Hydro has provided on-line specifications for upgrading each one.

Program name: Power Smart EnerGuide for Houses In-Home Energy Evaluation (M1-B)

Applicable Sector: Residential

Utility/Province: Manitoba Hydro

Program objectives: To provide residential customers with personalized information based to help determine potential cost/benefit of various home upgrades and the accompanying associated comfort of the upgrade.

Program Description: The assessments are conducted by Manitoba Hydro's evaluator as part of the federal government's EnerGuide for Houses Program offered across Canada. The program consists of an initial and follow-up assessment. The initial assessment is used to determine the current energy efficiency rating of the house. Customers are provided with a report that prioritizes various upgrades to the house and the associated impact on their energy use. The second evaluation occurs anytime within eighteen months of the initial assessment. The second assessment measures the change, if any, in the house's energy consumption and is completed after the customer notifies Manitoba Hydro that they have made upgrades to their residence. Customers receive an EnerGuide Rating Label for their residence based on the change in energy consumption between the first and second assessments. Based on this change, the customer is also eligible for an EnerGuide for Houses Energy Efficiency Retrofit Grant from the federal government. The rating system rates the house and does not rate the energy use habits of the people living in the house, therefore, a house of similar size and age may have very different energy consumption patterns due to individual energy use within each of the houses.

As of October 1st, 2004, each homeowner who completes an evaluation receives two free Compact Fluorescent Lights (CFLs) lights and two dye tablets for their toilets (see if there is any water leakage—water conservation measure).

Eligibility: To be eligible for the program, the customer must own the residence and be the principle occupant of the residence. To be eligible for the federal grant, the house rating must achieve a minimum energy performance improvement as outlined by Natural Resources Canada.

Involvement of other government(s)/agencies: Natural Resources Canada through their EnerGuide for Houses Program, available in all provinces and delivered by many different contractors in each province and territory.

Program name: On-Line Energy Assessment (M1-C)

Applicable Sector: Residential

Utility/Province: Manitoba Hydro

Program objectives: To aid customers in understanding how much energy they use to heat their homes and to operate their appliances.

Program Description: An on-line survey asks customers to provide information about their energy use and requires information in the following areas: type of residence (age and size), insulation levels, number and type of windows, comfort issues with the house such as drafts and/or cold spots, etc., the heating system, ventilation and air quality in the house, air conditioning, hot water, major appliances, pools, hot tubs, saunas, and vehicle use. A personalized report is mailed to the customer and contains information about how to make their home more comfortable, save money, and how to use energy more efficiently.

Eligibility: The survey is applicable to residences who have internet access and meet the following criteria: they have lived at the residence in question for a full year, the residence is not a cottage or an apartment that does not have its own electrical service meter, or duplex buildings services by only one electrical service meters. The applicant must be paying for their own electricity.

Program name: Mail-In Energy Assessment (M1-D)

Applicable Sector: Residential

Utility/Province: Manitoba Hydro

Program objectives: To aid customers in understanding how much energy they use to heat their homes and to operate their appliances.

Program Description: This survey is designed to be similar to the on-line survey and requires similar information. A mail-in survey asks customers to provide information

about their energy use and requires information in the following areas: type of residence (age and size), insulation levels, number and type of windows, comfort issues with the house such as drafts and/or cold spots, etc., the heating system, ventilation and air quality in the house, air conditioning, hot water, major appliances, pools, hot tubs, saunas, and vehicle use. A personalized report is mailed to the customer and contains information about how to make their home more comfortable, save money, and how to use energy more efficiently.

Eligibility: There is a 20 dollar processing fee associated with this survey. The survey is applicable to residences who meet the following criteria: they have lived at the residence in question for a full year, the residence is not a cottage or an apartment that does not have its own electrical service meter, or duplex buildings services by only one electrical service meters. The applicant must be paying for their own electricity.

Program name: Power Smart LED Seasonal Lighting (M2)

Applicable Sector: Residential

Utility/Province: Manitoba Hydro

Program objectives: To provide customers with information about why they might want to set up energy-savings seasonal lights as opposed to using incandescent seasonal lighting.

Program Description: Manitoba Hydro provides information online about the benefits of using light emitting diode (LED) lights rather than incandescent light bulbs for their seasonal decorating needs.

Manitoba Hydro provides information about the variety of colors, sizes, and lifespan of LED lights.

They also provide information about local retailers where the lights may be purchased. Retailers include: The Bay, Canadian Tire, Home Hardware, Pro Hardware, Shoppers Drug Mart, Rona Revy, Wal-Mart, and Zellers.

Eligibility: All customers with access to internet to access the information.

Involvement of other government(s)/agencies: Manitoba Hydro provides information about the LED lights on their website along with a list of local retailers who carry the lights.

Program name: W.I.S.E. Home Program for Seniors (M3)

Applicable Sector: Residential

Sub-sector: Senior Citizens

Utility/Province: Manitoba Hydro

Program objectives: To help senior citizens to save energy and money in their homes.

Program Description: Qualifying seniors receive a no cost, in-home energy check up provided by trained university student advisors. The energy check ups are available from May through August, 2004 in Winnipeg and surrounding areas. The advisor verifies information about the furnace, hot water tank, windows and thermostat, installs some energy saving devices, collects information about current energy use in the home, helps the owner complete a Manitoba Hydro home energy questionnaire, and provides a report with suggestions on how to save money and energy in the home. The report also provides the approximate costs and estimated savings from performing various retrofits. In addition to the personalized report, seniors also receive energy savings booklets and some complimentary energy saving devices.

Eligibility: To qualify, seniors must be fifty five years or older, the owner of the residence, and a Manitoba Hydro customer.

Involvement of other government(s)/agencies: Partnership with the Manitoba Society of Seniors (MSOS).

Program name: Manitoba R-2000 Program (M4)

Applicable Sector: Residential

Utility/Province: Manitoba Hydro

Program objectives: For home owners, to promote the benefits and cost savings associated with building or buying an energy efficient home. To promote the adoption of the R-2000 standard in contractor's building practices.

Program Description: This program works in conjunction with the Manitoba R-2000 program to encourage the use of energy efficient technologies and increased performance in the construction industry. R-2000 is a standard used for constructing new homes that meet specifications for energy efficiency, environmental impact, and health. Specifications for materials, technical requirements such as heat recovery ventilators, and testing of the home must be completed in order to label the house an R-2000 home.

Eligibility: All residential new home builds and/or retrofits to R-2000 levels. Eligibility requirements for contractors include formal training and a minimum amount of houses built per year. For houses to be labeled R-2000, they must pass a blower door test for air leakage and meet other technical and material requirements as outlined in the R-2000 program.

Involvement of other government(s)/agencies: This program is available in all provinces and is a partnered program with the federal government through Natural Resources Canada.

Program name: Earth Power Loan (M5)

Applicable Sector: Residential

Utility/Province: Manitoba Hydro

Program objectives: To provide home owners the ability to change/newly install a geothermal heat pump system in order to reduce the amount of energy used, increase home comfort levels, and decrease the amount of money spent on home heating/cooling.

Program Description: The Earth Loan is available for home owners to cover the cost of installing a geothermal heat pump to a maximum of fifteen thousand dollars. Homeowners can borrow up to fifteen thousand over a maximum of fifteen years to

finance the purchase of a geothermal heat pump system. The current interest rate for the Power Smart Residential Loan is set at six and a half percent fixed over the term of the loan.

Eligibility: Customers must have a valid Manitoba Hydro account, have their credit approved through Manitoba Hydro, and must be the owner of the home where the heat pump is installed. New installations as well as retrofits are eligible. The heat pump must be installed by a certified installer from an approved list from Earth Energy Society of Canada or from the International Ground Heat Source Pump Association (IGSHPA).

Involvement of other government(s)/agencies: Certified heat pump installers within Manitoba are responsible for installation of heat pumps and may fill out paper work for customers.

Program name: Home Energy Calculator (M6)

Applicable Sector: Residential

Utility/Province: Manitoba Hydro

Program objectives: To help customers determine how much electric and natural gas energy is used in their household on average.

Program Description: Customers enter details about their home and appliances in order to calculate an average energy use for the residence. Answers to the following sections are required in order to calculate residential energy use: office/entertainment, kitchen, laundry room/utility room, heating/cooling, outdoor/garage, and indoor lighting. Simple energy saving tips are provided on the margins of the survey. Customers receive a customized report that summarizes their energy costs and provides them with helpful tips on reducing their energy use. The report provides an estimate of their average monthly heating costs and an estimated maximum heating cost and an average monthly water heating cost. It also provides a section about the estimated average monthly and yearly appliance costs.

Eligibility: All residents with internet access.

Program name: Power Smart Appliances (M7)

Applicable Sector: Residential

Utility/Province: Manitoba Hydro

Program objectives: To help residents determine how much energy various household appliances use.

Program Description: Customers can choose an appliance from a list and learn simple tips—referred to as Power Smart tips for appliance use—to decrease the amount of energy their appliances use. Power Smart tips are provided for the following areas: cooking, clothes dryers and washers, dishwashers, and refrigerators, home entertainment, small heating appliances, and water heating devices such as water beds.

Eligibility: Residents with internet access.

Program name: Home Heating Cost Comparisons (M8)

Applicable Sector: Residential

Utility/Province: Manitoba Hydro

Program objectives: To provide customers with typical home and water heating costs based on a family of four.

Program Description: This three page information sheet outlines heating and water heating costs based on the four different fuel types: natural gas, electricity, fuel oil, and propane. The informational sheets also outlines issues that a home owner would want to consider before converting from electricity to natural gas—namely the cost of converting customer's existing systems, current rate structures for the different fuels, and the payback period for converting a system.

Eligibility: All residents who have internet access.

Program name: Power Smart Newsletter (M9)

Applicable Sector: Residential

Utility/Province: Manitoba Hydro

Program objectives: To provide customers with current energy saving tips.

Program Description: The newsletter includes customer testimonials, information focusing on Manitoba Hydro's Power Smart New Home Program, tips on how customers can make their houses "Power Smart", items for children to learn about energy conservation, and articles highlighting the benefits of appliances with Energy Star labels. Each edition of the newsletter features different Power Smart tips, highlights different programs, and provides information on various appliances. The newsletter is also mailed out via post mail.

Eligibility: All residents with internet access. All residents who receive a bill from Manitoba Hydro receive the mail out version.

Program name: Power Smart Home Insulation Program for Electrically Heated Homes (M10)

Applicable Sector: Residential

Utility/Province: Manitoba Hydro

Program objectives: To encourage customers to add insulation to their houses to increase comfort, lower heating costs, and to conserve energy. The following rates apply for insulating various areas of customer's houses.

- Attic insulation: \$0.02 /R /square foot
- Un-insulated wall cavities: \$0.04 /R /square foot
- Walls, re-siding: \$0.10 /R /square foot
- Basement walls: \$0.02 /R /square foot

- Crawlspace: \$0.08 /R /square foot for walls; \$0.06 /R /square foot for horizontal skirt requirement (note: both requirements must be met in order to qualify for a rebate) (Manitoba Hydro, 2004)

Customers receive their rebate as a credit on their hydro bill, have it applied to outstanding balances, or if there is no outstanding balance, may choose to have the rebate paid to them.

Eligibility: Residents must own the house that is receiving the upgrade, have a valid Manitoba Hydro account, must be the principal residence of the applicant or be the principal residence of the tenant. The home must be detached, semi-detached or a mobile/modular home on a permanent foundation.

Condominiums or condominium corporations billed at residential rates are also eligible.

Electricity must be the primary heating source for a minimum of one year before receiving the rebate.

The program does not apply to project in progress or those projects completed at the time that Manitoba Hydro receives the application. The program does not apply to cottages.

Program name: Power Smart New Home Program (M11)

Applicable Sector: Residential

Utility/Province: Manitoba Hydro

Program objectives: To provide customers with a comfortable, quality home and help reduce energy costs.

Program Description: Encourages Manitoba Hydro customers who are building new houses to build to the Power Smart New Home Program standards. The new home should include extra insulation, better heating, water, and lighting systems.

Customers who build to the minimum Power Smart standard are eligible to receive up to \$1,000 towards purchasing a front-loading washing machine or may choose to receive a \$600 rebate on their Manitoba Hydro electric bill. The new home would also receive an EnerGuide for New Houses rating, which provides information on the energy efficiency

of the home and allows a comparison to be made with your home's energy consumption to that of other homes with the EnerGuide label.

Eligibility: All residents with a Manitoba Hydro electrical account who are building a new house and meet the New Home program eligibility criteria.

Program name: Power Smart Compact Fluorescent Light (M12)

Applicable Sector: Residential

Utility/Province: Manitoba Hydro

Program objectives: To get residential customers to switch from using their current light bulbs to using compact fluorescent lights (CFLs).

Program Description: Customers are educated about cost savings of switching from regular light bulbs to CFLs in terms of amount of time the CFLs last, average amounts of money that can be saved, and some environmental reasons why CFLs should be used over regular bulbs. Information is also provided to indicate that CFLs can be used for the same applications as regular bulbs. Information about purchasing CFLs, with the ENERGY STAR logo is also provided, along with information about what the ENERGY STAR logo means in terms of energy performance.

Eligibility: All residents with a Manitoba Hydro electrical account. In the spring and fall of each year, Manitoba Hydro offers a promotional campaign which may include incentive offers and product give-aways. In 2004, residential customers received coupons for purchasing light bulbs with their hydro bill.

Saskatchewan Program Profiles

“energycheck”

homecheck (N1)

EnerGuide for Houses (N2)

Appliance Cost Calculator (N3)

Residential Energy Systems (N4)

Geothermal Heat Pump Systems (N5)

Program name: homecheck (N1)

Applicable Sector: Residential

Utility/Province: SaskPower

Program objectives: To help customers understand their electrical and natural gas use in their own homes.

Program Description: Customers fill out an on-line survey about their residences and are provided with personalized information about how to save energy and money, in addition to estimating customer's greenhouse gas emission. Categories of information include large appliances such as refrigerators, clothes dryers/washers, dishwashers, heating system, and miscellaneous smaller appliances. Customers receive a generalized report immediately and/or may add their account number to receive a detailed personalized report. The immediate report indicates their annual electrical cost, natural gas cost, and greenhouse emissions per appliance indicated in the survey. In addition, the customer receives a short list of tips on how to improve the efficiency of the appliances the customer listed as owning and also receives the option for going into a larger detailed energy saving tip sheet for the appliances they own.

Eligibility: All residents with internet access.

Program name: EnerGuide for Houses (N2)

Applicable Sector: Residential

Utility/Province: SaskPower in conjunction Sun Ridge Group

Program objectives: After completing their homecheck online survey, customers are encouraged to apply for an In-House Assessment from Sun Ridge Group.

Program Description: To provide residential customers with personalized information based on the performance of their home to help determine potential cost/benefit of various home upgrades and the accompanying associated comfort of the upgrade.

Assessments are conducted by Sun Ridge Group as part of the federal government's EnerGuide for Houses Program (found in all provinces and territories). The program consists of an initial and follow-up assessment. The initial assessment is used to determine the current energy efficiency rating of the house. Customers are provided with a report that prioritizes various upgrades to the house and the associated impact on their energy use. The second evaluation occurs anytime within eighteen months of the initial assessment. The second assessment measures the change, if any, in the house's energy consumption and is completed after the customer notifies Manitoba Hydro that they have made upgrades to their residence. Customers receive an EnerGuide Rating Label for their residence based on the change in energy consumption between the first and second assessments. Based on this change, the customer is also eligible for an EnerGuide for Houses Energy Efficiency Retrofit Grant from the federal government.

Eligibility: To be eligible for the program, the customer must own the residence and be the principle occupant of the residence. To be eligible for the federal grant, the house rating must achieve a minimum energy performance improvement as outlined by Natural Resources Canada.

Involvement of other government(s)/agencies: Natural Resources Canada through their EnerGuide for Houses Program, available in all provinces and delivered by many different contractors in each province and territory.

Program name: Appliance Cost Calculator (N3)

Applicable Sector: Residential

Utility/Province: SaskPower

Program objectives: To help residents determine their personal residential energy use.

Program Description: Customers complete on-line questions for every major and minor appliance or home system or farm system they have. Categories include heating/cooling, entertainment/office, kitchen—small appliances, kitchen—large appliances, laundry/utility, lighting, outdoors, personal care and comfort, shop, and for rural clients, farm equipment. For each appliance and/or system, the kilowatt hours and monetary cost is provided.

Eligibility: All residents with internet access.

Program name: Residential Energy Systems (N4)

Applicable Sector: Residential

Utility/Province: SaskPower

Program objectives: To provide customers with information pertaining to new builds, existing structures, and outdoor living and how to minimize energy use in all three areas.

Program Description: The program is divided into three sub-sectors including new and existing homes, and outdoor living. Each of the three areas provides detailed information about products and techniques related to improving energy efficiency and improving comfort levels in the home. In each of the three sub-sectors, there are three more layers of details that a customer can access. In existing homes, the customer can next choose from learning about water heating, envelope insulation, energy audits, fundamentals, modern living, kitchen, laundry, ventilation, heating, cooling, and improvements. For each of these choices, the customer may then access further information about that specific area. Once at the individual product or appliance level, the customer then has a choice to learn more about the specific product, energy saving tips about the product, and special considerations. For example, if a customer wanted to learn about “water heating”, the next level of detail would include three specific choices, each of which would include multiple choices that provide greater detail about water heating. Choosing “water heaters” allows the customer to access several different types of water heaters, each of which have further detail on their function. If the customer chooses “energy saving tips” in regards to

water heaters, they would be provided with simple energy saving tips, and if the customer chose “special considerations”, they would be provided with unique information related to water heaters. In this way, each topic area can become as detailed as the home owner wishes. Under “new home construction”, the same menu set-up with the same topic areas and level of detail is used. Under “outdoor living”, home owners can choose to access the following areas: outdoor lighting, lawn care, grills, spas, pools, and solar energy. Each of these areas has one tip sheet focused on reducing energy use in that particular area.

Eligibility: All home owners with internet access.

Program name: Geothermal Heat Pump Systems (N5)

Applicable Sector: Residential

Utility/Province: SaskPower

Program objectives: To educate home owners about an alternate source of heating and cooling for their home.

Program Description: The program provides information about the installation process, necessary equipment, fundamentals, and special considerations for applying a heat pump system for a residential application. SaskPower also provides information on the difference between a closed and open loop system. For each of the areas, the customer can receive basic to detailed information.

Eligibility: All residential home owners with internet access.

Note: Both Alberta and Ontario are currently deregulated, with approximately sixteen utilities in Alberta and approximately seventy utilities in Ontario. In order to examine the scope of available programming within each of these provinces, those utilities that provide minimal programming (energy saving tip sheets) will be classified into one larger group. Only if a program has unique characteristics will its name and provider be outlined.

Alberta Program Profiles

Energysense House (B1)

Energysense tips (B2)

EnerGuide for Houses (B3)

Energysense Publications (B4)

Saving Energy (B5)

Cost Calculator (B6)

Energy Education by ENMAX (B7)

Home Energy Audit (B8)

EPCOR Essential Elements House (B9)

Simple Electricity Calculator (B10)

Simple Water Calculator (B11)

Program name: Energysense House (B1)

Applicable Sector: Residential

Utility/Province: ATCO Electric

Program objectives: To provide customers with an understanding of how much energy they use in their houses.

Program Description: Customers can walk through a house and do a room by room review of appliances costs in dollars. Before entering the house, customers enter their electricity and/or natural gas rates. The month for calculations is also asked for, as well as the age and size of the home. Areas covered inside the house include heating/cooling, laundry/utility, indoor lighting, kitchen appliances, office and entertainment, and outdoors/garage. No energy saving tips are provided.

Eligibility: Residential customers with internet access.

Program name: Energysense tips (B2)

Applicable Sector: Residential

Utility/Province: ATCO Electric

Program objectives: To provide customers with no cost and low cost energy saving tips for their homes.

Program Description: Energy saving tips are groups into seasons and contain low and no cost energy saving tips.

Eligibility: Residents with internet access.

Program name: EnerGuide for Houses (B3)

Applicable Sector: Residential

Utility/Province: ATCO Electric

Program objectives: To provide residential customers with personalized information based to help determine potential cost/benefit of various home upgrades and the accompanying associated comfort of the upgrade.

Program Description: The assessments are conducted by Manitoba Hydro's evaluator as part of the federal government's EnerGuide for Houses Program (found in all provinces and territories). The program consists of an initial and follow-up assessment. The initial assessment is used to determine the current energy efficiency rating of the house. Customers are provided with a report that prioritizes various upgrades to the house and the associated impact on their energy use. The second evaluation occurs anytime within eighteen months of the initial assessment. The second assessment measures the change, if any, in the house's energy consumption and is completed after the customer notifies Manitoba Hydro that they have made upgrades to their residence. Customers receive an EnerGuide Rating Label for their residence based on the change in energy consumption between the first and second assessments. Based on this change, the customer is also eligible for an EnerGuide for Houses Energy Efficiency Retrofit Grant from the federal government.

Eligibility: To be eligible for the program, the customer must own the residence and be the principle occupant of the residence. To be eligible for the federal grant, the house rating must achieve a minimum energy performance improvement as outlined by Natural Resources Canada.

Involvement of other government(s)/agencies: Natural Resources Canada through their EnerGuide for Houses Program, available in all provinces and delivered by many different contractors in each province and territory.

Program name: Energysense Publications (B4)

Applicable Sector: Residential

Utility/Province: ATCO Electric

Program objectives: To provide residential customers with information about conserving electricity and to provide information about how much energy average household appliances use.

Program Description: One, eight page booklet describes the electrical costs of many common household appliances. The booklet also provides people with opportunities to calculate their own energy consumption by averaging their appliance use according to a calculation method provided.

The second booklet is an energy evaluation that can be completed by residents at home. The evaluation has ten areas that must be completed. The ten categories include entranceway, bathroom(s), bedroom(s), home office, family room, dining/living room, kitchen, laundry/utility room, outdoors/garage, and the whole house (heating/cooling system). After completing the survey, residents determine their grade according to calculations provided in the booklet. Grades range from seventy six (very efficient) to below thirty (needs to improve). Based on their scores for each of the above mentioned areas, the home owner is provided with an area to create an "action plan" to lower their energy consumption.

Eligibility: All residents with internet access.

Program name: Saving Energy (B5)

Applicable Sector: Residential

Utility/Province: ENMAX

Program objectives: Provide customers with information about how much energy common household appliances use.

Program Description: ENMAX provides no cost energy saving tips for the kitchen laundry room, yard, heating/cooling, and the office. Customers can read "Making room for energy conservation" for further no cost energy saving tips.

Eligibility: All residents.

Program name: Cost Calculator (B6)

Applicable Sector: Residential

Utility/Province: ENMAX

Program objectives: To help customers develop a personalized profile of the amount and monetary cost of their residential energy consumption.

Program Description: Customers fill out an on-line energy survey detailing number of appliances, approximate time in use, and other data. The calculator provides an estimate of the cost per month of each appliance and the estimated kilowatts per month used. A final total of all appliances is provided at the end both as kilowatt hours and in monetary cost.

Eligibility: All residents with internet access.

Program name: Energy Education by ENMAX (B7)

Applicable Sector: Residential

Utility/Province: ENMAX

Program objectives: To provide low and no cost energy saving tips for residential customers in a television viewing format.

Program Description: ENMAX provides a half hour television program that is aired twice weekly. The program contains low and no cost residential energy saving tips that are undertaken on air for viewers to see.

Eligibility: All Canadian residents.

Involvement of other government(s)/agencies: Delivered in cooperation with CFCN Television.

Program name: Home Energy Audit (B8)

Applicable Sector: Residential

Utility/Province: EPCOR

Program objectives: To provide customers with information on energy use by appliances, to aid customers develop their own energy profile, and to link customers to energy experts.

Program Description: This program is broken into four main areas: personal energy profile, energy use by appliance, energy saving tips section, and a contact section for further information.

Eligibility: All residents with internet access.

Program name: EPCOR Essential Elements House (B9)

Applicable Sector: Residential

Utility/Province: EPCOR

Program objectives: To provide customers with information about how much energy and money common household appliance use and cost.

Program Description: Customers can take an animated walk through of a house and explore different rooms. By clicking on individual appliances, the customer can learn the estimated consumption and electrical costs associated with each appliance.

Eligibility: All residents with internet access.

Program name: Simple Electricity Calculator (B10)

Applicable Sector: Residential

Utility/Province: EPCOR

Program objectives: To allow customers to determine appliance costs in their households based on their monthly utility bill.

Program Description: EPCOR customers enter the dollar amount of their bill, and estimate their average monthly usage of individual appliances. Based on the numbers entered by the customer, the calculator estimates the estimated monetary cost and the percentage of electricity that appliance represents on their utility bill. Customers may print out a usage chart based their information.

Eligibility: Only EPCOR customers with internet access.

Program name: Simple Water Calculator (B11)

Applicable Sector: Residential

Utility/Province: EPCOR

Program objectives: To allow customers to determine their personal water efficiency within their homes and the associated monetary costs for water heating and water delivery.

Program Description: Customers determine what their total monthly water usage is from their water meter and measure the flow rate from taps and showerheads and measure drip rates from faucets. Home owners enter the total seconds of time of the drip rates into the calculator, which calculates estimated litres of water wasted per day, week, and month by the household. A chart provides average amount of litres used and the monetary cost associated with common household water uses such as showering, cooking, flushing toilets, brushing teeth, doing laundry, using a dishwasher, and using garden hoses.

Eligibility: Residents with internet access.

Program name: Efficiency Guides (B12)

Applicable Sector: Residential

Utility/Province: EPCOR

Program objectives: To provide customers with low and no cost energy efficiency solutions for household practices.

Program Description: A range of low and no cost energy saving tips are provided in downloadable pamphlets. Sections are divided into water efficiency, home efficiency and conservation, appliance operating costs, appliance purchasing guides, and seasonal efficiency. Sub-titles in each category include such topics as Residential Water Efficiency Guide, Essential Tips for Conserving Energy, Fluorescent Lighting in Your Home, Lighting with Compact Fluorescents, Energy Efficient Recessed & Track Lighting, Heating System, Portable Heaters, Timers & Sensors, Expecting - for the expectant parents-to-be, Holiday Lighting: Bright Ideas to Save Money and Power, and Winter Savings: Timers and Power Saver Cords.

Eligibility: Residents with internet access.

Chart of available utilities in Alberta and availability of energy conservation programming.

Utility	Program Available?	Type
Direct Energy Preferred (H1)	Yes	Energy saving tips online
The Rocky Rural Electrification Association (I1)	Yes	Energy saving tips online, tips in mail out newsletter
Central Alberta Rural Electrification Association (J1)	Yes	Energy Saving Tips
ATCO Electricity (formerly Alberta Power)	Yes, see profile	B1 to B4
ENMAX (formerly City of Calgary Electric)	Yes, see profile	B5 to B7
EPCOR (formerly Edmonton Power)	Yes, see profile	B8 to B12
ESBI Alberta Ltd.(Transmission Administrator of Alberta)	No	n/a
Lethbridge Power	No	n/a
The Grid Company of Alberta Inc.	No	n/a
The Power Pool of Alberta	No	n/a
Prairie Power Ltd.	No	n/a
Canadian Hydro Developers, Inc.	No	n/a
South Alta Rural Electrification Association Limited	No	n/a
TransAlta Utilities Alberta Canada	No	n/a
Alberta Regional Transmission Organization	No	n/a
Altalink	No	n/a

Ontario Program Profiles

(ZZ1) to (ZZ26) programs are from utilities with energy saving tips only or an appliance chart.

Powerwise Calculator (ZZ27)

Energy Audit-Energy Saving Tips (ZZ28)

Appliance Usage Chart, buying tips, and shopping guide (ZZ29)

Energy Efficient Lighting (ZZ30)

Reality House (ZZ31)

Water saving tips (ZZ32)

Energy Efficiency Tips (ZZ33)

Energy Audit (ZZ34)

Home Comfort Products (ZZ35)

Energy Calculator (ZZ36)

Chart of available utilities in Ontario and availability of energy conservation programming.

Utility	Program Available?	Type
Barrie Hydro Distribution Inc. (ZZ1)	Yes	Energy saving tips online
Bluewater Power Distribution Corporation (ZZ2)	Yes	Energy saving tips online
Cambridge and N. Dumfries Hydro Inc. (ZZ3)	Yes	Energy saving tips online
Canadian Niagara Power Inc. (ZZ4)	Yes	Energy saving tips online
Chatham-Kent Energy Inc. (ZZ5)	Yes	Energy saving tips on radio every over Thursday
Collus Power Corp. (ZZ6)	Yes	Energy saving tips online
Essex Power Lines Corporation (ZZ7)	Yes	Energy saving tips online/online calculator
Festival Hydro Inc. (Stratford PUC) (ZZ8)	Yes	Online energy saving tips/Appliance power use chart
Great Lakes Power Limited (ZZ9)	Yes	Appliance consumption worksheet online
Hydro One (formerly Ontario Hydro Services) (ZZ10)	Yes	Online energy saving tips
Niagara Falls Hydro Inc. (ZZ11)	Yes	Online energy saving tips
Niagara-on-the-Lake Hydro Inc. (ZZ12)	Yes	Online energy saving tips
Oakville HE Distribution Inc. (ZZ13)	Yes	Online energy saving tips
Ontario's Independent Electricity Market Operator (ZZ14)	Yes	Online energy saving tips
Orangeville Hydro Limited (ZZ15)	Yes	Online energy saving tips
Orillia Power Corporation (ZZ16)	Yes	Online energy saving tips
Oshawa P.U.C. Networks Inc. (ZZ17)	Yes	Online energy saving tips
Hydro Ottawa (ZZ18)	Yes	Online energy saving tips/calculator, link to Natural Resources Canada Energuide program
Peterborough Distribution Inc. (ZZ19)	Yes	Online energy saving tips
Richmond Hill Hydro Inc. (ZZ20)	Yes	Online energy saving tips
St. Thomas Energy Inc. (ZZ21)	Yes	Online energy audit

Utility	Program Available?	Type
Sudbury Hydro Inc. (ZZ22)	Yes	Online appliance usage chart
Thunder Bay Hydro Electricity Distrib. Inc. (ZZ23)	Yes	Online energy saving tips
Waterloo North Hydro Inc. (ZZ24)	Yes	Online energy saving tips/mail in household energy audit (print from online)
Wellington Electric Distribution Co. Inc. (ZZ25)	Yes	Online energy saving tips, appliance usage chart
Hydro Ottawa (ZZ26)	Yes	Online calculator
Hamilton Hydro Inc.	Yes, see profile	ZZ27 to ZZ32
Ontario Hydro Energy Inc.	Yes, see profile	ZZ33 to ZZ35
Aurora Hydro Connections Limited	No	n/a
Joe Power	No	n/a
Brant County Power Inc.	No	n/a
Centre Wellington Hydro Ltd	No	n/a
Chatham-Kent Hydro Inc.	No	n/a
Cornwall Electric	No	n/a
E.L.K. Energy Inc.	No	n/a
Enersource Hydro Mississauga Inc.	No	n/a
ENWIN Powerlines Ltd.	No	n/a
Erie Thames Powerlines Corporation	No	n/a
Greater Sudbury Hydro Inc.	No	n/a
Greater Toronto Hydro	No	n/a
Guelph Hydro Electric systems Inc.	No	n/a
Innisfil Hydro Distribution Systems Ltd.	No	n/a
Markham Hydro Distribution Inc.	No	n/a
Mid-Ontario Energy Services Inc.	No	n/a
Middlesex Power Dist. Corp. (formerly Strathroy)	No	n/a
Midland Power Utility Corporation	No	n/a
Newmarket Hydro Ltd.	No	n/a
North Bay Hydro Distribution Ltd.	No	n/a
Northern Ontario Wires Inc. (Formerly Cochrane)	No	n/a
Ontario Power Generation (Formerly Ontario Hydro)	No	n/a
Ontario Power Generation Inc.: Customer Site	No	n/a
Ottawa River Power Corp.	No	n/a
Upper Canada Energy Alliance	No	n/a
Veridian Connections Inc.	No	n/a
Westario Power Inc.	No	n/a

Program name: Powerwise Calculator (ZZ27)

Applicable Sector: Residential

Utility/Province: Hamilton Hydro

Program objectives: To educate customers about their appliance costs based on a one month estimate.

Program Description: The calculator gives the cost of running appliances in a one-month period. Customers pick an appliance and insert their approximate usage Photographs and receive an estimated monetary cost of the appliance, which includes the cost of the electricity, delivery charge for electricity, debt retirement charge, and the local distribution charge (extra charges applicable in deregulated provinces).

Eligibility: Customers of Hamilton Hydro who have internet access.

Program name: Energy Audit-Energy Saving Tips (ZZ28)

Applicable Sector: Residential

Utility/Province: Hamilton Hydro

Program objectives: To help customers understand the monetary cost of their household appliance use.

Program Description: Customers are provided with online tools to complete a self-assessment of their homes. People are asked to identify where their house is losing energy, efficiency of their heating/cooling system, and ways to conserve hot water. Customers are asked to keep a yearly log and must take a weekly meter reading, and use the calculations provided to determine their energy use. They are also encouraged to do their own energy assessment and keep a checklist of problem areas. Some examples of what to look for are provided online. The program also suggests getting in touch with Green Venture, a partner of Hamilton Hydro, to receive a professional EnerGuide for Houses assessment.

Eligibility: Residents with internet access.

Program name: Appliance Usage Chart, buying tips, and shopping guide (ZZ29)

Applicable Sector: Residential

Utility/Province: Hamilton Hydro

Program objectives: To educate customers about purchasing energy efficient appliances and to educate people on energy usage in their own household appliances.

Program Description: A section of energy saving tips for appliances is provided, in addition to tips about purchasing energy efficient new appliances. An online appliance chart enables households to compare their own appliance's electrical use to those provided online.

Eligibility: All residents with internet access.

Program name: Energy Efficient Lighting (ZZ30)

Applicable Sector: Residential

Utility/Province: Hamilton Hydro

Program objectives: To provide customers with information about energy use by various lighting systems.

Program Description: Customers are provided with information about the amounts of energy used by different light bulb types.

Eligibility: Residents with internet access.

Program name: Reality House (ZZ31)

Applicable Sector: Residential

Utility/Province: Hamilton Hydro

Program objectives: To educate people about energy use in their house and provide energy saving tips.

Program Description: People can walk through a house and learn about different appliances and ways to reduce energy consumption of those appliances.

Eligibility: Residents with internet access.

Program name: Water saving tips (ZZ32)

Applicable Sector: Residential

Utility/Province: Hamilton Hydro

Program objectives: To provide customers with information about reducing the amount of water used in their residences.

Program Description: Low and no cost water conservation tips are provided for customers.

Eligibility: Residents with internet access.

Program name: Energy Efficiency Tips (ZZ33)

Applicable Sector: Residential

Utility/Province: Ontario Hydro Energy

Program objectives: To provide no and low cost energy saving tips customers can apply to their own households.

Program Description: No and low cost tips are provided for customers. Tips are arranged by room: kitchen, laundry, winter, and a miscellaneous section.

Eligibility: Residents with internet access.

Program name: Energy Audit (ZZ34)

Applicable Sector: Residential

Utility/Province: Ontario Hydro Energy

Program objectives: To help customers understand the monetary cost of their household appliance use.

Program Description: Customers are provided with an online calculator to determine appliance energy use and monetary cost. Customers also have the option to complete an online survey to develop a personalized energy profile based on information about their house.

Eligibility: Residents with internet access.

Program name: Home Comfort Products (ZZ35)

Applicable Sector: Residential

Utility/Province: Ontario Hydro Energy

Program objectives: To educate people about energy efficient windows, doors, heating/cooling/ventilation systems, and water heaters.

Program Description: Information on each of the above categories is provided for customers. Customers are provided with reasons why they would want to upgrade to energy efficient appliances and equipment. The information is provided because Ontario Hydro, in partnership with retailers such as Lanark Windows, sells products in each of those areas and has contractors who will install the products (customers pay for installation).

Eligibility: All residents.

Appendix 2 Evolution of PAR as a Methodology

As a concept, PAR, was initially developed in the 1940's. Kurt Lewin is generally considered the 'father' of action research (O'Brien 1998). Lewin was concerned with social issues and focused on participative group processes for addressing conflict, crises, and change, generally within organizations. Lewin first coined the term 'action research' in his 1946 paper "Action Research and Minority Problems", characterizing Action Research as "a comparative research on the conditions and effects of various forms of social action and research leading to social action", using a process of "a spiral of steps, each of which is composed of a circle of planning, action, and fact-finding about the result of the action" (O'Brien 1998).

Eric Trist, another major contributor to the field from that immediate post-war era, was a social psychiatrist whose group at the Tavistock Institute of Human Relations in London engaged in applied social research, initially for the civil repatriation of German prisoners of war. He and his colleagues tended to focus more on large-scale, multi-organizational problems. Both Lewin and Trist applied their research to systemic change in and between organizations. They emphasized direct professional - client collaboration and affirmed the role of group relations as basis for problem-solving. Both were avid proponents of the principle that decisions are best implemented by those who help make them.

By the 1970's, four main streams of PAR had emerged: traditional, contextural (action learning), radical, and educational action research.

Traditional Action Research

Traditional action research examines quality of working life, organization development, socio-technical systems (e.g., information systems), and organizational democracy. This approach tends to be conservative and generally maintains the status quo with regards to organizational power structures. This PAR style is based on Lewin's work and the importance of labour-management relations.

Radical Action Research

The Radical stream, which has its roots in Marxist 'dialectical materialism' and the praxis orientations of Antonio Gramsci, has a strong focus on emancipation and the overcoming of power imbalances. This research stream is often used in international development models and feminist and liberationist movements. Striving for social transformation through advocacy to strengthen peripheral groups in society is very important to RAR (O'Brien 1998).

Educational Action Research

A third stream of participatory action research, Educational Action Research, has its foundations in the writings of Thomas Dewey, an American educational philosopher of the 1920s and 30s, who believed that professional educators should become involved in community problem-solving. Its practitioners, not surprisingly, operate mainly out of educational institutions, and focus on development of curriculum, professional development, and applying learning in a social context. It is often the case that university-based action researchers work with primary and secondary school teachers and students on community projects (O'Brien 1998).

Contextual Action Research (Action Learning)

For the purposes of this research, contextual action learning was the PAR paradigm was considered to be pertinent as it "...entails reconstituting the structural relations among actors in a social environment; domain-based, in that it tries to involve all affected parties and stakeholders; holographic, as each participant understands the working of the whole; and it stresses that participants act as project designers and co-researchers. The concept of organizational ecology, and the use of search conferences come out of contextual action..." (O'Brien 1998) Contextual Action Research, also sometimes referred to as Action Learning, is an approach derived from Trist's work on relations between organizations. This paradigm tries to reconstitute the structural relations among all participants in the social environment. It tries to involve all affected parties and stakeholders (O'Brien 1998). Contextual action research is deemed by practitioners to be

more of a liberal philosophy, with social transformation occurring by consensus and normative incrementalism

Action Research Summary

It can be seen in each of the four Action Research paradigms that the main objective is to involve various stakeholders in identifying and seeking solutions to organizational and social problems and issues. The primary objective of Action Research is to create a dialogue between all parties and develop a relationship that enables change and allows all involved parties to advance their cause. Further development of Action Research in 1989 has resulted in the development of sixteen tenets that direct and guide Action Research. The sixteen tenets of PAR were presented at the Third World Encounter on Participatory Research in Managua, Nicaragua, in 1989. The tenets were developed by the Caledonia Centre for Social Development located in Scotland and are as follows:

Participatory Action Research is:

1. an approach to improving social practice by changing it
2. contingent on authentic participation
3. collaborative
4. establishes self-critical communities
5. a systematic learning process
6. involves people in theorizing about their practices
7. requires that people put their practices, ideas and assumptions about institutions to the test
8. involves keeping records
9. requires participants to objectify their own experiences
10. a political process
11. involves making critical analyses
12. starts small
13. starts with small cycles
14. starts with small groups
15. allows and requires participants to build records

16. allows and requires participants to give a reasoned justification for their social and (educational) work to others.

Because action research is carried out in real-world circumstances, and involves close and open communication among the people involved, the researchers must pay close attention to ethical considerations in the conduct of their work. Richard Winter (1996) lists a number of principles:

- "Make sure that the relevant persons, committees and authorities have been consulted, and that the principles guiding the work are accepted in advance by all.
- All participants must be allowed to influence the work, and the wishes of those who do not wish to participate must be respected.
- The development of the work must remain visible and open to suggestions from others.
- Permission must be obtained before making observations or examining documents produced for other purposes.
- Descriptions of others' work and points of view must be negotiated with those concerned before being published.
- The researcher must accept responsibility for maintaining confidentiality."

PAR research projects are situationally unique, but there are elements in the methods used that can be used by other researchers in different circumstances (Franklin 1994). For the purposes of this study, it was determined that use of a modified PAR approach would be best received by the community and community organizations that would be most in contact with the researcher. A modified PAR approach allows for as much or as little participation by community members and organizations, which is critical in allowing time and capital constrained organizations and individuals to decide at what point they would like to participate.

Appendix 3 Qualifying Criteria for Energuide for Houses Program

Eligibility Criteria for Energuide for Houses from Natural Resources Canada, November, 2003

Eligible Recipients

Homeowners living in Canada are eligible for a grant under the EnerGuide for Houses Retrofit Incentive provided that at the time of application, they own and live in the house for which the grant is requested they have received a pre-retrofit energy efficiency rating under EnerGuide for Houses they have performed, or have had performed on their behalf, energy efficiency retrofits they have received a post-retrofit energy efficiency rating under EGH that shows the house has met or exceeded the energy efficiency improvement levels required to meet the threshold for a grant they permit the service organization to submit the home's electronic data file and homeowner information to NRCan.

Eligible Houses

- To be eligible for the grant, the house must be in Canada and must be the *principal residence of the applicant*(vacation properties and cottages are excluded)
- must be *either* a dwelling that is a low-rise, detached, semi-detached or row house OR a mobile home on a permanent foundation (as defined under Parts 9 and 2 of the *National Building Code of Canada, 1995*)
- must not share heated areas, ventilation systems or heating systems with other dwelling units (In cases where the house meets Part 9 but has been divided into apartments, the building will be deemed eligible if it can be modeled as a whole).
- must be capable of receiving a rating under EGH
- If an energy advisor sees factors that in his or her opinion suggest the structure of the house may be unsafe or that may affect the health of the occupants, the energy advisor shall have the authority to refuse to rate the house.
- Tribal-Council- or First-Nation-owned/managed housing (as defined under Parts 9 and 2 of the *National Building Code of Canada, 1995*) is eligible. This includes

owner-occupied homes and all Aboriginal housing. Aboriginal housing is defined as housing on band or reservation lands as well as band-owned or tribal council owned homes located off-reservation.

What qualifies your home to be rated using Energuide for Houses? (Environment Network of Collington, Ontario, 2004)

1. Any fully detached, semi-detached or row house which is defined as a house under the Building Code can be rated. The Code includes a limit of - 6,400 ft in the size of the footprint of the building. Therefore, in principle, houses of 4 times this size in square feet could be done (3 floors and a basement). However other limitations below will disqualify many large houses.
2. Houses not greater than 3 stories.
3. Separate housing units which are vertically stacked are disqualified.
4. Must have its own self-contained heating system. (Eg. not fed by on off-site central heating plant).
5. If a house has more than one primary heating system it is disqualified. (Eg. multiple furnaces heating different zones in large houses). Supplementary heating systems are acceptable. For example if a house has a forced air gas furnace, but also a fireplace, or some electrical baseboards, it is acceptable.
6. Houses heated exclusively by wood cannot be rated due to the wide range of efficiency in wood heat systems. If backup heat source is present, then this source is used, and rating is possible
7. Houses that have rooms that cannot be accessed from the main part of the house are disqualified. A free flow of air from the full building envelope to the blower door is necessary.

8. However, units with only outdoor access to the basement can be rated. These houses will require different software (HOT2000) and may be more costly to assess. Other situations that may require this more customized approach include complex or detailed geometry, or multiple foundation types or sections.

9. A house which has not been built cannot be issued a label. It can be rated from plans, and an upgrade options report prepared. The label can only be issued once a blower door test is completed after construction.

Appendix 4 Criteria for Power Smart Residential Loan

Power Smart Residential Loan

- Make your home more comfortable and energy efficient with Manitoba Hydro's Power Smart Residential Loan.
- The loan covers the following measures: adding insulation, installing ventilation, sealing air leaks, replacing windows and doors, lighting, electrical service and wiring, and upgrading the efficiency of your existing furnace or water heater.
- Ineligible measure: central air conditioning (see The Energy Finance Plan (EFP)).
- Borrow up to \$5,000 per residence. The minimum loan is \$500 (see full Terms of the Loan).
- No down payment is required. The maximum term is 60 months, and the minimum monthly payment is \$15. Annual interest rate is fixed at 6.5% (O.A.C.).
- Monthly installments will be included on your energy bill.
- Hire a contractor or, to do the renovations work yourself, contact your participating retailer.
- Applicant must be a Manitoba Hydro customer, and the owner of the home in which energy improvements are to take place. Upgrades must be made to levels recommended by Manitoba Hydro.

Appendix 5 List of Winnipeg Inner City Neighborhoods

The neighborhoods constituting the inner city are as follows:

Armstrong Point	Broadway-Assiniboine
Burrows Central	Centennial
Central Park	Central St. Boniface
Chalmers	Chinatown
Civic Centre	Colony
Daniel McIntyre	Dufferin
Dufferin Industrial	Dufresne
Exchange District	Glenelm
Inkster/Faraday	Legislature
Logan	Lord Selkirk Park
Luxton	McMillan
North Point Douglas	North St. Boniface
Portage and Main	Portage-Ellice
River-Osborne	Robertson
Roslyn	South Point Douglas
South Portage	Spence
St. Matthews	St. John's Park
St. John's	The Forks
Tissot	West Alexander
West Broadway	William Whyte
Wolseley	

Appendix 6: List of Major Improvement Areas in the City of Winnipeg

The following fourteen neighbourhoods have been classified as *Major Improvement Areas*:

Centennial
Spence
Daniel McIntyre
St. Johns
Dufferin St.
Matthews
Dufferin Industrial
South Point Douglas
Lord Selkirk Park
West Alexander
North Point Douglas
West Broadway
North Portage
William Whyte

The following twenty one neighbourhoods have been classified as *Rehabilitation Areas*:

Airport	King Edward
Broadway-Assiniboine	Logan - CPR
Brooklands	Lord Roberts
Burrows Central	Luxton
Burrows-Keewatin	Mission Industrial
Central St Boniface	McMillan
Chalmers	River Osborne
Ebby-Wentworth	St. John's Park
Inkster-Faraday	Tissot
Kensington	Weston
Wolseley	

Appendix 7 City of Winnipeg Major Improvement Areas Map

The following map is from the City of Winnipeg and it outlines Neighbourhoods in need of major improvement, of which West Broadway is one, and those neighbourhoods in need of rehabilitation.

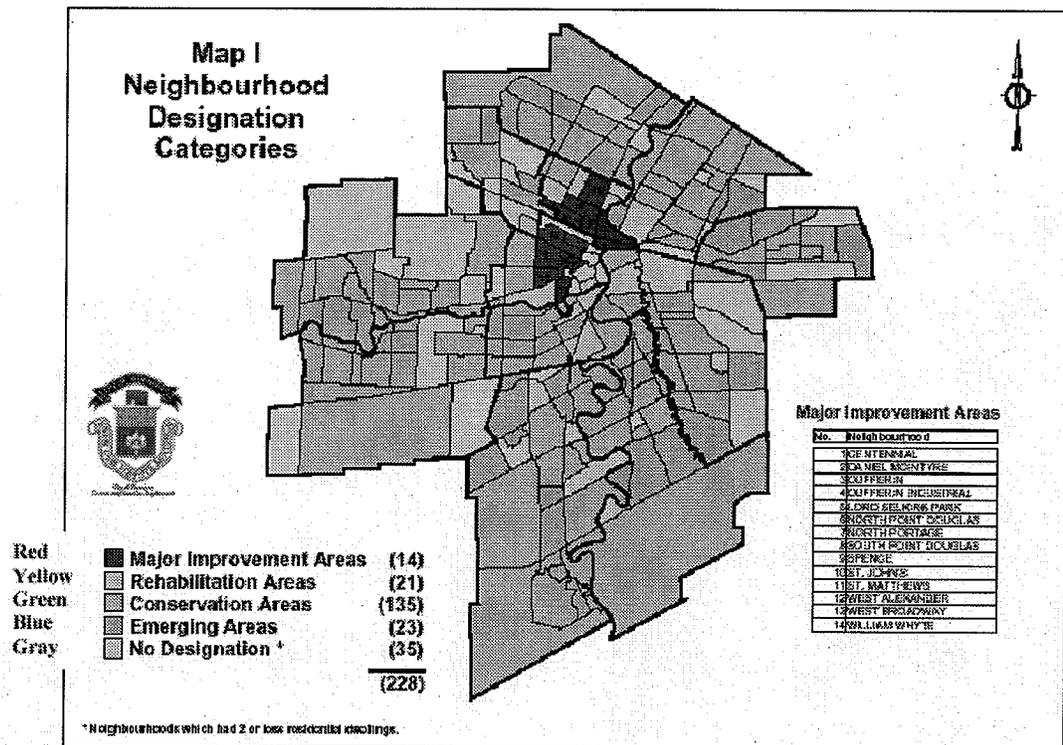


Figure 5. Source City of Winnipeg, March, 2000

Appendix 8 Invitation to Focus Group

Research Project by the Natural Resources Institute, University of Manitoba

Focus Group for Low Income Housing Initiatives Examining Manitoba Hydro's PowerSmart Programming

When: Wednesday, April 7, 2004 Time: 9:30 a.m. to 2:30 p.m.

Where: Freight House Community Centre, 200 Isabel Door #5

What: Focus Group for Low Income Housing Groups/Community members examining Manitoba Hydro's PowerSmart Programming

Sponsor: Manitoba Hydro

Cost: Free

Who: Community organizations involved in providing housing, renovating housing, and building new housing and consumers of low income housing initiatives community members.

Why: Based on the last CED Gathering, a number of "Next Steps" were suggested to help improve the affordable housing stock. At the Gathering, suggestions were made to:

- examine available programming,
- involve corporations in identifying solutions and
- involve the low income community in the implementation of programming.

This dialogue is an opportunity to meet with Manitoba Hydro staff and provide input/feedback on their current PowerSmart programming.

How: In the morning, Pam Vernaus from Manitoba Hydro will present an overview of Manitoba Hydro's PowerSmart family of programming as it currently exists. The afternoon will be spent in small groups discussing how the programming can be made more accessible to the low income community.

Roselle Miko, a graduate student at the University of Manitoba will compile the results from the focus group as part of her research into affordable housing strategies in Inner-City Neighborhoods.

Agenda

9:30 – Registration and coffee

10:00 – Survey and Welcome

10:30 - Overview: of Manitoba Hydro PowerSmart Programming - Pam Vernaus

11:45 – Question period

12:00 - Lunch break (lunch is provided)

1:00 - Break out into focus groups in the afternoon

2:15 – Small group reports

Please be sure to R.S.V.P to help with food quantities and childcare arrangements to Roselle Miko at ummikorm@cc.umanitoba.ca or by phone to Roselle Miko at

Child care will be provided on-site by Day Care Staff. Child Care will be in a separate room and snacks and activities will be provided for the children.

Appendix 9 Questions Posed for In-House Evaluators

1. Do you feel that the in-house evaluation covers all types of residences?
2. Do you feel that the audit misses any key points of energy efficiency? Any other types of efficiency? If yes, please elaborate.
3. Are there any areas not related to energy efficiency you think the audits should be covering?
4. Do you have any suggestions on how the programming could be improved for existing user groups? For reaching groups such as low income earners or inner city neighbourhoods?
5. Are there any challenges to performing audits in older residential buildings? Other buildings?
6. How much training did you receive, if any, before performing these audits?
7. What is your educational background in? Do you have a formal/informal training in the following areas: electrical, plumbing, heating, ventilation, insulation requirements, the National Building Code, best practices for energy efficiency/water conservation, other standards, etc?
8. Do you, or have you ever had someone come with you on an audit and evaluate your auditing skills?
9. On average, how much time does an audit take? Do you think that is enough time to do a thorough audit?
10. Do you ever meet with other auditors to discuss challenges you are facing when you are completing an audit?
11. How many evaluations have you completed? A? B?
12. On average how many evaluations are you completed per week?

Appendix 10 Follow-Up Questions for Home Owners Who had In-House Assessments

Follow up questions for the homeowner:

1. Do you have your report?
2. Have you read it?
3. Are you planning to do any of the recommendations? If yes, which ones and why?
4. Are you planning to do anything else?
5. How useful did you find the booklets?
6. Why or why not did you read the booklets?
7. Do you have any other questions or comments?

Definition questions

What is weatherstripping/where does it go?

What is caulking/where does it go?

Appendix 11 Ecological Footprint with Calculations

HOME

1. How many people live in your household?

Points

a) 1 30

b) 2 25

c) 3 20

d) 4 15

e) 5 10

2. How is your home heated?

a) natural gas 30

b) electricity 40

c) oil 50

d) renewable 0

(solar, wind)

3. How many individual faucets and toilets do you have in your home?

a) less than 3 5

b) 3-5 10

c) 6-8 15

d) 8-10 20

e) 10+ 25

FOOD

4. How many meals per week do you eat with meat or fish?

Points

a) 0 0

b) 1-3 10

c) 4-6 20

d) 7-10 35

e) 10+ 50

5. How many home-made meals do you eat per week (including those you bring to school or work)?

- a) under 10 25
- b) 10-14 20
- c) 14-18 15
- d) 18+ 10

6. When purchasing your food items, does your family try to buy locally produced goods?

- a) yes 25
- b) no 125
- c) sometimes 50
- d) rarely 100
- e) don't know 75

TRANSPORTATION

7. If you or your family own vehicles, what type are they? Add points for each type of vehicle.

Points

- a) motorcycle 15
- b) small-compact 35
- c) mid-sized 60
- d) full-sized 75
- e) SUV or van 100
- f) truck 130

8. How do you get to school/work?

- a) car 50
- b) public transit 25
- c) school bus 20
- d) walk 0
- e) bike or roller blade 0

9. How many trips do you make per week on public transit for which you would have otherwise used a car?

- a) 0 50
- b) 1-5 40
- c) 6-10 30
- d) 11-15 20
- e) 15+ 10

10. Where did you go on vacation in the last year?

- a) no vacation 0
- b) in the province 10
- c) another province 30
- d) to the US 40
- e) outside North America 70

11. How many summer weekend trips do you take by car?

- a) 0 0
- b) 1-3 10
- c) 4-6 20
- d) 7-9 30
- e) 9+ 40

PURCHASES

12. How many large purchases (e.g., stereo, TV, VCR, computer, car, furniture, refrigerator, furnace, etc.) Has your household made in the past year?

Points

- a) 0 0
- b) 1-3 15
- c) 4-6 30
- d) 6+ 45

13. Have you bought any energy/water efficient products in the past year (e.g., light bulbs, fridges, stoves, toilets)?

a) yes 0

b) no 25

WASTE

14. Does your household try to reduce the amount of waste created in the house (e.g., buying food in bulk, refusing junk mail/flyers, using reusable containers for storage, using natural cleaners)?

a) always 0

b) sometimes 10

c) rarely 20

d) never 30

15. Does your household compost?

a) always 0

b) sometimes 10

c) rarely 15

d) never 20

16. Does your household recycle newspapers, cardboard/boxboard/pizza boxes, fine paper, aluminum cans, glass/plastic bottles and other materials?

a) always 0

b) sometimes 10

c) rarely 15

d) never 20

17. How many garbage bags of waste do you set out for pick-up each week?

a) 0 0

b) one, half-full 5

c) 1 10

- d) 2 20
- e) 2+ 30

To get score total: add points from each question and match to chart.

Score = Ecological Footprint in Hectares

Less than 150 Less than 4.0

150 - 350 4.0 - 6.0 hectares

350 – 550* 6.0 - 7.7* hectares

550 - 750 7.7 - 10.0 hectares

More than 750 More than 10.0 hectares

* the Canadian average.

Ecological Footprint by Country (hectares per person)

United States 9.72

Canada 7.29

Singapore 6.48

Hong Kong 6.08

Ireland 5.67

France 5.27

Iceland 4.86

United Kingdom 4.46

Italy 4.05

Portugal 3.65

Malaysia 3.24

Costa Rica 2.84

Mexico 2.43

World Average 2.03

Egypt 1.62

India 1.22

Bangladesh 0.41

8. 1 hectare = 2.2 acres = 100m X 100M

Appendix 12 Survey Questions for Residents



Survey Questions for Residents

Introduction

The following questions are designed to determine your current housing situation and gauge your opinions regarding health and energy efficiency related issues.

This research has been approved by the Joint Faculty Research Ethics Board. If you have any questions or concerns about this project you may contact the Human Ethics Secretariat at 474-7122.

All responses will be kept confidential.

GENERAL INFORMATION

- Please indicate your age:
 20 or under 21 – 30 31 – 40 41-50 51 – 60 Over 60
- Please indicate which area of the city you live in?
 Assiniboine South Fort Garry River Heights St. Vital St. James
 Downtown River East Seven Oaks St. Boniface Transcona
 Other (please specify): _____
- Please indicate how long have you lived at your current residence? _____

ENERGY/WATER EFFICIENCY

- On a scale of 1-10, with 1 being "Not at all Important" and 10 being "Extremely Important", how important are the following to you (please circle):

	Not at all Important							Extremely Important		
	1	2	3	4	5	6	7	8	9	10
a) Energy efficiency?										
b) Water efficiency? (Water conservation)										
- Are you aware of any current programs in Winnipeg that encourage resource and energy efficiency?
 Yes
 No (SKIP TO QUESTION #7)
- Please indicate any of the following programs that you were aware of? (check all that apply)

<input type="checkbox"/> EnerTrend™ <input type="checkbox"/> Power Smart Design Standards <input type="checkbox"/> New Homes/R 2000 program <input type="checkbox"/> Home Comfort Initiative <input type="checkbox"/> MB Hydro/United Way initiative	<input type="checkbox"/> Home Energy Calculator <input type="checkbox"/> In-Home Energy Audit <input type="checkbox"/> Power Smart Residential Loan Program <input type="checkbox"/> Efficiency Manitoba <input type="checkbox"/> Other (please specify): _____
--	---

ENVIRONMENT

7. Do you think environmentally friendly housing costs more or less to build than conventional housing?
- Considerably Less Somewhat Less Somewhat more Considerably More
8. Do you think environmentally friendly housing costs more or less to operate than conventional housing?
- Considerably Less Somewhat Less Somewhat more Considerably More

HEALTH ISSUES

9. Do you or any family member who resides with you have any health concerns that they feel are a result of/worsened by the housing that they are living in?
- Yes (Please list): _____
- No
10. On a scale of 1-10, with 1 being "Poor" and 10 being "Excellent", how would you rate the indoor air quality in your residence?
- | | | | | | | | | | | |
|------|---|---|---|---|---|---|---|---|----|-----------|
| Poor | | | | | | | | | | Excellent |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | |

RESIDENT INFORMATION

11. What is your current housing situation?
- Own
- Rent (SKIP TO QUESTION #15)

RESIDENCE OWNERSHIP

12. Which of the following best describes the residence you own?
- Single family house
- 1/2 of a duplex
- Apartment block
- Housing Co-op
- Condo
- Other (please specify): _____
13. How much is your monthly mortgage payment? \$ _____

14. Please indicate which of the following measures you have performed to increase energy/water efficiency in your residence? (check all that apply)

- Installed energy efficient windows
- Installed energy efficient lighting
- Installed energy efficient hot water tank
- Installed mid/high efficiency furnace
- Installed faucet aerators
- Installed low flow showerheads
- Other (please specify): _____
- None of the above
- Increased insulation levels in roof/walls/basement
- Installed set-back thermostat
- Weather stripping (around exterior windows & doors)
- Caulked large holes (patch air leaks)
- Installed low flow toilet

(SKIP TO QUESTION #19)

RENTAL RESIDENCE

15. Which of the following best describes the residence you rent?

- Single family house
- 1/2 of a duplex
- Apartment
- Housing Co-op
- Condo
- Other (please specify): _____

16. How much is your monthly rent? \$ _____

17. Please indicate which of the following measures (to your knowledge) your property manager/landlord has performed in the past two years to increase energy/water efficiency in your residence? (check all that apply)

- Installed energy efficient windows
- Installed energy efficient lighting
- Installed energy efficient hot water tank
- Caulked large holes (patch air leaks)
- Installed faucet aerators
- Installed low flow showerheads
- Other (please specify): _____
- None of the above
- Increased insulation levels in roof/walls/basement
- Installed set-back thermostat
- Weather stripping (around exterior windows & doors)
- Installed high efficiency furnace/boiler
- Installed low flow toilet

18. On a scale of 1-10, with 1 being "Not at all Important" and 10 being "Extremely Important", how important are the following to your landlord or property owner/manager? (please circle)

	Not at all Important										Extremely Important
a) Re-investment in the building?	1	2	3	4	5	6	7	8	9	10	
b) Maintaining healthy indoor air quality?	1	2	3	4	5	6	7	8	9	10	
c) Energy efficiency?	1	2	3	4	5	6	7	8	9	10	
d) Water efficiency?	1	2	3	4	5	6	7	8	9	10	

COMMENTS

19. Do you have additional comments regarding any of the material covered in either the workshop or survey questionnaire?

THANK YOU FOR YOUR TIME AND COMMENTS

Appendix 13 Survey Questions for Housing Providers



Survey for Housing Providers

Introduction

The following questions are designed to gauge your opinions regarding alternative building materials, human health issues related to housing, and available energy savings programming.

This research has been approved by the Joint Faculty Research Ethics Board. If you have any questions or concerns about this project you may contact the Human Ethics Secretariat at 474-7122.

All responses will be kept confidential.

GENERAL INFORMATION

- Please indicate your age:
 20 or under 21 – 30 31 – 40 41-50 51 – 60 Over 60
- What organization do you represent? _____

ENERGY EFFICIENCY

- A sustainable building is constructed with the goal of minimizing the environmental impact of the structure and its grounds, while providing a safe, functional, and comfortable living or working environment. Are you aware of any sustainable buildings in Winnipeg or elsewhere?
 Yes (Please list): _____
 No
- On a scale of 1-10, with 1 being "Not at all Important" and 10 being "Extremely Important", how important to you in the renovation/new construction process is (please circle):

	Not at all								Extremely	
	Important								Important	
a) Energy Efficiency?	1	2	3	4	5	6	7	8	9	10
b) Saving money?	1	2	3	4	5	6	7	8	9	10
- Are you aware of any current programs in Winnipeg that encourage resource and energy efficiency?
 Yes (Please list): _____
 No (SKIP TO QUESTION #8)
- In the past, have you or your organization participated in any energy efficiency programs?
 Yes (Please list): _____
 No (SKIP TO QUESTION #8)

7. Please check off any of the following programs that you have participated in/used in the past:

- | | |
|---|---|
| <input type="checkbox"/> Home Energy Calculator | <input type="checkbox"/> Power Smart Residential Loan Program |
| <input type="checkbox"/> Power Smart Design Standards | <input type="checkbox"/> R-2000 program |
| <input type="checkbox"/> In-house Energy Audit | <input type="checkbox"/> Home Comfort Information Initiative |

8. Please indicate which of the following measures you have performed to increase energy/water efficiency in your residence? (check all that apply)

- | | |
|--|--|
| <input type="checkbox"/> Installed energy efficient windows | <input type="checkbox"/> Increased insulation levels in roof/walls/basement |
| <input type="checkbox"/> Installed energy efficient lighting | <input type="checkbox"/> Installed set-back thermostat |
| <input type="checkbox"/> Installed energy efficient hot water tank | <input type="checkbox"/> Weather stripping (around exterior windows & doors) |
| <input type="checkbox"/> Installed mid/high efficiency furnace | <input type="checkbox"/> Caulked large holes (patch air leaks) |
| <input type="checkbox"/> Installed faucet aerators | <input type="checkbox"/> Installed low flow toilet |
| <input type="checkbox"/> Installed low flow showerheads | |
| <input type="checkbox"/> Other (please specify): _____ | |
| <input type="checkbox"/> None of the above | |

ENVIRONMENT

9. Do you think environmentally friendly housing costs more or less to build than conventional housing?

- Considerably Less Somewhat Less Somewhat more Considerably More

10. Do you think environmentally friendly housing costs more or less to operate than conventional housing?

- Considerably Less Somewhat Less Somewhat more Considerably More

11. On a scale of 1-10, with 1 being "Not at all Important" and 10 being "Extremely Important", how important to you in the renovation/new construction process is (please circle):

	Not at all Important										Extremely Important
	1	2	3	4	5	6	7	8	9	10	
a) Minimizing construction waste?	1	2	3	4	5	6	7	8	9	10	
b) Conserving water (when considering fixtures)?	1	2	3	4	5	6	7	8	9	10	
d) Reusing/recycling building materials or fixtures?	1	2	3	4	5	6	7	8	9	10	

12. Does your house, or any houses you manage, have fixtures with water conservation factors (e.g. low flow toilets, water saving showerheads, faucet aerators, etc.)?

- Yes (Please list): _____
 No

13. When building or performing renovations do you reuse materials (e.g. windows, doors, appliances, etc.)?

- Yes (Please list): _____
 No

14. Are you aware of any businesses in Winnipeg that sell or purchase used building materials?

- Yes (Please list): _____
 No

15. Green building materials are those considered to have at least one of the following characteristics: nontoxic, recycled content; resource efficient; long life cycle; or, environmentally conscious. In your tenders, do you require your sub-contractors to use a certain percentage of reused materials or use a certain percentage of green materials?

- Yes (Please explain): _____
 No

16. Have you ever purchased green building materials?

- Yes (Please list): _____
 No

17. Are you aware of any other building codes or standards in Canada aside from the National Building Code?

- Yes (Please list): _____
 No

HEALTH ISSUES

18. Are you aware of any illnesses that require special considerations in terms of the built environment (homes, schools, workplaces, etc.)?

- Yes (Please list): _____
 No

19. On a scale of 1-10, with 1 being "Not at all Important" and 10 being "Extremely Important", how important is indoor air quality in designing/renovating your houses (please circle)?

Not at all Important								Extremely Important	
1	2	3	4	5	6	7	8	9	10

20. In housing you provide, are you aware of any occupants with asthma, compromised immune systems, allergies, chemical sensitivities, or respiratory problems?

- Yes (Please list): _____
 No

21. Thinking of the housing you currently provide, what changes would you make—if financially feasible—to improve occupant health, environmental friendliness, or energy efficiency (please list)?

COMMENTS

22. Do you have additional comments regarding any of the material covered in either the workshop or survey questionnaire?

THANK YOU FOR YOUR TIME AND COMMENTS