

**Warm Homes, Greener Living:  
Reducing Energy Poverty in Daniel McIntyre and  
St. Matthews through Energy Retrofits**

**By**

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## **Abstract**

This research examines energy poverty in the Daniel McIntyre and St. Matthews (DMSM) neighbourhoods in the city of Winnipeg. Energy poverty, defined as households spending more than 6% of their income on energy expenditures, affects as many as 50% of households in DMSM. Energy poverty can be alleviated through energy retrofits for dwellings such as weather stripping; increasing insulation in exterior walls, the attic and basement; and installing a high-efficiency furnace. The recommendations include: establishing consistent housing and energy efficiency policies; increasing the flexibility of utility on-bill financing; levying the necessary capital for energy retrofits through municipal financing mechanisms; increasing the knowledge and capacity of local residents; increasing the knowledge and capacity of local contractors for sustainable design and construction; creating a provincial strategy to increase the energy efficiency of social housing; developing low-income energy efficiency programs for rental properties; and increasing access to renewable energy sources.

Key words: energy efficiency, low-income, energy poverty, renewable energy, sustainable housing, Winnipeg neighbourhoods

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# CHAPTER 1: INTRODUCTION

This thesis examines energy poverty in the Daniel McIntyre and St. Matthews (DMSM) neighbourhoods in the city of Winnipeg. Energy poverty is a prevalent issue, affecting as many as 50% of households in DMSM. The purpose of this research is to produce recommendations for the alleviation of energy poverty and to examine the potential to transition to local renewable energy sources.

This chapter begins with background information on the disadvantages of older housing stock for lower income households, energy retrofits, and the benefits of on-site renewable energy systems. This is followed by the problem statement, the purpose and scope of the research, and the specific research questions that are addressed. It further includes a discussion of the research methods and analysis, the significance of the study, and the assumptions and limitations.

## 1.1 Background

Everyone should have the opportunity to live in a decent home at a price they can afford, in a place where they want to live now and in the future. Income greatly limits housing choices for low-income groups. Housing affordability, based on the CMHC core housing need model, defines affordability as spending no greater than 30% of income on shelter costs (30% rent/income ratio) (CMHC). Based on this model, housing affordability is directly correlated to the household income which varies greatly within a population. Location, housing quality and affordability, and owning versus renting are all factors that merge “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*” (Miko, 2005, p. 1). Low-income households are also more likely to own older, poorly insulated homes with older, less energy efficient furnaces and appliances (Rohe et al., 2010, p. 524).

Housing stock in the Daniel McIntyre and St. Matthews (DMSM) neighbourhoods was built primarily before 1946 and, unless recently upgraded, lacks adequate insulation to keep the houses warm without using a tremendous amount of energy for heat. For low-income groups, high heating bills can devastate budgets and can often force them to make difficult choices between necessities like food and heat. Policy responses have primarily been income assistance and improving the energy efficiency of the home and heating system. Improving the efficiency of the home is the more effective and sustainable solution (Walker, 2008, p. 4514).

There are approximately 78,000 homes in Manitoba that require energy retrofits. If completed, an estimated reduction of 234,000 tonnes of greenhouse gases (3 tonnes per house) is possible and total annual savings for residents of approximately \$31,200,000 (\$400 per dwelling). To put this amount in perspective, a mid-size car on average emits 5 tonnes of GHGs per year. Retrofitting all 78,000 homes would be equivalent to removing 46,800 cars from the road. In terms of economic impact, if the Province spent an average of \$4,000 per dwelling for energy retrofits, this would generate roughly 20 times the investment as well as 200 jobs for every million dollars of investment (Oppenheim & MacGregor, 2008, p. 3). Yet, to date, only 1,000 homes have been insulated. There are programs available for the homeowner to utilize, but unfortunately many barriers remain and these barriers are much more apparent for low-income households.



Reducing energy poverty through energy retrofits and utilizing on-site renewable energy sources has the potential to significantly reduce energy poverty. A significant issue in energy policy is the disparate nature of supply and demand as urban areas consume incredibly high amounts of energy but most often supply only a fraction of their own needs (Kellet, 2007, p. 382). It remains the norm for urban areas to be supplied with electricity, gas and petroleum from external sources, thereby avoiding environmental impacts of energy generation on dense urban populations — energy generation is highly decentralized while energy consumption is highly centralized (Roosa, 2004, p. 47). Hydroelectricity transmitted from northern Manitoba supplies the city of Winnipeg with electricity while natural gas is imported from Alberta. A more sustainable approach would focus on changing this dynamic, moving away from fossil fuels and making cities more self-sufficient using nearby renewable energy sources (Ibid). Using renewable sources of energy such as solar, wind and biomass has the potential to increase efficiency through reduced loss in transmission and greater environmental equity in terms of reduced impacts on the current and remote and supply areas (Kellet, 2007, p. 383).

In addition to moving the sources of energy to the cities themselves, and in seeking to increase the rate of change from carbon based energy sources to renewable energy sources, an immediate and potentially productive approach lies in retrofitting existing buildings - both to improve their energy efficiency and to provide them with alternative energy sources, even though the initial costs may be high and the payback period could span five to fifteen years (Kellet, 2007, p. 383; Walker, 2008, p. 4514). Since domestic buildings are the predominant land use in most cities and account for a large percentage of the total energy demand, they are an obvious target for improvement.

In Canada, housing accounts for 17% of energy use and 16% of the country's greenhouse gas emissions (CMHC, 2007).

For the individual household, on-site renewable energy – an electricity and/or heat generation project fifty kilowatts or less in size – has the potential to greatly reduce energy consumption and costs for the homeowner. Homes can become completely or partially self-sufficient by sourcing all or part of their heat and electricity needs from on-site renewable energy systems, which are available in a variety of forms and scales. The benefits can be great in that a one kilowatt energy installation can generate 1000 kilowatt hours of energy annually which would help to offset the average energy consumption of 9,000 kilowatt hours of Canadian households.

On-site renewable energy system developments have been used in parts of Europe for decades and include: solar panels that can heat water or generate electricity; small wind electric turbines that could be fitted to individual buildings; heat pumps; and small-scale hydro-power turbines. However, there are many problems and perspectives when it comes to addressing the conversion of current energy systems into 100% renewable energy systems. The main hindrances to the growth of renewable energy projects are the high up-front costs, lack of technical expertise, the presence of subsidies that distort market decisions and a lack of tools for evaluating projects (Ah-You & Leng, 1999, p. 1). Ontario's Renewable Energy Standard Offer Program (RESOP) influences the renewable energy market at the provincial level by utilizing feed-in tariffs. However, success of the program is limited – the successful elements of Germany's *Renewable Energy Sources Act*, such as priority grid access for renewable energy generators and tiered pricing, have been omitted in Ontario's program. Consequently, rapid deployment

of renewable energy across Ontario at the community level is not happening as it did in Germany (Taylor et al., 2008, p. 19). Furthermore, many of the policies, programs, and technologies developed in response to climate change have significant upfront costs rendering them useless to low-income households under current financing approaches. It is impossible to address poverty without addressing energy use and costs. Oppenheim and MacGregor state that:

Eliminating or diminishing the energy crisis of poor people is an extremely cost-effective way to fight poverty and move people toward self-sufficiency. When people can meet their essential energy needs, they can then address other fundamental problems, such as hunger, education, health care and employment. Such investments can lower the burdens currently placed on charitable resources, and support federal and state anti-poverty efforts. (2008, p. 33).

A combination of long-term energy efficiency investments and short-term emergency assistance is a cost-effective way to lessen poverty in a way that benefits the entire economy and community (Oppenheim & MacGregor, 2008, p. 3).

In this study, the neighbourhoods of Daniel McIntyre and St. Matthews in Winnipeg, Manitoba will be examined to assess the degree and nature of energy poverty, the ability of local residents to move from their current energy system to a renewable energy system, and the implications that such changes will have on local policies and programs. The combination of the large number of older homes in Daniel McIntyre and St. Matthews, the general lack of affordable housing, the high percentage of housing requiring repairs and upgrades, and the need to improve inner city neighbourhoods, are all relevant factors for considering in a study on energy efficiency and low income groups within inner city neighbourhoods (Miko, 2005, p. 2). Furthermore, the Daniel McIntyre St. Matthews Community Association (DMSMCA) is a recently formed community organization that is in the process of developing a green plan for the community.

Research conducted in DMSM will contribute to the green plan for the community and provide additional information for the DMSMCA as they move forward.

Existing data sets, such as Statistics Canada's census data, the City of Winnipeg's property tax assessment information, and information gathered through structured interviews with local households and semi-structured interviews with local professionals will be used to develop a neighbourhood level understanding of low income housing and energy efficiency. Based on the pervasive pre-existing conditions that characterize the housing stock such as larger energy inefficient housing and social considerations including low-income levels, the Daniel McIntyre and St. Matthews area of Winnipeg provides an excellent neighbourhood context to explore the above issues.

## **1.2 Problem Statement**

In Daniel McIntyre 57.1% and in St. Matthews 57.8% of dwellings were constructed prior to 1946 and virtually all homes were constructed prior to 1986. The EnerGuide for Houses data shows that ratings generally decrease as the house age increases. In Manitoba, the EnerGuide rating for housing stock constructed prior to 1945 is 55. The renovation of existing buildings is important: research in the European Union has demonstrated that retrofits can save as much as 80% of heating energy in the least efficient buildings and has an average of 28% in energy savings (WBCSD, 2007, p. 26). Therefore, reducing energy use through energy retrofits can have a disproportionately large impact on low-income households by reducing their household expenses. When families have enough money in their pockets, they spend more thereby creating more jobs for people who then spend their new incomes on more products and services, thus

creating yet more jobs. This is the multiplier effect and implementing low-income energy efficiency programs is a cost-effective way to reduce poverty and energy consumption (Oppenheim & MacGregor, 2008, p. 4).

BUILD (Building Urban Industries through Local Development) launched as a pilot project in Winnipeg's Centennial neighbourhood in 2006 and in 2007 Manitoba Hydro launched LIEEP (Lower Income Energy Efficiency Program). These were the first local indicators that energy poverty was a problem and that the main hindrance for low-income households was the upfront cost of energy retrofits. Since 2006 approximately 1,000 households through LIEEP have had energy retrofits. The federal government and City of Winnipeg appear to not be involved in either local initiative. A key component to reducing energy poverty is having the support of the federal and municipal governments.

Between the three levels of government, the DMSMCA, Manitoba Hydro, and local residents there is clearly a disconnect that precludes more households from undertaking energy retrofits. The success and evolution of low-income energy efficiency programs in the United Kingdom can provide some recommendations for reducing energy consumption and costs, and therefore energy poverty, because they are much further along in the process of planning for energy poverty reduction. While existing literature provides policies and programs in the United Kingdom and the United States to reduce energy poverty, there is a gap in the knowledge of planning for low-income energy retrofits and the utilization of on-site renewable energy without federal and municipal government support.

The upfront cost of energy retrofits is high. In Winnipeg it appears that households with sufficient resources are able to implement energy efficiency and renewable energy schemes to reduce their energy consumption and costs. Low-income households do not have the thousands of dollars for energy efficiency upgrades nor can they be saddled with a loan that they must pay off if they sell their dwelling. All income levels should have access to energy efficiency retrofits and renewable energy technology to lower energy costs.

DMSM and other lower income neighbourhoods would benefit from further research on improving the energy efficiency of dwellings for low-income households, eliminating the burden of high upfront costs, removing the persistent institutional barriers, and examining other jurisdictions that have experienced success in reducing energy poverty.

### **1.3 Purpose and Scope of the Research**

This thesis identifies effective practices in other jurisdictions and generates recommendations to reduce energy poverty in DMSM. Structured and semi-structured interviews will be used to produce policy and planning recommendations.

The structured interviews were conducted with twenty-four DMSM households to detect the greatest barriers to energy retrofits. The participating households were selected based on the following criteria:

- Resided in DMSM;
- Lived in a single-family or two-family dwelling; and
- Rented or owned the dwelling.

The semi-structured interviewees were selected according to the following criteria:

- Employed by one of the local stakeholders such as the Province, the City, the DMSMCA, Manitoba Hydro, or BUILD; and
- Expertise in energy efficiency, implementation of low-income energy efficiency programs, implementation of community initiatives, and/or renewable energy.

The DMSMCA is interested in the outcomes of this research. Local residents, other non-profit organizations and government agencies are expected to be as well. The results will enable them to apply recommendations and 'lessons learned' to future projects. This research is undertaken to provide evidence that would support, and to make recommendations for, environmental policy, housing policy and improved urban planning that would better consider the financial well-being of households, their quality of life, as well as their impact on the environment in Winnipeg.

## **1.4 Research Questions**

The following research questions were formulated to address the problem statement for this thesis:

1. What is the nature, extent and impact of energy poverty in the Daniel McIntyre and St. Matthews neighbourhoods?
2. Are there renewable energy options at the local level that can be used to address energy poverty?

3. What are the institutional barriers between the levels of government, the community association and local residents that prevent a reduction in energy poverty and in what ways can they be overcome?

## **1.5 Research Methods and Analysis**

There are a variety of methods used to analyze energy poverty and the benefits of retrofitting homes to reduce energy consumption. To identify the nature of energy consumption in DMSM and the opportunities and barriers of improving energy efficiency in established, lower income neighbourhoods, the following methods were used:

- A targeted literature review of existing energy poverty and energy efficiency programming for low-income groups in Canada, the United Kingdom, and the United States.
- Structured interviews with twenty-four DMSM households selected through snowball sampling to establish local energy profiles.
- Semi-structured interviews with self-selected technical experts and self-selected professionals at the DMSMCA, BUILD, the City of Winnipeg, the Province of Manitoba, and Manitoba Hydro.

Each area will inform the research questions to be addressed.

Every participant signed a consent form. For details on ethics approval by the Joint-Faculty Research Ethics Board please see Appendix M. Answers from the structured interviews were recorded on paper. The semi-structured interviews with key informants were recorded with a digital audio device and transcribed verbatim.



### **1.5.1 Literature Review**

The first research method conducted was a targeted literature review of the current and emerging trends in energy poverty programs and on-site renewable energy systems. Documents were identified through keyword searches on the University of Manitoba databases and through Google Scholar. Research bibliographies were used to access additional print and scholarly sources. Internet searches were particularly useful for researching existing policies and programs of other jurisdictions.

Policies and programs from Canada, the United States and Europe were assessed for a number of characteristics. Policies were assessed by: determining which levels of government created and implemented the policies; the length of time such policies have been in place; changes in policy over time; effectiveness; and types of programs that were created as a result of the policies. Programs were assessed by determining: the type of program; the structure of the program; the funding source; the types of persons targeted; the type of organization that implements the program (such as municipal government, NGOs, local charity, etc.); effectiveness; and if they worked in conjunction with other programs. The policies and programs were categorized and are included as Appendices I, J and K.

The second part of the literature review identified existing on-site renewable energy technologies and potential use in an urban setting. Section 4.14 discusses renewable energy in more detail.

### **1.5.2 Structured Interviews**

The structured interview is useful for finding regularities among groups of people and to quantify data (Zeisel, 1981, p. 176). Used in conjunction with other research methods such as semi-structured interviews, the structured interview is also useful for gauging people's perceptions, attitudes, and values (Zeisel, 1981, p. 177).

The structured interview is strict in wording and protocol and the order of questions cannot be altered. The order of questions should make sense to the respondent and there is often a range of responses to select from (Robson, 1993, p. 230). Some questions were pre-coded, meaning respondents choose from a list of options that are “exhaustive, are mutually exclusive, and have a single level of abstraction” (Zeisel, 1981, p. 165). Some questions used a rating scale — the Likert Scale. The typical format is a five-level scale where the respondent is asked if they *strongly disagree*, *disagree*, *neither agree nor disagree*, *agree* or *strongly agree* but a four-point scale was used where the middle option of *neither agree nor disagree* was omitted to force the respondent to choose either a positive or negative response.

The structured interviews were conducted with twenty-four households in DMSM who either rent or own their homes. People residing in apartment buildings were not included in this research. A concerted effort was made to have representation from the six sectors of the population in Manitoba identified by Carter and Polevychok in their report that are more likely to be living in poverty: the aging society; the aboriginal population; immigrants and refugees; single-parent families; children; and the new middle-income sector (2009, p. 10). Census data identifies the abundance of these sectors in DMSM and attempts were made to locate residents that fall into at least one of

the six categories, however it was not always possible as it was difficult to locate willing participants. The sampling method relied on available subjects and continued through snowball sampling. Snowball sampling was appropriate to locate members of targeted segments of the population. Data was collected with a few members of the target population known to the researcher and then asking those individuals to provide contact information for other members of the target population. Interviews were conducted in their home, a public place or by phone – whichever location the respondent preferred. Each interview lasted approximately 20 to 45 minutes.

Energy poverty is impacted by the dwelling, the amount and cost of energy used by household members, and household income. As such, questions for the structured interview (shown in Appendix A) were grouped into four categories: accommodation, household costs and characteristics, personal information, and the community association. The purpose of the final set of questions about the community association was to provide the DMSMCA with data about local perceptions of their activities. The structured interview required pre-testing and three individuals formed the pre-test group and helped to identify any unintended side effects. After the pre-test, the order of the questions was modified to improve the consistency of the format of the survey.

Analysis of the results depended on the type of question asked. Closed-ended questions were analyzed with simple statistical procedures such as averages, percentages, and frequency counts. Open-ended questions were analyzed by coding: the grouping together of similar responses, then counting and followed by simple statistical analysis. The structured interviews were used to construct profiles of energy consumption, to confirm certain segments of the population in DMSM are more likely to experience energy poverty, and to identify barriers to performing energy retrofits. The resulting

resident energy consumption profiles are specific to the individuals interviewed and generalizations will not be possible to make, however they will be able to inform later research.

### **1.5.3 Semi-Structured Interviews**

The third research method consisted of semi-structured (key informant) interviews. Semi-structured, qualitative interviews are a type of interview in which the interviewer has “some freedom to ask different questions or the same questions in different orders for different respondents as long as certain predetermined topics are covered. The predetermined questions constitute an interview guide” (Zeisel, 2006, p. 227). Zeisel states that one of benefits of the semi-structured versus a closed interview is respondents are allowed to express their own understanding of a concept in their own terms (2006, p. 227).

Semi-structured interviews with planners, policy-makers, community developers, and technical experts (key-informants) involved with energy efficiency and affordable housing were conducted to gather information about programs and policies not readily available in print sources. These qualitative interviews were conducted in order to:

- Investigate the issues of implementing energy poverty initiatives;
- Articulate challenges and identify barriers; and
- Produce recommendations for Winnipeg.

The types of professionals that were interviewed were divided into five groups and were grouped as follows:

**Group 1:** Professional planners involved in the provincial Community Led Emissions Reduction (CLER) program and from the Department of Planning, Property and Development at the City of Winnipeg;

**Group 2:** The greening coordinator and housing coordinator of the DMSMCA;

**Group 3:** Technical experts in the energy efficiency and renewable energy fields;

**Group 4:** The executive director of the Building Urban Industries through Local Development (BUILD) program; and

**Group 5:** A representative of the Lower Income Energy Efficiency Program (LIEEP) at Manitoba Hydro.

Figure 1 shows the author’s pre-interview expected relationships between the five groups.

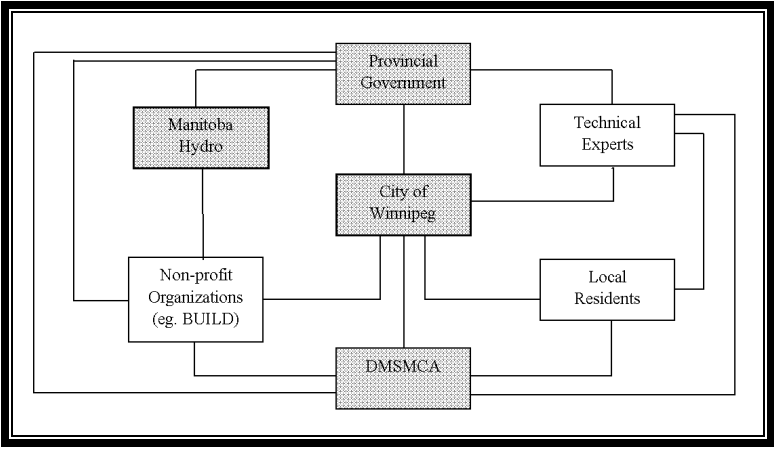


Figure 1. Expected relationships between the five groups interviewed.

It is expected that some groups will have relationships with one another and others will not. The shaded boxes indicate where professional planners are expected to be employed. This is important as the role of the planner would be to strengthen weaker

relationships. The Province, as the main funding source for housing and social programs, is expected to have a strong relationship with the DMSMCA and BUILD. The City, as the closest level of government to neighbourhoods, is expected to have a relationship with the DMSMCA, BUILD and local residents. Technical experts are expected to have a relationship with most of the other groups because of the knowledge they have is applicable to programs delivered at all levels of government. The DMSMCA, as a grassroots organization is expected to have a close relationship with the local residents and non-profit organizations such as BUILD that assist local residents. Manitoba Hydro delivers LIEEP so they are expected to have a relationship with BUILD. The purpose of these interviews is to determine the accuracy of Figure 1 and to understand the strengths and weaknesses of these relationships. This is important because the relationship between the different professionals impacts the delivery of energy poverty initiatives.

Each group of interviews had a particular focus based on the individual's expertise however all groups were asked about their knowledge of energy poverty, on-site renewable energy and their relationships with other local stakeholders.

The Group 1 interviews were conducted with a provincial planner and a City of Winnipeg planner. Questions for the provincial planner focussed on the CLER program and questions for the City of Winnipeg planner focussed on environmental and housing initiatives. Both planners were asked about the relationship between the two levels of government.

The Group 2 interviews with the greening coordinator and housing coordinator of DMSMCA focussed on their role in establishing green and affordable housing initiatives, the types of programs that they have implemented, the obstacles that they have faced to

implement such programs, the benefits that the programs have had to date, and the potential to expand current programs to include the transition from current energy sources to renewable energy sources.

The Group 3 interviews with the technical experts inquired about the cost of retrofitting homes, the constraints of on-site renewable energy (such as the local climate, cost, permits), and the limitations of current technology. Three technical experts were interviewed to try to get all the information that was desired. A local contractor for a non-profit agency, an engineer and a Winnipeg resident that undertook energy efficiency retrofits for an older home in a neighbourhood similar to DMSM were all questioned.

The Group 4 interview was specifically about the BUILD program. Questions included the work done by BUILD in the DMSM neighbourhoods, the potential to expand the program from reducing energy consumption to transitioning to on-site renewable energy, the barriers to operating the program and the role of the province and city with the program.

The Group 5 interview inquired about current low-income energy efficiency programs, knowledge of on-site renewable energy and the potential to transition from the current energy system to on-site renewable energy.

Different interview guides were used for each session. The interview guides were developed prior to conducting the interviews to ensure that all necessary topics were covered for each professional. Probes and follow-up questions were used to direct the focus of the interviewees to the relevant topics for this thesis. The interview guide templates are provided in Appendix B. Each subsequent interview built upon previous interviews so some of the questions, themes and prompts evolved as the research progressed. As well, some of the

key informants were asked questions from more than one group as their expertise spanned the categories established by the researcher.

These interviews were recorded with an audio device and each lasted approximately one half-hour to one hour. The interviews were conducted over five months (May 2010 and September to December 2010). The interviewee and author signed a letter of informed consent prior to each interview.

Each interview was transcribed from an audio recording. The interviews were read and coded. After each interview had been initially coded, a second reading grouped together similar responses and a definition was given to each theme. A third reading observed how the theme was represented in the respondent's own words. The results of the coding are shown in Appendices C, D, E, F and G.

## **1.6 Significance of Study**

This study evaluates the potential of reducing energy poverty for low-income households in DMSM through energy retrofits and on-site renewable energy sources. There are several intended benefits. The study develops a number of recommendations that can be pursued by the stakeholders including the DMSMCA, the provincial government, the municipal government, local residents and Manitoba Hydro. The recommendations may be useful to other jurisdictions as well that are interested in reducing energy poverty and energy consumption.

The first benefit is that information obtained from this study will be provided to the DMSMCA. As a recently established community association, the DMSMCA will benefit from research conducted in their community as they move forward and try to



implement green initiatives. The structured interviews with local residents specifically ask about the housing grants the DMSMCA provides, current green programs and initiatives the residents are aware of, and the types of green programs and initiatives they would like to see the DMSMCA undertake in the future.

The provincial government will also benefit from the recommendations to reduce energy consumption because the recommendations will assist the provincial government in meeting their emission targets.

The municipal government will benefit from the recommendations because they will offer ideas and initiatives that are feasible for the City to implement to reduce energy consumption and poverty. The City, just like the Province, has set targets to reduce energy consumption and additional research in this field may be helpful in meeting those targets. As well, the study will provide recommendations for additional linkages between the municipal government, provincial government and DMSMCA.

The interview process with local residents will provide the residents with information about local programs and services that contribute to implementing energy conservation measures. The interviews conducted with local residents will also provide information to each interviewee and may result in a reduction in energy consumption.

## **1.7 Assumptions and Limitations**

This study is limited by the small sample size of resident interviews. The original target was thirty participants but after extensive and time-consuming attempts, the total number interviewed was reduced to twenty-four participants. The structured interviews were conducted over a long period – from April to December 2010 – which made it

difficult for some respondents to locate their Manitoba Hydro bills from January, February and March 2010. Although the participants could obtain this data by contacting Manitoba Hydro, several potential participants refused to be interviewed for this reason and two participants have not submitted this data after numerous requests. As well, it must be noted that each participant did not necessarily have the same billing dates and a direct comparison of the energy consumption data was made more difficult because of this.

The structured interviews with households represent a snapshot in time and were limited to those residents that either rent or own their own homes and do not include those that live in apartment buildings. The survey conducted was limited to respondents that responded to recruitment posters, were located through personal contacts and were willing to be interviewed. The preferred method for the structured interview was in person because it promoted additional discussion about poverty, the neighbourhood and green technology. One of the interviews was conducted over the phone to accommodate the interviewee's schedule.

The semi-structured interviews were limited to nine professionals. The interviews were conducted during April, May, September, October, and December 2010. The study was limited by the subjective gathering of information and it is assumed that the chosen interviewees were the most appropriate individuals to interview. For example, one representative from the City and one representative from the Province were interviewed. Given the time constraints of conducting research, it was not possible to interview additional experts that would be able to provide further information — many of the issues

discussed with the various respondents would require input and expertise from a wide variety of city and provincial departments.

Three technical experts were interviewed, and each provided a different perspective regarding the feasibility of using sources of renewable energy in established, low-income neighbourhoods. It was discovered during this part of the research that additional interviews would have been helpful but potential interviewees did not respond to multiple requests for an interview. The representative from Manitoba Hydro was interviewed on two different occasions — once in May 2010 and again in October 2010. At the time of the first interview the federal Eco-Energy Rebate Program had just been cancelled and the impact on Manitoba Hydro's Lower Income Energy Efficiency Program (LIEEP) was not yet known. The LIEEP underwent a review in the following months and the follow-up interview discussed the impact of the cancellation of the federal program.

## **1.8 Chapter Outlines**

*Chapter One* provides an overall introduction to the thesis, stating underlying problems and providing background information on energy poverty, the benefits of increasing energy efficiency and renewable energy. The chapter also outlines the objectives and limitations for the study, the significance of the study and the research methods being applied.

*Chapter Two* provides details on the geographic location of the project, the demographics, housing stock and conditions, household and income characteristics as well as the history, goals and current initiatives of the DMSMCA.

*Chapter Three* outlines housing policy at the federal, provincial and municipal level to provide the context for current affordable housing initiatives in Winnipeg.

*Chapter Four* focuses on a literature review of trends and rationale for improving the energy efficiency of dwellings, establishing energy poverty strategies and programs, the benefits of transitioning to renewable energy sources, and an explanation of the different types of on-site renewable energy sources. The review also links the theories of the Just City, environmental justice, and sustainable development to creating and implementing an energy poverty strategy for the DMSM neighbourhoods in Winnipeg. Directions for research are based on findings from this chapter.

*Chapter Five* reports the results from the three research methods utilized. An analysis and discussion of the results is presented as well as a determination of the best approach for addressing energy poverty in DMSM.

*Chapter Six* provides a conclusion, recommendations, and areas for further study. The recommendations presented in this chapter are based on: a literature review presented in Chapter 4; common barriers to energy retrofits as identified by local residents; and research on energy retrofits, on-site renewable energy and institutional relationships through semi-structured (key informant) interviews. The chapter concludes with a discussion on the implications of this research for planning practice and identifies directions for further research.

*Appendices A and B* contain the questionnaires used for the structured interviews with DMSM households and the interview guides used for the semi-structured interviews with key informants.

*Appendices C to G* contains a table that summarizes the different themes encountered for each group of semi-structured interviews.

*Appendix H* contains a table that summarizes the advantages and disadvantages of on-site renewable energy versus community renewable energy.

*Appendices I, J and K* list and describe the initiatives related to energy efficiency, energy poverty and renewable energy found in Canada, the United Kingdom, and the United States.

*Appendix L* provides a summary of the energy audit readings for DMSM households that were interviewed.

*Appendix M* contains a copy of the ethics approval letter.

*Appendices N and O* contain copies of the Letter of Informed Consent that was signed off by each structured interviewee and semi-structured interviewee prior to commencing the interview.

## **CHAPTER 2: NEIGHBOURHOOD CHARACTERISTICS**

The first section of this chapter presents the trends in local natural gas and electricity costs, the impact that the rates have on average households, and a brief comparison to energy prices in other provinces. The next section examines the demographics and characteristics of the housing stock in DMSM and the final section provides a brief history of the DMSMCA.

### **2.1 Local Energy Costs and Comparisons**

Since 2008, natural gas commodity prices have been very volatile, initially falling because of the global economic slow-down and are still declining (Manitoba Hydro, 2010, p. 3). In Manitoba, Centra is a subsidiary of Manitoba Hydro and is Manitoba's largest natural gas distributor. Approximately half of Manitoba Hydro's customers rely on natural gas for space heating, the other half depend on electricity, propane, fuel oil and wood. With respect to this other half, electricity dominates.

Natural gas commodity prices represent approximately 65% of a customer's bill for a customer receiving primary natural gas under Centra's quarterly rates. The other components of the natural gas bill include a basic monthly charge, a transportation charge and a distribution charge. Centra passes on to its customers the utility's cost of gas without either any mark-up or profit. The following table illustrates changes in natural gas commodity prices and the affect on customers:

Table 1

*Historical primary gas costs and bill impact ending November 2011.*

<b>Date</b>	<b>Primary Gas Commodity Cost per Gigajoule</b>	<b>% Change in Primary Gas Cost</b>	<b>Annual Bill For Typical Residential Volume<sup>1</sup></b>	<b>% Change in Annual Bill at Current Volumes<sup>2</sup></b>
<b>01-Feb-06</b>	9.162	na	\$1,265	na
<b>01-Feb-07</b>	7.661	-16.40%	\$1,150	-9.10%
<b>01-Feb-08</b>	7.314	-4.50%	\$1,153	0.30%
<b>01-Feb-09</b>	7.853	7.40%	\$1,183	2.60%
<b>01-Feb-10</b>	5.5	-30.00%	\$1,035	-12.50%
<b>01-Nov-10</b>	4.166	-24.30%	\$904	-12.70%
<b>01-Nov-11</b>	3.753	-9.91%	\$895	-1.00%

Source: Manitoba Hydro

1. The average annual bill above is based on the estimated annual consumption of a typical customer of 2,530 cubic metres. On August 1, 2009 typical annual consumption, previously estimated at 2,590 cubic metres, was reduced to 2,530 cubic metres to reflect the ongoing and increasing impact of customer conservation efforts.

2. Residential customers receiving primary gas from marketers and Centra's Fixed Price Program rather than from Centra would not have the same cost and bill experience as Centra's customers. Primary gas costs of customers on contracts are in accordance with the contract with the supplier, generally fixed for one to five years at rates different than those charged by Centra as per the above quarterly rates.

Since 2006, natural gas rates have fallen significantly — decreasing by 59.0% and this decrease is reflected in the average annual bill. Compared to other provinces, Centra's residential commodity rate on average for 2010 (\$5.15/GJ) is similar to the rate in Saskatchewan (\$5.03), slightly higher than the rate seen in Alberta (\$4.47/GJ) and 24 percent lower than in British Columbia (\$6.78/GJ). Despite the trend of declining natural gas prices in recent years, it is expected the prices will rise in the future.

The cost of electricity in Manitoba is typically lower than in other provinces, but in recent years the cost has steadily increased. Table 2 shows the changes in the cost of electricity and the impact on the average customer's bill:

Table 2  
*Historical electricity costs and bill impact ending April 2011.*

Date	Cost (in cents) per Kilowatt Hour	Cost per 1,000 Kilowatt Hours	Cost including taxes	% Change in Monthly Bill at Current Volumes
01-Apr-06	6.3	63.02	\$73.42	na
01-Apr-07	6.44	64.41	\$74.39	1.30%
01-Apr-08	6.44	64.41	\$73.75	-0.90%
01-Apr-09	6.94	69.4	\$79.47	7.80%
01-Apr-10	7.08	70.84	\$81.11	2.10%
01-Apr-11	6.62	66.20	\$74.59	8.04%

Source: Manitoba Hydro

Compared to other provinces, Manitoba Hydro electricity prices were the second lowest in 2010, just slightly higher than Hydro-Quebec at \$68.75. BC Hydro was third lowest with an average monthly charge of \$77.93 while Maritime Electric (\$161.47), SaskPower (\$131.51) and Nova Scotia Power (\$128.88) had the highest rates.

## 2.2 The Neighbourhoods

Daniel McIntyre and St. Matthews (DMSM) are two neighbourhoods in the West End of Winnipeg. These neighbourhoods are considered to be part of Winnipeg's inner city, have older housing stock and generally a lower-income population.

For the purpose of this study, it is desirable to conduct research in these neighbourhoods because the neighbourhood size is manageable. Additionally, DMSM are unique inner city neighbourhoods with different concerns and issues than are found in other inner city neighbourhoods such as Spence and West Broadway. The housing stock in Daniel McIntyre and St. Matthews neighbourhoods was largely constructed prior to 1946 and the EnerGuide ratings are quite low for housing stock that have not been



retrofitted (see Table 8). Additional reasons for choosing these two neighbourhoods include the higher rate of home ownership (46.9%) compared to other inner city neighbourhoods like Spence (17.5%) and West Broadway (7.2%). As well, there is a higher percentage of single detached older dwellings (53.8%) compared to Spence (20.7%) and West Broadway (6.0%) where apartment buildings and rooming houses are more common. The DMSMCA is a relatively new community association, established in 2007 and as such little research has been done in this community compared to the adjoining neighbourhood of Spence.

These reasons only partly explain why these neighbourhoods were chosen as the study area. The inspiration began with two friends of the author who purchased a home in Daniel McIntyre. Their first winter in the home proved to be difficult. Although both friends worked, they were unable to afford to comfortably heat their home during the winter and frequently, to keep the cost of heating manageable, they kept the temperature of the home around 15° Celsius. The impact on their minds and bodies was great until they had managed to save enough money to properly insulate their home. This alerted the author — how many more people have difficulty heating their home and paying their utility bills?

### **2.2.1 Geographic Location**

Daniel McIntyre and St. Matthews are located west of Winnipeg's downtown area, as shown in Figure 2. The Daniel McIntyre neighbourhood is bounded by Notre Dame Avenue to the north, Sherbrook Street to the east, Ellice Avenue to the south and Ingersoll Street to the west. The St. Matthews neighbourhood is bounded by Ellice

Avenue to the north, Sherbrook Street to the east, Portage Avenue to the south and Ingersoll Street to the west (see Figure 3).

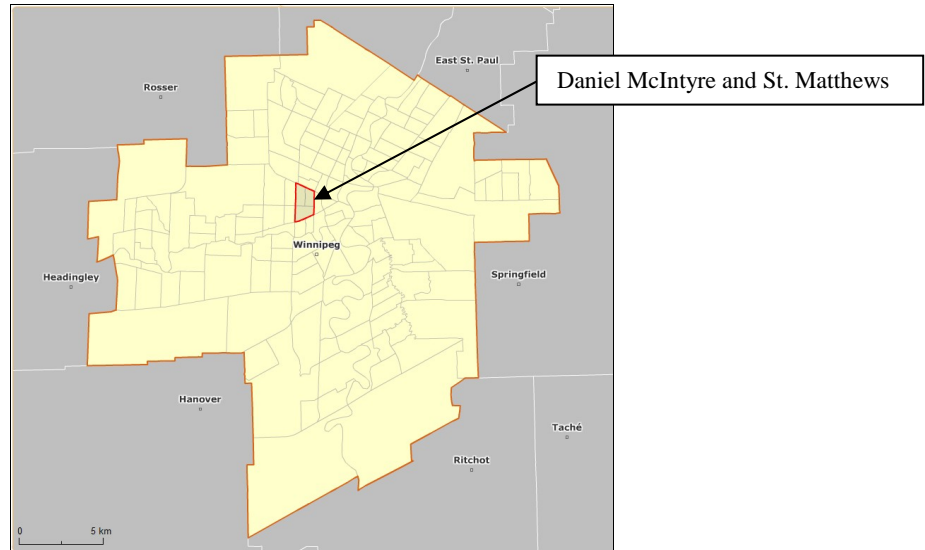


Figure 2. Contextual map of the study neighbourhoods.



Figure 3. Boundaries of the Daniel McIntyre and St. Matthews Neighbourhoods (Source: Skelton et al., 2006)

## 2.2.2 Demographics

The following sections provide demographic information for Daniel McIntyre and St. Matthews in comparison to the City of Winnipeg. Demographic data was supplied by the 2006 Census and derived from two sources – the City of Winnipeg community profiles and Statistics Canada. The City of Winnipeg community profiles provided data for each neighbourhood and the city. Statistics Canada provides data by census tract. St. Matthews is one census tract and Daniel McIntyre is divided into two census tracts – one census tract is east of Simcoe Street and the other is west of Simcoe Street.

### 2.2.2.1 Population

Table 3 shows the population for each neighbourhood and for Winnipeg from 1971 to 2006. Winnipeg's population has grown steadily since 1971, averaging 2.5% growth during each census period with a high of 5.3% between 1981 and 1986 to a low of 0.2% between 1996 and 2001. The population of the Daniel McIntyre neighbourhood declined by over 1,700 people for the same time period – averaging a 2.2% decrease between each census period. The St. Matthews neighbourhood shows a similar trend of population decline of almost 2,000 people and averaged a 4.1% decrease.

Table 3  
*Neighbourhood population from 1971 to 2006.*

<b>Region</b>	<b>1971</b>	<b>1976</b>	<b>1981</b>	<b>1986</b>	<b>1991</b>	<b>1996</b>	<b>2001</b>	<b>2006</b>
<b>Daniel McIntyre</b>	11,505	10,840	10,470	10,960	10,400	9,885	9,789	9,817
<b>St. Matthews</b>	8,035	7,335	6,710	6,920	6,365	5,885	6,041	5,953
<b>Winnipeg</b>	535,100	560,875	564,473	594,551	616,455	618,475	619,540	633,451

Source: Statistics Canada

### 2.2.2.2 Household Composition

Household composition is somewhat varied as shown in Figure 4. The neighbourhoods have a higher percentage of single person households than Winnipeg. They also have 6 or more person households than Winnipeg. Two person households are more abundant in Winnipeg than for either neighbourhood. Three and 4 to 5 person households are fairly equal across the different areas.

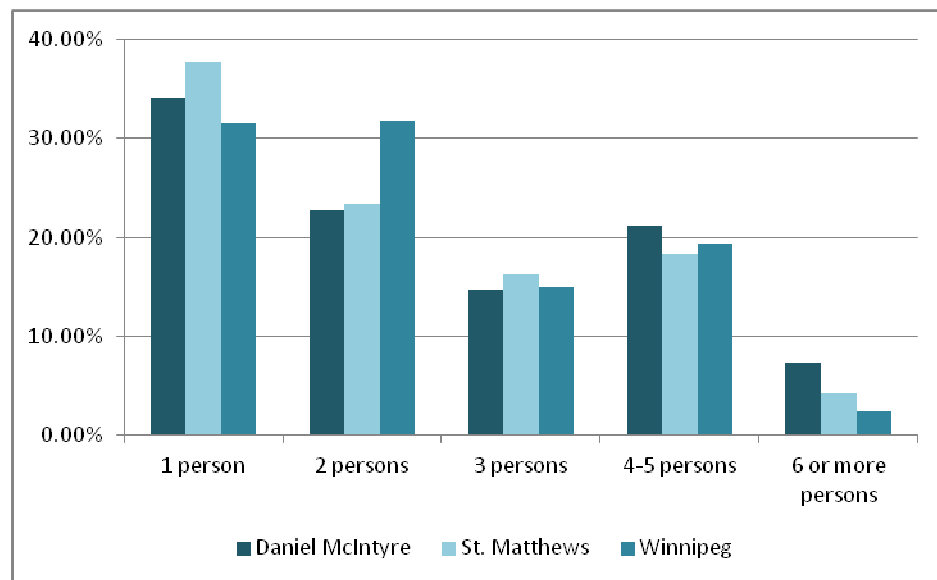


Figure 4. Frequency of different household sizes. Data source: Statistics Canada.

### 2.2.2.3 Age Composition

There is little variation between the two neighbourhoods but both are significantly younger in age composition than Winnipeg. Figure 5 depicts the higher percentage of population under 25. All of the age groups 40 and over are more abundant for Winnipeg whereas the age group 25 to 39 is most prevalent in St. Matthews.

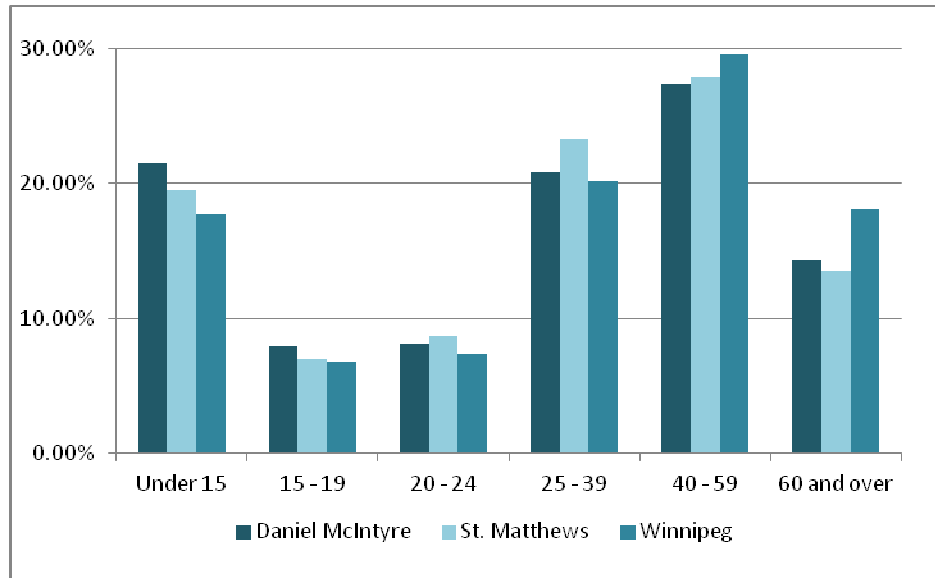


Figure 5. Frequency of different age groups. Data source: Statistics Canada.

#### 2.2.2.4 Employment

Across all areas, the percentage of the population in and out of the labour force is constant, with less than 2.2% variation. Of the percentage of people employed or unemployed, there is greater variation across areas. Employment is highest in Winnipeg and unemployment is highest in St. Matthews.

Table 4

*Rate of employment.*

<b>Employment Status</b>	<b>Daniel McIntyre</b>	<b>St. Matthews</b>	<b>Winnipeg</b>
In labour force	65.80%	67.70%	68.00%
Employed	60.90%	62.20%	64.50%
Unemployed	7.40%	8.10%	5.20%
Not in the labour force	34.20%	32.30%	32.00%

Source: Statistics Canada

### 2.2.2.5 Aboriginal Identity

The following figure depicts the percentage of the population by area that have identified themselves as Aboriginal. Daniel McIntyre and St. Matthews clearly have a much larger percentage of population that are Aboriginal and these two groups are considerably higher in DMSM than for the City as a whole.

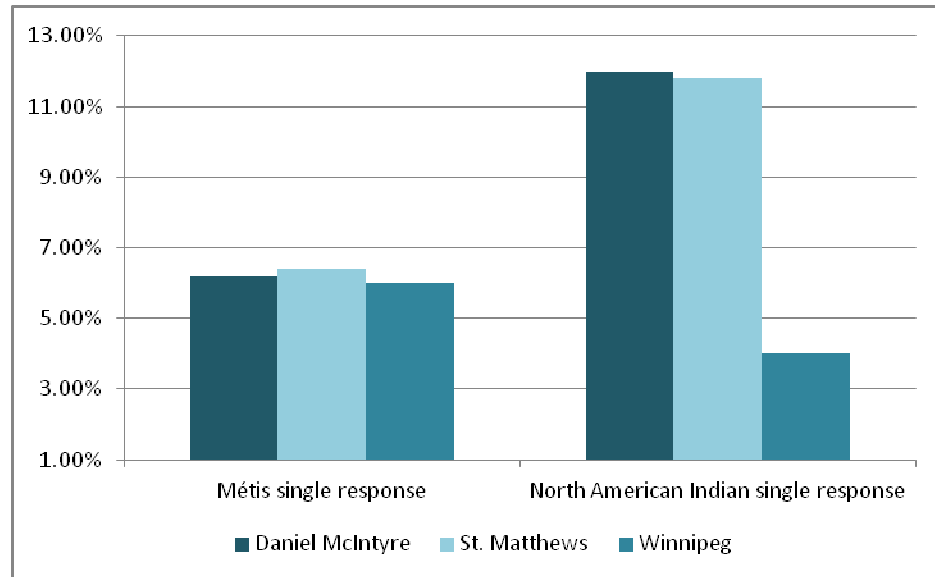


Figure 6. Frequency of Aboriginal identity. Data source: Statistics Canada.

### 2.2.2.6 Income

Of the various categories examined, Figures 7 and 8 illustrate income as the one category with the greatest disparity. Individuals and households in DMSM have average incomes that are only 65% of the average incomes for Winnipeg individuals and households. The majority of individuals in DMSM earn less than \$20,000 with approximately 67% of households earning less than \$50,000. Almost 20% of individuals and 50% of households in Winnipeg earn more than \$50,000.

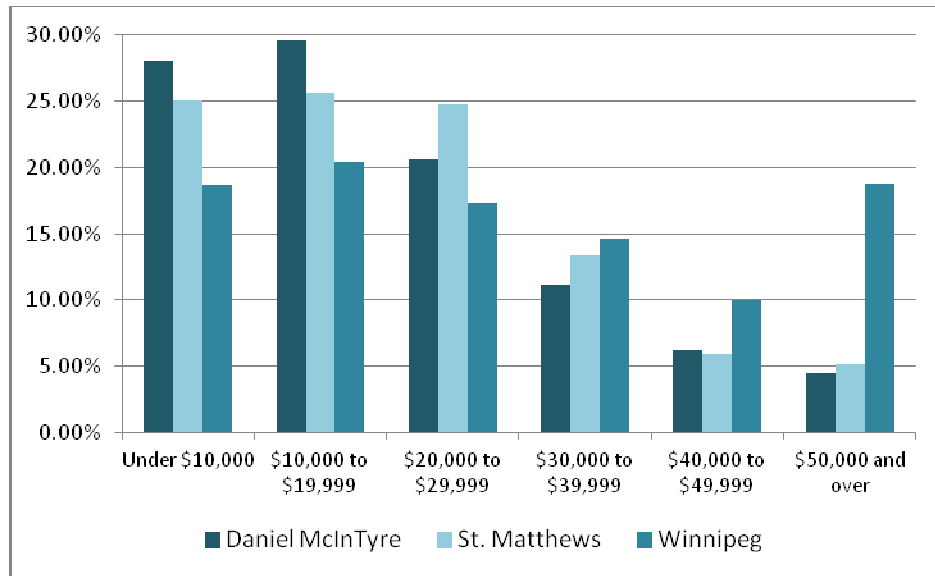


Figure 7. Frequency of individual income levels. Data source: Statistics Canada.

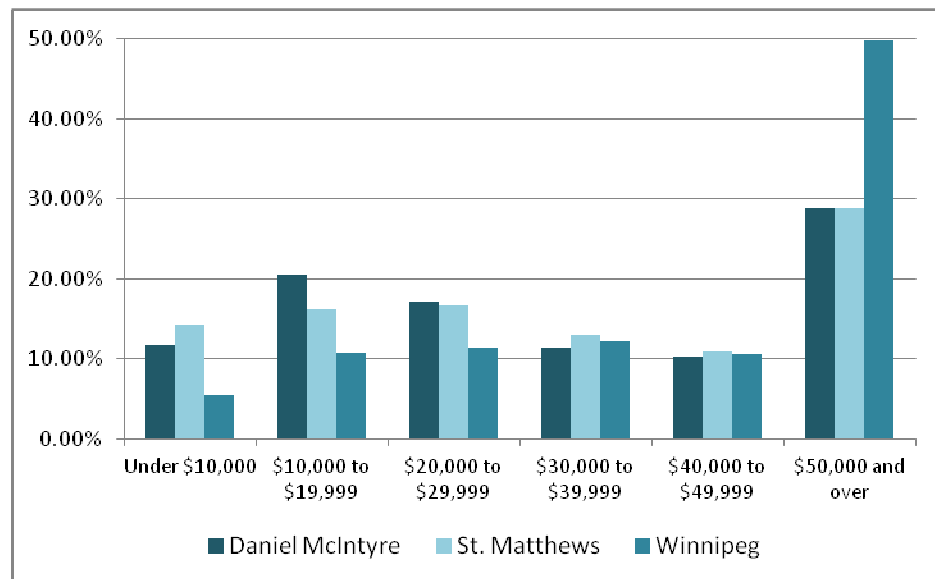


Figure 8. Frequency of household income levels. Data source: Statistics Canada.

A further examination of income, as illustrated in Table 5, clearly shows that the incidence of low income is much greater in DMSM than for Winnipeg. Approximately 33.0% of the total economic families in DMSM are considered low income compared to

only 11.1% for Winnipeg. Certain types of economic families are also more likely to be low income — such as female lone-parent families. The low income cut-offs, as determined by Statistics Canada, show that approximately 30.0% of families in DMSM are earning less than the values depicted in Table 6.

Table 5  
*Incidence of low income in 2005 after taxes.*

	<b>Daniel McIntyre</b>	<b>St. Matthews</b>	<b>Winnipeg</b>
Total economic families	30.30%	28.90%	11.10%
Couple economic families	20.80%	20.70%	6.40%
Male lone-parent economic families	38.90%	33.30%	18.10%
Female lone-parent economic families	55.10%	50.00%	33.60%

Source: Statistics Canada

Table 6  
*Low income cut-offs before taxes, 2009.*

<b>Size of family unit</b>	<b>Community Size 500,000 and over</b>
1 person	\$22,229
2 persons	\$27,674
3 persons	\$34,022
4 persons	\$41,307
5 persons	\$46,850
6 persons	\$52,838
7 or more persons	\$58,827

Source: Statistics Canada



### 2.2.3 Dwelling Characteristics and Condition

Figure 9 depicts the 2006 dwelling characteristics for Daniel McIntyre, St. Matthews and the City of Winnipeg. The two neighbourhoods are comprised of fairly similar types of housing, dominated by single-detached dwellings followed by apartments with less than 5 storeys, apartments more than 5 storeys and then duplexes.

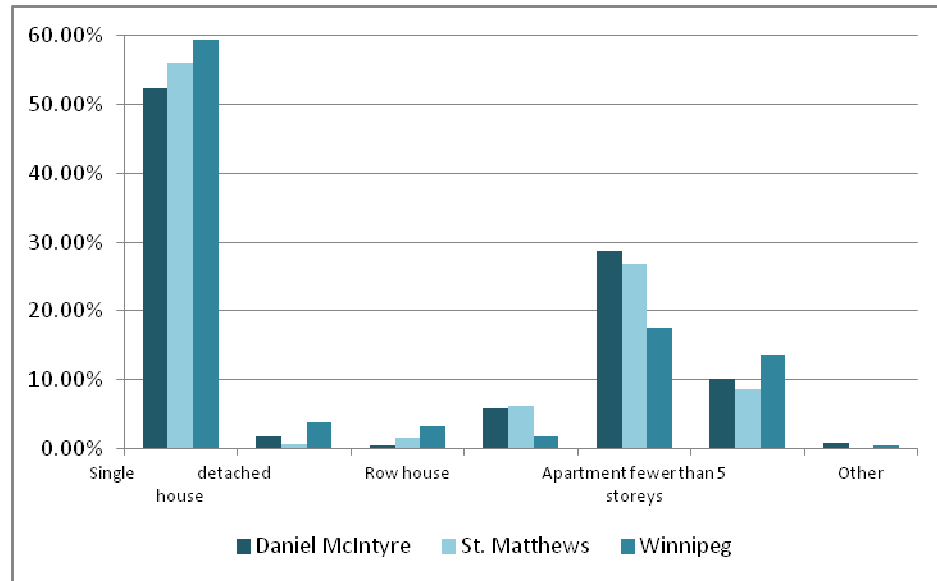


Figure 9. Frequency of different types of dwellings. Data source: Statistics Canada.

The percentage of owned dwellings is almost 20% lower in DMSM than in Winnipeg, which is a substantial difference. Subsequently the percentage of rental dwellings is much higher in DMSM than in Winnipeg, as shown in Figure 10.

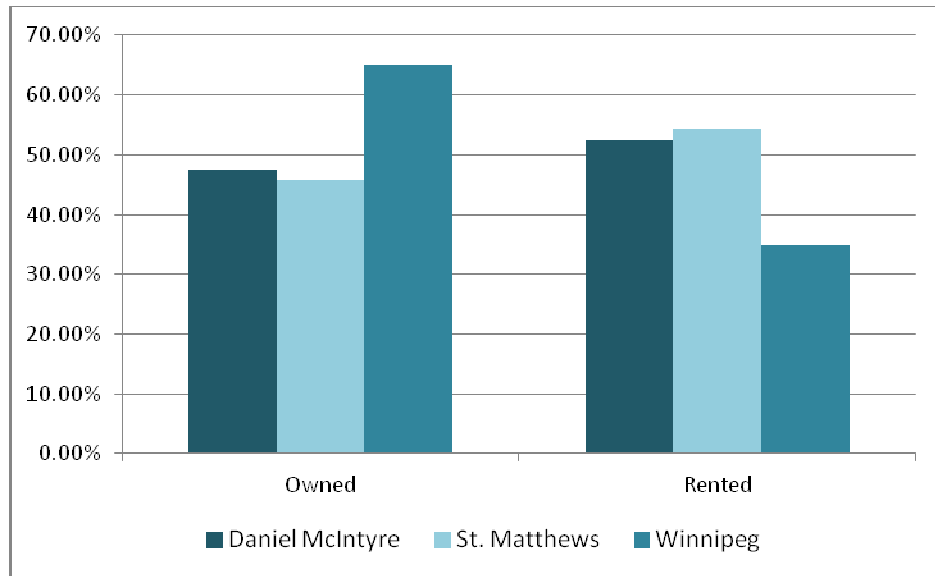


Figure 10. Dwelling tenure. Data source: Statistics Canada.

The average cost of rent and the average owner payment for a dwelling are lower in DMSM than for Winnipeg. Although housing costs are lower, a greater percentage of households are spending more than 30% of their income on shelter costs. Housing affordability, based on the CMHC core housing need model, defines affordability as spending no greater than 30% of income on shelter costs (30% rent/income ratio).

Table 7

*Average cost of owned and rented dwellings.*

	<b>Daniel McIntyre</b>	<b>St. Matthews</b>	<b>Winnipeg</b>
Tenant-occupied dwellings	52.40%	54.40%	35.00%
Tenant-occupied dwellings spending more than 30% of household income on shelter	43.50%	43.50%	37.30%
Average gross rent	\$493	\$524	\$618
Owner-occupied dwellings	47.60%	45.80%	65.00%
Owner-occupied dwellings spending more than 30% of household income on shelter	14.00%	11.60%	11.60%
Average value of dwelling	\$86,782	\$81,078	\$161,999
Average owner payment	\$646	\$623	\$838

Source: Statistics Canada

Table 8 shows the period of construction of dwellings in each of the two neighbourhoods. Again, there are similarities and nearly 60% of dwellings were constructed prior to 1946 and nearly 100% of the dwellings were constructed prior to 1980. However, the period of construction data does not register renovations that may have subsequently been completed by local residents.

Table 8  
*Period of construction for dwellings.*

	<b>Daniel McIntyre</b>	<b>St. Matthews</b>	<b>Winnipeg</b>
Before 1946	57.10%	58.70%	19.50%
1946 to 1960	18.80%	16.00%	20.30%
1961 to 1970	10.40%	16.60%	16.80%
1971 to 1980	9.70%	5.10%	19.50%
1981 to 1990	2.90%	2.30%	14.50%
1991 to 2000	1.20%	0.90%	5.80%
2001 to 2006	0.00%	0.40%	3.60%

Source: Statistics Canada

Dwellings in DMSM are more likely to require minor repairs and major repairs. Dwellings in DM are twice as likely to require major repairs and in SM dwellings are three times as likely to require major repairs compared to Winnipeg.

Table 9  
*Condition of dwellings.*

	<b>Daniel McIntyre</b>	<b>St. Matthews</b>	<b>Winnipeg</b>
In need of regular maintenance only	45.90%	43.30%	62.40%
In need of minor repairs	37.70%	34.30%	29.10%
In need of major repairs	16.50%	22.40%	8.50%

Source: Statistics Canada

### **2.3 The Daniel McIntyre St. Matthews Community Association**

The community association arose from a combination of a grassroots initiative and funding opportunities from the provincial government. Funding for the Daniel McIntyre/St. Matthews Community Association (DMSMCA) was announced in the summer of 2006. A steering committee was formed and from 2006 to 2007 community consultation was performed to determine the six priority areas. The six areas were determined to be:

1. Housing
2. Safety & Crime
3. Community Involvement
4. Physical Environment
5. Parks and Recreation
6. Community Economic Development

The DMSMCA was incorporated in March 2008 and the first Annual General Meeting was held in May 2008. The DMSMCA has established a five-year plan and the goal for the first year was to undertake the first three priorities. The goal for the second year was to continue with the first three priorities and begin work on the next three priorities.

During the first year, two grant programs were offered – one for housing improvements and one for local groups who wanted to conduct projects related to community involvement. The first year of operation issued 30 grants and during the second year they issued 60 grants. These exterior housing grants are for a maximum of one thousand dollars. The resident homeowner must contribute at least 20% to the

project or landlords must match the grant. More applications are received than there are grants and applicants are selected by draw.

In 2008, DMSMCA became one of the neighbourhood participants for the provincial Community Led Emissions Reduction program (CLER). The DMSMCA has developed an action plan where an emissions reduction target of 0.75 tons per person has been set. Initiatives that are being undertaken to meet this target are compost pickup, a car share, active and safe routes to school, neighbourhood bike share, sustainable yard care and community gardens.

DMSM is currently designated as a Neighbourhood Improvement Zone, however, as noted earlier they are not designated as a Housing Improvement Zone. Additional funds would be available from the City of Winnipeg if this designation applied to DMSM.

## **2.4 Chapter Summary**

This chapter presented the background information on local energy costs, details on the demographics and housing stock of DMSM, and a brief history of the DMSMCA.

DMSM, in comparison to Winnipeg, is a lower income area with older housing stock in more need of repairs. Census data indicates the housing stock is primarily constructed prior to 1946 and therefore less energy efficient than more recently constructed dwellings. Census data also indicates that individual and household incomes are significantly lower in these two neighbourhoods than for the city. The large number of households below LICO imply that at least the same number, if not more, are also in energy poverty. Older, less efficient dwellings combined with lower incomes in DMSM

sets a foundation for energy poverty to become entrenched in these neighbourhoods and others with similar characteristics, unless appropriate actions are taken.

The following chapter discusses housing policy at the three levels of government to provide a context for local conditions.

## **CHAPTER 3: HOUSING POLICY**

Energy poverty arises from many different factors: quality of the dwelling; the amount and cost of energy used by the household members; and household income. Chapter 2 discussed the cost of energy, quality of housing and household income and this chapter provides the background information on housing policy. Current housing policies can encourage or inhibit the development of energy poverty initiatives. This chapter summarizes federal, provincial and municipal housing policy to provide the context for current affordable housing initiatives in Winnipeg. National, provincial and municipal housing policy greatly impacts the ability of community organizations to deliver affordable housing programs, including low-income energy efficiency programs. All levels of governments should be responsible for housing but the federal government has shifted the responsibility for housing to the provinces while the City of Winnipeg plays a minimal role in housing.

### **3.1 Federal Government Housing Policy**

The growing gap between rich and poor Canadians has increasingly manifested itself in the housing system. Public policy decisions since the mid-1980s have exacerbated the disparity between rich and poor since government expenditures on housing have traditionally been among the first to be cut (Hulchanski, 2002, p. 7). In 1993, the federal government withdrew their support for housing until The Affordable Housing Initiative (AHI), introduced in 2001, provided funding to the provinces to delivery affordable housing programs (see Section 3.4 for more information on AHI). In September 2008, the government announced \$1.9 billion, over five years, for housing and

homelessness programs for low-income Canadians and as part of this investment, the AHI was extended for two years, until March 31, 2011. A stimulus package offers an additional \$1.525 billion in housing measures to build new and renovate existing social housing. This funding is being delivered through amendments to existing cost-sharing and delivery arrangements with provinces and territories through the AHI (CMHC, 2011). However, when the current agreements expire shortly, it will be necessary to source other funding for housing and energy retrofits.

The federal government is not likely to provide significant increases in sustainable funding beyond the current stimulus package (Carter, 2009, p. 6). The short term incentives to address the current economic “crisis” may actually reduce federal funding in years to come as the federal government works to get deficits and debt under control again. The Conservative Party offers no strategies to address housing except for the reinstatement of the Eco-Energy Retrofit grants for one more year which is out of reach for low-income households. Strong leadership from the federal government is necessary to guide strategies and develop basic guidelines (Carter, 2005, p. 10).

### **3.2 Province of Manitoba Housing Policy**

The Manitoba Housing and Renewal Corporation (MHRC) is the provincial body responsible for all housing and receives policy direction from the provincial government. *The Housing and Renewal Corporation Act* states that the purpose of the MHRC is:

1. To ensure that there is an adequate supply of housing stock in Manitoba;



2. To enhance the affordability of, and accessibility to, adequate housing for Manitobans, particularly those of low and moderate income or those with specialized needs;
3. To maintain and improve the condition of existing housing stock; and
4. To stimulate and influence the activities of the housing market to the benefit of Manitobans as a whole.

These points are addressed through initiatives such as HOMEWorks! and Neighbourhoods Alive!

HOMERworks! is the long-term provincial housing strategy and policy framework. Launched in 2008, the initiative is a \$104.5 million, three-year program that prioritizes eight specific segments of the population: the homeless; new Canadians; First Nations and Métis; low-income households; seniors; mature neighbourhoods and communities; Northern Manitoba; and rural communities with developing industries. It also supports other provincial initiatives such as All Aboard: Manitoba's Poverty Reduction Strategy and is meant to support community and economic development as well as provincial climate change goals. HOMERworks! promotes: the economic and social independence of people, places and communities; accountability among governments, organizations and citizens; and more housing options for Manitobans (Manitoba, 2009, p. 6).

HOMERworks! is complimentary to other federal and provincial housing programs including the Een Dah Aung program for Aboriginal off-reserve housing, the Neighbourhood Housing Assistance Program, the Residential Rehabilitation Assistance Programs, Rental and Co-operative Housing Program, Home Ownership Program, Homebuyer Down Payment Assistance Program and the Northern Remote Renovation

Program. All of these programs can play a role to increase affordable housing and to make the housing stock more energy efficient (MHRC, 2008, p. 1).

Neighbourhoods Alive! is an interdepartmental initiative that supports neighbourhood revitalization efforts of designated neighbourhoods in Winnipeg. In 2005, DMSM received the Neighbourhoods Alive! designation from the provincial government. Since DMSM has been designated as a NA! area, the neighbourhoods have received \$908,000 in funding (as of March 31, 2010). Generally, the intent of this funding is to strengthen community economic development and community development through the delivery of NA! Programs. The Neighbourhood Housing Assistance program is the only program directly related to housing and provides grants of up to \$10,000 per residence (Manitoba Neighbourhoods Alive, 2002, p. 6).

### **3.3 City of Winnipeg Housing Policy**

The City of Winnipeg has the second largest stock of older poor quality housing in Canada, following Montreal (City of Winnipeg, 1999, p. 1). Homes in the central, north end and west end neighbourhoods such as Daniel McIntyre and St. Matthews experienced significant declines in market value from 1988 to 1998. However, since 1999, market values for these older homes in the inner-city neighbourhoods have risen dramatically. The cost to purchase, while still lower than in suburban areas of Winnipeg, is now too high for many low-income households. In cases where poorer quality homes are affordable, homeowners often find themselves without enough capital to undertake extensive repairs and retrofits. This discourages homeowner investment in these areas.

In Our Winnipeg (the Plan), DMSM is designated as a “Mature Community”, which means a neighbourhood that was mostly developed prior to the 1950s. A subset of this designation is the “Reinvestment Areas” which are areas of decline indicated by deteriorating building stock and a lack of quality housing. The Plan does not identify specific neighbourhoods because neighbourhoods are not static, but the Plan does provide policies to support “Reinvestment Areas” such as supporting diverse housing options, collaborating with other levels of government to regenerate housing stock, and establishing partnerships to provide affordable housing throughout the City.

The City of Winnipeg housing policy has not yet been updated to reflect the adoption of the Plan in August 2011. However, the goals of the City of Winnipeg housing policy are similar to that of the Plan and are: to support housing renewal strategies that integrate economic and structural change; to create and provide tools to enable communities to implement renewal efforts; and to bring “new life” back to older neighbourhoods.

Neighbourhoods in decline can be designated as a Housing Improvement Zone (HIZ). There are five HIZs and each has received \$160,000 per year since 1999. The funding is allocated through Neighbourhood Renewal Corporations to assist with renovating or repairing houses and building new housing. Additionally, city fees associated with development are eliminated for projects in the five HIZs. Daniel McIntyre and St. Matthews have been categorized as Major Improvement Neighbourhoods, however they are not designated as HIZs. This means that the DMSMCA does not receive the \$160,000 for housing improvements.

### **3.4 Winnipeg Housing and Homelessness Initiative (WHHI)**

The WHHI was established in 2000 by the Governments of Canada and Manitoba, and the City of Winnipeg to assist local community organization in the revitalization of Winnipeg's older neighbourhoods, provide more opportunities to access safe and affordable housing, and create or enhance services for the homeless or those at risk of becoming homeless (WHHI, n.d.). The WHHI has been extended to 2013 and is a single window office that offers a one-stop service for individuals and community organizations to access information on government-funded housing and homelessness programs.

Specific housing programs delivered through WHHI include the Affordable Housing Initiative (AHI), the Residential Rehabilitation Assistance Program (RRAP), and the NA! Neighbourhood Housing Assistance program (as discussed in Section 3.2), and several programs delivered by the City of Winnipeg.

The AHI provides funding for a rental housing supply program, a rehabilitation/conversion program, a homebuyer down-payment program and a home ownership supply program. The RRAP is a program designed to help low-income households and landlords make the necessary repairs to their dwellings to bring them up to acceptable health and safety standards. The City of Winnipeg has allocated \$17.5 million over five years to fund housing initiatives such as: the Winnipeg Neighbourhood Housing Program that provides financial assistance for affordable housing projects; the Winnipeg Aboriginal Housing Program that provides funding for affordable housing for Aboriginal people; the Winnipeg Minimum Home Repair Program that provides funding to homeowners for minor critical repairs; the Winnipeg Development Cost Offset

Program that provides up to \$5,000 to assist neighbourhood organizations in creating affordable housing by covering the pre-development costs and City fees; the Winnipeg Neighbourhood Housing Plans and Advocacy Program that provides up to \$30,000 for communities to develop a Housing Plan.

### **3.5 Chapter Summary**

The lack of national and municipal affordable housing strategies and funding for affordable housing initiatives severely limits the progress the provincial government and community associations can make to reduce energy poverty. There are some initiatives, such as WHHI, that are a good example of the three levels of government working together but to produce a large impact on the reduction of energy poverty locally will require an effective strategy supported by the policy of the three levels of government.

The following chapter delves into the theories of the Just City and sustainable development. Namely, that everyone is entitled to safe, affordable, and adequate housing. However, there are many barriers to providing safe, affordable, and adequate housing and Chapter 4 will discuss the benefits of increased energy efficiency in housing, the potential to utilize on-site renewable energy as an alternative to traditional sources of energy, and selected programs and policies for low-income energy retrofits in other jurisdictions.

## **CHAPTER 4: SUSTAINABLE HOUSING AND THE JUST CITY —**

### **A REVIEW OF THE LITERATURE**

The theoretical framework for this thesis is based on the concepts of the “Just City” and sustainable development. As energy poverty is explored, it is necessary to keep in mind the potential equity implications of energy efficiency policies and strategies as well as the potential environmental, social and economical impacts. Different people have differential access to environmental programs and benefits of said programs. For example, there are inequalities in regards to access to energy services (heating, lighting, mobility, etc.), inequalities in the distribution of carbon footprints, inequalities in the distribution of climate-related impacts, and inequalities in access to mitigation against climate-related impacts. Some disadvantaged groups can be adversely affected by certain policies or strategies that have been developed in response to climate change, with little or no consideration given to social justice. Research needs to consider the equity implications of specific policy interventions and identify the local priorities of disadvantaged communities and integrate these into energy poverty strategies (Jackson, 2006, p. 5).

This chapter also examines the large body of literature that exists on the subject of energy poverty, sustainable housing, energy efficiency and on-site renewable energy. This literature review draws from a number of inter-related disciplines including sustainable development; urban planning; engineering; community activism; and economics. The literature begins with the theoretical framework and then examines a number of areas including: sustainable housing; energy poverty; energy efficiency and

consumption; energy poverty policies and programs in Canada, the United Kingdom and the United States; benefits of low-income energy efficiency programs; and renewable energy.

#### **4.1 Theoretical Framework**

Generally, social justice “refers to the degree to which a particular society affords groups and individuals fair treatment through an impartial division of advantages and disadvantages” (Fischer, 2009, p. 60). It is unclear what the actual definition of fair treatment is as the concept of social justice is used differently by the political left and the political right. Fischer states that for the left, social justice features a high degree of economic and social egalitarianism. For the right, social justice is a concept based on the free market which is viewed as offering greater equal opportunities than state-directed public policies (Ibid.).

Similarly, environmental justice calls for the efficient use of resources as well as sustainable development and the availability of abundant energy supplies at reasonable prices (Lawrence & McDonald, 2007, p. 7). A dimension of justice involves the benefits that the organizations provide for the poorest members of the local economy (Hess & Winner, 2007, p. 383). The following definition of Environmental Justice, which is also echoed by Blumenthal (2007, p. 97) states that:

The fair treatment and meaningful involvement of all people regardless of race, colour, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Fair treatment means that no group of people...should bear a disproportionate share of the negative environmental consequences resulting from industrial, municipal, and commercial operations or the execution of federal, state, local, and tribal programs and policies (United States Environmental Protection Agency).

Justice is necessary but not a sufficient goal for planning. It supports the remedying of injustices and leads towards the achievement of a city without distributional injustices, but it does not address the structural causes of injustice without additions (Marcuse, 2009, p. 92). Planning encompasses the task of integrating technical efficiency and social equality — social justice is a significant component of planning because it attempts to balance the two. However, attempts to improve social equality often result in a decrease of technical efficiency and vice versa. Therefore, the theoretical framework adopted in this study follows the Just City model, as this model incorporates ideas of social and environmental justice and more clearly defines “fair treatment” and promotes a better-designed democratic deliberation process in the planning process.

#### **4.1.1 The Just City**

For Fainstein, a Just City is not only about “fair treatment”, but a more complicated framework where one must simultaneously think about the means and ends, social movement strategies and goals as well as appropriate public policy (2009, p. 35). The Just City model facilitates interaction between different groups and it puts the planning theorist in the role of advocate of a program. It is an appropriate framework for neighbourhood planning as it relies on a more pluralistic, cooperative and decentralized form of welfare provision. A Just City searches for alternatives to the social given and connects environmental justice, social justice and sustainable development in the everyday public sphere. These variables are linked, interdependent and formulate a complex and often contentious relationship. As Marcuse notes: “Programs and policies



can be [environmentally] sustainable and socially just, but ... they can also be [environmentally] sustainable and unjust” (1998, p.103).

The Just City formulation can be best understood as “an invitation to engage in a discourse” (Potter & Novy, 2009, p. 236). Discussion can make social justice central to the activity of planning and changing popular discourse would be a first step towards incorporating the ideas of the Just City into urban policy (Fainstein, 2009, p. 35). Working toward the Just City requires “both critique and vision...it calls for sensitivity toward process and discourse as well” (Fainstein, 2005, p. 128). Changing discourse begins with developing alternatives to the conservative and neoliberal view of social justice. It also involves engaging more intensively with the middle class and their preferences.

There are numerous policy areas where municipalities have considerable control and as such they have the power to distribute benefits where they are needed most and will reap the most benefits. Urban redevelopments, racial and ethnic relations, open space planning and service delivery are all within the realm of municipal policy. In terms of energy poverty, municipalities have the capability, through urban redevelopment, to address this issue that troubles many low-income households. However, socially just urban redevelopment requires a municipality to take an approach that it may have not done previously. Urban planning as a profession has become modest or as Marcuse states:

formal planning has become opportunistic, vision-less, cautious, narrow, small-minded...and professional planning has in turn become what professional planners are today allowed to do in the conventional practice of their profession by those in a position to pay them, their employers and their clients, who are overwhelmingly those that hold power in the society. (Marcuse, 2009, p. 245).

Unfortunately, urban planning is often under attack from established conservative forces and social concerns are ignored to serve growth and business prosperity.

A city planner's efforts for change often focus on municipal policies because this is the arena in which they commonly operate but the focus needs to be both broader to include larger regions and at the same time, narrower by focussing on neighbourhoods. Marcuse states that what happens in any city is highly dependent on what happens in its region, its nation and the world (2009, p. 100). The same type of argument can be made for the reverse as well — what happens in any city is highly dependent on what happens in the individual neighbourhoods that comprise the municipality. Efforts for change will usually focus on municipal policies, but the focus must encompass both higher and lower levels including the provincial and federal government as well as neighbourhood organizations. Solutions are dependent on the support of all these levels and effective solutions cannot be confined to the city limits.

#### **4.1.2 Sustainable Development**

In 1987, the Brundtland Report contained one of the most used definitions of sustainable development. The oft-cited definition stated "sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs." This definition is ambiguous at best and review of the literature suggests that this definition is "where problems begin because the means of achieving a more sustainable future and the endpoint of sustainable development are seen to be so broad as to mean almost everything to everyone" (Saha & Paterson, 2008, p. 22).

Despite the ambiguity of what sustainable development really means, the idea of sustainable development continued to gain in popularity in the 1990s and has moved to the forefront of urban planning theory and practice. It was during this decade that scientific evidence began to mount indicating that human actions were having a negative impact on the environment on a global scale, leading to outcomes such as global warming. The theory of sustainable development addresses a large range of concerns and is often represented by three pillars — environment, economic and social — and sometimes includes a fourth pillar of governance or institutional. Sustainable development is often represented as a balance between the economy, environment and equity and demands ways of living, working and being that enable all people of the world to lead healthy, fulfilling, and economically secure lives without destroying the environment and without endangering the future welfare of people and the planet (Winston, 2009, p. 1783). Sustainable development continues to be promoted as the new large-scale vision to guide planning today.

However, there are inherent conflicts between the different pillars. Sustainability in most usages is heavily focused on ecological concerns (Marcuse, 1998, p. 109). This focus creates an imbalance and a burden on those individuals that cannot afford to meet higher environmental standards. Marcuse argues that the environmental movement is mostly an upper and middle-class movement in its leadership, financing and political weight (1998, p. 110). The environmental movement as a whole proclaims itself to seek solutions for the benefit of all, to which no one can object; however the cost of the movement is not borne evenly by everyone (Marcuse, 1998, p. 110). Winston refers to this issue as the “green cities conflict”: the conflict between liveability and ecology; the

“growth management conflict” between liveability and economic growth; and the “gentrification conflict” between liveability and equity. Planning must deal with these significant value conflicts (Winston, 2009, p. 1786).

Sustainable development cannot be reduced to ecological concerns. Also required are value choices about the priorities of individuals and communities, and about the distribution of costs, benefits and risks (Meadowcraft, 2004, p. 165). The major obstacles to sustainable development are lifestyle aspects, user habits and a general lack of concern regarding local and global environmental challenges (Stoa & Nesje, 2005, p. 3). In the past, sustainable development has largely focused on continued growth but humans must be placed at the centre and Meadowcraft (2004, p. 166) suggests four elements as fundamental in creating public engagement with sustainable development:

- *Adequate representation of concerned interests:* A sufficiently broad participation from local residents is necessary for an accurate cross-section of perspectives. The results of the process should also be open to inspection by all interested parties.
- *Encouragement of deliberative interactions:* Sustainable development will likely require a redefinition of interests and values among the people involved.
- *Application and integration of different forms of knowledge:* Scientific knowledge regarding conditions and measures for sustainable development are essential and needs to be made accessible and understandable for the actors taking part in the participation process.
- *Promotion of societal learning:* The participation process should enhance learning potential. (Stoa & Nesje, 2005, p. 4).

In Canada, sustainable development has become a key goal of public policy (Environment Canada, 2010, p. 1). Parliament passed the *Federal Sustainable Development Act* (the Act) in 2008. The Federal Sustainable Development Strategy (FSDS) fulfills the requirement of *the Act* by establishing a framework for sustainable development. The FSDS has set goals, targets and implementation strategies organized under four themes: addressing climate change and clean air; maintaining water quality and availability; protecting nature; and shrinking the environmental footprint of government. The FSDS does lay out the connection between the environmental, economic and social goals but it also clearly states that the focus is on environmental sustainability. This in itself is a problem — “environmental sustainability cannot be divorced from social and economic concerns” (Weier, 2007, p. 22).

Provincial governments have jurisdiction in several policy fields that directly affect sustainable development, including natural resources, agriculture and immigration. Manitoba’s *Sustainable Development and Consequential Amendments Act* (1997) created a framework through which sustainable development could be implemented in the provincial public sector and promoted in private industry and society in general (Environment Canada, 2010, p. 10). As with the FSDS, Manitoba’s Act does attempt to integrate the environmental, economical and social aspects but does appear to give more weight to the environmental component.

In Manitoba’s 2009 Provincial Sustainability Report, the three dimensions — natural environment, economy and social well-being — are reported separately although it is suggested that “it is helpful to view these issues across dimensions to better understand...how Manitoba’s sustainability [is] affected” (Manitoba Conservation, 2009,

p. 2). This report moves beyond the FSDS – stating that the “concept of sustainability is rooted in the interconnectedness and interdependency of each dimension on the other, with the notion that we cannot consider each aspect separately” (Manitoba Conservation, 2009, p. 8). In this report, real attempts have been made to link all dimensions. This is a step in the right direction. Sustainability is about the overall picture but some issues, such as sustainable housing, are not discussed in the report and therefore unlikely to be at the forefront of the current political agenda.

Roosa proposes an alternate definition for sustainable development:

The ability of physical urban development and urban environmental impacts to sustain long-term inhabitation by human and other indigenous species while providing: 1) an opportunity for environmentally sage, ecologically appropriate physical development; 2) efficient use of natural resources; 3) a framework which allows improvement of the human condition and equal opportunity for current and future generations; and 4) manageable urban growth (2004, p. 42).

Yet, there are inherent conflicts with this definition as well. There is no sustainability without addressing energy issues. Energy goes to the heart of all three sustainability pillars because it has economic, social and environmental implications. Economically, we remain largely dependent on increasingly scarce fossil fuels which are mostly imported. Socially, energy poverty is a serious issue. As fossil fuel prices continue to rise, more people have difficulty making ends meet, and low-income people tend to live in the least energy-efficient dwellings. Environmentally, energy efficiency and a switch to clean and renewable energy technologies are necessary to mitigate climate change effects (Scheurwater et al., 2010, p. 125).

It is very difficult to weigh and balance the concerns of the environment, economics and social factors (Weier, 2007, p. 22). Sustainable development is a complex and

contentious policy goal. Sustainability is more than being “green” and sustainable urban development needs to take into account all three pillars of sustainability simultaneously (Scheurwater et al., 2010, p. 124). Moving towards sustainable development requires economic and social systems that encourage environmental stewardship of resources for the long term, acknowledging the interdependency of social justice, economic well-being, and environmental stewardship (Haughton, 1999, p. 234). The social dimension is critical since the unjust society is unlikely to be sustainable in environmental or economic terms; the social tensions that are created undermine the recognition of reciprocal rights and obligations, leading to environmental degradation and ultimately to political breakdown (Ibid).

Sustainable development requires effective communication — it is imperative all stakeholders including citizens should be involved. The private sector, NGOs or grassroots campaigns cannot provide for sustainable regeneration alone and governments at *all* levels have a significant role to play, precisely as they do in creating the Just City. Therefore, sustainable development must have social justice as a central theoretical component if we are to truly commit ourselves to creating just cities (Stricker, 2010, p. 187).

#### **4.1.3 Balancing the Just City and Sustainable Development**

Sustainable development, following the classic Brundtland definition, can be socially unjust. Sustainability is now a desirable goal, and that in itself is a victory as the sustainability debate has given rise to more environmentally sensitive and responsible land use and building practices in cities (Poitras, 2009, p. 523). Yet Marcuse identifies

many arenas where sustainability can be a trap – such as housing and urban development (1998, p. 104). The concept of sustainable development can be revitalised in thought and practice by connecting social justice and environmental protection to sustainable development. Social justice serves as a necessary precondition for a society's transition to a more sustainable one (Stricker, 2010, p. 186).

The majority of the world's future population will live in urban areas and cities should be central to the pursuit of sustainable development (Bulkeley & Betsill, 2005, p. 44). With the emergence of the concept of sustainable cities, there has been a growing interest in the role that cities could have in addressing global environmental issues. Sustainable development is generally the most accepted framework in guiding planning policies and typical sustainable efforts include initiatives that address air quality, water quality and conservation, energy consumption, green buildings and equity initiatives.

The integration of planning and sustainable development is necessary for effective planning, as planners can become central players in “mediating conflict over economy, the environment, and social justice” (Saha & Paterson, 2008, p. 22). Yet, there are many obstacles to implementing sustainable initiatives that create the desired results. Social justice is not an integral part of many definitions of sustainability and Saha and Paterson suggest that environmental protection, equity and economic goals, the three “Es”, are the goals of sustainable development and a community that takes action with respect to all three “Es” is on the correct path (Ibid).

Most sustainable goals focus on environmental protection and many U.S. cities that otherwise appear to take sustainability seriously do so largely without significant awareness or concern for the social justice and equity implications of their sustainability



efforts (Saha & Paterson, 2008, p. 31). A reinterpretation of the classic Venn diagram of sustainable development, utilizing the three “Es”, shows the current state of sustainable development and a lack of significant overlap.

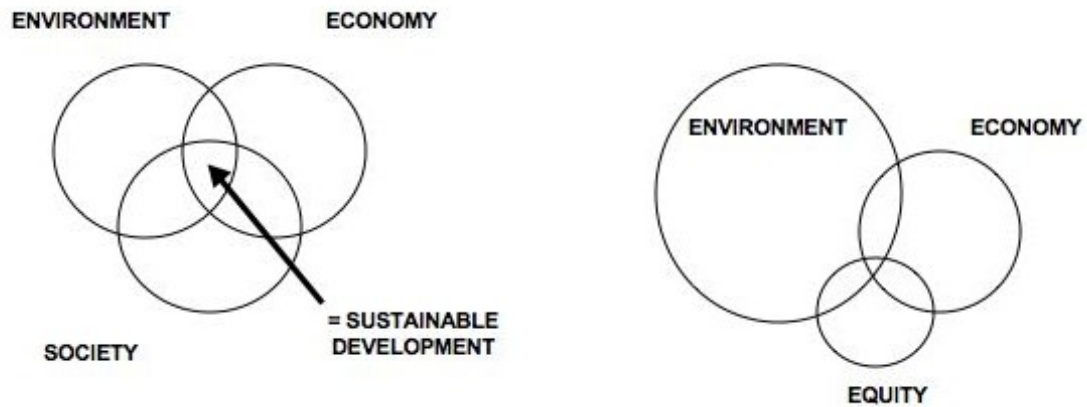


Figure 11. Reinterpreting the Venn Diagram Model of Sustainable Development (Saha and Paterson, 2008, p. 33)

Figure 11 reflects the current conflicts that are prevalent to the local sustainability effort. Lack of adequate funding, elected officials apathy, and lack of knowledgeable staff were three oft-cited reasons preventing the implementation of sustainable development initiatives. The perceived costs of initiatives are seen as too high – leading to ineffective policies and programs.

Numerous sustainable development policies have been undertaken, from international agreements to local sustainability proposals. Although sustainability policy appears to be important to planners, the implementation of such policies remains limited.

“If the definition of sustainable development is about changing patterns of consumption and production in a more ecologically sensitive, economically sound, and socially just manner, and if we recognize the inter-dependency between the Three Es of sustainable development, it makes more sense to evaluate whether local governments are putting in place sustainable activities that

enable them to realize the three goals of sustainable development at the same time” (Saha & Paterson, 2008, p. 35).

Therefore, balancing sustainable development and the concept of the Just City will be integral to formulating recommendations for future policies and programs for the Daniel McIntyre and St. Matthews neighbourhoods.

## **4.2 Sustainable Housing**

Housing is one of the most important public policies affecting urban development and it has a significant potential to contribute to sustainable development (Winston, 2009, p. 1781). Despite this, housing is one of the more neglected aspects of sustainability and the concept of sustainable housing is relatively neglected in the literature (Ibid). There are various definitions for sustainable housing, ranging from “housing with a minimum impact on the environment” to a more inclusive “sustainable housing system must incorporate social, economic, and environmental sustainability in a mutually reinforcing way” (Ibid). Sustainable housing should be readily available, high quality, affordable, environmentally friendly and meet the needs of the household.

Truly sustainable housing incorporates location, construction and design, and regeneration. For example, sustainable land-use planning would resist scattered settlements and prefer brown-field sites over green-field sites. The developments would be socially mixed to promote the viability of local services. This also reduces the likelihood of the “social wave” syndrome whereby an area is dominated by particular types of households (e.g. young parents with children) which leads to uneven demand for different services. The construction and design component would incorporate higher residential densities, sustainable construction that incorporates high standards for energy

efficiency and the use of local renewable materials. Regeneration would promote all of the above in addition to renovation rather than demolition.

Another aspect of sustainable housing is the issue of affordability. Housing affordability, based on the CMHC core housing need model, defines affordability as spending no greater than 30% of income on shelter costs (30% rent/income ratio) (CMHC). Based on this model, housing affordability is based on the individuality of employment income, and varies greatly within a population. Another consideration is the total debt service of a household, and other monthly expenditures such as heating costs and property taxes. Affordable housing is an attractive feature in a community, and offers the opportunity of enhancing economic growth through promoting a greater disposable income that can be fed back into the economy. Therefore, a true model of affordability within a community would accommodate the different incomes and debt ratios of the population, provide flexible tenure options, and units that respond to all price points in the market.

An aspect of sustainable housing that is often overlooked is the sustainable management and maintenance of housing. The potential of housing providers, such as government, private landlords and non-profit organizations to contribute to sustainable development is often neglected. The housing stock needs to be regenerated and physical regeneration alone is insufficient. Sustainable regeneration can be defined as involving environmental sustainability, economic efficiency and meeting social needs. The limited supply of affordable accommodation is a problem and social exclusion is created from the rising cost of housing. Policies for sustainable housing in disadvantaged areas would require social supports such as education and training, libraries, childcare, family support,

health, recreation and leisure, local management and maintenance of housing and community services. Over the long term the societal benefits of maintaining and improving the housing stock along with maintaining local social supports is more sustainable than constructing new housing in new areas.

### **4.3 Energy Poverty**

Households that have to spend 30% or more of their income on quality housing are considered to be in core housing need. They have less money to spend on other necessities including food, transportation and energy to heat the home. This greatly affects a households' ability to access safe, suitable and adequate housing. This situation is commonly found in distressed neighbourhoods with poor quality housing and among certain segments of the population such as women living alone, single parent families, persons with disabilities, Aboriginal families and immigrants (Manitoba Housing, 2009, p. 10). In Manitoba, 11.3% of households (or 46,900) were in core housing need in 2006 (Manitoba Housing, 2009, p. 9).

In Canada, the price of water, fuel and electricity increased by 50% between 1997 and 2007 and prices continue to increase. Between August 2007 and August 2008, the price of natural gas increased by a further 25%. The average cost of energy for a Canadian household is approximately 3.1%, less than half of the 7.3% the lowest-income quintile spent on energy costs. Almost 3 million households in Canada exceed the 5% threshold and close to one million households exceed the 10% threshold. The majority of these households are homeowners.

Energy poverty can be defined in a number of ways. In the United Kingdom, energy poverty is defined as when a household is required to spend more than 10% of its income on household fuel use. In Canada, alternative definitions have been proposed, such as a threshold double the average energy burden, which would be 6.2%, or another suggestion is 6%, which is equal to the 20% threshold for shelter costs (Maynes, 2008, p. 2). For a low-income consumer, the energy burden is a significant portion of their income. The average household spends approximately 4% of their income on their energy bills whereas low-income households pay 16 to 26% of their income to energy bills – despite consuming 15% less energy than non-low-income households (Power, 2008, p. 4). For some elderly people who live on fixed incomes, their energy bill can constitute as much as 35% of their annual income (Oppenheim & MacGregor, 2008, p. 5).

In Manitoba, there are a substantial number of households facing an energy burden: more than 8,500 Manitoba Hydro customers have an income at or below \$10,000 and face a potential home energy burden of more than 60%; 37,000 additional households live with incomes between \$10,000 and \$20,000 and face a potential home energy burden of 10% or more; and 23,000 more households live with incomes between \$20,000 and \$30,000 face a potential home energy burden of 6% or more (Colton, 2009, p. 2).

Energy poverty is a complex problem resulting from an interaction of many different factors. The main factors that affect the rate of energy poverty are: household income; energy efficiency of the dwelling; the behaviour of the members of the household; and the current cost of energy. Although the factors that cause energy poverty are the same regardless of location, different countries and regions tackle the

problem of energy poverty in a variety of ways. Typical means of addressing energy poverty usually only address two of the main factors: inadequate household income and poor energy efficiency of the dwelling. Emergency financial assistance to prevent disconnection or discounted energy rates for eligible households (such as seniors) are only temporary solutions because household income is unlikely to increase enough to cover high energy costs. Improving insulation and reducing drafts is more beneficial, there is a great amount of energy to be saved in the residential low-income sector as well as other societal benefits. Oppenheim and MacGregor stress that helping families permanently reduce their energy bills also attacks the hopelessness that poverty imposes (2008, p. 5). This helps to break the poverty cycle as low-income families can help themselves by using energy more efficiently. Assisting households to perform energy retrofits on their homes not only plays a role in reducing poverty, but there are additional benefits such as reducing greenhouse gas emissions and improved health and safety for household members.

#### **4.4 Energy Efficiency and Consumption**

Energy efficiency can be defined as reducing energy consumption while still providing the same energy service. It differs from energy conservation which is a decision to reduce service levels such as the amount of lighting or comfort level (Sarin, 2009, p. 9). More efficient use of energy in the built environment can have a significant impact in meeting certain urban goals including more appropriate housing solutions and reducing environmental impact (Roosa, 2004, p. 46). There are multiple ways to accomplish energy efficiency — from building retrofits to incorporating new, more

energy efficient technology. The importance of energy efficiency is multi-fold: it reduces the cost of living for consumers; it has the potential to create jobs and build the local economy; and it has the potential to reduce dependence on natural gas and meet energy demand through renewable sources.

In Manitoba, the average cost for space heating a 1,200 square foot home is \$947 annually with a conventional furnace, \$752 with a mid-efficiency furnace, or \$676 with a high- efficiency furnace. To heat a home electrically averages \$1,099 per year. Average water heating costs, based on 2.4 persons per household, are \$149 with a conventional water heater, \$144 with a side vent water heater, or \$106 with a tankless water heater. The cost for a conventional electric water heater averages \$238 annually (Manitoba Hydro, 2011, p. 1). Space and water heating costs are substantially higher for households that use fuel oil or propane.

Heating costs are dependent on a number of variables — weather, heating equipment, insulation levels, air tightness, perceived comfort level and consumer behaviour. The only listed variable that cannot be controlled is the weather. Therefore, in mitigating the remaining variables, the most common and cost-effective types of energy efficient measures a household can undertake to reduce their energy costs are:

1. Increasing insulation in the attic, basement and exterior walls to reduce heat loss (which on average is 17% through the above-ground walls, 15% through the basement, and 11% through the roof). Increasing the insulation can reduce annual heating costs by as much as 50%, depending on the original R-value.
2. Applying transparent film properly to windows to reduce heat loss and reduce heating costs by as much as 10% to 25%.

3. Installing a high-efficiency furnace to reduce the heating bill by up to 35%.
4. Installing an air-source heat pump to reduce heating costs by as much as 50%, depending on climate. Ground-source heat pumps are more efficient and more expensive but can reduce heating costs by as much as 65%.
5. Installing a programmable thermostat to lower the temperature during the night or when absent from the house for more than four hours – setting the temperature lower by 3°C during the night can save up to 3% on heating bills. As well, the precision of electronic thermostats procures a more constant temperature and can save up to 10% in heating costs over an old mechanical thermostat.
6. Air sealing by caulking and weather stripping around exterior doors and windows, baseboards, installing foam gaskets and plugs to seal wall electrical receptacles. A house that is not air-tight can increase the heating demand by up to 15%.
7. Implementing passive heating and cooling schemes by keeping curtains closed during the sunny, warm months and open during the cooler winter months. Planting deciduous trees provides shade during the summer and allows the sun through during the winter. Passive heating can be maximized through the installation of south facing windows but this may be difficult in established east/west oriented houses.
8. Proper furnace maintenance by regularly installing clean filters, cleaning the air intakes and outlets, and regularly cleaning the inside of the unit.



9. Installing faucet aerators to reduce the flow of water by approximately 30% and saving 5.5 litres of hot water per minute which equals, for an average family of four, savings of \$37 a year for electric water heater energy usage.
10. Lowering the temperature on the hot water tank from the typical 60°C to 54°C and saving approximately 10% a year for electric water heating because it reduces the amount of hot water used in appliances and reduces the heat escaping through the walls of the water heater tank; also insulating the hot water tank and pipes to reduce water heating costs by 25%.
11. Installing compact fluorescent lights to reduce lighting costs. Replacing five incandescent bulbs with CFLs can save as much as \$30 a year.
12. Installing a power pipe to recover heat from grey water and to preheat water as it enters the home from municipal water mains. A power pipe can potentially reduce water heating costs by 20 to 40%.

Upgrades to existing buildings, such as insulation and energy-efficient boilers, furnaces, windows and doors can decrease heating bills by one-third to one-half (Winnipeg Citizen's Coalition, 2010, p. 3). The need to weatherize low-income homes and make them energy efficient is largely unmet and will take decades to complete yet the economic, environmental and social benefits of investing in energy efficiency are enormous.

#### **4.4.1 Reducing Energy Consumption**

There are many barriers for individuals to adopt energy conservation behaviour and to undertake energy retrofits. Utilities frequently promote energy conservation by

providing comparative billing data, informational brochures, and financial incentives. However, attempting to influence consumer behaviour through traditional educational methods or financial incentives is not the most effective method for developing the desired behaviour. The failure of mass-media campaigns is due partly to the inadequate design of the messages but also to the underestimation of the difficulty of changing behaviour (McKenzie-Mohr, 2000, p. 545). The advantage of the social marketing technique is that “it starts with people’s behaviour and works backward to select a particular tactic suited for that behaviour” (Kollmuss & Agyeman, 2002, p. 240).

Community based social-marketing is a selective type of campaign for which it must be decided what particular behaviour is to be promoted. Unlike simple information brochures, social marketing emphasizes effective program design, and unlike mass-market campaigns, social marketing targets a specific population and a specific behaviour. McKenzie-Mohr outlines four steps to community-based social marketing: “uncovering barriers to behaviours and then, based upon this information, selecting which behaviour to promote; designing a program to overcome the barriers to the selected behaviour; piloting the program; and then evaluating it once it is broadly implemented” (2000, p. 546). Attempting to influence consumer behaviour through social incentives rather than financial ones is a major shift in thinking for most utilities.

#### **4.5 Energy Poverty Initiatives in Canada**

In Canada, a national framework to address energy poverty is lacking. Federal involvement in assisting low-income households is limited to the Homeowner Residential Rehabilitation Assistance Program (RRAP) delivered through Canada Mortgage and

Housing Corporation (CMHC). The RRAP is available to low-income households to bring their homes up to minimum standards. RRAP does not specifically address energy efficiency however, repairs to heating, structures, electrical systems, plumbing and fire safety are permitted. Eligibility for a forgivable loan is determined by the value of the home, household income level and substandard housing conditions (CMHC, 2011) . The maximum amount of funding per unit is \$16,000 to \$24,000, depending on the geographical area. Cost overruns must be paid by the homeowner.

Low-income energy efficiency programs in Canada are generally delivered at the provincial or municipal level. The majority of initiatives involve energy conservation and efficiency measures, yet there are a few original schemes that are progressive, integrated and preventative – incorporating many ideas brought forward in the United Kingdom Fuel Poverty Strategy. Unfortunately, many energy efficiency programs were negatively affected by the cancellation of the national ecoEnergy Retrofit Program, including Manitoba Hydro’s Lower Income Energy Efficiency Program (LIEEP) and Furnace Replacement Program (FRP) which have now lost a significant funding source.

The federal government cancelled the ecoEnergy Retrofit Program in April 2010 and despite this, all of the provinces, either through their utilities or government, or a combination of the two, continued to offer low-income households incentives and rebates for energy retrofits. Since the program was reinstated in May 2011, low-income energy efficiency programs can once again take advantage of this additional source of funding. In addition to the government and utility sponsored initiatives, there are a number of non-profit organizations that are assisting low-income households with energy retrofits. However, programs that target low-income households vary from province to province

and there are currently no low-income programs in the territories. The following describes the programs offered in each province.

#### **4.5.1 Newfoundland and Labrador**

In Newfoundland, the Residential Energy Efficiency Program for Low-Income Households (REEP) is offered to owners of single, row or semi-detached housing whose incomes are \$32,500 or less per year. A maximum of \$3,000 per unit is provided in Newfoundland and up to \$4,000 in Labrador. The cost of the pre and post-energy evaluations are also covered. In 2010-2011, the Home Heating Rebate Program was launched for families whose income is \$40,000 or less per year and directly incurs costs to heat their homes. A maximum rebate of \$250 is offered except for eligible Coastal Labrador communities which can receive a maximum rebate of \$500.

#### **4.5.2 Nova Scotia**

The Low Income Homeowner Program provides energy retrofits such as insulation water heater wraps, lighting, and programmable thermostats for free. Qualifying households must be electrically heated and have an income below LICO. Households with a heat source other than electricity may qualify for the Residential Energy Affordability Program (REAP). Unlike in other provinces, participants are referred from the Department of Community Service and have already been pre-approved for other home repairs. The Low to Modest Income Program provides assistance to households of \$150 for their home evaluations as well as an additional \$400 grant for heating and building envelope upgrades.

### **4.5.3 New Brunswick**

The Energy Efficiency Retrofit Program for Low Income Households is jointly offered through the Department of Social Development and Efficiency New Brunswick. The program is offered to homeowners with household incomes below the limits established for the area as well as private non-profit corporations and co-operatives occupied by tenants with low and moderate incomes. Potential upgrades include the heating system, air sealing, insulation and windows. The program offers homeowners a non-repayable grant to a maximum of \$4,500 and a repayable loan. Private non-profit groups and housing co-operatives are only eligible for a non-repayable grant to a maximum of \$5,000 per self-contained unit and \$3,000 per bed unit. Home evaluations are also provided. Rental property owners are required to sign a letter stating that rents will not be increased as a result of the energy retrofits and in situations where the energy costs are included in the rent, the savings will be passed on to the tenant.

### **4.5.4 Prince Edward Island**

The PEI Energy Efficiency Loan Program for Low-Income Households provides interest-free financing to a maximum of \$10,000 for energy efficient upgrades excluding doors and windows. If a household qualifies for this program, they also qualify for the PEI Energy Efficiency Loan Relief Program for Low-Income Households which reduces the monthly payment of the loan. The monthly payment will be reduced by 50% for households with incomes less than \$15,000 or the payment will be reduced by 25% for households with incomes from \$15,001 to \$35,000. The Home Energy Low-Income Program (HELP) is provided to clients who have applied for the PEI Energy Efficiency

Loan Program. HELP provides an air-sealing kit free of charge as well as the installation of a programmable thermostat, a low-flow shower head and a voucher for a free furnace cleaning.

#### **4.5.5 Quebec**

The Econologis Program is offered to low-income households provided they meet the eligible income threshold and is offered annually from September to March. It is separated into two components: Component 1 consists of a visit from a technician and can include caulking and weather stripping windows, installing sills and weather stripping on doors, insulating electrical outlets on outside walls, installing low-flow showerheads, adjusting the temperature of the hot water tank, installing aerators on water taps, and installing compact fluorescent light bulbs. Component 2 consists of the installation of an electronic thermostat. Hydro Quebec has designated \$15.3 million for energy efficiency measures for low-income households that includes \$7 million to replace inefficient refrigerators and \$12.4 million for collection services and other services for low-income customers. Gaz Metro offers the free installation of a drain water heat recovery system for low-income households. The systems are available to homeowners of a single family dwelling, duplex or triplex provided that the total household income does not exceed the income threshold and that the natural gas water heater is supplied by Gaz Metro.

#### **4.5.6 Ontario**

Ontario has multiple programs targeting low-income households. Energy assistance funds for low-income households are offered by a number of organizations. The Emergency Energy Fund (EEF) assists households by paying for utilities in arrears, security deposits or reconnection costs. The Ministry of Community and Social Services provides funds to municipalities to deliver for emergency charitable assistance. The Community Start-Up and Maintenance Benefit (CSUMB) is for people who qualify for social assistance and are about to lose their housing because they owe rent or utility payments. The maximum grant for CSUMB is \$799 for singles or couples without children or \$1,500 for families with a dependent under eighteen. In Toronto, the Shelter Fund is targeted towards households that have dependents under the age of eighteen and will provide a maximum benefit of \$1,500 and is intended to provide additional support to the CSUMB. The Winter Warmth Fund is for eligible low-income households that are currently in arrears or about to go into arrears. Funding for this program is from participating utilities (such as Enbridge Gas Distribution Inc., Toronto Hydro, etc.) and is administered by the United Way through their network of community-based agencies. A similar program, The Heat and Warmth Program (THAW) is provided to residents of London, Ontario and is administered by Housing Support Services of The Salvation Army. The following programs also follow a similar format of utility arrears funding: in Peterborough, the Fund for Utility Service Emergencies (FUSE); in the Waterloo Region, The Heat Bank; in Windsor and Essex County, Keep the Heat; in Hamilton, the Hamilton Utilities Arrears Program; and in the Rainy River District, Prevention of Homelessness and Advocacy. The Housing Emergency Loan Program (HELP) in Hamilton also

provides an interest free loan for people in variety of situations, including rent or utility arrears.

There are also programs that provide free energy efficiency/conservation measures for low-income households. The Multifamily Energy Efficiency Rebate targets building owners and property managers that have more than six housing units. Financial incentives can be for HVAC systems, lighting, appliance replacements, building envelope, and water heating. Funds are also provided for energy audits and resident education. Enbridge Gas Distribution Inc. offers two programs. The first is the Low-Income Home Weatherization Retrofit that provides eligible low-income households with free energy audits and weatherization upgrades. The second program is the Enhanced TAPS Program and provides a number of free energy efficient upgrades such as a programmable thermostat, low-flow showerheads, kitchen and bathroom aerators, and compact fluorescent light bulbs. Union Gas has similar initiatives such as the Helping Homes Conserve program, for their customers, however to participate in their Weatherization programs homes must be twenty-five years or older. Ottawa offers the PowerPlay Program in which they provide an in-home electricity audit showing how to reduce electricity and gas consumption and will install up to \$300 worth of conservation devices free-of-charge for Ontario Works recipients.

The Toronto Community Housing Corporation is a social housing provider that offers several programs aimed at reducing energy consumption by 20% by 2012. The Appliance Renewal Program provides low-income renters with high-efficiency replacement appliances. The Building Renewal Program is directed towards 19 developments with buildings that have higher-than-average utility costs and below-



average building conditions. Energy savings will finance a significant portion of the capital costs. Urgent repairs, retrofits and renovations will come first but energy efficiency is a key priority. Work includes: retrofit lighting; building HVAC systems replacement and enhancement; water conservation; and building envelope work such as window and door replacement. The Light Bulb Program is in the process of replacing more than 200,000 incandescent bulbs with CFLs where each bulb is expected to save \$40 in energy costs over its lifespan.

The Green Light on a Better Environment (GLOBE) program offers tenants and service providers in the social housing sector assistance and tools to improve the energy efficiency of their buildings and operations. GLOBE connects social housing providers and their tenants with the information and tools needed to make better choices about energy conservation, energy efficiency and green sustainable practices in the social housing sector. This program is limited to social housing and not available to low-income households that own their home.

The Solar Neighbourhoods Project is a joint project of the Toronto Atmospheric Fund, the Toronto Energy Efficiency Office, the Toronto Environment Office and Toronto Hydro. The goal of the project is to further the use of solar hot water systems to reduce greenhouse gas emissions (Solar Neighbourhoods). This program is a pilot project in the east end of Toronto and is an example of an energy transition program.

#### **4.5.7 Manitoba**

The prevailing energy efficiency program in Manitoba is Manitoba Hydro's Lower Income Energy Efficiency Program (LIEEP). The LIEEP was launched in

December 2007 and provides energy efficient improvements to homeowners who qualify based on income thresholds. The funding for LIEEP is provided through the company's \$35 million fund for targeting energy efficiency upgrades in low-income homes.

There are multiple components to the program and each household is assessed to determine which measures are the most appropriate to undertake. To qualify for LIEEP, household incomes must be 125% or less of LICO which will vary with household size. Qualifying households receive a free in-home energy audit and basic energy efficiency measures. The basic, low cost measures include weather stripping, hot water tank pipe wrap, faucet aerators and installing CFLs. More expensive, although still cost-effective, retrofits include improving insulation in attics, walls and basements. Low efficiency furnaces may also be replaced with a high efficiency natural gas furnace through the Furnace Replacement Program (FRP) for a cost to the homeowner of \$19 per month for five years. Manitoba Hydro funds the remaining cost of the furnace.

LIEEP works closely with Warm Up Winnipeg, which is a program that incorporates energy conservation and efficiency measures with skills training. Delivered by Building Urban Industries for Local Development (BUILD), Warm Up Winnipeg retrofits homes with upgrades to the insulation, heating and lighting systems, and the installation of low-flow plumbing fixtures. Most of the cost of their materials is funded through Manitoba Hydro's LIEEP program. The upgrades are completed by local residents trained by BUILD as part of their mandate to seek "a Winnipeg where utility bills in low-income housing are affordable and where the residents living in this housing have gainful, family supporting employment" (Warm Up Winnipeg). BUILD specifically targets low-income households and operates primarily in inner-city

neighbourhoods such as West Broadway, Spence, the North End and DMSM. To date, 315 homes have been retrofitted and 45 individuals are currently employed. On average, a retrofit can save a household \$500 in energy costs per year. The Brandon Energy Efficiency Program (BEEP) follows the same format.

Since the launch of LIEEP Manitoba Hydro has installed basic energy efficient measures in almost 3,000 homes throughout the province. More extensive energy retrofits have been performed in almost 1,000 homes with an additional 600 homes in various stages of the retrofit process. Manitoba Hydro is forecasting that an additional 1,900 homes will be retrofitted in 2010/11. It is estimated that there are between 15,000 and 19,000 lower income households that require substantial insulation upgrades (Manitoba Hydro 55/10, 2010, p. 42). To perform these retrofits two contractors (one of which is BUILD) have been employed for the installation of the insulation and an external auditor performs the in-home energy evaluations. For the FRP, Manitoba Hydro estimates that there are 22,000 low-income households in need of a high efficiency furnace or boiler. There are currently seven contractors installing furnaces and boilers in Winnipeg.

Manitoba Hydro also offers emergency financial assistance. In partnership with the Salvation Army, they deliver the Neighbours Helping Neighbours program which provides a one-time emergency bill payment and/or referrals to community support services, counselling and job training. Households are eligible if they are not receiving social assistance and have received a disconnection notice.

The Community Led Emissions Reduction (CLER) program in Manitoba, a provincial pilot program, is seeking to develop grassroots solutions to climate change.

The initiative is intended to develop projects and incentives that will encourage and support the greatest emissions reductions and long-term changes. The provincial government acts as an advisory group that assists municipalities and neighbourhoods to deliver an energy efficiency agenda. One of the areas targeted is implementing energy measures through home or building retrofits, from small changes such as more efficient lighting choices to the use of alternative energies such as solar, wind or biomass. Although energy retrofits and renewable energy are not at the focus of the program, Daniel McIntyre-St. Matthews residents have established the greening of their community as one of their priorities and participation in this program is expected to move their green agenda forward.

#### **4.5.8 Saskatchewan**

The Saskatchewan Home Energy Improvement Program (SHEIP) provides financial assistance to rental property owners housing low-income tenants as well as to low and moderate-income homeowners. SHEIP provides top-up grants that are combined with grants offered through SaskEnergy's Saskatchewan EnerGuide for Houses Program. Rental property owners of single, semi-detached or row house dwellings may receive a top-up grant of up to \$3,500 per unit in southern Saskatchewan or up to \$4,200 in northern Saskatchewan. Rental property owners of multi-unit dwellings or rooming houses may receive a top-up grant up to \$1,000 per unit in the south and up to \$1,200 per unit in the north. Homeowners may receive up to \$4,000 in the south and up to \$4,700 in the north. The level of assistance will vary with household income. If the costs of the

energy retrofits exceed that of the grant, the property owner is responsible for paying the overage.

#### **4.5.9 Alberta**

The Carbon Dioxide Reduction Edmonton (CO<sub>2</sub>RE) initiative offers a \$2,000 high efficiency furnace rebate for low-income households in Edmonton only. They have partnered with the federal Residential Rehabilitation Assistance Program (RRAP) to cover the approximately \$2,000 cost associated with the installation of a high efficiency furnace. There are currently no programs targeting low-income households that are province-wide.

#### **4.5.10 British Columbia**

The Affordable Warmth BC (AWBC) program provides the most up-to-date information on energy efficiency related services and programs to the affordable housing sector, including homeowners and renters. Through AWBC a homeowner can access any number of programs offering financial incentives. The BC Hydro Energy Conservation Assistance Program (ECAP) provides qualified BC Hydro customers with a free home energy evaluation and energy efficiency upgrades to help reduce their consumption and energy costs. Potential energy saving products that may be installed are: energy saving light bulbs (compact fluorescent lamps) indoor and outdoor; faucet aerators for the kitchen and bathroom; low-flow showerhead; water heater pipe wrap and blanket; reducing heat loss and air infiltration through weather stripping, caulking and outlet gaskets; insulation for attics, walls and crawlspaces; and/or an ENERGY STAR®

refrigerator. BC Hydro has also contracted the non-profit organization City Green Solutions to develop a Strategic Energy Management Plan (SEMP) for the BC Non-Profit Housing Sector. The SEMP will create a detailed portfolio on over 50,000 long-term non-profit housing units across the Province and recommendations on the best methods for completing energy retrofits on these housing units. The LiveSmart BC Efficiency Assistance Program (LEAP) provides grants for energy assessments and basic energy efficient upgrades to improve the energy efficiency of low-income households. This program targets social housing providers and provides an average per unit grant of \$1,700.

#### **4.6 Evolution of Energy Poverty Initiatives by Region: Canada**

The Canadian Government has a very limited and indirect involvement in addressing energy poverty. In Canada there are only four initiatives offered at the national level. The earliest initiative was established in 1974 was the Homeowner Residential Rehabilitation Assistance Program (RRAP). This program provides forgivable loans for low-income homes to bring their houses up to health and safety standards. Improvements can include energy efficiency measures but usually focus on heating, electrical, and structural repairs. Energy efficiency measures are more of a by-product of bringing the home up to acceptable standards. This was followed by the establishment of the Office of Energy Efficiency in 1998. This is the government office that deals with energy efficiency and alternative energies information. Affordable Energy Canada, an advocacy organization, was established in 2001 and is working to develop a coherent strategy to address energy poverty. The Federal Government only

began to concentrate on residential energy efficiency with the establishment of the ecoENERGY Retrofit program in 2007. However, the Federal Government's commitment to residential energy efficiency is inconsistent as evidenced by the cancellation of the ecoENERGY Retrofit Program in 2010, and then its reintroduction one year later. The Federal Government continues to have a minimal involvement in housing, especially affordable housing and continues to download the responsibility to provincial and municipal governments.

At the provincial level, the majority of initiatives fall into one of two categories: energy efficiency and emergency charitable assistance. The low-income energy efficiency programs were established between 2006 and 2009 and continue to operate. Only British Columbia, Manitoba, and Ontario have legislation that requires the local utility to operate a low-income energy efficiency program. The provincial governments and utilities (except in Alberta) utilize the federal ecoENERGY Retrofit program to supplement their low-income households energy efficiency programs. Energy audits are completed for each dwelling and the findings are used to determine the most cost-effective energy retrofits. Along with the energy audit, education and advice are offered to the homeowner to help them to lower their energy consumption. The emergency assistance programs are also funded by the utilities and receive additional funding through private donations. The funds are delivered through organizations like the Salvation Army. It is unclear when these programs were established.

Since 2006, there has been some groundbreaking work at the provincial level to combat energy poverty. In Manitoba, the most exceptional programs established have been BUILD in Winnipeg and BEEP in Brandon (see section 4.5.7 for more details).

Grassroots advocacy organizations have been established in Prince Edward Island, New Brunswick, and Nova Scotia to advocate for low-income households and promote energy efficiency as a tool to reduce monthly costs for low-income households. Ontario, by far, has the largest number and variety of programs. The *Green Energy Act* is the only Act implemented thus far in Canada that sets policies to make energy conservation a priority and to expedite the growth of renewable energy sources. Ontario also offers the Green Light on a Better Environment program (GLOBE) which focuses on improving the energy efficiency of social housing.

Despite the lack of federal involvement in residential energy efficiency, some programs and policies have been established at the provincial level that have proven to be exceptional and effective (i.e. BUILD). However, the majority of programs are energy efficiency measures and emergency assistance, and while important and necessary these two types of initiatives cannot be used in isolation.

#### **4.7 Energy Poverty Initiatives in the United Kingdom**

In the United Kingdom there is an overarching umbrella — the UK Fuel Poverty Strategy — that enables regional and local governments to develop fuel poverty strategies based on their needs. The principles and approach adopted by the UK Fuel Poverty Strategy are an example of an integrated approach — initiatives are preventative and curative, geographic and thematic. The Strategy states that actions must tackle the root causes — household energy efficiency, high fuel prices, and low household income. As such, there are three main measures that are being undertaken: the Warm Front Scheme (known as Warm Homes in Northern Ireland, as the Energy Assistance Package in



Scotland, and as NEST in Wales); the Carbon Emissions Reduction Target (CERT); and the Decent Homes Programme (DHP).

From 1996 to 2004, energy poverty has steadily decreased reaching a low in 2004 until rising fuel prices reversed the trend. Despite the difficulty in reducing the actual number of households suffering from energy poverty, Warm Front assisted 235,000 in 2008-09 and continues to accept applications. The Warm Front Scheme is the main energy poverty reduction program and has over £950 million in funding for the 2008 to 2011 period. It offers household energy audits and energy efficiency measures to households that meet income limits, own their home or rent from a private landlord, and/or do not have a working central heating system. Additionally, household residents must fall into one of three categories: those aged 60 or over; those who are pregnant or have children under 16; or those in receipt of government benefits such as the Housing Benefit or Child Tax Credit. Energy efficient measures include draft-proofing, lighting retrofits, heating retrofits and insulation upgrades. The vast majority of households do not contribute towards the energy efficient measures because the grant of £3,500 offered is often large enough to cover the costs.

In 2008 the Government began a Warm Front pilot project to install low-carbon technologies like thermal heating systems and air-source heat pumps. They have also launched the Community Energy Saving Programme (CESP) which obligates energy suppliers to partner with local authorities and community groups to deliver £350 million in free and discounted central heating, energy efficiency measures, and benefit checks to 90,000 households in 100 of the country's poorest communities. Both of these projects are not currently accepting applications.

The CERT program requires energy suppliers to meet 40% of their energy reduction targets through household efficiency measures. The suppliers are required by the government to prioritize low-income households and households with residents over the age of 70. Measures undertaken include insulation upgrades, heating system upgrades, retrofitting lighting and micro-generation (which includes ground-source heat pumps, solar water heating and small-scale combined heat and power). Households also have the opportunity to receive grants and offers from any energy company, regardless of whether they supply the gas and electricity or not. The energy efficient measures can also be undertaken by households not considered low-income and the costs are co-financed through levies on their energy bills.

The DHP is the government's commitment to bring all social housing and 70% of private households into "decent" condition. Decent is defined as adequate heating and insulation to ensure thermal comfort. Since 2001, 36% fewer homes fail the thermal criterion and between 1996 and 2006 average heating bills dropped by £132 per year.

In Wales, the Valley to Coast Housing (V2C) initiative is to promote regeneration of the local social housing stock and works in partnership with others to bring training and job opportunities for some of those not currently in the labour market. It also works with the Welsh Development Agency (WDA) to support local contractors and suppliers. As with the BUILD program in Winnipeg, the V2C is being used for housing renewal and to promote the local economy in terms of job training and job creation. To date, there are approximately 160 full-time jobs that are being sustained with V2C work. There is also additional evidence that there is indirect employment, local small businesses

in the construction industry are developing robust business profiles, and a construction skills centre project to address local skill shortages (Smith, 2006, p. 279).

Compared to England and Scotland, in Ireland, policy measures have been far less aggressive despite similarity in the incidence of fuel poverty (Healey, 2004, p. 173). The fundamental approach remains income subsidization, which has been in place since 1942. Two projects were introduced in the 1980s for improvements to attic insulation, and although effective, funds were drastically cut and never reinstated.

#### **4.8 Evolution of Energy Poverty Initiatives by Region: United Kingdom**

Over time programs and policies have transitioned in the UK from simple income supplements to an integrated strategy that incorporates increasing energy efficiency, reducing energy consumption and adding on-site renewable energy sources. In the UK awareness of energy poverty began as early as 1976 when the national government established the Fuel Direct scheme. This was a scheme targeting “vulnerable households” — low-income households with seniors, minors or disabled persons. It simply provides payment assistance and does little to address the root causes of energy poverty. Ten years later in 1986 the Cold Weather Payment scheme began which delivered additional funds to low-income households during colder than normal weather. During the 1990s new schemes were introduced — several programs that provided additional payment assistance but also, and more importantly, legislation that required every UK local authority with housing responsibilities to address the energy efficiency of their housing stock. This was the *Home Energy Conservation Act 1995* and it provided the groundwork for more innovative and progressive initiatives to be developed.

Since 1997, the UK government has focussed heavily on energy poverty and introduced a variety of initiatives that now include multiple sources of funding, multiple partnerships and a multi-faceted approach that directly address the root causes of energy poverty. They clearly recognize the importance of basic insulation measures and are still working towards their goal of insulating all wall and loft cavities in Great Britain. However, they are also cognizant that this is only a first step. Beginning in 2001 energy companies have been required to support local energy efficiency programs and frequently partner with local agencies to deliver programs for energy efficiency and heating system upgrades. The importance that the UK government has placed on energy poverty has trickled down to the regional governments with England, Scotland and Wales developing additional initiatives of their own that supplement the UK government's payment assistance schemes.

Since 2009, programs to address consumer behaviour have also been implemented. The introduction of smart meters, to be completed in all households by 2020, are an important tool in allowing consumers to see exactly how much energy they are using and in conjunction with education about energy conservation, have the potential to greatly reduce energy consumption. In 2013, the Warm Homes, Greener Homes Strategy will provide revised policies to reduce energy poverty. In addition to the original payment assistance and discounted rate programs, we see additional initiatives to address consumer behaviour, mechanisms to provide financing which is often one of the main barriers to energy retrofits, a shift to renewable energy at the household and community level, and new building standards.

As more and more households receive energy efficiency retrofits and are provided with advice to reduce energy consumption, the UK government is beginning to address changing the source of energy from non-renewable to renewable resources. With this shift in policy, we are also seeing a transition from targeting the individual household to focussing on whole communities. This transition to a holistic approach is spearheaded by the national government and can only operate in close partnership with the energy companies, local housing authorities, community organizations and local households. It has taken the UK approximately thirty-five years to reach their current achievements and based on their new strategy, it will take a minimum of nine more years to meet their revised goals.

#### **4.9 Energy Poverty Initiatives in the United States**

In the United States there are three distinct initiatives that were established to address energy efficiency for low-income households. The first, the Department of Energy's Weatherization Assistance Program (DOE WAP), was created to reduce the "burden of energy prices on the disadvantaged" (DOE, 2009). This was done by performing energy efficiency upgrades of low-income residents' homes and focussed on households with elderly people, people with disabilities and households with children (Sarin, 2009, p. 25). This program is funded with federal dollars and some additional funding is obtained through the Low-Income Home Energy Assistance Program (LIHEAP). DOE WAP is present in all fifty states and works with more than 970 local agencies that cover every political jurisdiction in the country. In the last several years, this program has averaged improving the energy efficiency of about 100,000 low-income

dwellings per year (Sarin, 2009, p. 26). In 2008 DOE allocated approximately \$227.2 million for WAP and this is to increase to a total of \$5 billion over the next three years to meet President Obama's goal to weatherize one million homes per year (Rohe et al., 2010, p. 528; Sarin, 2009, p. 53).

The second initiative is LIHEAP. It is the national program in place to provide emergency charitable assistance and programs at the state level deliver it. To qualify, the household's income must not exceed 150% of the poverty level or 75% of the State median income.

The third type of initiative is utility-based energy efficiency programs. Unlike DOE WAP, these types of programs grew in response to the increasing cost of purchasing energy. The utilities' wanted to save energy on their own system by providing energy with a lower cost alternative to nuclear power and reducing peak demand. The low-income utility programs are a subset of a larger portfolio of programs designed for this cost-reducing, profit maximizing based objective (Sarin, 2009, p. 26). As well, utility programs will vary from state to state but all utilities are required to fulfil their state's mandate for energy efficiency programming. The majority of states have restructured their electric industries and the funding for energy efficiency programs comes from a system benefit charge (SBC) that is levied at different rates per kWh from all customer segments or as a small percent of utility annual revenues. Low-income funding is then derived from a set percentage of the SBC, as mandated by the state public utility commission. Twenty-two states utilize a SBC to fund their energy efficiency programs; for example, in Massachusetts, the funds for low-income electricity energy efficiency are 10% of the entire SBC (Sarin, 2009, p. 27).

Thirty states have also provided about \$330 million of additional funding for weatherization through utility or public benefit funds, or a combination of both. Generally, states have more flexibility in determining how these funds are allocated to assist low-income households than they would under the federal WAP and LIHEAP programs (Rohe et al., 2010, p. 528).

Compared to the United Kingdom programs in the United States are piecemeal and lagging behind in terms of innovation. Rohe et al. states that the “local agencies administering these programs...rarely collaborate, and so the assistance they provide is not well coordinated ...and this creates many problems for the low-income homeowners” trying to access these programs (2010, p. 525). They narrow down these problems to four areas: projects not being done because neither program alone is sufficient to make the needed repairs; the projects are being done in the wrong order so that repairs done by one program are damaged by work funded from another program; unnecessary costs for the homeowners if they had to take loans to pay for work that could have been funded by grants; and duplication of effort by separate agencies (Ibid).

Only more recently in 2009 have DOE and the Department of Housing and Urban Development (HUD) begun to address these coordination problems through national policy and funding — injecting \$16 billion to DOE and HUD for weatherization activities. Despite the recent influx of funding and national strategy addressing energy poverty, several regions have had various organizations work together to provide services for low-income people to fill the gap left by the earlier lack of a national strategy. Progressive legislation has also played an important role in the degree of success these programs have obtained.

The Appliance Management Program (AMP) in Massachusetts, Rhode Island, and New Hampshire began in 1995 when the electricity supplier partnered with local low-income weatherization agencies. In 2008, the *Green Communities Act* legislated that a minimum of 25% of the state's electric load be satisfied by demand-side measures by 2020. For the household, the program begins with an energy audit and referrals to other energy efficiency programs, job training and/or educational programs. Potential energy retrofits include heating-system pumps, weatherization, refrigeration, lighting, heating, appliance upgrades. Regulating entities will credit the electricity supplier for non-electric savings which means that households that are heated with non-electric fuels may also participate. Over 30,000 customers have received assistance since 1996 and have an average electricity savings of 1,200 kWh per household which equals to a reduction of \$100 per year for electricity expenditures.

In Vermont two programs are offered — the Low-Income Single Family Service (LISF) and the Multifamily Low-Income Program. These programs arose from the Vermont Public Service Board that mandated the creation of state energy efficiency utility and that at least 15% of the body's budget to be spent on low-income services. LISF partners with WAP to undertake the energy audits and identification of eligible households. Services range from lighting retrofits to education to custom measures and arrangements with contractors. Average savings of \$234 per year per household have been reached. In addition to collaborating with WAP, LISF works with local low-income housing groups, state-funded affordable housing unit, and food banks. The Multifamily Low-Income Program, like LISF, partners with WAP. This program provides energy efficient upgrades to new and existing residential multifamily dwellings with at least five



units. Both of these programs are delivered through Efficiency Vermont and together they have achieved the highest energy savings in 2008 in the U.S.

The Californian Energy Management Assistance (EMA) and the New York Energy Smart programs follow a similar format to the LISF in Vermont by providing cost-effective energy efficient measures to eligible households. However, the EMA program in California differs from other programs by allowing the utility to directly contact suppliers for bulk-appliance purchases, thereby reducing the unit-cost, and ensuring that all appliances are Energy Star rated.

#### **4.10 Evolution of Energy Poverty Initiatives by Region: United States**

The approach to eliminate energy poverty in the United States appears to follow two streams. The first stream is comprised mostly of national advocacy and research and development organizations. These organizations established themselves as early as 1964 and initially targeted poverty in general. During the 1970s and 1980s additional organizations became established and the focus widened. The advocacy organizations continue to lobby government for additional funding and better policies targeting not only poverty but to also improve standards in the residential building industry, to promote the importance of energy efficiency, to encourage job training, and to assist agencies at the state level in delivering more of these types of initiatives. The research and development organizations focus on how the lives of people in poverty can be improved through better technologies, better building standards, better trained industry professionals and better education. Some of these organizations are funded by the federal government but the

majority depend on private donations, membership fees, corporate donations and funding from the utilities to further their agendas.

The second stream targets individual households and is comprised of the WAP and LIHEAP programs. Little has changed since WAP was implemented in 1976 and LIHEAP in 1982. Funding for WAP and LIHEAP are provided by the federal government and the responsibility to deliver the funds rests at the state level. Most of the funding is directed towards paying for a household's energy use rather than increasing energy efficiency of the dwelling. It is common for the state to direct 75% of funds to assist households with utility payments (i.e. LIHEAP) and to use the remaining 25% of funds for the energy efficient initiatives (i.e. WAP).

In the late 1990s and early 2000s some states passed legislation that required utility companies to collect money for assisting low-income households with their energy costs. These funds are raised through customer donations and/or a Systems Benefit Charge (SBC). Although this measure supplies additional funding to WAP and LIHEAP, the initiatives remain essentially the same and limited to mostly emergency assistance or payment assistance and the root causes of energy poverty (and poverty in general) are still not being addressed.

#### **4.11 Types of Energy Poverty Initiatives**

Three major regions were examined for their efforts in addressing energy poverty — Canada, the United Kingdom and the United States. National strategies were examined along with regional and local initiatives. Each initiative was evaluated based on their type, their date of implementation, partnering organizations, their source of

funding, and for their effectiveness. As shown in more detail in Appendices I, J, and K, each initiative can be classified into one, or sometimes several categories. The following subsections list the different categories the author observed during the literature review.

#### **4.11.1 Payment Assistance**

Payment assistance programs provide a discounted rate to qualifying households. The discounted rate may be in the form of a lesser amount of tax, a standard deduction, or deposit or late fee waivers. Some programs are only activated when the outside temperature reaches a certain threshold or when household energy consumption surpasses a certain threshold. The total deductions produce savings that range from as little as \$8 per month to a 40% discount. They are usually directed towards people on social assistance, seniors, disabled persons or households with minors. These programs are very common in the United Kingdom and the United States. In the United Kingdom, Fuel Direct and Cold Weather Payments are the main vehicles for assisting low-income households with their utility payments. In the United States these programs are predominantly funded through LIHEAP. In Canada these programs are uncommon.

#### **4.11.2 Energy Efficiency**

This classification applies to programs that assist with retrofitting homes. The energy retrofits can vary substantially in cost and scope and can include: upgrading the insulation; installing programmable thermostats; installing compact fluorescent light bulbs; upgrading windows and doors; installing or upgrading central heating systems; weather stripping; fridge and freezer thermometers; and/or a low-flow showerhead.

These initiatives are normally funded through the local utility and sometimes additional funding is provided by the government. Some initiatives deliver low-cost energy efficiency solutions such as weather stripping and are valued at about \$200. Other programs undertake the more extensive retrofits such as attic, wall and/or basement insulation which can cost as much as \$10,000. These programs are common throughout all of the regions studied. Examples include Warm Front in the United Kingdom, the Weatherization Assistance Program (WAP) in the United States, and the ecoENERGY Retrofit program in Canada.

#### **4.11.3 Research and Development**

Research and development refers to organizations that are undertaking research into alternative means of addressing energy poverty, including pilot studies. The organizations vary by how they are funded and how they were established. Many grassroots organizations assume research roles and the research role is often directly related to their advocacy role. Various levels of government and the local utility also play significant roles in research. In the United Kingdom, Neighbourhood Energy Actions (NEA) is an example, in the United States the American Council for an Energy-Efficient Economy (ACEEE) is a national non-profit organization, and the Saskatoon Housing Initiatives Partnership (SHIP) is a Canadian example.

#### **4.11.4 Legislation**

Legislation refers to the laws that serve to legally ensure that certain actions are carried out. Generally legislation is formed at the national level and the actions are

performed at the local level. For example, in the United Kingdom *The Home Energy Conservation Act 1995* requires every UK Local Authority to undertake energy efficient measures on all of the residential accommodations in their area. *The Green Energy Act* in Ontario supports the creation of new financing tools to help consumers manage the costs of energy retrofits, the establishment of a feed-in tariff for renewable energy sources and other measures to boost energy efficiency and investments in renewable energy projects.

#### **4.11.5 Policy**

Policy refers to the strategies that have arisen from federal or state/provincial legislation, advocacy organizations or community agencies to battle energy poverty. They are the plan of action which ensures that the strategies are complied with. The UK Fuel Poverty Strategy and Guelph's Community Energy Plan are examples of policies in the regions examined. Policies should not be static and should be reviewed regularly. The Warm Homes, Greener Homes Strategy in the UK will come into effect in 2013 and will replace the UK Fuel Poverty Strategy. Canada and the United States lack national policy to direct lower levels of government and organizations in their strategies to fight energy poverty.

#### **4.11.6 Advocacy Organization**

Generally, advocacy organizations are independent of government, formed by concerned citizens and support initiatives in the community that contribute to affordable housing. They may operate funds to finance housing projects, lobby government for effective policies and strategies, conduct research, leverage government for energy

poverty funding, educate the public and work with decision-makers at the various levels of government. An example of an advocacy organization in the UK is Consumer Focus that protects the interests of the consumer. In the United States, advocacy groups tend to operate at the national level and strive to maintain or increase the current level of LIHEAP funding — such as the National Fuel Funds Network. In Canada, these organizations tend to be located in the eastern regions such as Ontario, Nova Scotia, New Brunswick and Prince Edward Island. The most prolific Canadian advocacy organization is the Low-Income Energy Network (LIEN) in Ontario.

#### **4.11.7 Education**

Many organizations provide advice and education on: reducing energy consumption; installing energy-saving devices; and where to access information for grants or rebates. This also includes the installation of smart metres which provide the homeowner with information about their energy consumption. Sometimes financial counselling is provided to assist homeowners with budgeting for their energy costs and other essentials. Educational services are free and are frequently offered in conjunction with an energy audit. In the United Kingdom there are extensive resources for consumers to help them find the information they need and includes Energy Efficiency Advice Centres and the Home Heat Helpline. In the United States, educational services are focussed on energy efficiency professionals rather than the consumer, although some states offer consumer-focussed services. In Canada, the Office of Energy Efficiency provides advice to consumers, school boards, businesses and institutions. At the provincial level, most educational services are provided by the utility.

Educational opportunities are lacking for trades people to install renewable energy systems. Canada requires straightforward training and certification systems. This certification is necessary for consumer confidence in the renewable energy industry and to help reduce the upfront costs (Community Research Connections [CRC], 2006b).

#### **4.11.8 Financing Mechanism**

A major obstacle for low-income households to perform energy retrofits is the cost. A financing mechanism is a way for low-income households to pay for the energy retrofits without encountering additional costs or having to pay a substantial amount of money upfront. There are multiple financing mechanisms offered. Most are directed towards homeowners however several funding sources target non-profit organizations.

Many utilities, especially in the United States, utilize Systems Benefits Charges (SBC). By adopting a SBC, every consumer contributes a small amount monthly to a fund that provides the capital for low-income energy retrofits or for emergency assistance if the household is in danger of being disconnected.

An effective mechanism is for the money to be provided upfront by government or private industry and then repaid through the energy savings the homeowner is expected to experience. An example that is gaining wider recognition is Property Assessed Payments for Energy Retrofits Financing Program (PAPER). This type of financing is not a personal loan but a fee (not a tax) assessed to the property. A PAPER program has a number of key features providing multiple benefits: it would be delivered by municipalities on a revenue-neutral basis; it would provide upfront financing for energy improvements; it would ensure that annual energy cost savings exceed annual

payments. The financing and payments would be assessed to the property like a local improvement charge and repaid as a surcharge to the homeowner's property taxes. If the owner moves, the payments are then continued by the new owner who also receives the energy cost savings. This financing would allow people to invest in deeper, more costly improvements with longer payback periods than the owner's expected stay in the home. PAPER financing would be accessible to homeowners at all income levels. It could provide the same level of interest for all, or, as in the case of Boulder, Colorado, provide a lower interest rate for income-qualified owners. The Pay as You Save program in the United Kingdom follows a similar format. In Canada, an increasing number of governments are analyzing possibilities for the implementation of PAPER to finance energy retrofit programs. Halifax is pursuing legislative change to enable a solar thermal project and Vancouver, Ottawa and Toronto are considering the mechanism (Persram, 2011, p. 15).

Another method is to simply provide the homeowner with a grant. However, a grant may not cover the entire cost of the energy retrofit and the homeowner may still have to contribute a significant amount of money for the work to be completed. Another problem is that the grant is frequently given after the work has been completed; the homeowner has already paid for the work, and therefore does not eliminate the common barrier of the upfront costs.

Some initiatives also offer funding to organizations to develop affordable housing. The Encouraging Community Housing (ECHO) Program in Saskatchewan provides feasibility loans and/or development loans to local non-profit organizations to enable proponents develop detailed proposals for affordable housing.



#### **4.11.9 Energy Audit**

An energy audit is an assessment of the home to help determine which energy retrofits will provide the greatest benefit. Sometimes included with the energy audit is the installation of low-cost retrofits such as weather stripping, CFLs, pipe insulation and faucet aerators. The evaluation may also include the recommendation to perform more expensive retrofits such as attic, basement and/or wall insulation. For low-income households, an energy audit is performed for free or at a reduced cost. In the UK, energy audits are combined with educational programs to help consumers understand the impact that an energy retrofit can have their homes and are offered through the government's Fuel Poverty Strategy. Energy audits in the United States and Canada are usually performed by the utility through their low-income energy efficiency programs and are the precursor to improving the energy efficiency of the dwelling.

#### **4.11.10 Advisory Group**

An advisory group is a body responsible for helping to deliver a region's energy efficiency agenda, usually at arm's length from the government. The group may report on the effectiveness of current policies; identify barriers to the delivery of reductions in fuel poverty; develop effective partnerships; report on any additional policies needed to deliver the Government's targets; and report on the results of the work to monitor fuel poverty (Kenworthy, 2006, p. 71). An example is the Fuel Poverty Advisory Group in England.

#### **4.11.11 Skills Training**

Some programs combine energy saving measures and lack of income by employing local area residents to install energy saving measures. By doing so, local residents earn an income and acquire skills that could be used to find gainful employment in the future. In Canada, the BUILD and BEEP programs are the best examples. Several organizations in the United States offer job training to people in need of skills for the job market but these programs do not link job training with energy efficiency and reducing household costs like the BUILD and BEEP programs.

#### **4.11.12 Emergency Assistance**

Similar to programs classified as payment assistance, however the main difference is that emergency assistance programs are administered by non-profit agencies and are funded through private donations. Funding is usually limited and households with seniors, disabled persons or minors are given priority. This type of assistance is usually limited to one payment per year and to households that have exhausted all other services and are facing disconnection of services. This type of assistance is commonly provided in the United States and to a lesser degree in Canada. The UK approach is different and can be classified as payment assistance.

#### **4.11.13 Energy Transition**

Energy transition programs promote the transition from traditional energy sources such as natural gas to alternative energy sources. Alternative energy sources include on-site renewable energy options such as photovoltaic panels, solar water heaters, wind

turbines and others. The Solar Neighbourhoods Project in Toronto is an example that targets low-income households. More often, energy transition initiatives are available to households that can afford to absorb the upfront costs. The Feed-in Tariff (FIT) program in Ontario guarantees prices through long-term contracts for households that use a form of renewable energy and are tied into the electrical grid. Households can only apply to this program once they have installed a renewable energy source.

#### **4.11.14 Appliance Donation/Repair/Replacement**

These are initiatives that offer to supply appliances to households during extreme weather, to repair furnaces at no cost, or to replace older appliances with energy efficient versions. For example, in several southern states thousands of fans are distributed to the utility customers that cannot afford cooling devices during extremely hot weather. Priority is usually given to persons in poor health.

### **4.12 International Comparison of Energy Poverty Initiatives**

Fourteen different energy poverty initiatives were identified in a search of programs in Canada, the United States, and the United Kingdom (see Section 4.11). Each jurisdiction has taken a different approach to addressing energy poverty (see Figure 12). The United Kingdom has the most integrated and aggressive approach. Programs addressing fuel poverty there are evident from as early as 1976. Programs are also the most varied – both in terms of type of assistance and by source of assistance. Initiatives in Canada are mostly educational or energy efficiency related. Many small-scale projects have also been undertaken that target specific neighbourhoods but a national framework

is lacking. Warm Up Winnipeg and CLER are good examples of local initiatives, however the progression from utilizing traditional sources of energy to renewable sources is slow. In the United States, utilities and states rely heavily on emergency assistance and payment assistance schemes instead of adopting programs that target the root causes of energy poverty. Areas that receive very little focus across all jurisdictions are financing mechanisms, skills training, and energy transition, although new policies to be introduced in the UK offer new financing mechanisms.

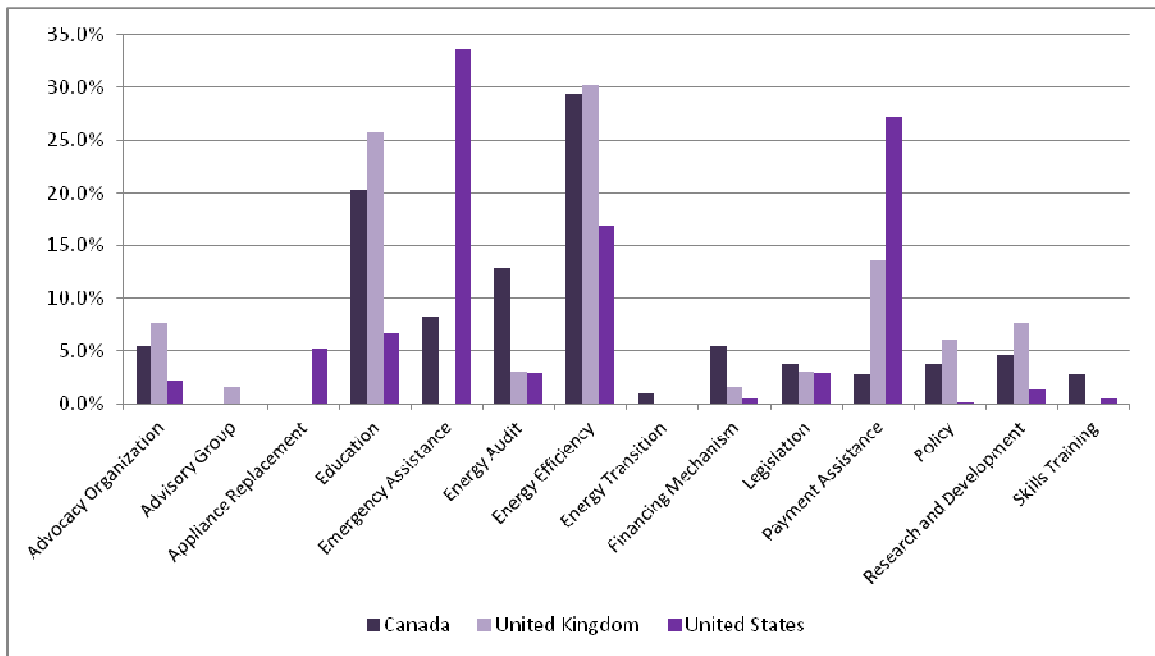


Figure 12. Frequency of energy poverty initiatives by region. Data source: Author’s findings from literature review.

### 4.13 Benefits of Energy Poverty Initiatives

Increasing the energy efficiency of low-income households has numerous household, societal and environmental benefits. Housing is a crucial element in assisting individuals, families and a community reach their full potential and is a key component

of creating sustainable communities (Manitoba Housing, 2009, p. 4). Carter states that “housing can be the platform for the success of other public policy initiatives” (2009, p. 9). The impact of achieving an adequate supply of affordable housing would be multi-fold — from providing a stable base for low-income households to alleviating poverty to neighbourhood revitalization. The same argument can extend to increasing the energy efficiency of low-income households because the energy retrofits will increase affordability and therefore produce the same positive impacts.

Low-income households often go without other basic needs, such as food and other utilities, to pay their energy bills. An American study found that 43% of low-income clients skipped rent, food, or medicine to pay a utility bill (Sarin, 2009, p. 21). However, increased energy efficiency can reduce energy costs by 20 to 40%. The effect of the savings a household obtains by increasing the energy efficiency of their home is disproportionately higher than for other households. Basically, the savings on their energy bill from an energy efficiency program can, and often does, go to pay for other crucial needs and helps to avert the “heating or eating” choice that many low-income households face. There are other household benefits: reduced costs of moving, the value of increased comfort and the reduced costs of poor health. In Manitoba, numerous individuals have obtained job training and meaningful employment through the BUILD and BEEP programs.

The societal benefits of low-income energy efficiency programs are tangible — investments in low-income energy multiply through the economy and Oppenheim and MacGregor assert that in the United States investments in energy efficiency are 3.0 times more economically productive than investments in manufacturing and create 3.4 times as

many jobs. Through multiple studies, they have discovered that each dollar LIHEAP assistance spends nationally creates \$5.40 in positive economic impacts (2008, p. 8).

Other societal benefits include the reduced costs of homeless shelters, the cost of crime avoided by reducing poverty and the reduced costs of healthcare as a result of reducing poverty.

Housing construction and renovation also provide opportunities to address global warming and climate change issues. Environmental benefits such as reduced greenhouse gas emissions, the potential to meet Kyoto targets and other climate change objectives also address provincial initiatives. Through partnerships with private and non-profit sectors and other levels of government, there is great potential to develop and manage environmentally sustainable, affordable housing in Manitoba.

An example of the benefits of an energy poverty initiative is Manitoba Hydro's Furnace Replacement Program. To replace an old, inefficient furnace increases the comfort level of the household, improves the safety of the household by reducing the risk of carbon monoxide leakages, and prevents extra expenses of replacing a failed furnace during the winter months. In addition to reducing natural gas consumption, new high-efficiency furnaces also consume less electricity and the overall energy savings can reach \$300 annually.

#### **4.14 Renewable Energy**

A separate stream of research and policy focuses on renewable energy rather than energy poverty. In the United Kingdom, most research and applications into renewable energy have either been based on large-scale renewable energy installations like

combined heat and power district heating schemes that feed into the National Grid or on packages for the installation of solar photovoltaics for individual households or businesses (Giddings & Underwood, 2007, p. 402). A renewable energy scheme, as the Cockfield Regeneration Scheme demonstrates, should use a number of energy sources with a significant proportion originating near to the place of use (Ibid). Features of a local renewable energy system for a community would be that it:

- Is carbon neutral;
- Uses reliable and available technology;
- Meets the heating, light and power needs of households;
- Ensures secure and autonomous supply;
- Is able to be locally controlled and is appropriate to the community and locations (Ibid).

Geothermal energy, solar, wind, hydro and biomass are recognized and categorized as renewable energy sources (Niitsuma & Nakata, 2003, p. 769). The optimum combination of renewable energy resources is dependent on local climatic conditions, the availability of the energy sources, the component cost and the demand patterns of the local residents. Wave, wind and solar energy are fluctuating sources which require an infrastructure that is able to cope with the fluctuations in a cost-efficient way. Generally, wind generators perform well and the electricity generated by this technology tends to account for the majority of the total electricity generated and it is becoming increasingly cost competitive with non-renewable energy sources. Additionally, there are many proven economic development benefits of installing and operating wind turbines that do not exist for non-renewable supplies (Galluzzo, 2005, p.

1). However, production becomes insufficient during windless periods and other methods of energy supply will be required. Solar and biomass constitute only a small part of the electricity generated due to their cost. Geothermal heat pumps can possibly bridge the gap between energy demand and supply. In Manitoba, hydroelectricity, wind, solar, and biomass are potentially the types of renewable energy that would be the most cost-effective.

Compared to a conventional energy system, an integrated renewable energy system has the potential to reduce carbon dioxide emissions by over 80%. Additionally, the annual cost of meeting a community's energy needs with an integrated renewable system can be reduced by 15% which accounts for the fuel, operating expenses and capital investment costs of the renewable energy sources. There are numerous types of renewable energy infrastructure — ranging from small to large scale and from local to centralized.

The potential for a district energy system to “assist with urban revitalization, brownfield remediation, community economic development and sustainable energy conservation” is increasing with the rising cost of energy and growing concerns about greenhouse gas emissions (Gilmour & Warren, 2007, p. ii). District energy (DE) is an “approach to meet the space heating and cooling needs of residential, institutional, commercial and industrial buildings and supporting processing requirements of local industry” (Gilmour & Warren, 2007, p. 2). The structure of a DE system can vary – central energy plants, mini plants or multiple plants – connected via piping are utilized to service buildings with space heating, hot water, steam and chilled water. A variation is to



provide electrical power in addition to the heating and cooling, which is referred to as combined heat and power (CHP).

In Denmark, savings and efficiency improvements have been important parts of their energy policy since the first oil crisis in 1973. Through energy conservation and expansion of Combined Heat and Power production (CHP) and district heating, Denmark has been able to maintain the same primary fuel consumption for a period of more than 30 years in spite of about 70% increase in GDP and extensive increases in urban development and construction (Lund, 2007, p. 912). The share of electricity production from CHP is as high as 50%, and approximately 20% of the electricity demand is supplied by wind power (Lund, 2007, p. 914). Moreover, 14% of fossil fuels have been replaced by renewable energy.

DE is feasible in areas that have a high density and a mix of land uses. High-density is essential for reducing the per unit cost of DE infrastructure and mixed uses helps to provide stability to the demand. Urban Energy Solutions outlines a number of indicators useful for selecting a community appropriate for a DE system. In selecting the Daniel McIntyre and St. Matthews neighbourhoods, the following components are applicable:

- A community with an interest in DE (as noted in their community Green Plan);
  - Opportunities for urban revitalization, brownfield remediation, economic development or energy conservation;
  - Mixed land use (because of its close proximity to the Health Sciences Centre);
- and

- Clustering and mixed-use buildings.

Renewable energy investments have external costs and benefits, which need to be taken into account if socially optimal investments are to be made (Bergmann et al., p.1004). Cost, advances in technology, availability of a renewable energy source, property ownership, a built environment are all factors that need to be considered when implementing renewable energy in an urban environment. For the purpose of this study, only the feasibility of using on-site renewable energy sources was examined. DMSM is an established neighbourhood and implementing large-scale district heating schemes would require removing existing infrastructure to insert the new infrastructure. Also, it would require agreements between all property owners affected and this raises additional costs and issues. Although the cost per unit is lower when implementing large-scale energy schemes, access to enough capital is a barrier and very difficult to overcome. Implementing renewable energy technology at the household level removes these barriers and reduces the burden to just the household, which may be easier to assist through incentive programs. Appendix H summarizes the benefits and disadvantages of renewable energy technology, at the household and large-scale district levels.

#### **4.14.1 On-Site Renewable Energy Sources**

There are a number of on-site renewable energy technologies available – varying in cost and appropriateness that can be utilized to further reduce energy consumption and costs. The following sources of on-site renewable energy have local potential:

**Solar photovoltaic cells:** Cells are made up of several layers of a semi-conducting material. When solar energy from the sun hits the cells, it creates an electric field across the layers, which causes electricity to flow. Estimates are that they would reduce resident's electricity bills by around 75%. They can be used for space heating and domestic hot water. The system's pump can be run by a smaller PV panel to reduce electricity costs.

**Solar Water Heating:** Solar panels fitted to the roof retain heat and transfer that energy to preheat water entering the solar storage tank. When the hot water is needed the solar heated water will then flow from the solar storage tank to the existing hot water system. Solar water heating systems generally supply an average household with a 50% savings on a household's water heating costs with the ability to reduce household energy use by approximately 10%.

**Solar Thermal:** Solar heated hot water is pumped through a radiant coil and an air handler fan blows air across the coil to distribute the heated air throughout the house. A small back up boiler can be utilized to boost the temperature of the water for space heating if the solar tank temperature is insufficient. Radiant floor heating is an efficient method for space heating that can use the solar heated water, thereby eliminating the need for a furnace and forced air system.

**Solar Wall:** Solar walls are typically used for space heating in commercial and industrial applications although they can be used residentially. A solar wall can be passive or can incorporate heat exchange pumps for better performance. Passive solar collection can be as simple as allowing sunlight into a heated space through south facing windows. The heat energy is then stored in the building materials inside the space.

Passive solar collectors use the natural convective movement of heated air to transfer heat from the solar collector into the building. When the sunlight is sufficiently intense, the air between the clear glazing and the dark metal absorber is warmed and rises. This hot air exits into the building through a slot at the top of the wall into the building. A slot near the bottom of the wall allows cool building air into the solar collector to start its cycle again. Passive solar walls can be added to an existing insulated building with slight modifications. The building requires a good southern exposure to consider any type of solar heating. Active solar heating follows the same premise but instead of the natural convective movement of heated air, once heated the air is pumped via fans or dampers into the facility's central heating system or directly into the building itself.

**Wind Turbines:** These generate power by converting kinetic energy from the wind into rotating shaft power, which in turn generates electricity. Turbines vary in size and power and can be mounted on a building or free standing. Some models plug directly in to the circuitry of the house while others can be linked up to the electricity meter allowing excess electricity to be returned to the grid. In recent years, wind energy projects in Canada have been spurred by the improved reliability and affordability of wind energy systems and by the experience derived from earlier demonstration projects (Ah-you & Leng, 1999, p. 1). Urban wind turbines are very new and not well enough developed to be affordable and effective sources of energy.

**Hydropower:** Power is produced by converting potential energy stored in water held at height to turn a turbine that then produces electricity. Small hydro plants have a useful life of more than fifty years and are quite cost-effective and suited to remote communities which have a good hydro source.

**Ground Source (Geothermal):** A ground loop, made of lengths of pipe buried in the ground, is filled with a mixture of water and antifreeze, which is pumped through the pipe absorbing heat from the ground and transferring it to a hot water tank. The tank feeds the distribution system, which can be under floor heating, radiators or water storage for hot water supply. The Orkney Housing Association has installed ICE Energy heat pumps to power under floor heating and water heating in 19 flats in Kirkwall, reducing CO2 emissions by 75%.

**Biomass:** To use biomass involves the burning of organic matter, such as wood, animal or food processing waste. For households, wood is usually used. Wood pellets, chips or logs are burned in either a stand-alone stove or boiler connected to central heating and hot water systems. Biomass represents a potential valuable resource, which could supply heat via district heating networks or individually, both to domestic and business premises, as well as having potential for electricity generation (Kellet, 2007, p. 389).

Overall, given Manitoba's low cost of electricity, certain types of solar energy technologies may not be the most cost-effective, such as solar photovoltaics. Renewable energy technologies that can be used for space and water heating are likely to have the most return on investment as well as the largest reductions in monthly energy bills.

#### **4.15 Implementing an Energy Efficiency Strategy**

Many energy efficient and renewable energy measures are held back by many barriers including:

- A lack of awareness of cost-effective savings potential;
- Missing or partial information on energy efficiency performance;

- Lack of consideration of system and process energy efficiency issues;
- Different economic incentives which exist between landlords who procure energy using equipment and tenants who pay the energy bill; and
- The fact that energy efficiency is a minor determinant of capital-acquisition decisions and is bundled in with more important decision factors (Waide & Gerundino, 2007, p. 2).

Recognizing that some of these barriers stem from a lack of awareness, local government participation and community participation are key components for overcoming these barriers. Zahran suggests that local governments need to do three things: firstly, they need to provide financial assistance for individuals to adopt energy efficient measures; secondly, they need to boost their civic environmental capacity by initiating environmental awareness campaigns and directing more resources toward programs that engage the public in recycling, energy conservation, and public transportation activities; thirdly, local and regional governments need to better articulate the risks of climate change to all communities, including indirect costs (2008, p. 471). In conjunction with initiatives brought forward by government, public participation can increase ownership over the problem of climate change.

Community participation “contributes to public awareness of environmental, social and economic issues, gives the public the opportunity to express its concerns, and enables local authorities to take due account of such concerns” (Impetus Consulting, 2004, p. 15). Community involvement also furthers accountability of and transparency in decision-making and strengthens public support for decisions on social, environmental and economic issues. The Aarhus Convention summarises the key characteristics of effective participation into the following principles:

- Timely and effective notification of the community concerned;

- Reasonable timeframes for participation, including provision for participation at an early stage;
- A right for the community concerned to inspect information which is relevant to the decision-making free of charge;
- An obligation on the decision-making body to take due account of the outcome of the community participation; and
- Prompt community notification of the decision, with the text of the decision and the reasons and considerations on which it is based being made publicly accessible (Ibid).

Community participation helps to circumvent the pitfalls of the “decide, announce, defend” approach. This approach often leads a local authority into the awkward territory of having to defend the decision, which can be costly in terms of time, money and reputation. It is essential that the community and local authorities work closely together to ensure that the strategies “are in line with community interests and needs, leading to sustainable decisions which are more likely to have the buy-in of the community (Ibid). The top-down policy approach to bring about rapid change is insufficient and public support for implementing renewable energy strategies will require an “alternative approach of planning and action through interactive communication, public participation and collective learning among all stakeholders” (Upreti & van der Horst, 2004, p. 61).

A viable alternative agency, other than a utility or local government, remains a key requirement. In Australia, Urban Development Corporations are agencies that draw together funding from existing agencies such as the Carbon and Energy Savings Trusts

and the Renewables Obligation. The second component needs to be a high degree of community involvement (Kellet, 2007, p. 392). A possible model is provided by the Energy Service Companies (ESCO). An ESCO is an organization that is involved in developing, installing and financing comprehensive, performance based projects, centred on improving energy efficiency. The organization seeks to improve energy efficiency for customers in order to reduce their energy costs. It does this by raising finance from lenders and using the efficiencies gained to pay the full cost of its measures (Ibid). The primary benefit to consumers is financial, in the form of reduced energy bills. The primary objective of the ESCO is to reduce fuel poverty by maximizing the energy purchasing power of the community. Kellet suggests Energy Service Companies (ESCOs) should be viewed as socially oriented businesses whose rationale is community development, both in the social, economic and environmental sense, rather than being profit focused (Ibid).

Community consultation in the context of community planning and energy poverty is suited to the following situations:

- Developing strategies and agreeing action plans, such as Community and Energy Poverty Strategies, development frameworks and the action plans that are set out for their implementation;
- Implementing the strategy action plans, such as developing projects and schemes which implement the policies and aspirations set out in the strategies and count towards meeting specified targets; and



- Conflict resolution, which may be necessary at any point where there is polarity in views and finding agreement and common ground, proves difficult (Impetus Consulting, 2004, p. 22).

## **4.16 Chapter Summary**

The actual number of households in energy poverty in Canada is not known. Green Communities Canada estimates there are almost 3 million households in Canada (23.3%) spending more than 5% of their income on energy and almost 1 million households (7.6%) are spending more than 10% of their income on energy costs (Maynes, 2008, p.2). There is no clear definition although the general consensus appears to be that households spending more than 6% of their income on energy bills are in energy poverty.

In Canada, the cancellation and the recent reintroduction of the ecoENERGY poverty program suggest that there is significant public support for increasing energy efficiency of dwellings and the national government recognizes this support. Households that have been able to participate in the ecoENERGY program saved an average of 20% on their utility bills but the upfront costs are out of reach for most low-income households. The national government has yet to adopt initiatives that target the most vulnerable households. At the provincial level there is some effort to address energy poverty through low-income energy efficiency programs. Although a national strategy is lacking, every province in Canada has in place programs to assist low-income households with their energy bills. The majority of programs are delivered through utilities and offer energy retrofits and emergency assistance. The most innovative program, BUILD, has

been replicated in Brandon (see Section 4.5.7 for additional details). BUILD has seen success with their program during 2010: the total utility bill reductions exceeded \$1,000,000; 76 hard-to-employ persons became more employable; and over the next ten years a further \$7,000,000 will be saved on utility bills. Expansion of their program will require more support from all levels of government.

The approach to tackle fuel poverty in the UK generally consists of programs that target the root causes of fuel poverty. Inefficient dwellings (including social housing) are targeted to improve their energy efficiency; the high cost of fuel is targeted by applying pressure to energy companies to maintain and/or reduce fuel costs and to ensure fair treatment for low-income households; and low incomes - trying to reduce fuel poverty through programs that promote social justice. However, energy poverty is a moving target. Even though in the United Kingdom tackling energy poverty is a priority and the goal was to end energy poverty in vulnerable households by 2010 and in all households by 2016, the number of households in energy poverty has risen despite the large number and variety of policies and programs that were implemented.

Part of the problem is that energy bills increased by an average of 16% between 2004 and 2008 and fuel prices continue to rise. In the UK, there has been a decline in the number of households receiving Fuel Direct payments. The reverse is true for Cold Weather payments — since 1988 the number of payments has increased from 5,000 to 472,000. This could mean any of the following: the amount of funding for Cold Weather payments has increased; there may have been more episodes of extremely cold weather; or there may now be more households in fuel poverty. It is likely a combination of all factors but despite strong efforts by the UK government energy poverty continues to rise.

The UK government review and assess their policies and programs regularly and try to adjust accordingly. In 2009 the Government reviewed their energy poverty strategy and made changes to their Warm Front Scheme and their Carbon Emissions Reduction Target (CERT), as well as developing the Community Energy Saving Program CESP). Building on the previous success of Warm Front and CERT, the Government is rolling out a new strategy for 2013: The Warm Homes, Greener Homes Strategy. The effectiveness of the Warm Homes, Greener Homes Strategy is yet to be determined, but several initiatives stand out as having the potential to eliminate some of the most common barriers that households in energy poverty face. For example, with the adoption of the Warm Homes, Green Homes Strategy, they will continue to try to improve the delivery of energy poverty initiatives and to better target the most vulnerable households. However, they are also using the adoption of this strategy to begin delivering new programs and initiatives. They are implementing new financing mechanisms for homeowners and promoting the transition of current energy sources to renewable forms of energy.

The United State's approach to tackling energy poverty is very similar to that of Canada. A national policy and strategy is lacking and any initiatives are usually undertaken by either the utility companies or local non-profit organizations. During the last 30 years, the U.S. Department of Energy's Weatherization Assistance Program (DOE WAP) has contributed more than \$5 billion provided weatherization services to more than 5.6 million low-income families. On average, weatherization reduces heating bills by 32% and overall energy bills by \$358 per year at current prices. This spending, in turn, spurs low-income communities toward job growth and economic development.

Funding for LIHEAP and DOE WAP has existed almost nearly as long as funding for the Fuel Direct program in the UK. However, where the UK's strategy has evolved, the American approach at the national level has barely changed. Funding to LIHEAP for 2012 is expected to be cut by 50% and clearly poverty in general and energy poverty in particular, are not high on the agenda of either main political party in America. The haphazard approach to tackling energy poverty is further complicated by the way the energy distribution system is structured which means that the national government does not have the legal authority to ensure a unified policy is implemented. There are fifty-one regulatory bodies that set residential rates and the standards for consumer protection. In rural areas, the distribution of electricity is by non-regulated cooperatives and 15% of low-income households are heated by oil, propane or wood and none of which is subject to price regulation.

There is a dramatic contrast between the UK approach to reducing energy poverty versus Canada and the United States. The differences are partly due to the difference in governance but the core difference is really the importance, or lack of importance, that poverty and energy poverty are on the domestic political agenda. In the UK energy poverty is high on the agenda and there is a clear national policy, agreement on what percentage of expenditure is too high for energy costs, a national target date for eliminating energy poverty and a significant amount of national government funding to deliver a wide variety of initiatives.

Ultimately, programs that target the root causes of energy poverty are the most effective. No single program can be effective in isolation and it will take a combination of approaches to effectively address energy poverty. The biggest inroads, by far, have

been made in the UK yet even there increases in the cost of energy are having a detrimental impact and setting back target dates. The key feature of the UK regime is the wide variety of programs. The least progress appears to be in the United States. In the 1970s and 1980s a number of advocacy organizations were established, and few advances have been made since then. The vast majority of initiatives are payment assistance and emergency assistance programs – the least effective approach that fails to address the core causes of energy poverty. Canada clearly lacks a national approach but most provinces are engaging in a wide variety of initiatives.

In a Just City, municipalities have the authority to distribute benefits more evenly to their constituents and can facilitate relationships between different stakeholders. The literature review clearly directs research towards the examination of inter-organizational relationships because it is extremely important that stakeholders are involved, communicative, and co-operative with one another to make their community a “just” city. In Winnipeg there is much work to be done. The federal, provincial, and municipal housing policies are misaligned and energy poverty is not on the agenda of any level of government. In a Just City, energy poverty would be brought to the forefront of the political agenda. There are so many benefits to performing energy retrofits on underperforming dwellings: reductions in energy costs; reductions in poverty: economic stimulus; reductions in greenhouse gas emissions; reductions in crime; increases to employment; and improvements to the health and safety of the home. The potential for a local community to obtain these benefits is what has shaped the research for this thesis.

The following chapter provides the findings from the research undertaken by the author, an analysis of the findings, and a discussion of the findings in relation to the literature review.

## **CHAPTER 5: RESEARCH FINDINGS, ANALYSIS AND DISCUSSION**

The following chapter describes and analyzes the findings from a review of the literature, the structured interviews with Daniel McIntyre and St. Matthews residents, and from the semi-structured (key informant) interviews with local professionals. Sub-sections reflect different key questions used for the resident interviews and different types of professionals from the key informant interviews.

The literature review and interviews were carried out to help inform the research questions:

1. What is the nature, extent and impact of energy poverty in the Daniel McIntyre and St. Matthews neighbourhoods?
2. Are there renewable energy options at the local level that can be used to address energy poverty?
3. What are the institutional barriers between government, the community association and local residents that prevent a reduction in poverty and in what ways can they be overcome?

The first question was mainly addressed by the semi-structured interviews with local residents; the second by the literature review and key informant interviews; and the third question through the key informant interviews.

## **5.1 Structured Interview Findings**

The structured interviews with local households were conducted in May 2010 and from September 2010 to March 2011. Twelve of the households interviewed resided in Daniel McIntyre and the other twelve resided in St. Matthews. Twenty-one of the households interviewed own their home (87.5%) and the remaining three households rents their home (12.5%), compared to 46.9% ownership for DMSM. Each resident was asked the same set of questions divided into four sections: accommodation; household costs and characteristics; personal information; and the Daniel McIntyre St. Matthews Community Association. The following sub-sections show the results from each section of the interviews.

### **5.1.1 Accommodation**

The intent of the questions asked from this section was two-fold. The first was to obtain information about the structural characteristics of the house and the heating systems. The structural characteristics of the home greatly impact the amount of energy used for heating and therefore the cost of energy. As noted in Section 2.2, homes constructed prior to 1945 have an energy rating of 55 or lower. Heating systems also impact energy usage and costs. Heating a home with a natural gas furnace typically costs more than heating a home with a boiler system.

The other intent of this set of questions was to determine if any energy retrofits have been performed on the dwellings, if any energy retrofits were planned and the general awareness of “green” renovations. The intent of the resident to undertake energy retrofits is a tremendous commitment in terms of money, time and knowledge. Even



though the end result of performing energy retrofits is positive by reducing energy consumption and costs, the barriers to performing the energy retrofits are substantial.

**5.1.1.1 Structural characteristics**

Table 10 shows the average date of construction and size of the dwellings. The age of construction for the dwellings is relatively equal between neighbourhoods. Of those surveyed, 23 of 24 (95.8%) dwellings were constructed prior to 1946. The average age of construction of the homes was 1916 — the oldest was constructed in 1905 and the newest was constructed in 1948. In DMSM, 57.7% of homes were constructed prior to 1946 and 17.7% between 1946 and 1960.

Six homes are less than 1,000 square feet and the remaining 18 are greater than 1,000 square feet. The homes were smaller on average in St. Matthews by 144 square feet. Overall the average size of the homes is 1,111 square feet, with the smallest being 640 square feet and the largest, a duplex, is 1,840 square feet.

Table 10  
*Average date of construction and size of dwelling.*

	<b>Daniel McIntyre Average</b>	<b>St. Matthews Average</b>	<b>Overall Average</b>
<b>Date of Construction</b>	1915	1916	1916
<b>Size of Dwelling (in square feet)</b>	1,183	1,039	1,111

Data source: Author’s findings from structured interviews with householders.

The majority of these dwellings are 1 and  $\frac{3}{4}$  storey, followed by 2 storey homes, bungalows and 1 and  $\frac{1}{2}$  storey homes. The majority of heating systems are natural gas furnaces — only two had boiler systems.

#### ***5.1.1.2 “Green” Retrofits***

The residents interviewed were asked if they were aware of any renovations to their home prior to moving in, what renovations they have completed thus far, and if they planned to undertake any additional renovations in the future. Each type of renovation was classified into one of the following categories: cosmetic renovation which would include upgrades such as painting, kitchen renovations and new flooring; home system replacement which includes electrical or plumbing upgrades; energy retrofits which includes installation of a high-efficiency furnace, insulating the attic, basement and/or exterior walls, and weather stripping. Many homes have had renovations that fall into two or three of the above categories.

As shown in Figure 13 below, six houses had cosmetic renovations prior to the current residents moving in, five houses had a combination of cosmetic and energy retrofits, and nine homes had no known renovations. The types of renovations that homeowners have undertaken were slightly different. There was a greater focus on improving the energy efficiency of the home and the majority of renovations, seventeen, included an energy retrofit of some sort. In planning for the future, homeowners appear to want to undertake more cosmetic renovations, which is a logical succession once energy retrofits and home system replacement types of renovations have been completed.

The three homes that are rented have not had any renovations since the current tenants have moved in and there are no renovations planned for the future.

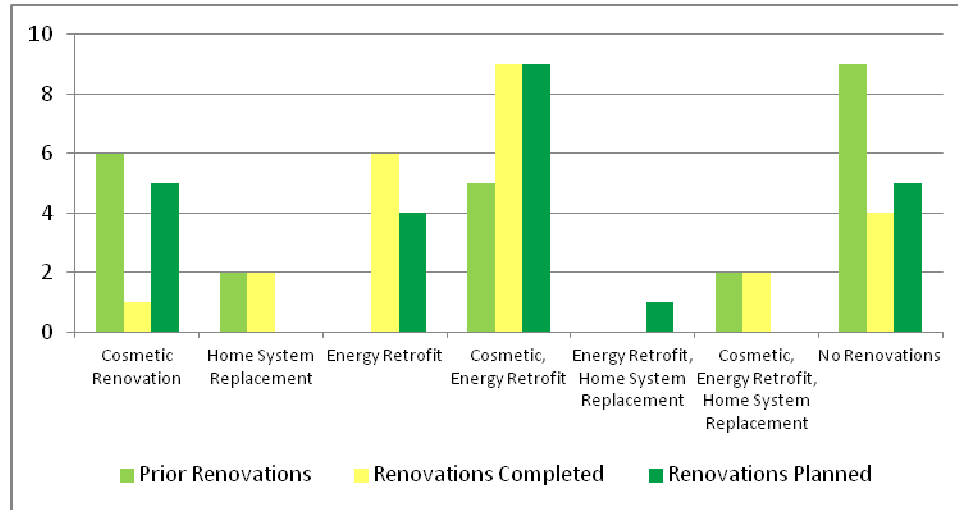


Figure 13. Types of renovations completed and planned. Data source: Author’s findings from structured interviews with householders.

In terms of potential “green” renovations, Figure 14 shows all of the responses. The top four responses were: upgrading windows and doors; installing a high-efficiency furnace; installing a tankless hot water heater; and insulating the walls, attic and basement. The responses raise several more questions. The top four responses provided are for very expensive energy retrofits. The most popular response, upgrading windows and doors, is one of the least cost-effective retrofits a homeowner could undertake. The most cost-effective, least expensive and simple “green” renovation is weather stripping — and it only received one response, although five households had indicated in an earlier question that they had already completed this energy retrofit. Of the 19 different responses, renewable energy technologies were only mentioned six times, and two of the responses were not energy related (at the household level).

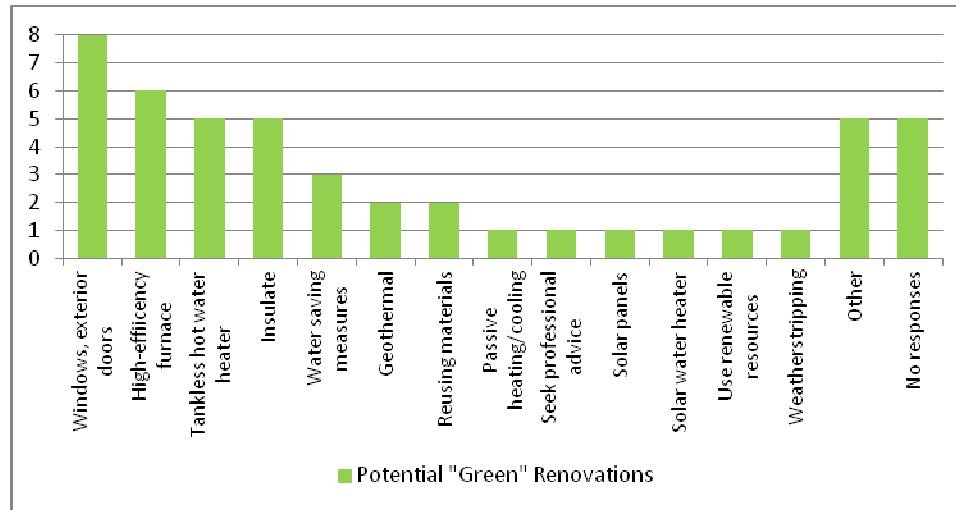


Figure 14. “Green” renovations to increase energy efficiency of dwelling. Data source: Author’s findings from structured interviews with householders.

Twelve households have completed an initial energy audit and the initial values (for seven houses) ranged from 11 to 60 out of a possible 100. All twelve of the households have completed some energy retrofits. Measures undertaken range from weather stripping, to the installation of a high-efficiency furnace, to upgrading insulation and upgrading windows. Five households have had their final energy audit performed and there was an average improvement of 29.4 (see Appendix L for actual readings and renovations performed).

Despite the ability of 17 out of 21 homeowners (rental properties not included) to undertake some type of energy retrofit, and 19 of the households indicating they are undertaking some renovations, all respondents were asked if there were any barriers to undertaking additional energy retrofits. Overwhelmingly, the lack of available funds was perceived as the greatest barrier however there were eleven respondents that indicated they did not have any barriers. Overall, the barriers could be classified as follows:

1. **Financial:** The upfront cost for many improvements is expensive, regardless of potential incentives offered by the government and Manitoba Hydro.
2. **Cost-effectiveness:** This pertains to the types of energy retrofits that will or will not “payback” the homeowner in a reasonable amount of time (such as 10 to 15 years). For example, converting to a different heating system or replacing a mid-efficiency furnace prematurely may be cost prohibitive.
3. **Physical:** These types of barriers include the age of the house, the small lot size, the close proximity to neighbours, and the current condition of the home. For example, if there are structural problems or foundation problems, this may inhibit the insulation of the basement.
4. **Knowledge:** These types of barriers include the lack of knowledge about the best types of renovations to undertake and/or the need to seek professional advice.
5. **Ownership:** This refers to households that rent their home and therefore do not have the authority, desire or benefits of performing energy retrofits.

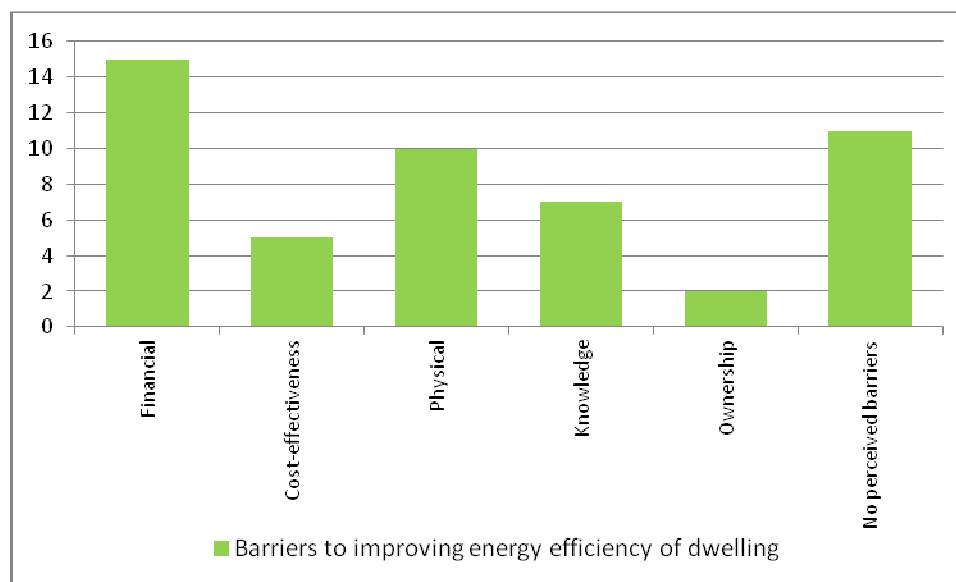


Figure 15. Barriers to improving the energy efficiency of the dwelling. Data source: Author’s findings from structured interviews with householders.

The majority of respondents have “a little knowledge” of the various renewable energy technologies. Knowledge of geothermal systems was the greatest followed by solar photovoltaic cells and solar water heaters. The majority of people are least familiar with biomass (which based on one of the semi-structured interviews with an engineer is probably one of the best options to use in an established neighbourhood). Other than the five potential renewable energies that each respondent was asked about, only one respondent was able to provide an additional type of technology not listed.

Table 11

*Resident knowledge of on-site renewable energy technologies.*

<b>Technology</b>	<b>A lot</b>	<b>A little</b>	<b>Not at all</b>
Solar photovoltaic cells	3	20	1
Solar water heater	3	17	4
Wind turbines	1	19	4
Geothermal	7	14	4
Biomass	0	8	16
Other (solar walls)	0	1	0

Data source: Author’s findings from structured interviews with householders.

### **5.1.2 Household Costs**

This section of the survey was used to determine the amount of electricity and natural gas used by each household during January, February and March 2010; to calculate the costs of the energy consumed; and to determine if the household was in energy poverty which is defined as 6% of the total household’s income spent on energy costs.

**5.1.2.1 Energy consumption and cost**

For this portion of the interview, Manitoba Hydro bills were examined for 22 of the 24 households. Two households were not able to obtain copies of their bills. The billing dates ranged from December 8, 2010 to March 25, 2011. Because of Winnipeg’s cold winters, these are the months that would typically be the most expensive for home heating. To compare natural gas consumption and cost, heating degree days were calculated for each household’s billing period. A value for natural gas consumption and cost was predicted using the known heating degree days and known consumption. To compare electricity consumption, the number of days in each billing period was calculated for each household and then a monthly amount of electricity consumption was calculated from these known values. Typically one of the three bills examined provided an actual meter reading and the other two were estimated readings.

Table 12 shows the average corrected natural gas consumption and cost per month and Table 13 shows the average corrected electricity consumption and cost per month, as well as the highest and lowest values.

Table 12  
*Average natural gas consumption and cost for January, February and March 2010.*

	January Forecast		February Forecast		March Forecast	
	Consumption (m <sup>3</sup> )	Cost	Consumption (m <sup>3</sup> )	Cost	Consumption (m <sup>3</sup> )	Cost
<b>Average</b>	440.913	\$184.94	413.961	\$173.03	318.089	\$130.67
<b>Median</b>	412.23	\$168.67	397.767	\$169.04	261.401	\$114.46
<b>Highest</b>	674.128	\$264.76	669.181	\$261.31	783.273	\$301.41
<b>Lowest</b>	282.317	\$119.05	255.512	\$108.76	72.496	\$38.88

Data source: Author’s findings from structured interviews with householders.

In Manitoba the average annual cost for space heating using a conventional furnace (60% efficiency) is \$947, using a mid-efficiency furnace (80%) is \$752, a high efficiency furnace (92%) is \$676, and a geothermal closed loop heat pump is \$440 (based on a 1200 square foot house with 2.4 persons). A conventional water heater using natural gas will cost approximately \$149 per year to operate whereas a conventional electric water heater will cost \$238 per year. Overall, an average household will spend about \$900 annually for their natural gas consumption. The households interviewed on average spent more than half that in only three months.

Table 13

*Average electricity consumption and cost for January, February and March 2010.*

	January Forecast		February Forecast		March Forecast	
	Consumption (kWh)	Cost	Consumption (kWh)	Cost	Consumption (kWh)	Cost
<b>Average</b>	638.342	\$55.23	567.728	\$51.10	644.126	\$55.73
<b>Median</b>	568.062	\$48.51	549.692	\$46.71	573.624	\$48.91
<b>Highest</b>	1335.516	\$114.96	1361.161	\$121.70	1335.516	\$114.96
<b>Lowest</b>	184.286	\$21.04	171.857	\$20.15	184.286	\$21.04

Data source: Author's findings from structured interviews with householders.

While natural gas usage is dependent on the size of the house and weather, electricity consumption is dependent on the size of the household and income levels. Accordingly, the more persons per household and the higher the income, the higher the expected consumption of electricity. Electricity usage on average is 9,000 kWh for a two-parent family with an annual household income of \$40,000; 12,000 kWh for a two-parent family with an annual household income between \$60,000 and \$75,000; 6,000 kWh for a single-parent family; and 4,500 kWh of electricity usage for the tenant.



Assuming that the households interviewed are two-parent families with an approximate income of \$40,000, their electricity consumption is less than the Manitoba average.

#### ***5.1.2.2 Other household costs***

Housing costs greatly varied from one household to another. Monthly rent or mortgage payments ranged from a low of \$281 to a high of \$1,000. Four households owned their homes outright and those that still have mortgages have an average of 18 years remaining on them. The average monthly mortgage payment was \$465, which is substantially lower than the overall average of \$646 for DM and \$623 for SM. The three households that rent their homes also showed a lot of variation with the monthly rents ranging from \$350 to \$950, for an average of \$650 which is higher than in DM (\$646) and SM (\$623). Combined with the cost of natural gas and electricity, some households were in poverty and in energy poverty (see Table 14).

### **5.1.3 Personal Information**

The intent of this portion of the survey was to determine if the sample collected was representative of the neighbourhood as a whole. While the sample did show a reasonable amount of variation there were some differences and gaps.

#### ***5.1.3.1 Household composition***

The households interviewed varied greatly in size. There were three 1-person households (13%); nine 2-person households (37%); three 3-person households (13%); seven 4-person households (29%); one 5-person household (4%); and one 6-person

household (4%). Compared to DMSM, fewer 1-person households and more 2-person households were represented in the sample.

Residents were also asked to identify themselves as any of the following: middle-income; a couple with children; a single parent with children; a senior; an immigrant or refugee; and/or Aboriginal. Some households identified with several categories: seventeen households (79%) declared that they were middle-income; six households (25%) were couples with children; three households (13%) were single parents with children; two households (8%) were senior; one household was Aboriginal (4%); and two households did not identify with any of the options. The sample was fairly reflective of neighbourhood demographics (see Section 2.2.2). In terms of targeting the segments of the population most vulnerable to poverty, Aboriginals and immigrants/refugees were underrepresented.

#### ***5.1.3.2 Length of residency***

Most of the residents interviewed have lived in their current residence for less than 10 years, and four households have resided in their current homes for more than 10 years and only one household has lived in their home for more than twenty years. On average, the length of residency was six years.

#### ***5.1.3.3 Employment***

The Census data does not distinguish between full or part-time employment but measures the number of people in the labour force and the number of those in the labour force that are unemployed. Some residents fall into two categories but the majority of

respondents (58%) are employed full-time. The remaining individuals are in a number of different situations from being employed part-time (21%), looking for employment (4%), students (17%), retired (8%) or not in the labour force (4%). Compared to the Census data, 79% of respondents were in the labour force compared to 65.8% for the neighbourhoods as a whole.

#### ***5.1.3.4 Income***

The majority of households (57%) earned over \$50,000 annually, 13% earned between \$40,000 to \$50,000, 9% of households earned between \$30,000 to \$40,000, 9% of households earned between \$20,000 to \$30,000, and 13% of households earned less than \$20,000. In DM (28.9%) and SM (28.8%), far fewer (than the 57%) households earned more than \$50,000 annually.

The median income of the interviewed households was \$3,500 per month. The rental households, the single parent households, the part-time workers and the aboriginal household all had monthly incomes below the median. Of the six households that found it a strain to meet their monthly costs, four were below the median income level. Six households below the median worked full-time.

#### ***5.1.3.5 Incidence of energy poverty***

Figure 16 shows each household that reported their income, the percentage of their income spent on utilities, and if they are in energy poverty because they spend more than 6% of their income on energy costs.

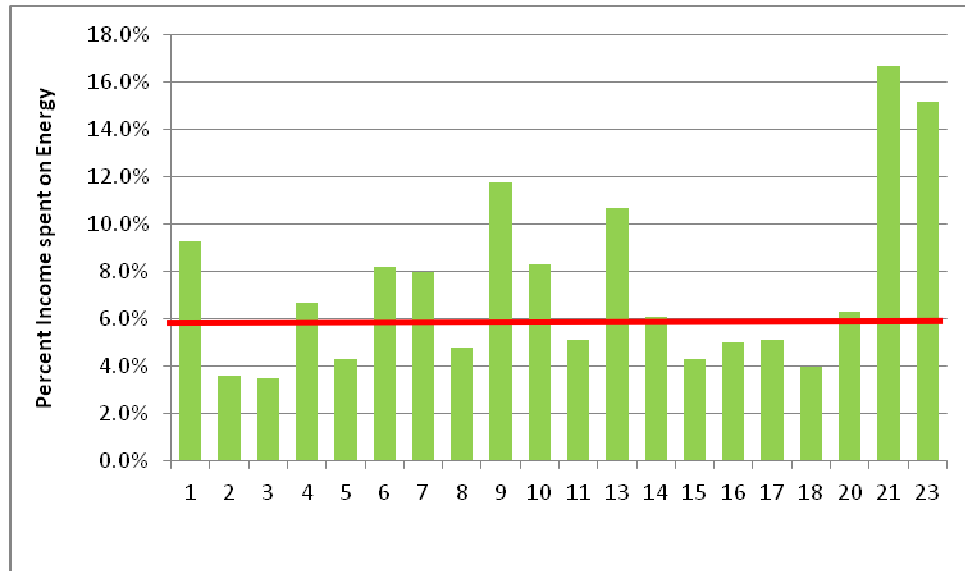


Figure 16. Percent income each household spent on energy costs during January, February and March 2010. Data source: Author’s findings from structured interviews with householders.

Based on reported incomes, 11 out of 20 households spend more than 6% of their monthly income on energy costs (during the coldest months) and 6 of the 11 households in energy poverty are below LICO. Table 14 shows that 7 of the 11 households would qualify for Manitoba Hydro’s LIEEP and the other 4 have household incomes that exceed the limit of 125% of LICO. Four of the households reported that it was a strain to meet their monthly housing costs and all 4 of these households meet the criteria for energy poverty. Three households reported having to go without food or paying other utilities to ensure that their energy costs were met.

Table 14

*Households in energy poverty and eligibility for Manitoba Hydro's LIEEP.*

<b>Interview</b>	<b>Household Size</b>	<b>Average Utility Costs*</b>	<b>% of Income Spent on Utilities</b>	<b>Below LICO</b>	<b>In Energy Poverty</b>	<b>Qualifies for Hydro's LIEEP</b>
1	4	\$173.50	9.30%	Yes	Yes	Yes
4	4	\$282.35	6.70%	Yes	Yes	Yes
6	4	\$344.66	8.20%	No	Yes	No
7	1	\$120.73	8.00%	Yes	Yes	Yes
9	2	\$258.67	11.80%	No	Yes	Yes
10	4	\$223.65	8.30%	No	Yes	No
13	5	\$256.43	10.70%	Yes	Yes	Yes
14	3	\$201.71	6.10%	No	Yes	Yes
20	2	\$177.75	6.30%	No	Yes	No
21	2	\$233.55	16.70%	Yes	Yes	Yes
23	3	\$181.93	15.20%	Yes	Yes	No

\*Average cost derived from the average of January, February and March 2010 costs.

Data source: Author's findings from structured interviews with householders.

#### **5.1.4 Daniel McIntyre St. Matthews Community Association**

This portion of the survey asked the respondents about their familiarity with the DMSMCA. The first part asked about the housing grants, if they have received one and the type of renovation that was completed with the grant. The second part asked about green initiatives that the DMSMCA has undertaken and if there are any other initiatives that they would like to see the DMSMCA tackle.

Twenty-two respondents are aware of the exterior housing grant provided by the DMSMCA. Eleven households have applied for the grant and eight households were provided with the grant. The three households that were declined are not aware of the reason why they were denied.

As noted in section 2.3, the grants are for a maximum of \$1,000 and must be used for exterior improvements. The respondents received grants ranging from \$700 to \$1,000 and the average was \$929. The renovations completed are shown in Figure 17.

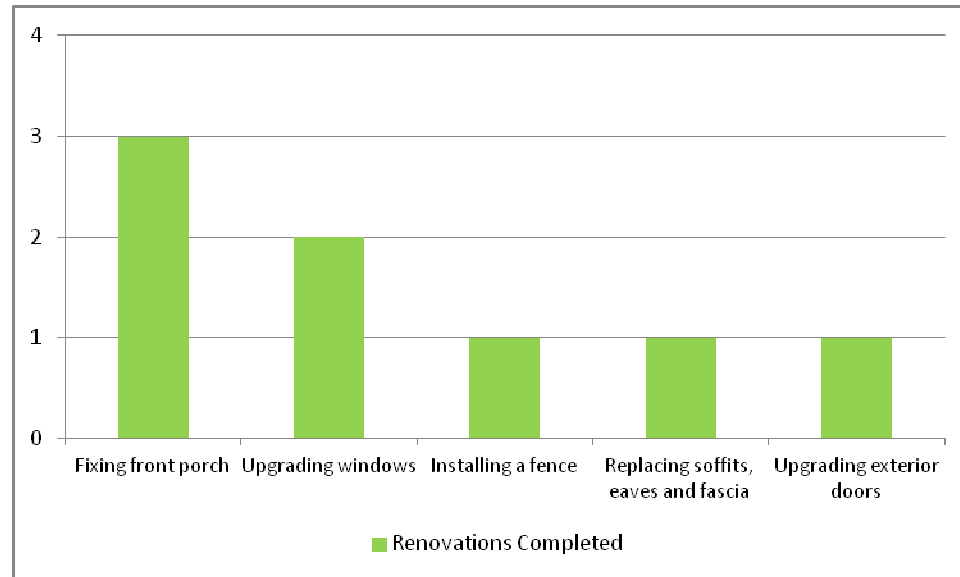


Figure 17. Renovations completed and funded through the DMSMCA housing grant program. Data source: Author’s findings from structured interviews with householders.

Respondents were then asked if any of the renovations resulted in a decrease in their energy costs. Two households indicated “yes” of which one had upgraded their windows and the other was able to add insulation to their front porch while it underwent repairs.

When asked if they were aware of any “green” initiatives that the DMSMCA has undertaken, sixteen respondents said “yes”. When asked to name these initiatives, the endeavours that residents were most familiar with were the community gardens, followed by the Orioles Community Club bike cage, and the workshops on home repairs and

renovations (see Figure 18). These workshops are the only program that residents named that educate homeowners about energy retrofits or other types of home repairs.

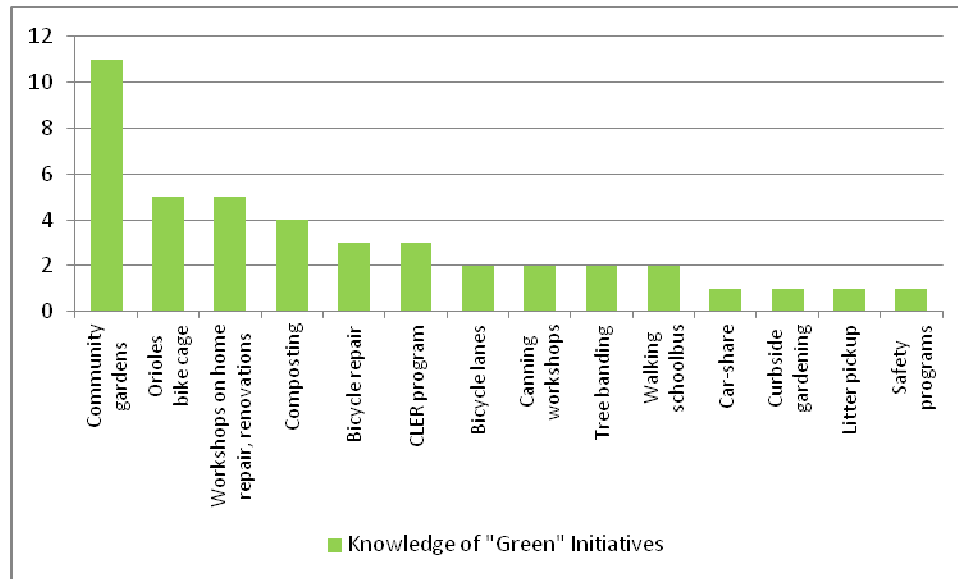


Figure 18. Resident knowledge of DMSMCA “green” initiatives. Data source: Author’s findings from structured interviews with householders.

Respondents were asked a follow up question: do you have any “green” ideas that you think the DMSMCA should undertake? Fifteen respondents provided ideas. As shown in Figure 19, the ideas were mostly focussed on improving or expanding current initiatives – such as expanding community gardening, composting programs and garbage cleanup programs. Three respondents want the DMSMCA to play a more active role in housing retrofits which would also include energy retrofits.

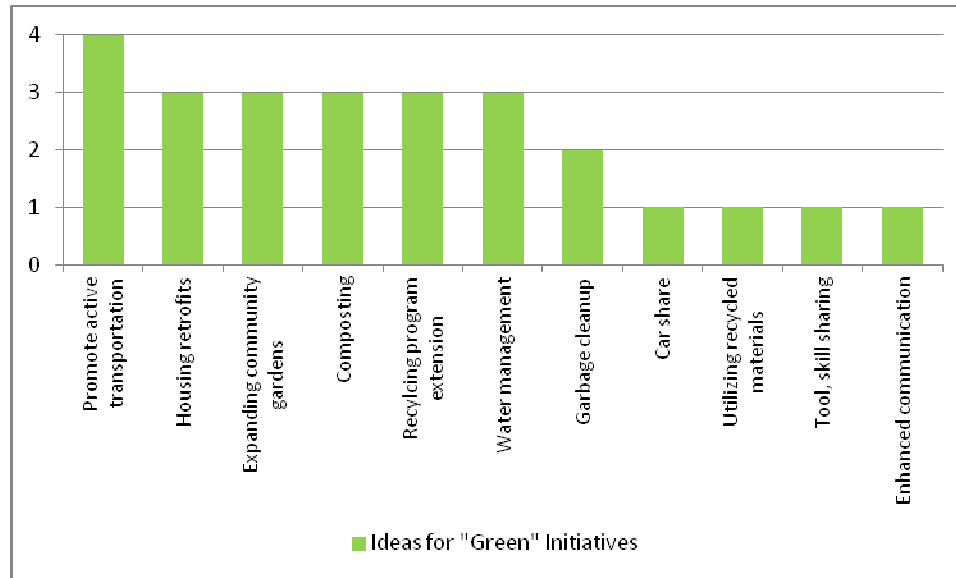


Figure 19. Resident ideas for additional “green” initiatives. Data source: Author’s findings from structured interviews with householders.

The final question simply asked if the respondent would be interested in attending a workshop on alternative energy. The majority of respondents, 61% said “yes” while the remaining respondents said “no”. One respondent said “maybe”, depending on the exact content of the workshop.

## 5.2 Semi-Structured (Key Informant) Interview Findings

Ten key informant interviews were conducted with nine professionals over a five-month period in May 2010, and from September to December 2010. Key informants represented a number of stakeholders including the City of Winnipeg, the Province of Manitoba, the DMSMCA, technical experts, BUILD and Manitoba Hydro (see Appendix B for the interview schedule).

All respondents were asked a question related to their knowledge of energy poverty to both get a sense of their knowledge and expertise but to also obtain additional



information about energy poverty in Winnipeg. Respondents differed slightly in their description of energy poverty but in general, respondents noted that energy poverty is a problem in Winnipeg and more needs to be done to address this issue.

All respondents were also asked about their relationship with other organizations. Responses were varied but the other representatives consistently stated the need for a better relationship with the City of Winnipeg.

All respondents were questioned about existing policies and programs in Winnipeg that address energy poverty. All were aware of Manitoba Hydro's LIEEP program and the BUILD program. No information was provided on any additional policies or programs. Many respondents also discussed the difficulties that the individual homeowner may have in performing energy retrofits.

Below are brief summaries of the interviews, the information provided in relation to their area of expertise, and the major themes that emerged from each interview. Many of the themes were echoed by subsequent professionals. See Section 1.5.3 for an explanation of the group formation.

### **5.2.1 Group 1: Provincial Planner**

The Provincial Planner explained their role in delivering the CLER project to municipalities and neighbourhoods. Through the delivery of this program, it became clear that collaboration, capacity building and access to information are critical in achieving the desired outcomes. Frequently, it is difficult for small neighbourhoods or municipalities to undertake new initiatives beyond their daily duties. They often lack the capacity — in terms of money, knowledge, staff, energy and focus to diligently pursue

new projects. As well, to qualify for provincial funding programs need to benefit the community, not just individual households. However, municipalities and neighbourhoods are restricted by the funding they receive as this is often for very specific types of projects and there is little flexibility to change the parameters. What is needed is for the stakeholders to be clearly identified and their roles clearly defined to promote participation in projects that have the potential to benefit a whole community. The most common themes from this interview include: organizational roles; inter-organizational relationships; funding; accessibility to information; and capacity.

### **5.2.2 Group 1: City Planner**

A new standard has been set with the City of Winnipeg's new development plan titled "Our Winnipeg" and housing, including affordability, supply, quality and safety are central to the Plan. The City Planner explained the potential role that they could play in addressing energy poverty, acting as a collaborator with other agencies. The City is not in the position to take on a role that is not in their mandate or delegated to the municipal level by the Charter. However, there are many examples of programs like the Building Communities Initiative or the Winnipeg Development Agreement that have required coordination between the different levels of government to be delivered effectively. A model such as this may be appropriate for addressing energy poverty. The City has the potential to be a collaborator with community organizations and other levels of government. The City Planner focussed on capacity; progressive policies; organizational roles; inter-organizational relationships; and changing the status quo.

### **5.2.3 Group 2: DMSMCA Greening Coordinator**

In addition to the general questions that were asked of every professional, the Greening Coordinator was asked specifically about the CLER project and other green projects that the DMSMCA is currently undertaking or wants to undertake. The Greening Coordinator was able to identify many issues that the DMSMCA has encountered in their attempts to implement environmentally friendly projects. Typical projects include community gardens; car-share; bike-share; community composting; and walking school buses. Themes that emerged include: funding; low-income; changing the status quo; accessibility to information; inter-organizational relationships; and green projects.

### **5.2.4 Group 2: DMSMCA Housing Coordinator**

The Housing Coordinator focussed on the inability of low-income households to pay for energy retrofits. The most effective programs we have to assist low-income households are Manitoba Hydro's LIEEP and BUILD because they pay for the cost of materials and labour. However, eligibility requirements are strict. Other programs also have very strict eligibility requirements that make it nearly impossible to qualify for the funding — the housing grants that are supplied to DMSMCA from WHHI for example. Successful applicants receive up to \$1,000 for exterior improvements only and this rarely translates into energy savings for the household. Furthermore, DMSMCA must apply for this funding from WHHI every year and is for a maximum of \$60,000. If the goal is provide a grant to every household in the neighbourhoods, it would take over 60 years. In addition to helping homeowners find sources of funding for energy retrofits,

DMSMCA also provides education. In the past workshops have been conducted on how to hire a contractor, cost-effective energy efficiency measures, and home repairs.

Themes that emerged from this interview are very similar to that of the Greening Coordinator and include: funding; low-income; accessibility to information; inter-organizational relationships; community development; education; and organizational roles.

### **5.2.5 Group 3: Technical Experts**

Three technical experts were interviewed: a local contractor of a non-profit organization that performs energy retrofits; an engineer; and an individual who renovated their inner-city home to reduce their energy consumption as much as possible. All three experts provided different insights into the feasibility of performing energy retrofits on older homes and the potential to use on-site renewable energy.

The local contractor stressed the difficulty that low-income households have in obtaining the necessary capital to perform energy retrofits. This is the biggest barrier that low-income households face and in his opinion the existing structure of Manitoba Hydro's LIEEP does not assist the households that need it the most. The savings that a household can achieve through energy retrofits are substantial and these savings can/should be used to finance the cost of the retrofits. Energy efficiency retrofits need to be completed on all older housing stock, including apartment buildings. More importantly, the types of energy retrofits need to be cost-effective. The energy retrofits that are the most cost-effective are installing a high-efficiency furnace; insulating the

basement; and air sealing. This interview revolved around several themes: funding; energy efficiency; cost-effectiveness; changing the status quo; and progressive policies.

The engineer was able to offer a different perspective. Electricity, transportation and heating/cooling account for 100% of our energy usage. He stated that in Manitoba the only area we can control is the heating/cooling component therefore it is only logical that energy retrofits are performed on low performing dwellings. The most cost-effective and renewable method for heating/cooling is district heating (see Section 4.14 for more details on district heating). District heating schemes can be large or small and can be used at the neighbourhood level. Apartment buildings are also a logical place to implement renewable energy technologies and it would be more cost-effective than for a single dwelling. Potential on-site renewable energy technologies for older dwellings in established neighbourhoods are:

- 1. Biomass:** This technology is simple and can reduce energy consumption by 100%. The cost of installation can vary from \$2,000 to \$6,000 per dwelling.
- 2. Solar walls:** This is a less expensive type of technology because no liquids are used. A perforated wall is installed on one side of a building. Air is heated by the sun and then piped through the heating system of the dwelling. The cost would be approximately \$2,000 to \$3,000 and would reduce energy consumption by 30% to 40%.
- 3. Solar thermal:** This would be more difficult to implement because a solar thermal system would have to be constructed specifically for the dwelling. The cost is also higher and varies from \$5,000 to \$8,000. Energy consumption would be reduced by 60% to 70%.

The engineer concentrated on technology; accessibility to information; cost-effectiveness; and energy efficiency.

The individual technical expert renovated an older inner-city dwelling with an initial energy audit reading of 14. The goal was to perform low-cost sustainable retrofits and to push against existing barriers to sustainable retrofits. The types of renovations undertaken were limited by time, cost and stakeholder differences. This expert was able to improve the energy rating of the dwelling to the mid-eighties. To achieve this, 90% of the work performed on the dwelling was to improve the building envelope. This included insulating the exterior walls, attic and basement; installing an electric boiler with a radiant floor system; air-sealing; and installing a recovery ventilator system. Additional renovations include installing solar panels and a composting toilet. Also, a very conscious effort was made throughout the renovation to reuse and recycle existing materials and to incorporate features for a more sustainable lifestyle — such as landscaping with annual edibles, utilizing rain water for the garden, and ensuring that there is no space for parking a car to eliminate/reduce the desire to drive. The barriers to sustainable, low-cost energy retrofits was the most abundant theme throughout this interview.

#### **5.2.6 Group 4: BUILD Executive Director**

Each level of government has a role to play. The City of Winnipeg has “chosen not to” play a role in addressing low-income energy efficiency. The City can contribute financially through tax increment financing. The cost of the energy retrofit must have a payback value but the upfront cost can be added to the property tax bill and paid down

over a number of years. The savings in energy costs will pay for the increase in property taxes. As well, unlike the Manitoba Hydro loan, if the homeowner moves, the cost is transferred to the new owner and the original homeowner is not saddled with paying for a loan while the new homeowner enjoys the benefits.

The federal government cancelled the ecoENERGY program in April 2010, re-established the program in May 2011 for one year, but does not specifically address low-income energy efficiency. They have invested \$78 million in the ecoENERGY program until March 2012 but there are no programs directed towards low-income households and no specific targets for housing energy retrofits.

The Province is the only level of government involved in housing. The Province can provide additional support through legislation and a mandate to target low-income households with the majority of the work to be performed through community-based projects such as BUILD or BEEP.

If all 3,240 of the single detached dwellings in DMSM upgraded their insulation, the potential savings in energy costs in these neighbourhoods would be about 30% — or approximately \$1,296,000 (\$400 per dwelling) annually. This is only a rough estimate of the potential savings and benefits but it provides concrete evidence about the importance of energy retrofits.

The transition to renewable energy is important but there has to be a reasonable payback period. For example, solar photovoltaic is not economically beneficial but solar thermal can be. In Winnipeg, solar thermal is a logical choice for space and water heating because of the local sunny climate and large domestic water heating needs.

Building codes should reflect the potential for using renewable energy and future-proofing new houses should be mandatory.

As the director of the very innovative and progressive BUILD program, the main theme that arose was the idea to “think big” and change the status quo. The director also identified different barriers than previous interviewees and stressed the importance of adopting a community-based approach to addressing energy poverty.

### **5.2.7 Group 5: Manitoba Hydro**

Funding for Manitoba Hydro’s LIEEP is legislated through the *Winter Heating Cost Control Act*. In November 2006 Manitoba Hydro was required to establish the Affordable Energy Fund to provide support for programs and services that increase energy efficiency and for developing alternatives to natural gas. The programs for energy efficiency and conservation must be designed to ensure that those with low incomes have access to the programs. Initially, the LIEEP program capitalized on Manitoba Hydro’s PowerSMART program and the federal ecoENERGY program. Since the cancellation of the federal program, Manitoba Hydro has had to absorb the additional costs, thereby potentially reducing the total number of dwellings that are energy retrofitted.

Manitoba Hydro estimates there are approximately 78,000 houses that require energy retrofits. As of March 2010, the approximate number of houses that have been upgraded throughout Manitoba is 1,000, with most of these renovations occurring from 2009 to 2010. Improvements have been made to LIEEP to help increase the uptake and to build the necessary knowledge and labour infrastructure. Although the success of LIEEP has improved since its inception, there are problems with increasing the uptake of the



program. Ownership is a problem in the sense that undertaking home renovations to improve the energy efficiency of one's home is not a priority for everyone. A long-time homeowner may not want to undertake the hassle of a renovation if they only plan on remaining in the home for a short while. Some people place more importance on other matters – such as working, family life and obtaining basic necessities such as food. The disruption created by insulating a basement or exterior walls is also a barrier to increasing the uptake. Structural problems or water problems in the basement also prohibit LIEEP from performing energy retrofits.

Essentially, the onus is on the homeowner to participate in LIEEP and to reach as many of the 78,000 households that may qualify for the program is precluded by the above-mentioned barriers. Despite these barriers, LIEEP employees work closely with many organizations to reach as many community members as possible: West Broadway Development Corporation; Spence Neighbourhood Association; Winnipeg Harvest; Social Planning Network; Kinew Housing; Manitoba Urban Native Housing Association; the Province; and many others. LIEEP has been extended to March 2013, or until the funds are depleted.

The main themes arising from this interview are funding; energy efficiency; consumer behaviour; and inter-organizational relationships.

### **5.3 Analysis of Results**

The following sections answer the three research questions outlined in Section 1.4, namely the nature and extent of energy poverty in DMSM, potential renewable

energy options, and the institutional barriers that prevent a significant reduction in energy poverty.

### **5.3.1 Nature, Extent and Impact of Energy Poverty in DMSM**

Energy poverty can be defined as spending more than 6% of your income on energy costs. Eleven households of twenty met or exceeded this percentage for their monthly energy payments. Average natural gas and electricity costs for these eleven households ranged from a low of \$120.73 (for a single person household) to a high of \$344.66 (for a 4-person household). The nature of energy poverty for these eleven households is incongruous. Three households found it a strain to meet their monthly housing costs and two of these households had to go without food or other utilities in an attempt to meet their energy costs. The other eight households did not find it a strain to meet their monthly housing costs and seven of these households felt their home was comfortably heating during the winter months. The numbers contrast with the way the households perceive their situation.

Of the four main factors discussed earlier in Section 4.3 that contribute to energy poverty, the energy efficiency of the dwelling and consumer behaviour are the two factors that appear to have the greatest impact on household energy costs in DMSM. This corresponds with the information provided by Manitoba Hydro and the executive director of BUILD. The energy efficiency of the dwelling is widely varied — every house is unique in terms of structure, renovations that have been completed over the years, and the general quality of the building envelope. A house-by-house approach is necessary to determine the most cost-effective energy retrofits that need to be performed.

The nature of energy poverty for each household is unique just as every dwelling is unique.

Consumer behaviour is also widely varied and highly dependent on the individual. Firstly, consumer behaviour in terms of their daily priorities. For example, increasing the energy efficiency of their dwelling may not be important to them because they have other, more pressing concerns such as putting food on the table. Secondly, consumer behaviour in terms of their perception of their situation. If the consumer does not believe there is a problem with the cost of their energy bills or the efficiency of their dwelling, then it is unlikely that they will pursue energy retrofits that are available to them. Thirdly, consumer behaviour in terms of reducing their actual energy consumption by turning off lights when not in use, lowering the temperature of the home, reducing the temperature on their hot water heater, or simply installing low-cost energy efficiency measures such as weather stripping or plastic film on the windows. If the consumer does not perceive a problem with their energy consumption and bills, then this increases the difficulty of reaching these households.

The 2006 Census data indicates that in DM 30.3% and in SM 28.9% of economic families were considered to be low-income. Of the households interviewed for this thesis and reported their income, 30.0% can be considered to be low-income. All of the low-income households were in energy poverty, spending as much as \$398.20 a month for their natural gas usage. Clearly, a household that is considered below LICO is also in energy poverty. This means that at least 30% of households are in energy poverty in DMSM (not necessarily all are homeowners or live in a single detached dwelling). However, LICO is not a good indicator of energy poverty as it was determined that 50%

more households were in energy poverty that did not meet LICO. Likely, more than 30% of households in DMSM are in energy poverty however the sample size is too small to directly correlate the results to the neighbourhoods as a whole. This is the extent of energy poverty in DMSM.

The negative impact of poverty on a community is well documented and can include poorer health, higher crime rates, higher rates of addiction and other problems for the residents. Because energy poverty is present in high numbers, the potential to reverse these trends is also high. Oppenheim and MacGregor state that there is a 23 to 1 societal payback by retrofitting low-income households (2008, p. 3). The economic benefits of providing employment for hard-to-employ individuals are equally substantial and there would also be a reduction in crime. The executive director of BUILD estimates that 50% of the aboriginal men in prison locally have criminal records of two years or less and would be trainable employees to work in the BUILD program. In addition to the economic and social benefits, there are also the environmental benefits of reducing energy consumption. Addressing energy poverty is a pathway to sustainable development. The negative impact of energy poverty can be reversed and the positive sustainable impacts for the community can be had if we can just “think big”.

### **5.3.2 Renewable Energy Options at the Local Level**

A reoccurring issue that was mentioned by all three technical experts as well as the DMSMCA Housing Coordinator, the BUILD Executive Director and the Manitoba Hydro representative was the need to adequately insulate and seal the building envelope prior to implementing any new energy sources. First and foremost, the building envelope

must be upgraded and the dwelling must be high-performing. Only once this has been achieved is it reasonable to examine renewable energy options.

Renewable energy can be implemented at a small scale like the single dwelling or on a larger scale for a neighbourhood. In terms of cost, renewable energy projects are more cost-effective with the higher number of dwellings that are connected to the renewable energy source. For example, the cost for a household to install geothermal heating and cooling is approximately \$15,000 but to install a unit that can heat and cool several homes has the potential to reduce the cost per unit. District heating is the most cost-effective way to heat and cool homes but in established neighbourhoods it is very difficult to implement due to the existing infrastructure and the cost may be prohibitive. Potential on-site renewable energy options for a homeowner as outlined in Section 4.14.1 include: solar photovoltaic cells; solar water heating; solar thermal; solar wall; wind turbines; hydropower; ground source (geothermal); and biomass. Of the technologies previously listed, there are three types of installations that would be the most cost-effective and possible for an urban area: solar walls; biomass; and solar thermal. However, if a homeowner in DMSM was to pursue on-site renewable energy, there are a number of constraints to overcome.

Solar walls would be impractical retrofits in DMSM – the closeness to neighbours and the east/west configuration of the neighbourhood essentially constrains this possibility (except maybe on selected corner lots). Biomass has potential – as the source of heat for a district heating system, multiple units, or less so at the single dwelling level. The cost can vary but it would reduce the natural gas consumption by 100%. For space heating there are really varying technologies like fire places, stoves, boilers and dual-

boilers. Boilers and dual-boilers are the most efficient exceeding 95% efficiency and sometimes are nearly 100% efficient. Potential barriers include a bio-fuel source and storage of the bio-fuel, maintenance, and operator knowledge. Solar thermal is slightly more expensive than biomass and would reduce energy consumption by about 60% to 70%. It would be necessary to customize a system for an older dwelling which would require the homeowner to obtain this knowledge to do themselves or it would increase the cost of installing the system. The general rule is to install solar thermal collectors in direct sun with no shade during the peak solar window (from approximately 9:00 AM to 3:00 PM). In an older neighbourhood with mature trees it would be necessary to ensure shading is minimal. This will limit which houses could utilize solar thermal and smaller dwellings such as bungalows would probably not to be able to use this technology.

Residents were very familiar with solar photovoltaic cells which are one of the least cost-effective technologies for our location. Residents were the least familiar with the options which had the highest potential rate of success — biomass and solar walls.

In Section 4.15, Waide and Gerundino outline the barriers to implementing energy efficiency programs and local renewable energy systems: lack of knowledge; energy efficiency issues; rental properties; lack of adequate economic incentives; lack of local government participation; and funding (2007, p. 2). All of these barriers were raised in the interviews with the local professionals. It is essential that the community works closely with government to ensure strategies for programs will have the buy-in from the community. The following section discusses the institutional barriers in more detail and the role of the planner in overcoming these barriers.

### 5.3.3 Institutions and the Barriers they Create

An integrated approach is necessary to reduce energy poverty. This cannot be achieved unless all stakeholders establish working relationships and common goals. Each stakeholder has an important role to fulfil. In DMSM, there are nine stakeholders that need to form a cohesive unit to overcome institutional barriers to lessen energy poverty. Figure 20 depicts the current relationships between the six stakeholders interviewed.

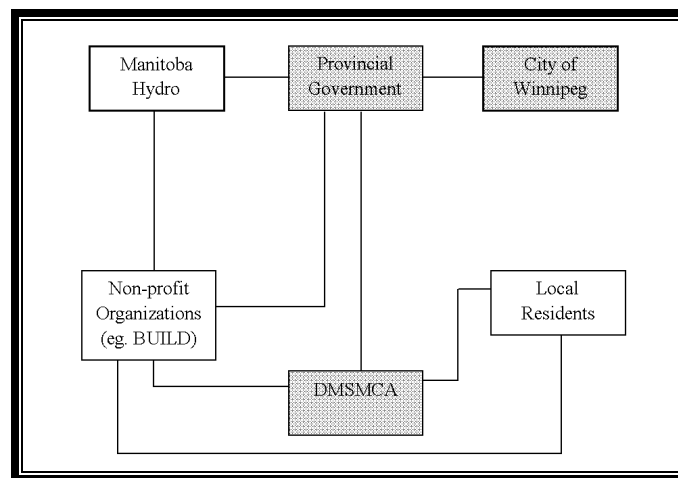


Figure 20. The existing relationships between stakeholders. Data source: Author's findings from structured interviews with householders.

The shaded boxes indicate where planners are currently employed. The role of the planner, as noted in Section 1.5.3, is to construct relationships with and between stakeholders, and strengthen existing relationships. The following is a list of these stakeholders plus an additional three stakeholders identified, the current level of participation by the stakeholder, and potential future action.

**City of Winnipeg:** The City's involvement in delivering affordable housing is negligible. Partly because the main responsibility for affordable housing lies with the Province but also because it is an area that is not acknowledged as needing additional

work and/or funding. The relationship that the City has with the other stakeholders is either strained or non-existent. For example, the DMSMCA deals directly with the Province (as they are the main funders of their association) but is having difficulty establishing a meaningful relationship with the City. Even at the basic level of issuing permits the City does not have the capacity to inspect units when there is a large influx, such as when Manitoba Green Retrofits was granted a contract from the Mental Health Association.

The City needs to increase their capacity: by connecting with community associations; completing basic duties such as issuing building permits and performing inspections; by providing information and building standards for energy retrofits and renewable energy systems; and providing a financing mechanism (i.e. tax increment financing). The City can strengthen their relationship with local residents by assisting with the financing of energy retrofits. Many households do not qualify for Manitoba Hydro's program, but through innovative financing measures the City can support these initiatives without spending additional funds. The City does not need to take a lead role in lessening energy poverty but they do need to be an active participant.

**Province of Manitoba:** In 2008 the Province passed *The Climate Change and Emissions Reductions Act* committing the province to meet their Kyoto targets. If the Province is serious about meeting their targets, additional legislation should be passed to set aside funds for energy retrofits that target low-income households. To obtain the maximum benefit, the project should be community-based like BUILD in Winnipeg and BEEP in Brandon.



As well, the Province needs to consider the benefits that improving the quality of social housing would have on the local economy, as well as society and the environment.

Carter in a study of housing needs in Manitoba neatly summarizes the steps that

Manitoba Housing needs to complete to improve housing for Manitobans over the next ten years:

- i. Broaden its working partnerships and be more proactive in the community.
- ii. Broaden departmental activities under a renewed and enhanced mandate so housing can play a more supportive role in other public policy sectors.
- iii. Repair, modernize and re-target the existing portfolio.
- iv. Address affordability problems with both demand and supply side programs.
- v. Work to provide the stable housing base for clients who need a range of services to address complex health, physical and social problems (2009, p. iii).

**Federal Government:** The cancellation of the federal ecoENERGY program in April 2010 was “can only be described as a mean-spirited – if not ignorant move” (Loney, 2009, p. 1). Although it was re-established in May 2011 for one year, the program does not provide additional support for low-income households although Manitoba Hydro does utilize the federal funding to support their LIEEP program. The federal government needs to set clear targets about energy efficiency and expand the ecoENERGY program to include additional assistance for low-income households.

**DMSMCA:** The DMSMCA provides housing grants of up to \$1,000 for exterior improvements. Unfortunately, this rarely translates into energy efficiency retrofits because the grant that they receive for this purpose has strict parameters that must be followed. An extension of this program to include energy efficiency measures would be beneficial to homeowners and the community.

**Manitoba Hydro:** Manitoba Hydro has assumed the lead for energy retrofits for low-income households. Since the introduction of LIEEP in 2007 over 1,000 homes have received energy retrofits. Manitoba Hydro tries to work closely with community organizations to establish trust with the local residents. Uptake of the program has increased each year but they still need to determine a better strategy for targeting low-income households.

There are currently three problems with LIEEP. The first is that the program has rigid qualifying income criteria: household income cannot exceed 125% of LICO. Many households in energy poverty will not meet the income criteria. Secondly, many homeowners cannot receive the energy retrofits because of structural problems with the dwelling. Manitoba Hydro will refer these customers to RRAP but it is unlikely the homeowner will be able to qualify for enough funding to cover the costs. Consequently, the dwelling does not receive the energy retrofits nor does the homeowner experience the cost-savings and increased comfort. Lastly, tenants that do not own their dwelling cannot access LIEEP and this eliminates a large portion of the low-income segment of the population residing in social and rental housing that would benefit greatly from lower utility costs.

Manitoba Hydro needs to increase the uptake of the LIEEP program; develop strategies for dwellings that have structural problems in addition to RRAP; and establish a program for rental properties including apartment buildings.

**Landlords:** Landlords and owners of rental properties do not directly benefit from energy retrofits as the resident is usually responsible for utility payments. Landlords can play an important role by partnering with Manitoba Hydro to assist in developing a

scheme that will benefit the resident. Manitoba Hydro has yet to develop a program targeting low-income rental households. A potential model to follow is the program established by Memphis Light, Gas and Water Division that successfully passed an ordinance targeting energy efficiency in rental properties. The ordinance sought to create and enforce minimum energy efficiency standards for rental properties in Memphis. If conditions are below standard, the utility works with the landlord to fix the issues cited in the audit. If the issues remain unresolved, the utility becomes an advocate for the tenant during the process and ultimately can and will take the landlord to environmental court.

**Local Residents:** Local residents need to be proactive regarding their energy consumption and cost. There are three problems: the general lack of knowledge regarding energy efficiency and renewable energy and the unwillingness to try something new; the difficulty in obtaining the correct information; and changing behaviour. Consequently, many people do not have the time to invest in finding the relevant information and potential contractor for the energy upgrades. The time and knowledge constraints can be lessened if the City of Winnipeg sets concise regulations to follow and if there are local trades willing to undertake this type of work. As well, a program similar to BUILD could fill this gap.

Residents also need to organize themselves and come together as a community. Property ownership makes it more difficult to establish renewable energy schemes for multiple dwellings but if residents can work together the cost per unit would be significantly less.

**Local non-profit organizations:** As part of the community, local non-profit organizations have the potential to reach local residents in need of assistance. In

Winnipeg, BUILD is the best example of a non-profit organization that works closely with the community to train local residents to perform the energy retrofits. BUILD is currently at capacity with approximately 75 employees. There is demand for additional training positions and if BUILD can expand to meet this demand, the community will benefit. Additional funding from the Province would assist with the expansion of the program.

**Financial Institutions:** Financial institutions currently do not play a role in addressing energy poverty. Since lack of capital is one of the main barriers to energy retrofits, the cost of the upgrades can be bundled with the mortgage at a low interest rate. The annual utility bill savings is usually greater than the annual increase in the mortgage cost.

If the stakeholders do not come together to create a plan, or if the federal and provincial governments do not create any policies and rules regarding energy poverty, it will be difficult to make a significant change (Cairney, 2008, p. 25). All of the professionals that were interviewed for this study — the city planner, provincial planner, DMSMCA housing and greening coordinator, the technical experts, the executive director of BUILD, and the LIEEP representative from Manitoba Hydro — agree that energy retrofits for low-income households are important and inter-organizational relationships are minimal. Better connections and working relationships between agencies is crucial and the potential connections are shown in Figure 21.

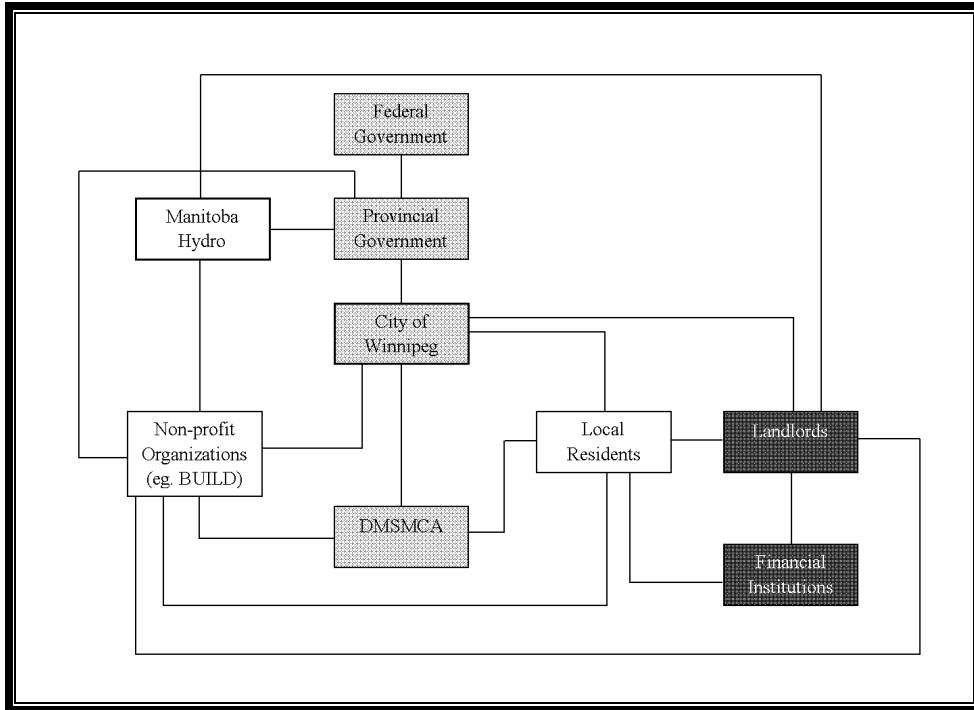


Figure 21. The relationship connections between stakeholders necessary for a reduction in energy poverty. Data source: Author’s findings from structured interviews with householders.

Organizations where planners are employed are central (shown in medium shaded boxes) — relationships must be established between planners employed by the federal, provincial and municipal governments and local community associations. The strength of future connections with the other stakeholders is dependent on these core relationships. A strong core can develop effective programs and initiatives and connect to other stakeholders like Manitoba Hydro, non-profit organizations and local residents to deliver these programs. The peripheral stakeholders such as the landlords and financial institutions (shown in the darkly shaded boxes), are also needed to assist with the delivery of programs. Landlords, because the majority of low-income households reside in rental properties, and financial institutions because the upfront cost of energy retrofits is the most difficult barrier for low-income households to overcome.

## 5.4 Chapter Summary

There were three main questions addressed in this thesis:

1. What is the nature, extent and impact of energy poverty in the Daniel McIntyre and St. Matthews neighbourhoods?
2. Are there renewable energy options at the local level that can be used to address energy poverty?
3. What are the institutional barriers between the levels of government, the community association and local residents that prevent a reduction in poverty and in what ways can they be overcome?

Twenty-four households were interviewed and many of them, despite working full-time, spent more than 6% of their household income on energy costs. An average household in Manitoba will spend about \$900 annually for their natural gas consumption whereas the households interviewed on average spent more than half that in only three months. More interestingly, households in energy poverty *were not necessarily* below LICO. Eleven households could be considered to be in energy poverty but only six households were below LICO. As such, these households are in a difficult situation because they do not qualify for Manitoba Hydro's LIEEP but still cannot afford the upfront costs to pay for energy retrofits.

All of the low-income households were in energy poverty. Clearly, a household that is considered low-income is also in energy poverty. This means that at least 30% of households are in energy poverty in DMSM (not necessarily all are homeowners or live in a single detached dwelling). However, LICO is not a good indicator of energy poverty as it was determined that 50% more households were in energy poverty that did not meet

LICO. Likely, more than 30% of households in DMSM are in energy poverty however the sample size is too small to directly correlate the results to the neighbourhoods as a whole.

A reoccurring issue that was mentioned by all three technical experts as well as the DMSMCA Housing Coordinator, the BUILD Executive Director and the Manitoba Hydro representative was the need to adequately insulate and seal the building envelope prior to implementing any new energy sources. Once the building envelope was improved, three types of installations that would be the most cost-effective and possible for an urban area are: solar walls; biomass; and solar thermal. If a homeowner in DMSM was to pursue on-site renewable energy (even if cost was not an issue), there are still a number of constraints to overcome.

An integrated approach is necessary to reduce energy poverty. All professionals interviewed agree that energy poverty is a problem in the city of Winnipeg. Interviews with the local residents confirm that people experience difficulties paying for their energy bills. A reduction in energy poverty cannot be achieved unless all stakeholders establish working relationships and common goals. Each stakeholder has an important role to fulfil. In DMSM, there are nine stakeholders that need form cohesive units to overcome institutional barriers to lessen energy poverty: the City of Winnipeg; Province of Manitoba; federal government; DMSMCA; Manitoba Hydro; landlords; local residents; local non-profit organizations; and financial institutions.

There is evidence that the provincial government, Manitoba Hydro, community associations, non-profit organizations and individuals are working towards reducing energy consumption among homeowners in lower-income neighbourhoods. There is also

evidence that not all levels of government and stakeholders are active participants in promoting a reduction in energy consumption through housing retrofits. If the stakeholders do not come together to create a plan, or if the government does not create any policies and rules regarding energy poverty, it will be difficult to make significant change (Cairney, 2008, p. 25). All of the professionals that were interviewed for this study — the city planner, provincial planner, DMSMCA housing and green coordinator, the technical experts, the executive director of BUILD, and the LIEEP representative from Manitoba Hydro — agree that energy retrofits for low-income households are important but inter-organizational relationships are minimal at this time. Improved connections and effective working relationships between agencies are crucial.

The findings from Chapter 5 lead directly to the conclusion, recommendations, and areas for further study provided in Chapter 6.



## **CHAPTER 6: CONCLUSION, RECOMMENDATIONS AND AREAS FOR FURTHER STUDY**

This section provides a conclusion, elucidates the recommendations for stakeholders, and discusses areas for further study.

### **6.1 Conclusion**

The main factors that affect the rate of energy poverty are: household income; the energy efficiency of the dwelling; consumer behaviour; and the current cost of energy. The intent of the research for this thesis was to clarify the causes of energy poverty in a local context, identify the barriers to reducing energy poverty, and assess the plausibility of implementing renewable energy sources.

Energy poverty, defined as households spending more than 6% of their income on energy costs, is a prevalent issue affecting as many as 50% of households in DMSM. In neighbourhoods with older housing stock like DMSM, the energy efficiency of the dwellings is significantly lower than for the average dwelling in Manitoba. Space heating costs are high for households during the winter months in Winnipeg and energy retrofits can yield significant decreases in energy costs. Households that have been able to participate in the ecoENERGY Retrofit Program saved an average of 20% on their utility bills but the upfront costs remain out of reach for most low-income households. To maximize a reduction in energy consumption in the residential sector, the priority of the ecoENERGY Retrofit Program should be to encourage the participation of houses with the largest emission-reduction potential which means dwellings constructed prior to 1945 that have not undergone previous energy retrofits (Parker et al., 2003, p. 181).

Loney, Oppenheim and MacGregor, Colton, Cairney — numerous authors have stated the benefits of performing energy retrofits for low-income households: reduction in poverty (and therefore energy poverty); improvement in health and well-being; reduction in crime; economic benefits; and environmental benefits (see Section 4.13). Energy retrofits are a particularly positive approach to focus on because they would provide long term results for low-income housing, and they are a step towards sustainable development by reducing energy costs for low-income households, and creating more environmentally friendly housing (Cairney, 2008, p. 25). Clearly the societal benefits of performing energy retrofits on older housing stock is multi-fold, and so much so that all levels of government need to contribute to take full advantage.

Institutional barriers created by the different stakeholders are prohibiting an increase in the number of energy retrofits that are being performed in Manitoba. In Manitoba, approximately 1,000 low-income households have benefitted from LIEEP and BUILD since 2007. However, with 78,000 households in need of energy retrofits the reduction in energy poverty has been minimal.

All levels of government, all stakeholders need to make a concerted effort. There is a dramatic contrast between the UK approach to reducing energy poverty versus Canada and the United States (see Section 4.12). The differences are partly due to the difference in governance, but the core difference is the importance, or complete lack of importance that poverty and energy poverty are on the domestic agenda. In the UK energy poverty is high on the agenda and there is a clear national policy, agreement on what percentage of expenditure is too high for energy costs, a national target date for

eliminating energy poverty and a significant amount of national government funding to deliver a wide variety of initiatives.

The Canadian Government for some time now has had a very limited and indirect involvement in addressing energy poverty and only began to concentrate on residential energy efficiency with the establishment of the ecoENERGY Retrofit program in 2007. However, the Federal Government's commitment to residential energy efficiency is inconsistent as evidenced by the cancellation of the ecoENERGY Retrofit Program in 2010, and then its reintroduction one year later, for a limited period. Furthermore, the ecoENERGY Program does not provide additional incentives for low-income households to help them overcome the upfront costs. The Federal Government needs to provide the policy structure for provinces to follow and funding to reduce energy poverty. The United Kingdom government provides a good example for establishing effective infrastructure as they have been involved for many years in energy poverty reduction programs.

With the absence of the Federal Government, the City of Winnipeg, landlords and financial institutions as committed stakeholders, a large reduction in energy poverty cannot be achieved. As shown in Figure 21, relationships need to be established. If the City of Winnipeg supported BUILD through the provision of financing options for residents, more households could perform energy retrofits. The potential to finance renewable energy options also becomes a reality if the City is willing to play a significant role.

There is significant institutional momentum within government that continues to favour traditional energy sources over renewable, despite strong economic,

environmental and health arguments to the contrary (Solar Energy Society of Canada et al., 1999, p. 5). The first concern is that the dwelling must be high-performing; the building envelope must have been retrofitted. Only once this has occurred is it feasible to discuss using renewable energy. However, the upfront cost, property ownership, and the lack of knowledge infrastructure prohibit a larger transition to renewable energy sources.

Several programs are operating at the local, provincial and federal levels to reduce energy poverty; however a comprehensive plan and strategy has not been put into effect. This reflects a lack of public awareness regarding the issue, a lack of interest from politicians, as well as an unwillingness to accept access to energy as a basic human right for all Canadians. Barriers for the individual homeowner (see Section 5.1.1.2 and Figure 15) are too difficult to overcome for low-income households without institutional support.

## **6.2 Recommendations**

City planning is a multi-disciplinary profession and to implement the recommendations the author has proposed would require the input of many stakeholders, including the three levels of government. The recommendations from this study are divided below into five broad categories: policy, education, financing, social and rental housing, and renewable energy.

### **6.2.1 Policy**

**Move toward consistent housing and energy efficiency policies at the three levels of government.** Affordable housing and energy reduction policies need to be in place at every level of government. The lack of involvement in housing, let alone affordable housing and/or energy efficient housing by the federal government and the City of Winnipeg is dismal. The Province is the authority on housing but the federal government and the City need to assist where possible. The federal government needs to re-enter the housing arena through policy development and funding and the City needs to do the same. An example for the federal government is the UK Warm Homes, Greener Homes Strategy Fuel Poverty. The federal government provides the direction and local housing authorities deliver the programs.

The City, also through policy development and funding, can help the Province deliver affordable housing and energy efficiency initiatives. Municipalities have a large role to play in improving the sustainability of their neighbourhoods. A City can help or hinder sustainable renovations. The City could establish a formal relationship with the local community associations, provide input on their community green plans, and support local initiatives like BUILD. An invitation has been extended to the City by BUILD to tour their facility and discuss the work that is being done, but the City has not responded. The City needs to connect with their communities.

### **6.2.2 Financing Mechanisms**

To overcome the upfront costs of energy retrofits, which is the greatest barrier, new financing mechanisms need to be established for low-income households to acquire

the necessary capital, especially those that do not qualify for the existing Manitoba Hydro LIEEP.

**Increase the flexibility of utility on-bill financing.** Manitoba Hydro currently employs this financing mechanism. Homeowners can obtain a low-interest loan for energy retrofits but there are a number of flaws with this mechanism. Manitoba Hydro will issue a loan for only up to \$7,500 and this would not be well-suited to perform the more expensive whole-home retrofits many older homes require. The five-year repayment term and the obligation to pay out the loan on moving are other factors that prohibit a low-income household from benefitting.

**Levy the necessary capital through municipal financing mechanisms.**

Potential financing mechanisms include:

- i. *Local Improvement Charges (LICs)*. A local improvement charge is an internal source of revenue for a municipality and has long been used by municipalities to finance infrastructure improvements that are supposed to benefit homeowners. The charges are repaid through property tax bills. Current regulatory challenges to applying the LIC mechanism for energy improvements are primarily that costs are allocated based on lot frontage; the process for setting up LICs is very complex; and municipalities are uncertain whether their broad powers extend to using LICs for this purpose.
- ii. *Tax Increment Financing (TIF)*. Council may establish tax increment financing programs in designated areas of the city to encourage development or revitalization in those areas. If a neighbourhood improvement was implemented using TIF, the overall energy savings the

consumer has can be forwarded to paying down the TIF. Property owners in a tax increment district (TID) incur the same local tax rate as property owners outside the district. The main difference is that taxes from the increased assessment base of the TID are dedicated to financing local improvements.

### **6.2.3 Education**

There are two segments of the population that would benefit from improved education — residents and contractors.

**Increase knowledge and capacity among local residents.** Local residents need help to navigate the renovation process and information about how to reduce their energy consumption. The DMSMCA has already held a number of workshops and information sessions for residents regarding renovations and reducing energy consumption. They can continue the work they are doing. Once their current programs become more established they can expand and move forward to new projects. For example, district heating. Without good advice and information, and access to skilled installers, there is the danger of energy systems not being appropriate for the building or user and therefore optimum performance is not achieved (Walker, 2008, p. 4515).

Individuals can do much by altering their own behaviour but often need the knowledge about what to do, and a little coaxing. There are many conflicting and competing factors that shape our daily decisions. It is apparent that multiple tools are required to have the greatest impact on bridging the gap between knowledge and pro-

environmental action and no single action will be entirely effective against all types of barriers.

“Without detailed knowledge of barriers it is highly unlikely that an effective strategy can be developed” (McKenzie-Mohr, 2000, p. 547). Community based social-marketing is a selective type of campaign for which it must be decided what particular behaviour is to be promoted. Unlike simple information brochures, social marketing emphasizes effective program design, and unlike mass-market campaigns, social marketing targets a specific population and a specific behaviour. McKenzie-Mohr outlines four steps to community-based social marketing: “uncovering barriers to behaviours and then, based upon this information, selecting which behaviour to promote; designing a program to overcome the barriers to the selected behaviour; piloting the program; and then evaluating it once it is broadly implemented” (2000, p. 546).

The social-marketing campaign can be delivered by a number of different organizations, from the DMSMCA to Manitoba Hydro to the City of Winnipeg.

**Increase knowledge and capacity of local contractors for sustainable design and construction and put this knowledge into regular practice.** The number of local contractors with knowledge of renewable energy installation and maintenance is still very limited (Weier, 2007: 90). The trades are largely untrained to implement the more sustainable household systems. One possibility may be to train BUILD employees with this technology. While it is not likely that renewable energy technology will be widely used in Winnipeg in the foreseeable future because of the need to perform a tremendous amount of energy retrofits first — knowledge of these sustainable techniques among residential construction workers is essential. Canada lacks straightforward training and



certification systems for installers of renewable energy systems. Certification is essential for consumer confidence in the industry (CRC Research, 2006a).

#### **6.2.4 Social and Rental Housing**

**Create a provincial strategy to increase the energy efficiency of social housing.** It is a 2.3 billion dollar asset and improving energy efficiency of the social housing units is vital. The Province should retrofit all Manitoba Housing units. The amount of money saved through reduced energy bills will offset the cost of the retrofits.

**Develop low-income energy efficiency programs for rental properties.** Rental properties have an entirely different set of issues and require a more creative solution. Significant proportions of people with low incomes and at high risk for energy poverty are not homeowners and are therefore dependent on their landlord for potential energy retrofits. Landlords are generally not motivated to improve the energy efficiency of their dwellings. Even though upgrades increase the value of the property, there is the danger that costs may be recouped through an increase in rent which would worsen the degree of energy poverty. Manitoba Hydro, BUILD, the DMSMCA and all levels of government do not have a potential solution in place and it appears that a solution will be not available in the near future.

#### **6.2.5 Renewable Energy**

**Increase access to renewable energy sources for local residents.** Although the context of the UK is very different with open electricity markets versus the monopoly situation in Manitoba, many of the issues are the same — interconnection, codes and

standards, local planning issues, and high upfront costs for consumers (CRC Research, 2006a). Adapting the UK process to local circumstances is a way to engage the public in energy and climate change issues. Beginning in 2000, the UK government established a working group to address the barriers to increasing renewable energy use. In 2003, a uniform set of codes and standards followed which provided installers with a single and comprehensive set of rules. As a result, customers were able to install on-site renewable energy equipment and connect to the grid without obtaining permission from the local utility. In 2006 The Microgeneration Strategy was published, followed by £80 million in funding for implementation of the strategy, and legislation was enacted that required the government to make microgeneration technologies exempt from planning permission requirements. This approach can be adapted to local circumstances but transitioning to renewable energy sources will require involvement from the federal, provincial and municipal governments, and Manitoba Hydro.

### **6.3 Areas for Further Study**

Many interesting questions arose throughout this research and these would provide solid direction for further study. Manitoba's Hydro's LIEEP is a good program, but largely untapped by those who would benefit the most. Section 6.3.1 discusses the potential for modifying eligibility criteria. Section 6.3.2 describes another area recommended for study and it targets the social housing and rental sector. This is a very important area of energy retrofits that remains largely untouched yet houses 60% of the low-income population. Another area of research that needs to be examined locally is the potential for district heating schemes in established neighbourhoods as is discussed in

Section 6.3.3. Section 6.3.4 examines potential financing mechanisms. A financing mechanism that would permit lower-income households to perform energy retrofits without the burden of a large upfront cost is essential for the reduction of energy poverty.

### **6.3.1 Increasing the uptake in Manitoba Hydro’s LIEEP**

Manitoba Hydro targets households with advertising for their LIEEP program but the uptake of the program has been slower and less than “they would like”. To increase the number of homes retrofitted, it may be necessary for MH to evaluate their eligibility criteria. Potential areas of change include increasing the amount of allowable income from the current 125% of LICO. LICO was derived from a calculation based on average incomes and average energy consumption (Colton & Colton, 2010, p. 6). The use of LICO as a definition of “low-income” status tends to over-state the income of low-income households in Manitoba. The gap between actual income and reaching the Low-Income Cutoff is substantial. A revised income criterion would allow Manitoba Hydro to reach more households and “catch” some households in need that currently do not qualify for LIEEP.

Another issue that MH needs to address is the energy efficiency of rental properties, including apartment buildings. Currently LIEEP is only available to households that own their home. See the following section for more information on the further study of providing energy retrofits to rental properties.

### **6.3.2 Social and Rental Housing Energy Retrofits**

Manitoba Housing’s portfolio is extensive — the provincial government either owns or funds over 35,000 units where low-income families live. Too often government

looks at the cost rather than the savings. The feasibility of redirecting money towards social housing energy retrofits is an area of potential study. The economic benefits, the environmental benefits, and the social benefits would be tremendous. Some work has already been done. In Manitoba, the NDP government made important commitments in its 2009 throne speech. As a result, BUILD in Winnipeg, and BEEP in Brandon, will complete over 3000 retrofits for Manitoba Housing during 2010 (apartment units and single family dwellings) and reduce utility bills by over \$250,000/year. However, as 32,000 units remain to be retrofitted a key question is how can energy retrofits for social housing be accelerated?

Also, there remains the approximately 60 % of low income families who live in privately-owned buildings. Governments could follow the lead of the state of Minnesota who is now requiring all landlords to meet minimum efficiency requirements by 2012. Other options include tying conditions to above-guideline rent increases (where rent controls exist) or dramatically increasing existing efficiency incentives for landlords with below-median rents, in exchange for a commitment to pass along utility bill reductions to lower-income tenants (Loney, 2009, p. 2).

### **6.3.3 Facilitating District Energy through Planning Practices**

The City of Winnipeg needs to develop a municipal energy plan. The energy plan should identify sites within the municipality that would have a high demand for heating and a mix of building types. Neighbourhoods such as DMSM meet these criteria. However, the connection of existing development to district energy would be difficult at best. How, in a city with older housing stock and a high requirement for space heating,

can we facilitate this connection? For new development the process is much easier — a development agreement between the developer and the city can address the connection of the new development to the district energy system, as well deal with the usual municipal infrastructure requests such as sidewalks, roads, sewer connections and storm water management. A community wide district heating scheme would greatly reduce the per dwelling heating cost, as well as provide numerous environmental benefits. However, there are many barriers to community renewable energy schemes and further study could identify the barriers, the tools to overcome the barriers, and provide direction for connection to alternative energy sources through a municipal energy plan. Potential case studies include Lonsdale District Heating in North Vancouver, British Columbia; Western Harbour’s Sustainable Community in Malmö, Sweden; and Hamilton Community Energy in Hamilton, Ontario.

#### **6.3.4 Financing Mechanisms**

The largest barrier to energy retrofits for low-income households is the upfront cost. The upfront costs to insulate and to replace a furnace are very high. Manitoba Hydro does offer LIEEP but to qualify can be difficult and if the 125% of LICO is not met, then the homeowner must find another way to perform the retrofits.

As such, a financing mechanism must be implemented. There are three potential mechanisms that may work in Manitoba and would require further study. These include: local improvement charges; bank financing; and systems benefit charges. The question is, can these mechanisms work with the current governance structure or are major

changes required? Potential case studies are Halifax and Vancouver as they both have recently implemented PAPER programs.

In closing, there are many challenges to be overcome if energy poverty is to be reduced. Best practices for energy poverty reduction are still emerging and are relatively new locally. The first step, to perform energy retrofits, is only just beginning in Manitoba and the transition to renewable energy sources is the last step. Research argues that community development strategies for energy retrofits, such as the local program BUILD, can contribute greatly to the well-being of low-income households through better living conditions, more disposable income, a reduction in environmental degradation, and crime reduction because of increased employment for the hard-to-employ.

There is clearly a disconnect between the three levels of government and the DMSMCA, Manitoba Hydro and local residents that precludes more low-income households from performing energy retrofits on their dwellings. “It’s time for a national community-based strategy on low-income energy and water efficiency. The costs of doing nothing are too great, and the benefits of the solution...are huge” (Loney, 2010, p. 5).

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## Appendix A: Structured Interview Questions

### LOCAL RESIDENT INTERVIEW QUESTIONS

Thank you for agreeing to take part in our survey. The purpose of this survey is to understand the current situation of residents in regards to their current living situation, the cost of their utilities and the energy efficiency of their homes. The survey is divided into 4 sections – accommodation; household costs and characteristics; personal information; and the Daniel McIntyre St. Matthews Community Association. I remind you that you are not obligated to answer any of the questions.

#### SECTION A. ACCOMMODATION

In this section I'll ask questions about your current accommodation.

1. What is your current address? \_\_\_\_\_
2. What is the age of your home (ie. when was your home constructed)?  
\_\_\_\_\_
3. What is the size of your home (in square feet)? \_\_\_\_\_
4. How long have you lived at your current address? \_\_\_\_\_
5. Which of the following most closely describes your current place of residence?
  - Single detached house
  - Duplex or triplex
  - Other: \_\_\_\_\_
6. Is your house a bungalow, two-storey or other type of style? \_\_\_\_\_
7. Which of the following most closely describes your current living arrangement for you and your household?
  - Rent from a private landlord
  - Rent from Manitoba Housing
  - Rent from a non-profit
  - I / we own individually
  - Other: \_\_\_\_\_
8. How is your home heated?
  - Gas furnace
  - Electric furnace
  - Boiler
  - Geothermal
  - Electric baseboard
  - Other \_\_\_\_\_
  - Don't know



## Appendix A Continued: Structured Interview Questions

9. Had your current accommodation been renovated when you moved in?

- Yes       No       Don't Know

a. If YES, what had been done?

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b. Who performed most of the renovation work?

- Contractors hired by you or someone in your household  
 Household members  
 A community agency. Which one? \_\_\_\_\_  
 Private landlord  
 A previous owner  
 Someone else. Who? \_\_\_\_\_  
 Don't know

10. Have you had an energy audit performed for your home?

- Yes       No       Don't Know

a. If YES, what was the energy audit reading? \_\_\_\_\_

b. Has the follow-up energy audit been performed?

- Yes       No       Don't Know

c. If YES, what was the energy audit reading? \_\_\_\_\_

11. Are any renovations planned for your current accommodation?

- Yes       No       Don't Know

a. If YES, what renovations are planned?

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b. Who will perform most of the renovation work?

- Contractors hired by you or someone in your household  
 Household members  
 A community agency. Which one?  
 Private landlord  
 A previous owner  
 Someone else. Who?

## Appendix A Continued: Structured Interview Questions

Don't know

12. Are you aware of any "green" renovations that you could undertake?

Yes       No

a. If YES, could you please explain further?

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13. How familiar are you with any of the following micro-renewable technologies:

	A lot	A little	Not at all
Solar photovoltaic cells	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Solar Water Heater	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Wind Turbines	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ground Source (Geothermal)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Biomass	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

14. Are there obstacles to improving the energy efficiency of your home?

Yes       No

a. If YES, what are they?

- I rent/do not own my home
- Money
- Time
- Know-how
- Other \_\_\_\_\_

### SECTION B. HOUSEHOLD COSTS AND CHARACTERISTICS

15. How much is your rent or mortgage payment each month? \_\_\_\_\_

a. If you have a mortgage, how many years are remaining on it?

\_\_\_\_\_

16. Can I now see your Hydro bills that I asked you to bring?

b. How much do you pay for natural gas? \_\_\_\_\_

Month: \_\_\_\_\_      Cost: \_\_\_\_\_  
Month: \_\_\_\_\_      Cost: \_\_\_\_\_



## Appendix A Continued: Structured Interview Questions

22. What do you think could be done to lower your bill?

- Increase attic or basement insulation
- Change to energy star appliances
- Change furnace to a high-efficiency furnace
- Install energy efficient windows
- Turn off lights in rooms not in use
- Use compact fluorescent light bulbs
- Set the thermostat lower
- Other \_\_\_\_\_

23. Do you find that there is anything you have to go without in order to pay your hydro bill?

- Food
- Other utilities
- Other \_\_\_\_\_

### SECTION C. PERSONAL INFORMATION

Now I would like to ask some personal questions that will help us understand and interpret all the answers. You are under no obligation to provide an answer to any of the following questions.

24. Would you consider yourself to be:

- Middle-income
- A couple with children
- A single parent with children
- Aboriginal
- An immigrant or refugee
- A senior over the age of 65
- None of the above

25. What is your current employment situation? (Please indicate all that apply)

- Working full-time
- Working part-time
- Looking for work
- Caregiver
- Full-time student
- Retired
- Other: \_\_\_\_\_

**Appendix A Continued: Structured Interview Questions**

26. Into which range does your total household income fall?

- Below \$20,000
- \$20,000 to \$29,999
- \$30,000 to \$39,999
- \$40,000 to \$49,999
- \$50,000 to \$59,999
- \$60,000 and over

a. Is most of your income from work?

- Yes
- No

b. Do you receive any government benefits?

- Yes
- No

27. Household Composition

Person	Age Range	Gender	Relationship to Person 1
1. You			
2.			
3.			
4.			
5.			

Age ranges: Under 15; 15 to 19; 20 to 24; 25 to 39; 40 to 59; Over 60

**SECTION D. THE DANIEL McINTYRE ST. MATTHEWS COMMUNITY ASSOCIATION**

I am asking the following questions on behalf of the community association to help them improve their current programs and provide some direction for the types of initiatives they should undertake in the future. I'll remind you again that you are not obligated to answer any of the questions.

28. Are you aware of the housing grants provided by the local community association (DMSMCA)?

- Yes
- No

a. Have you applied for a grant?

- Yes
- No

**Appendix A Continued: Structured Interview Questions**

- b. If YES, were you approved or denied?  
 Approved       Denied
- c. If approved, how much money did you receive? \_\_\_\_\_
- d. What improvements were you able to make to your home?

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- e. Did the improvements that you were able to make reduce your energy costs?  
 Strongly agree     Agree     Disagree     Strongly Disagree

29. Are you aware of any 'green' initiatives they have undertaken?

- Yes       No

a. If YES, what are they?

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30. Do you have any 'green' ideas that you think the Community Association should undertake?

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31. If the Community Association offered a workshop on alternative energy, would you be interested in attending?

- Yes       No

**END OF SURVEY:** The survey is now complete. Thank you for taking the time to answer the questions. Your opinions are a very valuable part of our study.

Do know any other residents of Daniel McIntyre or St. Matthews that would be willing to take part in this survey?

## Appendix B: Semi-Structured (Key Informant) Interview Schedules

### GROUP 1: PROFESSIONAL PLANNERS KEY INFORMANT INTERVIEW QUESTIONS

**INTENT:** The intent of interviews with Group 1 is to determine the potential and role of the provincial and municipal governments to address energy poverty at the neighbourhood level using “green” methods, such as micro-renewable energy.

Key topic areas will include:

- Familiarity with the concept of energy poverty;
- Issues surrounding the delivery of affordable housing;
- Green initiatives directed at the household that are currently being undertaken; and
- Alternative energy and the potential of micro-renewable energy to lower household costs.

A basic background will be established to start the interview, such as discussing the issues with current energy policy:

*A significant issue in energy policy is the disparate nature of supply and demand. It remains the norm for urban areas to be supplied with electricity, gas and petroleum from external sources. A more sustainable approach would move away from fossil fuels and use renewable sources of energy such as solar, wind and biomass. A potentially productive approach lies in retrofitting existing buildings - both to improve their energy efficiency and to provide them with alternative energy sources.*

The discussion will then turn to more open-ended questions.

*Energy Poverty:*

1. Are you familiar with the concept of energy poverty? (*Probe: Can you explain further?*)
  - a. Do you think energy poverty is a problem in Winnipeg? (*Probe: In what ways?*)
  - b. Do you know of policies/programs that address energy poverty in Winnipeg? (*Probes: Which programs appear to be the most effective and why? What could be done to improve these programs further? If you are not aware of programs in Winnipeg, are there examples from other cities that you can think of?*)
  - c. Policies and programs that have been developed to address energy poverty vary in scope and effectiveness. What type of energy poverty program do you think would be the most effective in Winnipeg? (*Probe: Income assistance, policy, energy transition, education, energy conservation?*)

## Appendix B Continued: Semi-Structured (Key Informant) Interview Schedules

### *Housing Affordability:*

2. Does your department play a role in addressing the issue of affordable housing in Winnipeg? If so, how? If not, does your department indirectly address the issue? (*Probes: Can your department do more? Should your department do more?*)
3. Does your department work jointly with other levels of government? (*Probes: If so, in what ways? If not, why?*)
4. Do you think policies/programs that incorporate sustainability into their framework are beneficial to low-income households? (*Probes: In what ways? Can you explain further? Can you think of an example in Winnipeg or elsewhere?*)
5. Do your policies/programs have a “green” component?
  - a. If so, what makes it “green”? If not, do you think it would be beneficial to add a “green” component? Would it be feasible to add a “green” component?
  - b. What types of “green” features would be the most worthwhile to increase housing affordability? (*Probes: Upgrading insulation in homes? Community energy plans? Education? Transitioning to renewable energy sources?*)

### *Alternative Energy:*

6. Are alternative energy sources a viable approach to reducing energy consumption and costs? (*Probe: Can you explain which alternative energies would be the most effective?*) If not, why?
7. What regulatory changes would help to improve the energy efficiency for low-income households? (*Probes: For example, would changes to the local zoning by-law help? Or, are community energy plans a possibility?*)
8. How could micro-renewable energy be used by professionals to better facilitate and promote alternative energy usage?
9. Who should be responsible for the on-ground delivery of programs? Who is currently responsible? (*Probe: The federal government, provincial government, municipal government, community association, Manitoba Hydro or other?*)



## Appendix B Continued: Semi-Structured (Key Informant) Interview Schedules

10. Are there programs that are working well? (*Probe: Can you explain why the program is working well?*) What would an effective strategy for using alternative to decrease energy poverty involve? (*Probes: What specific issues or barriers could you identify? What sort of strategy could help overcome these barriers and enable more projects?*)

### GROUP 2: DMSMCA COORDINATOR KEY INFORMANT INTERVIEW QUESTIONS

INTENT: The intent of interviews with Group 2 is to determine if current housing and greening initiatives could be expanded to move beyond current limits and promote the transition from current sources of energy to alternative energy sources.

Key topic areas include:

- The community association's relationships with other organizations;
- Green and affordable housing initiatives types of programs that they have implemented;
- The obstacles that they have faced to implement such programs; and
- The benefits that the programs have had to date, and the potential to expand current programs to include the transition from current energy sources to local renewable energy sources.

A basic background will be established to start the interview, such as discussing the issues with current energy policy:

*A significant issue in energy policy is the disparate nature of supply and demand. It remains the norm for urban areas to be supplied with electricity, gas and petroleum from external sources. A more sustainable approach would move away from fossil fuels and use renewable sources of energy such as solar, wind and biomass. A potentially productive approach lies in retrofitting existing buildings - both to improve their energy efficiency and to provide them with alternative energy sources.*

The discussion will then turn to more open-ended questions.

#### **For both coordinators:**

1. Are you familiar with the concept of energy poverty? (*Probe: Can you explain further?*)
  - a. Do you think energy poverty is a problem in Winnipeg? (*Probe: In what ways?*) Do you think it is a problem in Daniel McIntyre / St. Matthews?

## Appendix B Continued: Semi-Structured (Key Informant) Interview Schedules

- b. Do you know of policies/programs that address energy poverty in Winnipeg? (*Probes: Which programs appear to be the most effective and why? What could be done to improve these programs further? If you are not aware of programs in Winnipeg, are there examples from other cities that you can think of?*)
  - c. Policies and programs that have been developed to address energy poverty vary in scope and effectiveness. What type of energy poverty program do you think would be the most effective in Winnipeg? (*Probe: Income assistance, policy, energy transition, education, energy conservation?*)
  - d. Do you think policies/programs that incorporate sustainability into their framework are beneficial to lower income households? (*Probe: Can you explain further?*)
2. What is the nature of the relationship the community association has with:
- e. The City of Winnipeg?
  - f. The Province of Manitoba?
  - g. BUILD?
  - h. Manitoba Hydro?
- If a relationship does not exist, do you feel that a relationship with the organization would help advance your greening or housing initiatives? (*Probe: How could this organization advance your initiatives?*)
3. Who could/should be included as a partner to advance the goals and objectives of the community association? How should they be involved? How can residents best be involved? (*Probe: In what ways?*)
4. Can you please explain the origins of the community association? (*Probes: Was it a grassroots initiative? Or provincial? How is Neighbourhoods Alive involved?*)

### ***For the greening coordinator:***

5. The CLER program states that participants and their communities are working through the five milestone program:
- i. Establishing a GHG emissions inventory;
  - ii. Setting a GHG emissions reduction target;
  - iii. Developing a local climate change action plan;
  - iv. Implementing GHG emissions reduction projects and activities;
  - v. Monitoring progress and reporting results.
- At what milestone is DMSMCA? If the inventory has been established, do you know the amount of GHG emissions that can be attributed to household energy consumption?

## **Appendix B Continued: Semi-Structured (Key Informant) Interview Schedules**

6. How does the CLER program fit in with the community association's goals and objectives? (*Probe: Has the community association had to adapt their goals to be more compatible with the CLER program?*)
7. What types of programs are being implemented to meet the CLER program objectives?
  - i. What programs are a priority for the community association? Why?
  - j. Will the programs target households within a certain income bracket or area of the neighbourhood? (*Probes: Which income bracket? Which area of the neighbourhood?*)
  - k. Does the Green Plan contain any housing improvement initiatives? (*Probes: If so, what types of initiatives are planned? If not, why are they not included?*)
  - l. Have you encountered any barriers to establishing the Green Plan?
8. Are there other activities that the community association is undertaking regarding energy conservation and/or the transition to local renewable energy? (*Probe: Does the community association plan to undertake any activities in the future?*)

### **For the housing coordinator:**

9. Where does the community association obtain funding for the exterior improvement housing grants? (*Probes: Does the community association need to apply every year for funding? Can funding be increased? Are there other sources of funding that can be applied for?*)
10. Is there potential to expand the program to include other types of housing improvements? (*Probes: Such as improving energy efficiency or installing micro-renewable technologies?*)
11. Part of the problem is the need for the applicant to pay for the housing improvements upfront and then to be reimbursed. Are there strategies to assist low-income households in overcoming this barrier? Does the program specifically target households in a certain income bracket? Or in a certain area of the community?

## **GROUP 3: TECHNICAL EXPERT KEY INFORMANT INTERVIEW QUESTIONS**

**INTENT:** The intent of interviews with Group 3 is to determine the feasibility of retrofitting homes and the constraints of micro-renewable energy (such as the local climate, cost, permits).

Key topic areas include:

- The true cost of retrofitting older homes with renewable energy technologies;
- The best types of renewable energy technologies that will work in the local climate; and
- Current barriers that may be encountered due to local regulations.

## Appendix B Continued: Semi-Structured (Key Informant) Interview Schedules

A basic background will be established to start the interview, such as discussing the issues with current energy policy:

*A significant issue in energy policy is the disparate nature of supply and demand. It remains the norm for urban areas to be supplied with electricity, gas and petroleum from external sources. A more sustainable approach would move away from fossil fuels and use renewable sources of energy such as solar, wind and biomass. A potentially productive approach lies in retrofitting existing buildings - both to improve their energy efficiency and to provide them with alternative energy sources.*

The discussion will then turn to more open-ended questions.

1. Are alternative energy sources a viable approach to reducing energy consumption and costs in older homes? (*Probes: If so, why? If not, why?*)
2. In older homes, what types of micro-renewable technologies (PV panels, solar hot water heater, micro-windmill, etc.) would be most beneficial for reducing energy costs? How much do these technologies cost? What would be the monthly/yearly savings in energy costs? Are there certain types of technologies more suitable to use in urban areas? (*Probes: What criteria does one have to consider when using micro-renewable technologies in older homes? Do costs generally increase as the age of the home increases? Are there ways of reducing the cost of these technologies?*)
3. Are current City of Winnipeg regulations (ie zoning by-law) a barrier to retrofitting homes with micro-renewable energy apparatus? (*Probe: How could the regulations be changed to decrease barriers?*)
4. What needs to be done to enable more housing retrofits with micro-renewable energy technology? (*Probe: For example, education, grants, reducing costs, etc.*)
5. Are you familiar with the concept of energy poverty? (*Probe: Can you explain further?*)
  - m. Do you think energy poverty is a problem in Winnipeg? (*Probe: In what ways?*)
  - n. Do you know of policies/programs that address energy poverty in Winnipeg? (*Probes: Which programs appear to be the most effective and why? What could be done to improve these programs further? If you are not aware of programs in Winnipeg, are there examples from other cities that you can think of?*)
  - o. Policies and programs that have been developed to address energy poverty vary in scope and effectiveness. What type of energy poverty program do you think would be the most effective in Winnipeg? (*Probe: Income assistance, policy, energy transition, education, energy conservation?*)

## Appendix B Continued: Semi-Structured (Key Informant) Interview Schedules

- p. Do you think micro-renewable energy would help to reduce energy poverty? (*Probe: If so, how? Can you explain further?*)

### GROUP 4: BUILD EXECUTIVE DIRECTOR KEY INFORMANT INTERVIEW QUESTIONS

**INTENT:** The intent of interviews with Group 4 is to determine the feasibility of expanding the existing BUILD programs to incorporate renewable energy technology with the current energy efficiency upgrades.

Key topic areas include:

- The extent of the work done by BUILD in the Daniel McIntyre and St. Matthews neighbourhoods;
- The potential to expand the program from reducing energy consumption to transitioning to micro-renewable energy;
- The barriers to operating the program; and
  
- The role of the province and the city.

A basic background will be established to start the interview, such as discussing the issues with current energy policy:

*A significant issue in energy policy is the disparate nature of supply and demand. It remains the norm for urban areas to be supplied with electricity, gas and petroleum from external sources. A more sustainable approach would move away from fossil fuels and use renewable sources of energy such as solar, wind and biomass. A potentially productive approach lies in retrofitting existing buildings - both to improve their energy efficiency and to provide them with alternative energy sources.*

The discussion will then turn to more open-ended questions.

1. Can you explain Warm Up Winnipeg?
  - a. Does the program target specific neighbourhoods? If so, which neighbourhoods?
  - b. Does the program target specific households? How are the households determined? (*Probe: Do all chosen households receive the same retrofits?*)
  - c. What is the extent of the work that has been done in the Daniel McIntyre / St. Matthews neighbourhoods?
  - d. What kinds of changes have you noticed in the neighbourhoods that Warm Up Winnipeg targets? (*Probes: Have there been positive changes? Negative changes? Little or no change?*)
  - e. In what ways has Warm Up Winnipeg been beneficial to lower income households?
  - f. What potential is there for Warm Up Winnipeg to expand beyond current options and incorporate micro-renewable energy technologies into the retrofits?

## **Appendix B Continued: Semi-Structured (Key Informant) Interview Schedules**

2. What role does the City play in the delivery of Warm Up Winnipeg? What role does the province play? (*Probes: Can the City or province do more? Are there other organizations that could be helpful?*)
3. Who should be responsible for the on-ground delivery of programs – government, utilities, non-profits, for-profit businesses? (*Probes: Can you explain further? How would that organization help with the delivery of the program?*)
4. What has made the program successful? What do you think could be done to build on the current success?
5. What barriers have you encountered? How have you been able to overcome them?
6. What needs to be done to enable more housing retrofits to be completed?
7. Do you know of other policies/programs that address energy poverty in Winnipeg? (*Probes: Which programs appear to be the most effective and why? What could be done to improve these programs further? If you are not aware of programs in Winnipeg, are there examples from other cities that you can think of?*)
  - a. Policies and programs that have been developed to address energy poverty vary in scope and effectiveness. What type of energy poverty program do you think would be the most effective in Winnipeg? (*Probe: Income assistance, policy, energy transition, education, energy conservation?*)
  - b. Do you think micro-renewable energy would help to reduce energy poverty? (*Probe: If so, how? Can you explain further?*)

### **GROUP 5: MANITOBA HYDRO KEY INFORMANT INTERVIEW QUESTIONS**

**INTENT:** The intent of interviews with Group 5 is to determine the feasibility of expanding current low-income energy efficiency programs to incorporate renewable energy technologies.

Key topic areas include:

- Current low-income energy efficiency programs;
- Knowledge of micro-renewable energy; and
- The potential to transition from the current energy system to alternative energy sources.

A basic background will be established to start the interview, such as discussing the issues with current energy policy:

## Appendix B Continued: Semi-Structured (Key Informant) Interview Schedules

*A significant issue in energy policy is the disparate nature of supply and demand. It remains the norm for urban areas to be supplied with electricity, gas and petroleum from external sources. A more sustainable approach would move away from fossil fuels and use renewable sources of energy such as solar, wind and biomass. A potentially productive approach lies in retrofitting existing buildings - both to improve their energy efficiency and to provide them with alternative energy sources.*

The discussion will then turn to more open-ended questions.

1. What types of policies or programs does your organization implement?
  - a. Do any of these policies/programs address energy poverty? (*Probe: directly or indirectly?*)
2. Do your low-income programs target specific neighbourhoods in Winnipeg? If so, which neighbourhoods?
  - a. What kinds of changes have you noticed in the neighbourhoods that your policies/programs target?
3. Do your policies or programs target households within a certain income bracket?
  - a. In what ways has the support that your policies/programs provides been beneficial to lower income households?
4. How do you think your low-income programs have been effective?
  - a. What do you think could be done to improve the effectiveness of your policies/programs?
  - b. Does Hydro work jointly with the municipal or provincial government, or other organizations, to deliver your low-income programs?
5. Do you think policies/programs that incorporate sustainability into their framework are beneficial to lower income households? (*Probe: In what ways?*)
6. What needs to be done to enable the transition from current energy sources to renewable energy sources?
7. Are homeowners able to sell surplus energy to Manitoba Hydro?

## **Appendix B Continued: Semi-Structured (Key Informant) Interview Schedules**

8. Are you familiar with the concept of energy poverty? (*Probe: Can you explain further?*)
- a. Do you think energy poverty is a problem in Winnipeg? (*Probe: In what ways?*)
  - b. Do you know of policies/programs that address energy poverty in Winnipeg? (*Probes: Which programs appear to be the most effective and why? What could be done to improve these programs further? If you are not aware of programs in Winnipeg, are there examples from other cities that you can think of?*)
  - c. Policies and programs that have been developed to address energy poverty vary in scope and effectiveness. What type of energy poverty program do you think would be the most effective in Winnipeg? (*Probe: Income assistance, policy, energy transition, education, energy conservation?*)

Do you think micro-renewable energy would help to reduce energy poverty? (*Probe: If so, how? Can you explain further?*)



## Appendix C: Group 1 Semi-Structured Interview Themes

Theme	Key Words	Definition	Appearance of Theme	
			Group 1 - Planners	
			City Planner	Provincial Planner
Accessibility to Information	Knowledge or lack of knowledge, teaching, no information, no support	Residents need easy access to information regarding energy efficiency, conservation measures, and renewable energy technology. If it is too difficult to find the correct source, people continue as they are rather than spend more time looking for what they need.	As a "late bloomer", the City has access to information from other communities about programs/initiatives that have been successful regarding GHG reductions.	Through CLER, information flows to municipalities/communities and then to residents. Also, the province is learning as they develop CLER and learning to communicate with other departments, trying to not operate in a silo. Many things do not happen because people do not know where to access the necessary information. As part of CLER, they held workshops with participating communities to give them ideas about what sorts of projects they can do that will be eligible for funding under CLER's criteria.
Affordability	Costs, upfront costs, credit	Affordability refers to the costs associated with energy retrofits and the ability of a household to pay for these retrofits. In many instances, energy retrofits are <i>not</i> affordable. Affordability, or lack of, is a specific type of barrier.	Housing affordability, supply and quality housing are central issues in the Plan. Energy efficiency measures do not necessarily have to start at a high level such as geothermal. More affordable measures are a good place to start.	Energy retrofits are not affordable. They do eventually pay for themselves but the upfront burden is too great for many.
Barriers	Tradespeople, small lot sizes, costs, high interest, program eligibility, time, rental properties, challenge	Barriers can take a variety of forms but they all prohibit a household from undertaking energy retrofits. The most common barrier is money as the upfront costs for retrofits cannot be met by low-income households. Eligibility criteria for programs can be a barrier.	Many social issues fall are the province's jurisdiction and therefore the City would likely be a collaborator rather than a leader on any housing and/or energy initiatives.	CLER is a very specific program - very strict guidelines. All projects that receive CLER funding have to reduce GHG emissions in Manitoba. Also, a lack of knowledge about energy efficiency.
Capacity	Municipalities have limited power, redesign, flexibility	Capacity refers to the skills an organization has to overcome adversity. Organizations need to be flexible and adaptive for greater success.	The problems with service and communication linkages reduce the capacity of the City to make effective change but improvements, new approaches are being developed.	Capacity can be learned. The Province is supporting a number of communities/municipalities for the CLER program and helping them to increase their capacity for implementing change. Program delivery would probably be best done through neighbourhood associations because of the trust they have established with local residents. Unfortunately, they may not have the capacity yet for change so support from other stakeholders, such as the province, is critical. Also, organizations should not take on too much too soon which is a real danger.
Choice	Diversify, not available to certain sectors	Households need a choice of energy retrofits, a choice of knowledgeable contractors, a choice of program and a choice of energy.	There is vulnerability associated with being largely dependent on one type of energy source as we are in Manitoba. We need to diversify and incorporate other types of renewable energy into our energy portfolio.	MH will provide grants for energy retrofits that reduce natural gas consumption. More choice should be available to consumers and benefits for a reduction in energy consumption, regardless of type of energy.
Community Development	Skills training, community-based approach, reduction in crime	Community development refers to establishing programs and/or policies that are rooted in the community and are intended to benefit the local community. For example, the BUILD model follows a community-based approach to enhance community development.	The City could potentially play more of a role in terms of community development. The communication and service linkages are not lining up necessarily as they should be but improvements are being made.	Related to capacity - community development happens when capacity is increased. Can make changes to benefit the whole community rather than just a few individuals.
Consumer Behaviour	Complacency, priorities, proactive, low-cost solutions, simplify, complacency, lifestyle, work with my neighbour, community	Consumer behaviour refers to the actions of the individual. For many low-income households, energy efficiency is not a priority because day-to-day challenges such as paying rent or purchasing food take precedence. This also includes lifestyle. For example, do individuals turn off lights when they leave a room, or lower the thermostat during the night, etc. Consumer behaviour is a specific type of barrier.	Social marketing is a large component of implementing change.	NA
Cost-effectiveness	Pay-back, cost-benefit, pays for itself, low-cost heating	The initial cost of an energy retrofit can be expensive but over a period of time the savings in energy costs will exceed the initial cost. Depending on the action taken, the payback period can range from 2 to 15 years.	Geothermal has a very high entry point - some measures are very cost-effective, such as house orientation, and these should be looked at first.	NA

## Appendix C Continued: Group 1 Semi-Structured Interview Themes

Theme	Key Words	Definition	Appearance of Theme	
			Group 1 - Planners	
			City Planner	Provincial Planner
<b>Energy Efficiency</b>	Low-performing dwelling, old housing stock, high-efficiency furnace, weather stripping, insulation	This refers to the performance level of the dwelling. Older homes tend to be low-performing unless the insulation and heating systems have been upgraded. Energy efficiency measures are wide-ranging and can include, but is not limited to, weather stripping, high-efficiency furnaces, insulation, window replacement, CFLs, pipe and water heater wrap, etc.	Energy reduction will be more of a component of the zoning by-law when it is reviewed. Development standards will be improved to increase energy efficiency.	Energy efficiency to reduce GHG emissions falls under Manitoba Hydro's control. Therefore, as employees for CLER we promote MHS programs.
<b>Funding</b>	Financing, capital, financing mechanisms, TIF, a surcharge on utility bills	This refers to the money required to pay or finance energy retrofits. Funding can come from many different sources and can either be in the form of a grant or loan.	The City would likely participate in programs funded by the province or federal government. However, for them to provide funding for projects is highly unlikely due to current fiscal constraints.	Ultimately reduction in energy poverty comes down to money. Of course, there is never enough money. Many organizations/municipalities are barely managing with day-to-day operations and to undertake additional programs/responsibilities they require support through increased funding, personnel, and information.
<b>Green Projects</b>	Environment, green plans, energy mapping	Green projects are environmentally friendly initiatives that an organization is undertaking. These can include community gardens, car shares, GHG emissions reduction, etc.	The City does not have an environmental department but there are a number of "green projects" underway at the City. There is interest in pursuing more projects but details still need to be worked out.	CLER arose out of the influx of "green" project applications for NA! funding. Partnering with rural municipalities, City of Winnipeg neighbourhoods (including DM and SM), and some school districts, CLER helped these groups develop strategies to reduce their GHG emissions.
<b>Intergovernmental relationships</b>	Stakeholders, collaboration, working with different groups/communities	This refers to the relationships that currently exist between the five stakeholders interviewed.	The City does work regularly with the Province as they are a 50% funder of the Plan and Winnipeg is the key municipality for a regional planning approach the Province is undertaking. Any relationships with community associations are inconsistent and informal.	The lack of City of Winnipeg involvement is a glaring omission. Neighbourhood organizations can only get so far without support from the City. The federal government has removed themselves as well from the housing arena.
<b>Organizational Roles</b>	City chosen not to participate, hassle, present administration, city's role, lack of federal involvement	The roles of the five different organizations interviewed, as well as the roles that they should have.	Municipalities have limited power and would only be one player. The municipality would be the organization responsible for land use, building codes, etc. Many social development issues are provincial responsibility - the City would have more of a role in terms of vitality, liveability and those kinds of things. The City is not in the position of taking on areas that are not in their mandate. The City would be more of a collaborator rather than a leader in terms of program delivery. There are examples of programs that have moved up or down through levels of government.	If the government is serious about reaching Kyoto targets, and if we're committed to supporting equality and lifting people out of poverty then we need to subsidize these things and simplify. Stakeholder relationships are key, organizations need support from stakeholders. MH covers energy efficiency - appears there is little room for other organizations to assist with increasing energy efficiency other than referring people to MH.
<b>Low-income</b>	Social assistance, working people	Low-income refers to either an individual, household, neighbourhood or organization that does not have an adequate amount of money/funding to cover the costs of necessities.	NA	It's a vicious cycle - energy costs are high but to remedy the problem is very expensive. Low-income households can't afford some basic necessities so energy retrofits are likely to be low on their priority list.
<b>Planning</b>	Large-scale problem, home-by-home approach, model, more work to be done, patience	To lessen energy poverty, planning is essential. Planning refers to establishing long-term policies and programs to target low-income households and revitalize inner-city neighbourhoods.	Housing is central to Plan Winnipeg. The policies are dynamic and are meant to adapt to changing conditions. Planning for adequate, safe housing will contribute to a community's vitality and liveability.	Planning for energy in the future should be at the community scale, rather than piecemeal at the individual household level. Also, by providing assistance to communities CLER hopes to integrate climate change initiatives into their everyday planning so that in the long term these communities can be more sustainable and more resilient.
<b>Progressive Policies</b>	Dynamic policies, creativity, legislation, mandate, role of government, renewable portfolio standard, improvements can be made, flexibility, integrated approach	Policies should not be static and frequently re-evaluated for effectiveness.	Integrated energy systems and a holistic approach are necessary to reduce energy poverty. There are many pieces to the puzzle including education, energy efficiency, energy conservation, etc. As well, areas designated for housing improvements will not be mapped. The new policies are intended to be dynamic. The City could look at existing programs and how to improve them without investing a lot of new resources.	The formation of CLER arose from the increasing number of green project proposals NA! was receiving. The projects are not necessarily housing or energy poverty related. Also, simplify existing programs for homeowners.

## Appendix C Continued: Group 1 Semi-Structured Interview Themes

Theme	Key Words	Definition	Appearance of Theme	
			Group 1 - Planners	
			City Planner	Provincial Planner
<b>Status quo</b>	New normal, push the limits, fear of unknown, need a different approach, need to think big, lack of creativity	This refers to an organization that is content with continuing to operate as they have always operated and is reluctant to adopt more progressive or forward-thinking policies and programs. This has a negative affect on the most vulnerable parts of the population because they would benefit the most from change. This may also refer to individuals or organizations that want to change the status quo by pushing the limits or thinking big and undertake a different approach. The different approach may or may not work, but what we currently have in place is not working very well so by thinking big, there are many more opportunities to move forward	One of the outcomes of the planning process for developing Plan Winnipeg is that a lot of initiatives that would have been considered as "green" are now the new normal.	NA
<b>Technology</b>	Variety of energy sources, low-cost renewables, energy generation, solar, wind turbines, geothermal	Technology refers to the advances in recent years that contribute to the reduction of energy consumption. These include renewable energy technologies.	Renewable energy has a role to play in the reduction of energy poverty, especially as the cost of this technology falls.	Renewable energy technologies as a means to reduce GHGs was not brought forward by participating communities.

## Appendix D: Group 2 Semi-Structured Interview Themes

Theme	Key Words	Definition	Appearance of Theme	
			Group 2 - DMSMCA	
			Housing Coordinator	Greening Coordinator
Accessibility to Information	Knowledge or lack of knowledge, teaching, no information, no support	Residents need easy access to information regarding energy efficiency, conservation measures, and renewable energy technology. If it is too difficult to find the correct source, people continue as they are rather than spend more time looking for what they need.	The HC provides information to local residents regarding energy efficiency programs. They have educational sessions, provide information through their monthly newsletters, make recommendations or refer people to other organizations that may be able to help. They are also able to reach out to local residents through the housing grants program.	The GC has had difficulty accessing information regarding building codes, so how is the homeowner with limited time supposed to find the information they need? Another issue, is the GC had problems following the GHG emissions calculator used for the CLER program, ie it was confusing and difficult to use. If the GC had problems, it's highly likely that most people will have problems. We need simpler tools.
Affordability	Costs, upfront costs, credit	Affordability refers to the costs associated with energy retrofits and the ability of a household to pay for these retrofits. In many instances, energy retrofits are <i>not</i> affordable. Affordability, or lack of, is a specific type of barrier.	People are struggling to pay to heat their older homes and are struggling to save enough money to perform energy retrofits or to even pay for basic necessities. As HC, they are trying to break this cycle by connecting the resident to MH's LIEEP and to BUILD.	The key to addressing energy poverty is to eliminate the upfront costs of labour and materials.
Barriers	Tradespeople, small lot sizes, costs, high interest, program eligibility, time, rental properties, challenge	Barriers can take a variety of forms but they all prohibit a household from undertaking energy retrofits. The most common barrier is money as the upfront costs for retrofits cannot be met by low-income households. Eligibility criteria for programs can be a barrier.	Renters are in an especially difficult situation because they do not have control over the energy efficiency of the dwelling. Another barrier are the terms of their funding for the housing grants. The grants can only be used for exterior cosmetic improvements.	It is difficult for low-income households to come up with the upfront costs and then wait to be reimbursed through the enerGUIDE programs. It is not feasible. Also, in terms of implementing green projects the DMSMCA has encountered barriers at the City with local zoning by-laws and building codes that prohibit the DMSMCA from undertaking some of the projects they would like to.
Capacity	Municipalities have limited power, redesign, flexibility	Capacity refers to the skills an organization has to overcome adversity. Organizations need to be flexible and adaptive for greater success.	NA	DMSMCA recruits local residents to sit on their various committees. The value is the residents are able to provide direction and help with the public engagement component.
Choice	Diversify, not available to certain sectors	Households need a choice of energy retrofits, a choice of knowledgeable contractors, a choice of program and a choice of energy.	NA	Choice would be nice. Right now people do not have a choice in addressing their energy needs.
Community Development	Skills training, community-based approach, reduction in crime	Community development refers to establishing programs and/or policies that are rooted in the community and are intended to benefit the local community. For example, the BUILD model follows a community-based approach to enhance community development.	The housing committee is comprised of local residents interested in housing issues. They provide ideas and direction for the DMSMCA and provide feedback regarding the delivery of programs. They've developed a housing plan through local consultations.	The DMSMCA works closely with the community to establish their objectives and prioritize the projects that they can undertake. Residents sit on committees and help with public engagement. As well, DMSMCA offer workshops to provide information to local residents.
Consumer Behaviour	Complacency, priorities, proactive, low-cost solutions, simplify, complacency, lifestyle, work with my neighbour, community	Consumer behaviour refers to the actions of the individual. For many low-income households, energy efficiency is not a priority because day-to-day challenges such as paying rent or purchasing food take precedence. This also includes lifestyle. For example, do individuals turn off lights when they leave a room, or lower the thermostat during the night, etc. Consumer behaviour is a specific type of barrier.	DMSMCA provides workshops on renovations, energy efficiency improvements to help local residents learn how to improve their dwelling, how to hire a contractor and other skills.	Residents participate in areas that are of interest to them, such as community gardens or the bike cage. If they are not interested then they do not participate.
Cost-effectiveness	Pay-back, cost-benefit, pays for itself, low-cost heating	The initial cost of an energy retrofit can be expensive but over a period of time the savings in energy costs will exceed the initial cost. Depending on the action taken, the payback period can range from 2 to 15 years.	The most effective measures are cost-effective and include simple things like air sealing. A program to assist residents with something simple and inexpensive could go a long way.	NA
Energy Efficiency	Low-performing dwelling, old housing stock, high-efficiency furnace, weather stripping, insulation	This refers to the performance level of the dwelling. Older homes tend to be low-performing unless the insulation and heating systems have been upgraded. Energy efficiency measures are wide-ranging and can include, but is not limited to, weather stripping, high-efficiency furnaces, insulation, window replacement, CFLs, pipe and water heater wrap, etc.	There is a lot of work to be done in DMSM in regards to improving the energy efficiency of dwellings. The amount of interest from local residents is high. Basically, the goal is to prevent the loss of energy/heat in the first place and insulation and air-sealing are the most cost-effective ways to do this.	NA
Funding	Financing, capital, financing mechanisms, TIF, a surcharge on utility bills	This refers to the money required to pay or finance energy retrofits. Funding can come from many different sources and can either be in the form of a grant or loan.	DMSMCA provides exterior housing grants but the HC receives numerous inquiries about energy efficiency grants. They receive funding for this program through WHHI. Together with other community associations they ask for more funding.	Stated that the biggest barrier for low-income households is the upfront costs for energy retrofits.

## Appendix D Continued: Group 2 Semi-Structured Interview Themes

Theme	Key Words	Definition	Appearance of Theme	
			Group 2 - DMSMCA	
			Housing Coordinator	Greening Coordinator
Green Projects	Environment, green plans, energy mapping	Green projects are environmentally friendly initiatives that an organization is undertaking. These can include community gardens, car shares, GHG emissions reduction, etc.	NA	As a Neighbourhoods Alive! Community, recent years have seen a trend towards implementing "green" projects. DMSMCA has developed a community green plan.
Interorganizational relationships	Stakeholders, collaboration, working with different groups/communities	This refers to the relationships that currently exist between the five stakeholders interviewed.	The HC promotes programs offered by MH and BUILD to help local residents find affordable ways to perform energy retrofits. The HC works with the City in regards to derelict houses. The HC is also on a committee with other community association HCs. The HC will also refer residents to BUILD.	The GC works closely with the province through NA! and the CLER program, with other GCs from other community associations, with the Parks and Recreation department at the City.
Organizational Roles	City chosen not to participate, hassle, present administration, city's role, lack of federal involvement	The roles of the five different organizations interviewed, as well as the roles that they should have.	DMSMCA does not receive funding directly from the City but they are able to obtain funding through their local councillor for certain projects. Unfortunately these projects tend to be capital related, not housing related. The HC works closely with the Province, housing coordinators from other community associations, RRAP, etc. They have also asked for some of the surplus money the City has for their housing improvement zones but they want the money to be used for large projects instead of small projects.	Non-profit organizations (such as BUILD) need support and significant funding from government or foundations. DMSMCA works with a variety of organizations. They are most closely linked to the provincial government because they fund the DMSMCA, but they also work with other community associations, the City, Urban Greenspaces Coalition. They do not work very closely with the City but would like to have a better working relationship with them.
Low-income	Social assistance, working people	Low-income refers to either an individual, household, neighbourhood or organization that does not have an adequate amount of money/funding to cover the costs of necessities.	Low-income households could never afford to pay for energy retrofits themselves. And renters do not have any control over the condition of their housing.	Social assistance rates are not high enough to find an adequate place to live, to have good food and the high cost of utilities, many people are forced to live in uncomfortable conditions.
Planning	Large-scale problem, home-by-home approach, model, more work to be done, patience	To lessen energy poverty, planning is essential. Planning refers to establishing long-term policies and programs to target low-income households and revitalize inner-city neighbourhoods.	The DMSMCA listed one of their priorities to be safe housing for all. To the HC, safe housing includes healthy housing in that they are adequately heated during the winter months and the health of the resident is not compromised. They have also developed a housing plan.	They have developed a green plan.
Progressive Policies	Dynamic policies, creativity, legislation, mandate, role of government, renewable portfolio standard, improvements can be made, flexibility, integrated approach	Policies should not be static and frequently re-evaluated for effectiveness.	The area of greatest concern is rental housing because these dwellings tend to be the most poorly maintained. The residents are unable to improve their situation and the poor quality housing negatively impacts their health and many aspects of their lives. Policies and programs for renters would help these households to improve their lives in many ways. Another area of concern is the number of condo conversions. Other municipalities have restrictions for condo conversions and the same should be considered for Winnipeg because it would prevent the displacement of renters who cannot afford to purchase a condo.	We require more forward-looking policies that will address the rising costs of natural gas and electricity. Also, building codes and local regulations need to be updated to accommodate new advancements in technology.
Status quo	New normal, push the limits, fear of unknown, need a different approach, need to think big, lack of creativity	This refers to an organization that is content with continuing to operate as they have always operated and is reluctant to adopt more progressive or forward-thinking policies and programs. This has a negative affect on the most vulnerable parts of the population because they would benefit the most from change. This may also refer to individuals or organizations that want to change the status quo by pushing the limits or thinking big and undertake a different approach. The different approach may or may not work, but what we currently have in place is not working very well so by thinking big, there are many more opportunities to move forward.	NA	LIEEP is sponsored by MH and there is an inherent bias. Although it is very important to upgrade the building envelope, funding is not available for things like geothermal which would drastically reduce heating costs. The City Planner for the DMSM area only deals with development applications and review. They don't deal with the larger issues such as climate change, housing, poverty. It appears that this will not change anytime soon. Residents are often content to continue with things the way that they are. Only if they are interested in a particular project do they seem to participate. How can we change consumer behaviour?
Technology	Variety of energy sources, low-cost renewables, energy generation, solar, wind turbines, geothermal	Technology refers to the advances in recent years that contribute to the reduction of energy consumption. These include renewable energy technologies.	NA	Technology exists to reduce heating costs but they are not being utilized due to so many barriers.

## Appendix E: Group 3 Semi-Structured Interview Themes

Theme	Key Words	Definition	Appearance of Theme		
			Group 3 - Technical Experts		
			Entrepreneur	Engineer	Individual Renovator
<b>Accessibility to Information</b>	Knowledge or lack of knowledge, teaching, no information, no support	Residents need easy access to information regarding energy efficiency, conservation measures, and renewable energy technology. If it is too difficult to find the correct source, people continue as they are rather than spend more time looking for what they need.	NA	NA	There is a lack of knowledge infrastructure regarding sustainable retrofits for residents. It is difficult to find a contractor with the appropriate knowledge to perform the work. Or, if a contractor is willing to do the project, it may be their first time and will increase the costs. There is also a lack of knowledge at the City about greywater systems and composting toilets. Residents also need to be informed about the maintenance component of their retrofits. The house may be more air tight now, but in 5 years this may not be the case.
<b>Affordability</b>	Costs, upfront costs, credit	Affordability refers to the costs associated with energy retrofits and the ability of a household to pay for these retrofits. In many instances, energy retrofits are <i>not</i> affordable. Affordability, or lack of, is a specific type of barrier.	Energy retrofits not only benefit the current residents, but future residents as well which will increase the affordability. The upfront capital to perform energy retrofits is the biggest problem so we need to figure out a financing mechanism.	Lack of knowledge locally by the trades that make it difficult for the homeowner to obtain information and reliable installation of renewable energy projects.	Affordable sustainable retrofits are subject to many barriers. For renewable energy technology, part of the reason they are more expensive is because the infrastructure is not in place among tradespeople to install/maintain these systems. For example, there are a hundred companies that can install/maintain your furnace but for renewable energy there may be only 1 or 2.
<b>Barriers</b>	Tradespeople, small lot sizes, costs, high interest, program eligibility, time, rental properties, challenge	Barriers can take a variety of forms but they all prohibit a household from undertaking energy retrofits. The most common barrier is money as the upfront costs for retrofits cannot be met by low-income households. Eligibility criteria for programs can be a barrier.	MHs criteria for LIEEP eliminates households on social assistance. As a taxpayer, we are paying for their energy costs - why are we not performing energy retrofits to reduce these costs?	Union and labour problems are contributing to the lack of renewable energy installations.	It is a lot of work to improve the building envelope and to make the dwelling high-performing that the desire may not be there to pursue alternative sources of energy. Another barrier is the orientation of the houses - they all face east/west and the close proximity to neighbours and the small lot size make it more difficult to use different energy sources like geothermal.
<b>Capacity</b>	Municipalities have limited power, redesign, flexibility	Capacity refers to the skills an organization has to overcome adversity. Organizations need to be flexible and adaptive for greater success.	MGR increases their capacity through hiring tradespeople that can perform different tasks. The business itself formed because BUILD did not have the capacity to enter into a contract with the Mental Health Commission to perform 4 years of work. Therefore, MGR established the capacity to undertake this contract.	NA	The City does not have the capacity to permit homeowners to implement sustainable technologies. Current building codes are adequate for installing solar panels but not a greywater system or composting toilet unless it is a commercial use. If the City could adapt commercial codes to residential that would be helpful for homeowners.
<b>Choice</b>	Diversify, not available to certain sectors	Households need a choice of energy retrofits, a choice of knowledgeable contractors, a choice of program and a choice of energy.	BUILD targets households that regular contractors avoid.	NA	NA
<b>Community Development</b>	Skills training, community-based approach, reduction in crime	Community development refers to establishing programs and/or policies that are rooted in the community and are intended to benefit the local community. For example, the BUILD model follows a community-based approach to enhance community development.	There are two community-based programs - BUILD and BEEP. They purchase materials from local businesses. Community participation is also important. If a community can organize themselves low-income people would especially benefit.	NA	NA
<b>Consumer Behaviour</b>	Complacency, priorities, proactive low-cost solutions, simplify, complacency, lifestyle, work with my neighbour, community	Consumer behaviour refers to the actions of the individual. For many low-income households, energy efficiency is not a priority because day-to-day challenges such as paying rent or purchasing food take precedence. This also includes lifestyle. For example, do individuals turn off lights when they leave a room, or lower the thermostat during the night, etc. Consumer behaviour is a specific type of barrier.	It is difficult to establish neighbourhood hearing schemes that would reduce the cost per unit because you have to obtain consent from all affected property owners. A community needs to organize itself, everyone would benefit but especially low-income households.	Stated that we need to reduce demand for energy.	A consumer must be willing to be proactive and seek out the information they need and the contractors that will perform the work. This may be a long process and many people are not willing to make that much of a time commitment. Another component of consumer behaviour is lifestyle, such as landscaping with annual edibles or using the basement for cold storage. Sustainable retrofits are not a priority for many people. Some people can afford to pay their energy bill so they are not motivated to make changes.

## Appendix E Continued: Group 3 Semi-Structured Interview Themes

Theme	Key Words	Definition	Appearance of Theme		
			Group 3 - Technical Experts		
			Entrepreneur	Engineer	Individual Renovator
<b>Cost-effectiveness</b>	Pay-back, cost-benefit, pays for itself, low-cost heating	The initial cost of an energy retrofit can be expensive but over a period of time the savings in energy costs will exceed the initial cost. Depending on the action taken, the payback period can range from 2 to 15 years.	Everything has a payback period. We have the technology today to build carbon neutral houses but it appears to be expensive. Not the actual cost, but the interest that would be applied because the majority of people cannot pay cash for a house. As well, the payback period must be suitable to the resident. If they plan on moving, they are less likely to make improvements because they will not benefit. Windows are not cost-effective, insulation, high-efficiency furnaces and air-sealing are.	A district heat pump is very expensive but provides heating at a very low cost. Another way to improve cost-effectiveness is to improve the energy efficiency of multi-family dwellings such as apartment buildings.	Solar panels were probably not cost-effective but it was one of the priorities for this renovation. However, many simple and low-cost ideas were implemented. For example, cold storage in the basement, a summer kitchen fed by rainwater, and airsealing.
<b>Energy Efficiency</b>	Low-performing dwelling, old housing stock, high-efficiency furnace, weather stripping, insulation	This refers to the performance level of the dwelling. Older homes tend to be low-performing unless the insulation and heating systems have been upgraded. Energy efficiency measures are wide-ranging and can include, but is not limited to, weather stripping, high-efficiency furnaces, insulation, window replacement, CFLs, pipe and water	The best energy efficient measures are the most cost-effective. Air sealing, insulation and installing a high-efficiency furnace are the most effective measures to improve energy efficiency.	As part of the strategy to reduce demand, we can improve energy efficiency of dwellings. There is huge potential for increasing the efficiency of space heating. For low-income households, insulation is the lowest cost and best bet.	With older housing stock it is necessary to improve the building envelope prior to the installation of any alternative energy sources. 90% of the work happens to the building envelope, before you even think about alternative sources of energy. Airsealing, high-efficiency furnace, insulation and then maybe windows to squeeze out the last bits of energy efficiency.
<b>Funding</b>	Financing, capital, financing mechanisms, TIF, a surcharge on utility bills	This refers to the money required to pay or finance energy retrofits. Funding can come from many different sources and can either be in the form of a grant or loan.	Access to capital or low interest loans is a barrier. If you have the money, you can do almost anything. This is also related to cost-effectiveness. If you switch to a high-efficiency furnace money just appears and you can use this money to payback the loan. District heating schemes can be financed through the municipality. The municipality does this for other types of improvements, why not for energy efficiency?	NA	NA
<b>Green Projects</b>	Environment, green plans, energy mapping	Green projects are environmentally friendly initiatives that an organization is undertaking. These can include community gardens, car shares, GHG emissions reduction,	NA	NA	NA
<b>Interorganizational relationships</b>	Stakeholders, collaboration, working with different groups/communities	This refers to the relationships that currently exist between the five stakeholders interviewed.	With the City, because MB Green Retrofits was undertaking a large project, the City decided to not issue the necessary permits because they do not have adequate staff to perform the inspections. BUILD and MGR work with local residents and businesses.	NA	NA
<b>Organizational Roles</b>	City chosen not to participate, hassle, present administration, city's role, lack of federal involvement	The roles of the five different organizations interviewed, as well as the roles that they should have.	Energy retrofits should be able to be financed through the City. Residents should group together to install community-wide heating systems. MH needs to increase access to LIEEP by modifying their eligibility criteria.	NA	The City could provide guides and information about sustainable technologies such as composting toilets, like they do for garages.
<b>Low-income</b>	Social assistance, working people	Low-income refers to either an individual, household, neighbourhood or organization that does not have an adequate amount of money/funding to cover the costs	Because many working families are not eligible for MH's LIEEP, this person wanted to focus on the working people that are making a real effort and needed some help.	NA	NA
<b>Planning</b>	Large-scale problem, home-by-home approach, model, more work to be done, patience	To lessen energy poverty, planning is essential. Planning refers to establishing long-term policies and programs to target low-income households and revitalize inner-city neighbourhoods.	We need to plan programs to assist renters because most low-income people rent their homes.	We need to plan for low-cost renewables.	NA
<b>Progressive Policies</b>	Dynamic policies, creativity, legislation, mandate, role of government, renewable portfolio standard, improvements can be made, flexibility, integrated approach	Policies should not be static and frequently re-evaluated for effectiveness.	Progressive policies and regulations are needed because frequently policies are not up to date with current activities. There's an example in New Mexico where a developer was required to run hydro lines even though the houses were off the grid.	There are a lot of improvements that can be made to reduce energy consumption and to facilitate the transition to renewable energy generation.	NA

## Appendix E Continued: Group 3 Semi-Structured Interview Themes

Theme	Key Words	Definition	Appearance of Theme		
			Group 3 - Technical Experts		
			Entrepreneur	Engineer	Individual Renovator
<b>Status quo</b>	New normal, push the limits, fear of unknown, need a different approach, need to think big, lack of creativity	This refers to an organization that is content with continuing to operate as they have always operated and is reluctant to adopt more progressive or forward-thinking policies and programs. This has a negative affect on the most vulnerable parts of the population because they would benefit the most from change. This may also refer to individuals or organizations that want to change the status quo by pushing the limits or thinking big and undertake a different approach. The different approach may or may not work, but what we currently have in place is not working very well so by thinking big, there are many more opportunities to move forward.	Housing stock outlasts the household. It would make sense, as a community, to decide that our children should spend less and we can finance a heating scheme, such as geothermal. Improve the efficiency of the dwelling, then all the residents that follow will also benefit. Also, it would be highly beneficial to target apartment buildings. Changing the status quo by increasing the capacity of local residents is possible. It is risky but the benefits would be enormous.	NA	Wanted to "push the limits" and see how much could be accomplished. Part of the process was to also identify the barriers to completing affordable sustainable retrofits. We are so used to the building industry working one way that it is very difficult to see it another way. Consumers may also be reluctant to try new things because there are so many unknown variables.
<b>Technology</b>	Variety of energy sources, low-cost renewables, energy generation, solar, wind turbines, geothermal	Technology refers to the advances in recent years that contribute to the reduction of energy consumption. These include renewable energy technologies.	We have the technology to heat homes using renewable energy. The barrier is not the technology but obtaining the upfront capital to pay for it.	To help reduce demand, some energy generation is also necessary. Best technologies for energy generation are solar walls, biomass and solar thermal air.	There are building code issues with implementing new technology at the residential level.



## Appendix F: Group 4 Semi-Structured Interview Themes

Theme	Key Words	Definition	Appearance of Theme
			Group 4 - BUILD
Accessibility to Information	Knowledge or lack of knowledge, teaching, no information, no support	Residents need easy access to information regarding energy efficiency, conservation measures, and renewable energy technology. If it is too difficult to find the correct source, people continue as they are rather than spend more time looking for what they need.	NA
Affordability	Costs, upfront costs, credit	Affordability refers to the costs associated with energy retrofits and the ability of a household to pay for these retrofits. In many instances, energy retrofits are <i>not</i> affordable. Affordability, or lack of, is a specific type of barrier.	The upfront costs for energy retrofits is too much for low-income households and prevents households from performing these measures.
Barriers	Tradespeople, small lot sizes, costs, high interest, program eligibility, time, rental properties, challenge	Barriers can take a variety of forms but they all prohibit a household from undertaking energy retrofits. The most common barrier is money as the upfront costs for retrofits cannot be met by low-income households. Eligibility criteria for programs can be a barrier.	Manitoba Hydro was commonly referred to as a barrier. It was stressed that the main reason MH does not like renewable energy is because they prefer dispatchable power. Using renewable energy would require an extra step for the utility to deliver the power. Transiency of the rental population is also a barrier.
Capacity	Municipalities have limited power, redesign, flexibility	Capacity refers to the skills an organization has to overcome adversity. Organizations need to be flexible and adaptive for greater success.	NA
Choice	Diversify, not available to certain sectors	Households need a choice of energy retrofits, a choice of knowledgeable contractors, a choice of program and a choice of energy.	In relation to BUILD, individuals need a choice between criminal activity and work. Hard-to-employ people have no choices but BUILD provides them a choice.
Community Development	Skills training, community-based approach, reduction in crime	Community development refers to establishing programs and/or policies that are rooted in the community and are intended to benefit the local community. For example, the BUILD model follows a community-based approach to enhance community development.	The BUILD program is a community development model that targets inner-city neighbourhoods. They work closely with members of the community in a number of different ways. They provide skills training to local residents, support local businesses, reduce crime by employing hard-to-employ individuals. BUILD is a cycle breaking process that can provide inspiration to other persons in the community. Other organizations can also be established around this model. TIF financing for a district heating system would also promote community development.
Consumer Behaviour	Complacency, priorities, proactive, low-cost solutions, simplify, complacency, lifestyle, work with my neighbour, community	Consumer behaviour refers to the actions of the individual. For many low-income households, energy efficiency is not a priority because day-to-day challenges such as paying rent or purchasing food take precedence. This also includes lifestyle. For example, do individuals turn off lights when they leave a room, or lower the thermostat during the night, etc. Consumer behaviour is a specific type of barrier.	Referred to transiency of rental population and the day-to-day challenges that supercede the importance of insulating the attic.
Cost-effectiveness	Pay-back, cost-benefit, pays for itself, low-cost heating	The initial cost of an energy retrofit can be expensive but over a period of time the savings in energy costs will exceed the initial cost. Depending on the action taken, the payback period can range from 2 to 15 years.	The transiency of the rental and low-income population is an issue because for an energy retrofit to be cost-effective the residents must remain in the same dwelling for a number of years. Certain types of energy retrofits are more cost-effective than others.
Energy Efficiency	Low-performing dwelling, old housing stock, high-efficiency furnace, weather stripping, insulation	This refers to the performance level of the dwelling. Older homes tend to be low-performing unless the insulation and heating systems have been upgraded. Energy efficiency measures are wide-ranging and can include, but is not limited to, weather stripping, high-efficiency furnaces, insulation, window replacement, CFLs, pipe and water heater wrap, etc.	BUILD increases the energy efficiency of dwellings for low-income households. They have retrofitted private dwellings as well as Manitoba housing and Aboriginal housing. Typical measures they undertake are insulating the basement, attic and exterior walls. Believes that our natural gas consumption is already falling because of the provincial government's regulation for high-efficiency furnaces and MH's incentives.
Funding	Financing, capital, financing mechanisms, TIF, a surcharge on utility bills	This refers to the money required to pay or finance energy retrofits. Funding can come from many different sources and can either be in the form of a grant or loan.	One option for funding low-income energy efficiency would be a surcharge on utility rates. One of the most important things the City could do is provide financing for cost-effective energy retrofits, such as a TIF or adding a charge to the property taxes. This is beneficial because the cost of the improvement stays with the dwelling, unlike the MH loan that must be paid if the owner sells the home. Community wide initiatives such as district heating can be funded through TIF. A community wide approach will also reduce the per unit cost. Financing retrofits to reduce and/or using alternative energy instead of natural gas would have the greatest benefits.
Green Projects	Environment, green plans, energy mapping	Green projects are environmentally friendly initiatives that an organization is undertaking. These can include community gardens, car shares, GHG emissions reduction, etc.	NA

## Appendix F Continued: Group 4 Semi-Structured Interview Themes

Theme	Key Words	Definition	Appearance of Theme
			Group 4 - BUILD
<b>Interorganizational relationships</b>	Stakeholders, collaboration, working with different groups/communities	This refers to the relationships that currently exist between the five stakeholders interviewed.	BUILD works closely with community associations. The City does not fund or seem to support BUILD.
<b>Organizational Roles</b>	City chosen not to participate, hassle, present administration, city's role, lack of federal involvement	The roles of the five different organizations interviewed, as well as the roles that they should have.	The City has chosen not to participate. First step, they have to care about low-income families and the present administration does not. Next, the key municipal lever is TIF. It is already done with sidewalks, sewers, why not energy retrofits? The federal government is not involved in housing either, or energy efficiency. Their cancellation of the ecoENERGY program can be viewed as either very ignorant or very vicious. The provincial government needs to set targets.
<b>Low-income</b>	Social assistance, working people	Low-income refers to either an individual, household, neighbourhood or organization that does not have an adequate amount of money/funding to cover the costs of necessities.	Low-income energy efficiency needs to be on the federal and municipal political agendas. Low-income energy efficiency programs have a large societal payback.
<b>Planning</b>	Large-scale problem, home-by-home approach, model, more work to be done, patience	To lessen energy poverty, planning is essential. Planning refers to establishing long-term policies and programs to target low-income households and revitalize inner-city neighbourhoods.	There are 80,000 homes outside of public housing that are in need of energy retrofits. A plan is required to tackle such a large-scale problem that varies from one dwelling to the next.
<b>Progressive Policies</b>	Dynamic policies, creativity, legislation, mandate, role of government, renewable portfolio standard, improvements can be made, flexibility, integrated approach	Policies should not be static and frequently re-evaluated for effectiveness.	Recommends legislation that mandates Manitoba Hydro to insulate 50% of the 80,000 homes in the next 10 years, and that 25% of this work should be done by community groups. Also recommended that the City employ a similar model to BUILD for contracting out services.
<b>Status quo</b>	New normal, push the limits, fear of unknown, need a different approach, need to think big, lack of creativity	This refers to an organization that is content with continuing to operate as they have always operated and is reluctant to adopt more progressive or forward-thinking policies and programs. This has a negative affect on the most vulnerable parts of the population because they would benefit the most from change. This may also refer to individuals or organizations that want to change the status quo by pushing the limits or thinking big and undertake a different approach. The different approach may or may not work, but what we currently have in place is not working very well so by thinking big, there are many more opportunities to move forward.	The Province, Manitoba Hydro and other organizations need to take a different approach if they are serious about reducing energy poverty. Money needs to be spent where it will have the most significant impact. You need to "think big" and look at things in a different way. Also, there are significant gaps in the eligibility requirements for LIEEP and many households that would benefit greatly from the program are missed.
<b>Technology</b>	Variety of energy sources, low-cost renewables, energy generation, solar, wind turbines, geothermal	Technology refers to the advances in recent years that contribute to the reduction of energy consumption. These include renewable energy technologies.	We have the technology to use renewable energy. Builders, for minimal cost, can future proof a house so a homeowner can easily install renewable energy measures in the future when the initial costs come down. Also, renewable energy projects are a lot quicker to develop than traditional forms of energy.

## Appendix G: Group 5 Semi-Structured Interview Themes

Theme	Key Words	Definition	Appearance of Theme
			Group 5 - Hydro
Accessibility to Information	Knowledge or lack of knowledge, teaching, no information, no support	Residents need easy access to information regarding energy efficiency, conservation measures, and renewable energy technology. If it is too difficult to find the correct source, people continue as they are rather than spend more time looking for what they need.	MH targets specific communities through direct mail inserts, advertising in local papers and establishing connections with community organizations. However, it is difficult to increase uptake in LIEEP and part of the problem is people having access to the necessary information. Again, language and different priorities are factors.
Affordability	Costs, upfront costs, credit	Affordability refers to the costs associated with energy retrofits and the ability of a household to pay for these retrofits. In many instances, energy retrofits are <i>not</i> affordable. Affordability, or lack of, is a specific type of barrier.	MH will cover the upfront costs of insulation and labour for eligible households. However, the resident has to initiate the process and be aware of this program.
Barriers	Tradespeople, small lot sizes, costs, high interest, program eligibility, time, rental properties, challenge	Barriers can take a variety of forms but they all prohibit a household from undertaking energy retrofits. The most common barrier is money as the upfront costs for retrofits cannot be met by low-income households. Eligibility criteria for programs can be a barrier.	MH is having difficulty extending LIEEP to include rental properties. The tenant needs to be protected. MH also has difficulty reaching their target households because the households they are trying to reach have different priorities. Also, to insulate a home is highly disruptive to a household and if there are structural problems, those need to be repaired before MH can insulate. MH has to overcome barriers to implement their program but they also create their own barriers including: eligibility requirements; only targeting homeowners; requirements of their loan program; small number of dwellings retrofitted to date.
Capacity	Municipalities have limited power, redesign, flexibility	Capacity refers to the skills an organization has to overcome adversity. Organizations need to be flexible and adaptive for greater success.	Since LIEEP was implemented in 2007, MH has had to redesign the program to increase uptake. LIEEP is reviewed regularly and adapted accordingly. Also, LIEEP is a house-by-house approach and this flexibility is essential to deliver the best energy retrofits to the consumer. If a component of LIEEP is not effective, MH has the ability to change it. Capacity has increased as MH builds the infrastructure around the program.
Choice	Diversify, not available to certain sectors	Households need a choice of energy retrofits, a choice of knowledgeable contractors, a choice of program and a choice of energy.	NA
Community Development	Skills training, community-based approach, reduction in crime	Community development refers to establishing programs and/or policies that are rooted in the community and are intended to benefit the local community. For example, the BUILD model follows a community-based approach to enhance community development.	The key to LIEEP is working closely with the community. If you don't have community buy-in or community involvement then it is difficult to establish trust between the two parties. Trust is important when delivering a low-income program. For LIEEP to be effective, MH needs support from community organizations.
Consumer Behaviour	Complacency, priorities, proactive, low-cost solutions, simplify, complacency, lifestyle, work with my neighbour, community	Consumer behaviour refers to the actions of the individual. For many low-income households, energy efficiency is not a priority because day-to-day challenges such as paying rent or purchasing food take precedence. This also includes lifestyle. For example, do individuals turn off lights when they leave a room, or lower the thermostat during the night, etc. Consumer behaviour is a specific type of barrier.	Consumer behaviour is a huge component. Energy bills are going down but it is difficult to assess exactly how much energy bills decrease because of the wide variation in consumer behaviour and household size. The other factor is finding what works for people. This is the most difficult because even though MH is providing free upgrades, people have different priorities. There are also language issues. The customer has to be willing to participate and if they are, MH will try to make it an easy process.
Cost-effectiveness	Pay-back, cost-benefit, pays for itself, low-cost heating	The initial cost of an energy retrofit can be expensive but over a period of time the savings in energy costs will exceed the initial cost. Depending on the action taken, the payback period can range from 2 to 15 years.	The furnace replacement program is cost-effective. The homeowner pays \$19 monthly but the cost savings is greater, therefore this is a cost-effective upgrade.
Energy Efficiency	Low-performing dwelling, old housing stock, high-efficiency furnace, weather stripping, insulation	This refers to the performance level of the dwelling. Older homes tend to be low-performing unless the insulation and heating systems have been upgraded. Energy efficiency measures are wide-ranging and can include, but is not limited to, weather stripping, high-efficiency furnaces, insulation, window replacement, CFLs, pipe and water heater wrap, etc.	Insulation upgrades will reduce energy bills by an average of \$250 per year. Installation of a high-efficiency furnace will reduce bills by an average of \$300 per year. Other benefits include increase in home comfort, more discretionary income, increased living space.
Funding	Financing, capital, financing mechanisms, TIF, a surcharge on utility bills	This refers to the money required to pay or finance energy retrofits. Funding can come from many different sources and can either be in the form of a grant or loan.	Money is leveraged from the federal enerGUIDE program and Manitoba Hydro's PowerSmart program to offset the cost of LIEEP. During the year that the enerGUIDE program was cancelled MH continued LIEEP and footed the extra costs. There is not enough money to energy retrofit all 80,000 dwellings.
Green Projects	Environment, green plans, energy mapping	Green projects are environmentally friendly initiatives that an organization is undertaking. These can include community gardens, car shares, GHG emissions reduction, etc.	NA

## Appendix G Continued: Group 5 Semi-Structured Interview Themes

Theme	Key Words	Definition	Appearance of Theme
			Group 5 - Hydro
<b>Interorganizational relationships</b>	Stakeholders, collaboration, working with different groups/communities	This refers to the relationships that currently exist between the five stakeholders interviewed.	MH works with many organizations to implement LIEEP. Some of them include: Manitoba Housing, RRAP, West Broadway, Spence and CNBC. There are many avenues /connections that have been and still need to be established. MH looks to other organizations for ideas including Winnipeg Harvest, Social Planning Network, etc.
<b>Organizational Roles</b>	City chosen not to participate, hassle, present administration, city's role, lack of federal involvement	The roles of the five different organizations interviewed, as well as the roles that they should have.	MH is the organization in Manitoba that delivers LIEEP and essentially all other energy efficiency programs such as BUILD are provided support from MH. The province cannot mandate the number of homes that should be retrofitted.
<b>Low-income</b>	Social assistance, working people	Low-income refers to either an individual, household, neighbourhood or organization that does not have an adequate amount of money/funding to cover the costs of necessities.	To qualify for LIEEP, the household income must be 125% of LICO or less. As well, if you are on social assistance or rent your home you are not eligible.
<b>Planning</b>	Large-scale problem, home-by-home approach, model, more work to be done, patience	To lessen energy poverty, planning is essential. Planning refers to establishing long-term policies and programs to target low-income households and revitalize inner-city neighbourhoods.	Planning to eliminate energy poverty is a slow, difficult process. MH requires patience and perseverance to try to reach their target households. Also, they take a house-by-house approach to provide the best plan for each household.
<b>Progressive Policies</b>	Dynamic policies, creativity, legislation, mandate, role of government, renewable portfolio standard, improvements can be made, flexibility, integrated approach	Policies should not be static and frequently re-evaluated for effectiveness.	An advantage that MH has is flexibility. They can change the program if they are not achieving the results they want. The PUB secures some money from natural gas revenue to fund the high-efficiency furnace program.
<b>Status quo</b>	New normal, push the limits, fear of unknown, need a different approach, need to think big, lack of creativity	This refers to an organization that is content with continuing to operate as they have always operated and is reluctant to adopt more progressive or forward-thinking policies and programs. This has a negative affect on the most vulnerable parts of the population because they would benefit the most from change. This may also refer to individuals or organizations that want to change the status quo by pushing the limits or thinking big and undertake a different approach. The different approach may or may not work, but what we currently have in place is not working very well so by thinking big, there are many more opportunities to move forward.	MH has to work within the confines of the existing infrastructure in Canada. The US has a different system that makes it easier for them to obtain customers. This means that obtaining customers for MH is slow and steady. Also, MH states that the majority of low-income households live in apartment buildings and MH does not have the authority as a utility to force management to improve the energy efficiency.
<b>Technology</b>	Variety of energy sources, low-cost renewables, energy generation, solar, wind turbines, geothermal	Technology refers to the advances in recent years that contribute to the reduction of energy consumption. These include renewable energy technologies.	LIEEP will increase insulation, install high-efficiency furnaces but does not include installing renewable energy systems.

## Appendix H: Advantages and Disadvantages of Renewable Energy

Renewable Energy Source	Description	Benefits of:		Disadvantages of:	
		Large Scale Renewables	Micro-Renewables	Large Scale Renewables	Micro-Renewables
<b>Biomass</b>	Can come from so many sources such as wood, woodchips, paper, trash, agricultural crops, animal waste, manure, sewage, hemp and algae.		There is a wide variety of choices and prices for the consumer.	Requires a great deal of space. Water can also be a problem as it would require large quantities to handle the recycling process for waste materials.	Direct burning of biomass as fuel can release carbon dioxide and other greenhouse gases into the atmosphere at an accelerated rate.
<b>Geothermal</b>	A refrigerant fluid carries the Earth's heat above-ground through a looped pipes system that sits underground. This refrigerant fluid absorbs heat when expanded and so serves as a packing horse for heat.	District heating makes use of the cost advantages of using a single boiler installation to provide heat to a number of buildings.	At the smaller scale geothermal will also greatly reduce heating costs. After the initial start up costs, they are very inexpensive to run.	In an existing neighbourhood would be very difficult to implement because it would require a major and expensive overhaul to the existing infrastructure. Additionally, the residents in the affected area would have to agree to the cost and installation of the district heating system.	The main objection to installing geothermal heat pumps is its installation cost. This can range from \$10,000 to \$30,000 depending on dwelling.
<b>Solar</b>	Solar energy can be used to generate electricity and heat water.		Solar energy is free. Passive solar heating can be fairly inexpensive and includes things like planting trees, window coverings. Other solar energy technologies that would work well in Manitoba are solar water heaters and solar walls.	It is very expensive to build solar power stations, although the cost is coming down as technology improves.	In Manitoba electricity is inexpensive. The installation of some solar energy technologies would be cost prohibitive. Solar walls are relatively inexpensive but in DMSM would not work very well due to the close proximity of the houses and the east/west orientation of the dwellings.
<b>Hydro Power</b>	Electric power is produced by converting potential energy stored in water held at height to turn a turbine that then produces electricity.	Traditionally, hydro power is transmitted from remote areas to provide energy to a number of regions. The costs of building hydro power generation plants are much cheaper than building nuclear power plants.	Small hydro plants have a useful life of more than fifty years and are quite cost-effective and suited to remote communities which have a good hydro source.	To be efficient, hydro power generation plants need a reservoir, and this may result in many acres of land being flooded. This can mean the removal of homes and people, plus the relocation of entire species that inhabit the area.	The potential for micro-renewable hydro power is highly dependent on the location of a water source. In DMSM, this would not be feasible. Other forms of renewable energy would be more practical and cost-effective.
<b>Wind</b>	The energy contained in wind is converted into electric energy. The wind is caught by blades that spin as a result.	Large turbines are installed in <i>wind farms</i> or <i>wind power plants</i> . Wind farms can generate electricity that could be used locally.	The smaller wind turbines have a direct current output and can drive small household appliances.	Wind is variable and for a steady supply of electricity an additional source of energy would be required because it is difficult to store wind power energy and a large physical space is needed.	Urban wind turbines are relatively rare because it is difficult to access enough wind power because of existing buildings, trees.
These types of renewable energy sources would be the most suitable for lower income, established neighborhoods.					

## Appendix I: Policies and Programs in Canada

Region	Name of Initiative	Date of Implementation	Type of Initiative	Lead Organization	Source of Funding	Target Population
Canada	Homeowner Residential Rehabilitation Assistance Program	1974	Energy Efficiency	Canada Mortgage and Housing Corporation (CMHC)	Federal Government	Low-Income Households
Canada	Office of Energy Efficiency (OEE)	1998	Policy, Education	Office of Energy Efficiency	Federal Government	All Households
Canada	Affordable Energy Canada	2001	Advocacy Organization, Research and Development	Green Communities Canada	Private Donations, Government	Low-Income Households
Canada	ecoENERGY Retrofit	2007 to 2010, 2011 to 2012	Energy Efficiency, Energy Audit	Federal Government, Provincial Government, Utilities	Federal Government	All Households
British Columbia	Utilities Commission Act	2008	Legislation	Provincial Government	The utility	Low-Income Households
British Columbia	LiveSmart BC Low-Income Program (LSIP) (pilot project)	2008 to 2009	Energy Efficiency, Energy Audit	Provincial Government	Provincial Government	Low-Income Households
British Columbia	Energy Conservation Assistance Program (ECAP)	2009	Energy Efficiency, Energy Audit, Education	The utility	The utility	Low-Income Households
British Columbia	Energy Saving Kits for Low-Income Households	2009	Energy Efficiency	The utility	The utility	Low-Income Households
British Columbia	Partnership for Energy Efficiency and Conservation	2010	Policy	Provincial Government	Provincial Government	Government, Utilities, Crown Agencies
Alberta	CO2RE: Edmonton's Greenhouse Gas Reduction and Energy Strategy	2004	Energy Efficiency, Education, Financing Mechanism	CO2RE	Federal Government, Provincial Government, Municipal Government	All Households
Saskatchewan	Saskatoon Housing Initiatives Partnership	1999	Advocacy Organization, Research and Development, Education	Saskatoon Housing Initiatives Partnership	Public and Private Funding	Low-Income Households; Housing Providers
Saskatchewan	Saskatchewan Home Energy Improvement Program (SHEIP)	2006	Financing Mechanism	Department of Social Services	Provincial Government	Low and Moderate-Income Households
Saskatchewan	Share the Warmth Home Energy Efficiency Project	2006	Energy Efficiency	Salvation Army	The utility	Low-Income Households
Saskatchewan	Encouraging Community Housing (ECHO) Program	-	Financing Mechanism	Department of Social Services	Provincial Government	Non-profit organizations, private corporations, First Nations co-operatives, municipalities
Manitoba	Warm Up Winnipeg	2006	Energy Efficiency, Skills Training	Building Urban Industries for Local Development (BUILD)	Manitoba Hydro, Provincial Government	Low-Income Households
Manitoba	Brandon Energy Efficiency Program (BEEP)	2007	Energy Efficiency, Skills Training	Brandon Neighbourhood Renewal Corporation (BNRC)	Manitoba Hydro, Provincial Government	Low-Income Households
Manitoba	Winter Heating Cost Control Act	2006	Legislation	Provincial Government	Manitoba Hydro	All Households
Manitoba	Affordable Energy Fund	2005	Energy Efficiency, Research and Development	Provincial Government	Manitoba Hydro	Low-Income Households
Manitoba	Neighbours Helping Neighbours	-	Emergency Charitable Assistance	Salvation Army	The utility, private donations	Low-Income Households
Manitoba	Manitoba Hydro's Lower Income Energy Efficiency Program	2007	Energy Efficiency, Energy Audit	The utility	The utility, Federal Government	Low-Income Households
Manitoba	Manitoba Hydro's Furnace Replacement Program	2007	Energy Efficiency	The utility	The utility, Federal Government	Low-Income Households

## Appendix I Continued: Policies and Programs in Canada

Region	Name of Initiative	Date of Implementation	Type of Initiative	Lead Organization	Source of Funding	Target Population
Ontario	Efficient Sudbury	-	Education	Municipal Government	Municipal Government	All Households
Ontario	Electric Thermal Storage Heating Program	-	Financing Mechanism	The utility	The utility	All Households
Ontario	Feed-in Tariff (FIT) Program	2009	Energy Transition	Ontario Power Authority	Ontario Power Authority	All Households
Ontario	Fridge and Freezer Pickup	-	Energy Efficiency, Education	The utility	The utility	All Households
Ontario	Golden Age Service	-	Payment Assistance	The utility	The utility	Senior Households
Ontario	Greater Sudbury's Energy Meter Loan Program	-	Education	The utility	The utility	All Households
Ontario	Guelph's Community Energy Plan	-	Policy	Municipal Government	Municipal Government	All Households
Ontario	Helping Homes Conserve	2007	Energy Efficiency	The utility	The utility	Low-Income Households
Ontario	Home Energy Assistance Toronto (HEAT)	-	Energy Efficiency, Financing Mechanism	Municipal Government	Municipal Government	All Households
Ontario	Home Energy Savings Program (HESP)	-	Energy Audit, Energy Efficiency	Provincial Government	Provincial Government	All Households
Ontario	Kingston's Energy Meter Loan Program	-	Education	Municipal Government	Municipal Government	All Households
Ontario	Peaksaver	-	Education	The utility	Provincial Government	All Households
Ontario	Power Pledge	-	Education	The utility	Ontario Power Authority	All Households
Ontario	powerWISE	-	Education	The utility	Provincial Government, Ontario Power Authority, the utilities	All Households
Ontario	Residential Programmable Thermostats	-	Education	The utility	The utility	All Households
Ontario	RETScreen International - Clean Energy Support Centre	-	Education, Research and Development	Federal Government	Provincial Government	Planners, government, the industry
Ontario	Toronto Atmospheric Fund (TAF)	-	Energy Efficiency	TAF	Municipal Government	Non-profit organizations, City departments
Ontario	Low-Income Energy Network	-	Advocacy Organization, Research and Development, Education	LIEN	-	Government, Utilities, Non-profit Organizations
Ontario	Provincial Emergency Energy Fund	-	Emergency Charitable Assistance, Payment Assistance	Municipal Government	Provincial Government	Low-Income Households
Ontario	Winter Warmth Fund	-	Emergency Charitable Assistance	United Way	The utility	Low-Income Households
Ontario	The Heat and Warmth Program (THAW) - London Hydro, Share the Warmth; Fund for Utility Service Emergencies - Peterborough Utilities Services; Heat Bank - Waterloo Region	-	Emergency Charitable Assistance	Local Community Agencies	The utilities	Low-Income Households
Ontario	Keep the Heat	-	Emergency Charitable Assistance, Education	Local Community Agencies	Municipal Government	Low-Income Households
Ontario	Community Start-Up and Maintenance Benefit (CSUMB)	-	Emergency Charitable Assistance	Provincial Government	Provincial Government	Low-Income Households
Ontario	Shelter Fund	-	Emergency Charitable Assistance	Municipal Government	Municipal Government	Low-Income Households with Minors

## Appendix I Continued: Policies and Programs in Canada

Region	Name of Initiative	Date of Implementation	Type of Initiative	Lead Organization	Source of Funding	Target Population
Ontario	Hamilton Utilities Arrears Program	-	Emergency Charitable Assistance	Municipal Government	Municipal Government	Low-Income Households
Ontario	Housing Emergency Loan Program (HELP)	-	Emergency Charitable Assistance	Local social agency	Municipal Government, Private Donations, Community Donations, Loan Repayment	Low-Income Households
Ontario	Enbridge Gas Distribution Enhanced TAPS Program	-	Energy Audit, Energy Efficiency	United Way	The utility	Low-Income Households
Ontario	Enbridge Low-Income Home Weatherization Retrofit Program	-	Energy Efficiency	Not-for-profit Organizations	The utility	Low-Income Households
Ontario	Energy Greenboxes through Food Banks	2007	Energy Efficiency, Education	Friends of the Earth Canada	The utilities	Low-Income Households that utilize food banks
Ontario	Discretionary Benefit to Cover Energy Conservation Measures	-	Financing Mechanism	Ministry of Community and Social Services	Provincial Government	Low-Income Households
Ontario	Ottawa's PowerPlay Program	2005	Energy Audit, Energy Efficiency, Education	The municipality and not-for-profit agency	The utility and municipality	All Households
Ontario	Green Light on a Better Environment (GLOBE)	2008	Energy Efficiency, Education, Energy Audits, Skills Training	Social Housing Services Corporation, Provincial Government, Municipal Government	SHCP	Low-Income Households in Social Housing
Ontario	saveONenergy	-	Energy Efficiency, Education	The utility	Ontario Power Authority	All Households
Ontario	Ontario Energy Board (OEB)	2006	Legislation	The utility, OEB	The utility	Low-Income Households
Ontario	Green Energy Act	2009	Legislation	Provincial Government	Provincial Government	All Households
Ontario	Energy Saving Kit	-	Energy Efficiency	The utility	The utility	All Households
Quebec	Agence de l'efficacité énergétique Community Program	-	Energy Efficiency, Energy Audit	The utility	The utility, Provincial Government	All Households
Quebec	Econologis	2004	Energy Efficiency, Energy Audit, Education	Equiterre	The utility, Provincial Government	Low-Income Households
New Brunswick	Energy Efficiency Retrofit Program for Low-income Households	-	Energy Efficiency	The province	The province	Low-Income Households
New Brunswick	Vibrant Communities of Saint John (VCSJ)	2005	Advocacy Organization, Policy, Education	Vibrant Communities of Saint John	The utility	Low-Income Households
Prince Edward Island	PEI ecoENERGY Audit Assistance for Low-Income Households Program	-	Energy Audit	The utility	The utility, Provincial Government	Low-Income Households
Prince Edward Island	PEI Working Group for a Livable Income	-	Advocacy Organization	Not-for-profit Organization	Not-for-profit Organization	Low-Income Households, Government
Nova Scotia	Affordable Energy Coalition	-	Advocacy Organization	Not-for-profit Organization	Not-for-profit Organization	Government, Low-Income Households
Nova Scotia	Low-Income Homeowner Program	2011	Energy Efficiency, Energy Audit	Provincial Government	Provincial Government	Low-Income Households
Nova Scotia	Efficiency Nova Scotia	2009	Energy Efficiency, Education	ENS	Provincial Government	All Households, Businesses
Newfoundland	Home Heating Rebate Program	2003	Energy Efficiency	Provincial Government	Provincial Government	Low-Income Households
Newfoundland	Residential Energy Efficiency Program for Low-Income Households (REEP)	2007	Energy Efficiency, Energy Audit	Provincial Government	Provincial Government	Low-Income Households
Newfoundland	EnerGuide for Houses	2007	Energy Efficiency, Energy Audit	Provincial Government	Provincial Government	All Households
Yukon	Pioneer Utility Grant	-	Payment Assistance	The utility	The utility	Senior Low-Income Households



## Appendix J: Policies and Programs in the United Kingdom

Region	Name of Initiative	Date of Implementation	Type of Initiative	Lead Organization	Source of Funding	Target Population
United Kingdom	Fuel Direct	1976	Payment Assistance	Government	Government	Low-Income Households with Seniors, Minors or Disabled Persons
United Kingdom	Neighbourhood Energy Actions (NEA)	1981	Energy Efficiency, Research and Development	NEA	Government, the Utilities	Low-Income Households with Seniors, Minors or Disabled Persons
United Kingdom	Cold Weather Payments	1986	Payment Assistance	Government	Government	Low-Income Households
United Kingdom	Eaga Partnership Charitable Trust	1993	Research and Development	The Utility Board of Trustees	The utility	Organizations, Individual Research Consultants
United Kingdom	Home Energy Conservation Act 1995 (HECA)	1995	Legislation	National Government	Government	Local Government (Local Housing Authorities)
United Kingdom	Value Added Tax (VAT) Reduction	1997	Payment Assistance	National Government	Government	All households
United Kingdom	Winter Fuel Payments	1997	Payment Assistance	National Government	Government	Senior Low-Income Households
United Kingdom	Climate Change Programme (to be replaced by the Warm Homes, Greener Living Strategy in 2013)	2000	Policy	National Government	Government	All households
United Kingdom	Warm Front	2000; Ending in 2013 in England; Scotland, Wales and Northern Ireland are continuing with their respective schemes	Energy Efficiency	Department of Energy and Climate Change	Government	Low-Income Households with Seniors, Minors or Disabled Persons
United Kingdom	Consumer Focus (formerly known as Energywatch)	2000	Advocacy Organization	Government	Government	All households (with a focus on vulnerable households)
United Kingdom	Energy Saving Trust	2000	Education, Research and Development	DEFRA	Government	All households
United Kingdom	Energy Efficiency Partnership for Homes	2000	Advocacy Organization	Government	Government	Government, Public Sector, Private Sector and Voluntary Sector
United Kingdom	UK Fuel Poverty Strategy	2000	Policy	National Government	Government	Governments of England and Wales; and Governments of Scotland and Northern Ireland although not legally obligated to follow this specific strategy
United Kingdom	Warm Homes and Energy Conservation Act	2001	Legislation	Government	Government	Governments of England and Wales
United Kingdom	Energy Efficient Commitment (EEC)	2001	Energy Efficiency	Government	Government	All households
United Kingdom	Energy Efficiency Advice Centres (EEACs)	2001	Education	Local Non-Profit Agency	Government	All households
United Kingdom	Warm Zones	2001	Energy Efficiency, Education, Payment Assistance	Government	Government	Households in the "Warm Zones"
United Kingdom	National Energy Action (available in England, Wales and Northern Ireland)	2003	Advocacy Organization, Research and Development, Education	NEA	Private Sector, Government	Government, Utilities, Housing Providers and Health Services, Consumer Organizations, Low-Income Households
United Kingdom	Carbon Emissions Reduction Target (CERT) (replaces the Energy Efficiency Commitment program)	2008	Energy Efficiency	The utilities	The utilities	All households (with a focus on low-income households)
United Kingdom	Social Tariffs	2008	Payment Assistance	The utilities	The utilities	Low-Income Households with Seniors, Minors or Disabled Persons
United Kingdom	Affordable Warmth Solutions	2009	Energy Efficiency, Education	Community Interest Company (CIC)	The utility	Low-Income Households
United Kingdom	Community Energy Saving Programme (CESP)	2009	Energy Efficiency	The utilities, Local Authorities, Community Groups	The utilities	Low-Income Households
United Kingdom	Smart Meters	2009	Education	The utilities	The utilities	All households
United Kingdom	Energy Rebate Scheme	2010	Payment Assistance	Government	Government	Senior Low-Income Households
United Kingdom	Warm Homes, Greener Homes Strategy	2013	Policy	Government	The utilities, Financing Mechanism	All households
United Kingdom	Energy Company Obligation (ECO) (to replace the current CERT program)	2013	Energy Efficiency	The utility	Government	All households
United Kingdom	Pay As You Save	2013	Financing Mechanism	Financial Institutions	Private Sector	Majority of households
United Kingdom	Consumer Support	2013	Education, Energy Audit	Government	Government	All households

## Appendix J Continued: Policies and Programs in the United Kingdom

Region	Name of Initiative	Date of Implementation	Type of Initiative	Lead Organization	Source of Funding	Target Population
England	Fuel Poverty Advisory Group	2000	Advisory Group, Policy	Government	Government	Government
England	Community Energy Plus	2000	Energy Efficiency, Education	Community Energy Plus	Community Energy Plus, the utility	Low-Income Households
England	Decent Homes Assistance Grants	2000	Energy Efficiency	Local Authorities	Government	Low-Income Households with Seniors, Minors or Disabled Persons
England	mpower Health Through Warmth (HTW)	2000	Energy Efficiency, Education	The utility	The utility	Vulnerable people whose health is affected by cold, damp living conditions
England	British Gas 'here to HELP' programme	2002	Energy Efficiency	The utility, local charities	The utility	Low-Income Households with Seniors, Minors or Disabled Persons
England	Home Heat Helpline	2005	Education	Energy Retail Association	The utilities	Low-Income Households with Seniors, Minors or Disabled Persons
Scotland	Heatwise (aka The Wise Group)	1983	Energy Efficiency, Research and Development	Heatwise	European Social Fund, Glasgow Development Agency, UK Department of the Environment	Low-Income Households with Seniors, Minors or Disabled Persons
Scotland	Scottish Community and Householder Renewables Initiative (SCHRI)	2003	Energy Efficiency, Education	Scottish Government	Scottish Executive	All Households, Communities
Scotland	Dundee Sun City Project	2008	Education, Energy Efficiency	SCARF	Scottish Executive, Dundee City Council, SCARF	All Households
Scotland	Scottish Power Energy People Trust	2009	Energy Efficiency, Education	Non-Profit Organization	The utility	Non-Profit Organizations
Scotland	SGN Assisted Connections	-	Payment Assistance	The utility	The utility	Low-Income Households
Scotland	Energy Assistance Package (replaced the previous programs known as Warm Deal, the Central Heating Programme)	-	Energy Efficiency, Education, Payment Assistance	Energy Saving Trust	Government	All households
Scotland	Energy Action Scotland	-	Advocacy Organization	EAS	Private Donations	Low-Income Households
Scotland	Changeworks	-	Education, Energy Efficiency, Advocacy Organization	-	-	All households, Businesses
Scotland	Cosy Kids, Warm and Well, Warmburgh Advice Team, Switched On, East Lothian Energy Advice Centre, Fuel Poverty Prevention Project, Community Futures Goes Green, Energy Heritage, Renewable Heritage, Tenements Project: delivered by Changeworks	-	Education, Energy Efficiency	Local Agency	Government	Low-Income Households
Wales	Nest (replaced Home Energy Efficiency Scheme (HEES))	-	Energy Efficiency, Energy Audit, Education	Government	Government	Low-Income Households

## Appendix K: Policies and Programs in the United States

Region	Name of Initiative	Date of Implementation	Type of Initiative	Lead Organization	Source of Funding	Target Population
United States	Low-Income Home Energy Assistance Program (LIHEAP)	1982	Payment Assistance	State	Federal Government	Low-income Households
United States	Weatherization Assistance Program	1976	Energy Efficiency	State	Federal Government	Low-income Households
United States	Affordable Comfort Inc. (ACI)	1986 (first conference held) and 1992 (incorporated as a non-profit organization)	Research and Development, Education, Advocacy Organization	ACI	Federal Government, Private Donations	Government, utilities, private sector companies, non-profit organizations, training groups
United States	American Council for an Energy-Efficient Economy (ACEEE)	1980	Research and Development, Education, Advocacy	ACEEE	Private Donations from Individuals and Organizations	All households, Government
United States	American Gas Foundation	1989	Research and Development	AGF	The utilities, private donations	Policy Experts, Government Officials, the media, others
United States	Community Action Partnership	1964	Advocacy Organization, Research and Development, Energy Efficiency, Skills Training, Emergency Assistance	CAP	Membership Fees, Private Donations	Community Action Agencies
United States	Public Citizen	1971	Advocacy Organization	Affordable Energy (part of Public Citizen)	Private Donations	Government
United States	Energy CENTS Coalition	1993	Advocacy, Research and Development, Payment Assistance, Energy Efficiency	ECC	Private Donations	Government, Low-Income Households
United States	Economic Opportunity Studies	1964	Education, Skills Training, Research and Development	EOS	Grants, Contracts, Private Donations	Community Action Agencies
United States	National Association for State Community Services Programs	-	Policy, Advocacy Organization	NASCSP	Grants, Contracts, Private Donations	State
United States	Natinal Center for Appropriate Technology	1976	Research and Development	NCAT	Private Donations	Communities
United States	National Community Action Foundation	1981	Advocacy Organization	NCAF	Membership Fees, Private Donations	Community Action Agencies
United States	National Energy Assistance Directors' Association	-	Education, Research and Development	-	Grants, Contracts, Private Donations	State LIHEAP Programs
United States	National Low Income Energy Consortium	1986	Advocacy Organization, Education	NLIEC	Corporate Donations, Grants	Public, Private and Non-Profit Organizations
United States	National Fuel Funds Network	1984	Advocacy Organization	NFFN	Private Donations, Grants, Membership Fees	Government
Alabama	Discounted Rate	-	Payment Assistance	The utility	The utility	Low-income Households
Alabama	Neighbors Helping Neighbors Fund	1996	Energy Efficiency	State	Private Donations	Low-income Households
Alabama	Project Share	-	Payment Assistance	Salvation Army	Private Donations	Seniors, disabled persons, low income households
Alabama	Operation Warm	-	Payment Assistance	Local Community Agency	Private Donations	Low-income Households
Alaska	Power Cost Equalization Program (PCE)	-	Payment Assistance	State	State	Low-income Households in rural areas
Alaska	General Relief Assistance (GRA)	-	Payment Assistance	State	State	Low-income households
Alaska	Golden Valley Electric Association (GVEA) HomeSense	-	Energy Audit, Energy Efficiency	The utility	The utility	Low-income Households
Arizona	Energy Support Program / Medical Care Equipment Program	-	Payment Assistance	The utility	The utility	Low-income Households
Arizona	Energy-Wise	-	Energy Efficiency, Education	The utility	The utility	Low-income Households
Arizona	Project S.H.A.R.E.	-	Emergency Assistance	Salvation Army	The utility	Low-income Households
Arizona	C.A.R.E.S.	-	Payment Assistance	The utility	The utility	Low-income Households
Arizona	Low-Income Weatherization Program	-	Energy Efficiency	The utility	The utility	Low-income Households
Arizona	Economy Price Plan / Medical Life Support Discount	-	Payment Assistance	Salt River Project	Salt River Project	Low-income households
Arizona	Low Income Ratepayer Assistance (LIRA)	-	Payment Assistance	The utility	The utility	Low-income households
Arizona	Low-Income Energy Conservation Program	-	Energy Efficiency	The utility	The utility	Low-income households
Arizona	Residential Lifeline Discount Program	-	Payment Assistance	The utility	The utility	Low-income households
Arizona	Weatherization Program	1982	Energy Audit, Energy Efficiency	The utility	The utility	Low-income households
Arizona	Salt River Project	-	Energy Efficiency	Community Action Association	Salt River Project	Low-income households
Arizona	Senior Citizen Discount / Life Support Discounts	-	Payment Assistance	The utility	The utility	Low-income senior households/serious health condition

## Appendix K Continued: Policies and Programs in the United States

Region	Name of Initiative	Date of Implementation	Type of Initiative	Lead Organization	Source of Funding	Target Population
Arizona	Home Energy Assistance Fund delivered through the Community Action Program	2006	Emergency Assistance	Arizona Community Action Association	The utility, Private Donations, Grants	Low-income households
Arizona	Members Helping Members	-	Emergency Assistance	The utility	The utility	Low-income households
Arizona	SHARE	-	Emergency Assistance	Salvation Army	Salt River Project and customer donations	Low-income households
Arizona	Energy Share	-	Emergency Assistance	Salvation Army	The utility, Private Donations	Low-income households
Arizona	Operation Roundup	-	Emergency Assistance	The utilities	Private Donations	Low-income households
Arizona	Help with Emergency Relief Operation (HEERO)	-	Emergency Assistance	Salvation Army	Private Donations	Low-income households
Arizona	Low-Income Fund for Emergencies (LIFE)	1996	Emergency Assistance	Salvation Army	The utility	Low-income households
Arkansas	Sales Tax Exemption	-	Payment Assistance	The utility	The utility	Low-income Households
Arkansas	Empire's Action to Support the Elderly (EASE)	-	Payment Assistance	The utility	The utility	Seniors, disabled persons, low-income households
Arkansas	Neighbor to Neighbor	-	Emergency Assistance	United Way	The utility, Private Donations	Low-income Households
Arkansas	Hearts Warming Hearts	-	Emergency Assistance	United Way	The utility, Private Donations	Low-income Households
Arkansas	Good Neighbor Fuel Fund	-	Emergency Assistance	LIHEAP	The utility, Private Donations	Low-income Households
Arkansas	Project Help	-	Emergency Assistance	Red Cross	The utility	Seniors and disabled persons
Arkansas	Beat the Heat	-	Appliance Donation	The utility	The utility	Energy service area
Arkansas	Project Deserve	-	Emergency Assistance	The Southern Good Faith Fund	The utility, Private Donations	Seniors and disabled persons
California	California Alternate Rates for Energy (CARE)	-	Payment Assistance	Most utilities	The utilities through a rate surcharge on all customers.	Low-income Households
California	Family Electric Rate Assistance (FERA)	-	Payment Assistance	Most utilities	The utilities	Low- to Middle-Income Households
California	Medical Baseline Program	-	Payment Assistance	Most utilities	The utilities	Low-income senior households/those with life-threatening health condition
California	Emergency Assistance Fund	-	Emergency Assistance	Local Community Organizations	The utility	Low-income Households
California	Residential Low-Income Rate	-	Payment Assistance	The utility	The utility	Low-income Households
California	Payment Program	-	Emergency Assistance	County	The utility	Low-income households with minors
California	Energy Assistance Program Rate (EAPR)	-	Payment Assistance	The utility	The utility	Low-income Households
California	Energy Assistance Program (EAP)	-	Payment Assistance, Energy Efficiency, Appliance Replacement	Red Cross	The utility	Low-income Households
California	Low-Income Senior Energy Credit	-	Payment Assistance	The utility	The utility	Low-Income Senior Households
California	Residential Low-Income Assistance	-	Emergency Assistance	Multiple utilities	The utilities	Low-income Households
California	Banning Electric Alternative Rate	-	Payment Assistance	The Municipality	Electric Public Benefits Charge	Low-income Households
California	Energy Efficiency Bonus Plan	-	Payment Assistance	The utility	The utility	Low-income Households
California	Low-Income Energy Efficiency (LIEE)	-	Energy Efficiency	The utilities	The utilities	Low-income Households
California	Evaporative Cooler Program	-	Appliance Donation	The utility	The utility	Low-income Households
California	Cool Care	-	Appliance Replacement	The utility	The utility	Low-income Households
California	REACH	-	Emergency Assistance	Salvation Army	The utility	Low-income Households
California	Project HELP	-	Emergency Assistance	Salvation Army	The utility, Private Donations	Low-income Households
California	Neighbor to Neighbor	-	Emergency Assistance	The utility	The utility, Private Donations	Low-income Households
Colorado	Energy Savings Partnership Program	-	Energy Efficiency	Local community agencies	State	Low-income Households
Colorado	Energy Outreach Colorado	1989	Advocacy Organization, Emergency Assistance, Education, Energy Efficiency	Local Community Agency	The utilities, Private Donations, Corporate Donations, Grants	Low-income Households
Colorado	Energy Resource Center (ERC)	-	Energy Efficiency	The utility	The utility	Low-income Households
Colorado	Home Efficiency Assistance Program (HEAP)	-	Energy Efficiency, Education	The utility	The utility	Low-income Households
Colorado	Low-Income Rate Assistance	-	Payment Assistance	State	State	Low-Income Senior Households and disabled
Colorado	Aquila Cares	-	Energy Efficiency	Local Community Agencies	The utility, Private Donations	Low income Households
Colorado	Sharing the Warmth	-	Emergency Assistance	Local community agencies	The utility, Private Donations	Low-Income Households

## Appendix K Continued: Policies and Programs in the United States

Region	Name of Initiative	Date of Implementation	Type of Initiative	Lead Organization	Source of Funding	Target Population
Colorado	Lighten the Load/COPE/Help a Neighbor in Distress	-	Emergency Assistance	Local community agencies	The municipalities, the utilities	Low-income Households
Connecticut	Connecticut Energy Assistance Program (CEAP)	-	Emergency Assistance, Energy Efficiency	State, Local Community Agencies	State	Low-Income Households
Connecticut	Contingency Heating Assistance Program (CHAP)	-	Emergency Assistance, Energy Efficiency	Department of Social Services and Community Action Agencies	State	Low- to Middle-Income Households
Connecticut	Systems Benefits Charge (SBC)	-	Payment Assistance	The utilities	SBC	Low-income Households
Connecticut	NUSTART	-	Payment Assistance	The utility	SBC	Low-income Households
Connecticut	Matching Payment Plan	-	Payment Assistance	The utilities	SBC	Low-income Households
Connecticut	Winter Protection Program	-	Emergency Assistance	The utilities	SBC	Low-income Households
Connecticut	MaPP	-	Payment Assistance	The utility	SBC	Low-income households
Connecticut	Forgiveness Program	-	Payment Assistance	The utility	SBC	Low-income households
Connecticut	Home Energy Solutions - Income Eligible	-	Energy Efficiency, Appliance Replacement	The utilities	SBC	Low-income households
Connecticut	Energy Audit	-	Energy Audit	The utility	SBC	Low-income households
Connecticut	UI HELPS	-	Energy Efficiency	The utility	SBC	Low-income households
Connecticut	Operation Fuel	-	Emergency Assistance	Operation Fuel	SBC	Low-income households
Connecticut	Warm Up Fund	-	Emergency Assistance	Warm Up Fund	Private Donations	Low-income households
Connecticut	Windsor Fuel Bank	-	Emergency Assistance	Windsor Community Service Council	Private Donations	Low-income households
Delaware	Sharing Program	-	Emergency Assistance	Catholic Charities, Salvation Army	The utility, Private Donations	Low-Income Households
Delaware	Good Neighbor Fuel Fund	-	Emergency Assistance	Salvation Army	The utility, Private Donations	Low-Income Households
District of Columbia	Residential Aid Discount (RAD)	-	Payment Assistance	The utility	The utility	Low-Income Households
District of Columbia	Residential Essential Service (RES)	-	Payment Assistance	The utility	The utility	Low-Income Households
District of Columbia	Washington Area Fuel Fund (WAFF)	-	Emergency Assistance	Salvation Army	The utility, Private Donations	Low-Income Households
Florida	William E. Sadowski Affordable Housing Act	1992	Legislation	State WAP	Taxes	Low-Income Households
Florida	Senior Citizen's/Disabled American Veteran's Discount	-	Payment Assistance	City Electric System	The utility	Senior/Disabled Low-Income Households
Florida	Weather Care	-	Energy Efficiency	The utility, community organization	The utility (Tampa Electric) and community organization	Low-Income Households
Florida	Care to Share Program, SHARE, Neighbor to Neighbor, Share to Care	-	Emergency Assistance	The utility	The utility and customer donations	Low-Income Households
Florida	Energy Neighbor Fund, Citizens Utility Relief Effort, Project Share, Project Care, Good Neighbor Energy Fund, Neighbors Who Care Program	-	Emergency Assistance	Local Social Service Agencies	The utility and customer donations	Low-Income Households
Florida	Operation Roundup	-	Emergency Assistance	Charitable Trust (set up by the utility)	Customer Donations	Low-Income Households or Organizations
Florida	SECO Angel Fund	-	Emergency Assistance	Local Assistance Agencies	Utility and customer donations	Low-Income Households or Organizations
Georgia	Regulated Natural Gas Provider Program	-	Payment Assistance	The utility, Local Community Agency	The utility, State	Low-Income Households
Georgia	Public Utility Commission (PUC) Mandate	1989	Payment Assistance, Legislation	State	The utilities	Low-Income Households
Georgia	Home and Heartwarming Program	-	Energy Efficiency	The utility	The utility	Low-Income Households
Georgia	Heating Energy Assistance Team, Project SHARE, Sharing the Warmth, Operation Roundup	-	Emergency Assistance	Community Action Agencies or the Salvation Army	Utility and customer donations	Low-Income Households
Hawaii	Residential Rehabilitation Loans	-	Financing Mechanism	County	County	All Households
Hawaii	Low-Income Rate Assistance	-	Payment Assistance	Hawaiian Electric Co.	The utility	Low-Income Households
Hawaii	Qualifying Member Appliance Replacement Program	-	Appliance Replacement	County of Kauai	The utility and County	Senior Low-Income Households

## Appendix K Continued: Policies and Programs in the United States

Region	Name of Initiative	Date of Implementation	Type of Initiative	Lead Organization	Source of Funding	Target Population
Idaho	Low-Income Energy Efficiency Program	-	Energy Efficiency	The utility	The utility	Low-Income Households
Idaho	Low-Income Energy Efficiency Program	-	Energy Efficiency	Community Action Partnership agencies	The utility (Idaho Power)	Low-Income Households
Idaho	Project Share, Helping Hand Program, Project Warmth	-	Emergency Assistance	Community Action Agencies, Salvation Army	The utility and customer donations	Low-Income Households
Idaho	Operation Roundup	-	Emergency Assistance	Charitable Trust (set up by the utility)	Customer Donations	Low-Income Households
Idaho	Lend a Hand	-	Emergency Assistance	Local non-profit agencies	The utility (Rocky Mountain Power)	Low-Income Households
Illinois	Supplemental Low-Income Energy Assistance Fund (SLEAF)	1998	Payment Assistance, Energy Efficiency	State	Surcharge on utility bills	Low-Income Households
Illinois	Percentage of Income Payment Plan (PIPP)	-	Payment Assistance	LIHEAP	State	Low-Income Households
Illinois	Emergency Housing Assistance Program	-	Energy Efficiency	The Municipality	The Municipality	Low-Income Households
Illinois	Good Samaritan Initiative	-	Payment Assistance	State Department	The utilities	Low-Income Households
Illinois	Residential Bill Payment Assistance, Residential Hardship Fund	-	Payment Assistance	Local Community Agencies	The utility	Low-Income Households
Illinois	Hardship Assistance for Residential Customers	-	Payment Assistance	Local Community Agencies	The utility	Low-Income Households
Illinois	Summer Assistance Program	-	Payment Assistance	Local LIHEAP Office	The utility	Low-Income Households
Illinois	Fresh Start	-	Payment Assistance	The utility	The utility	Low-Income Households
Illinois	ComEd Helps Activated Military Personnel (CHAMP)	-	Payment Assistance	The utility	The utility	Military households
Illinois	Senior Citizen Discount Rate	-	Payment Assistance	The utility	The utility	Senior Low-Income Households
Illinois	Dollar More	-	Emergency Assistance	Human Services Agencies	The utility and customer donations	Low-Income Households
Illinois	Warm Neighbors Cool Friends	1982	Emergency Assistance, Energy Efficiency	Local community agency	The utility, Private Donations	Low-Income Households
Illinois	Sharing the Warmth	-	Emergency Assistance	Local agency	The utility, Private Donations	Low-Income Households
Illinois	I CARE	-	Emergency Assistance	The utility	The utility, Private Donations	Low-Income Households
Illinois	Sharing Program	-	Payment Assistance	Salvation Army	The utility, Private Donations	Low-Income Households
Illinois	Share the Warmth	-	Payment Assistance	Local agency	The utility, Private Donations	Low-Income Households
Illinois	RELIEF	-	Payment Assistance	The utility	The utility	Low-Income Households
Illinois	WORKS	-	Payment Assistance	The utility	Private Donations	Low-Income Households and Organizations
Indiana	Poor Relief Legislation	1894	Legislation	Township Offices	Property Taxes	Low-Income Households
Indiana	Universal Service Program	2005	Payment Assistance, Energy Efficiency	The utility	State	Low-Income Households
Indiana	Winter Warmth Program	-	Payment Assistance	The utility	The utility	Low-Income Households
Indiana	Low-Income Weatherization Program	-	Energy Efficiency, Education	The utility	The utility	Low-Income Households
Indiana	Share the Warmth	-	Energy Efficiency	The utility, local community agencies	The utility, Private Donations	Low-Income Households
Indiana	Winter Assistance Fund	-	Emergency Assistance	The United Way	The United Way	Low-Income Households
Indiana	Operation Roundup	-	Emergency Assistance	The utility	The utility and customer donations	Low-Income Households
Indiana	Warm Heart, Warm Home Foundation	-	Emergency Assistance	The utility	The utility and customer donations	Low-Income Households
Indiana	Helping Hand	-	Emergency Assistance	The utility	The utility	Senior or Disabled Low-Income Households
Indiana	Gift of Warmth	-	Emergency Assistance	Salvation Army	The utility and customer donations	Low-Income Households
Indiana	Energy Share	-	Emergency Assistance	Local community agencies	The utility	Low-Income Households
Iowa	Low-Income Weatherization Program	-	Energy Efficiency	Local Community Action Agencies	The utility	Low-Income Households
Iowa	HomeCheck	-	Energy Audit	The utility	The utility	Low-Income Households
Iowa	EMBRACE IOWA	-	Emergency Assistance	Community Action Agency	Des Moines Register	Low-Income Households
Iowa	Hometown Care Energy Fund, Black Hills Cares, Sharing the Warmth, ReCare	-	Emergency Assistance, Energy Efficiency	Community Action Agency	The utility and customer donations	Low-Income Households
Iowa	Operation Roundup	-	Emergency Assistance, Energy Efficiency	The utility and local community agencies	Customer Donations	Low-Income Households or Non-profit Organizations
Iowa	Project Share	-	Emergency Assistance	Community Action Agency	Community donations	Low-Income Households
Iowa	I CARE	-	Emergency Assistance	The utility	The utility	Low-Income Households

## Appendix K Continued: Policies and Programs in the United States

Region	Name of Initiative	Date of Implementation	Type of Initiative	Lead Organization	Source of Funding	Target Population
Kansas	Emergency Energy Fund, Share the Warmth	-	Emergency Assistance	Salvation Army	Community donations	Low-Income Households
Kansas	HeatShare	-	Emergency Assistance	Local community agencies	Community donations	Low-Income Households
Kansas	Sharing the Warmth, Dollar Aide	-	Emergency Assistance	energy assistance agency	The utility and customer donations	Low-Income Households
Kansas	We Care	-	Emergency Assistance	The utility	Employees and trustees	Low-Income Households
Kansas	Project Deserve	-	Emergency Assistance	The Red Cross	The utility and customer donations	Low-Income Households
Kentucky	Preventive Assistance Program	-	Emergency Assistance	Department of Social Services	State	Low-income households with minors
Kentucky	Project WARM	1982	Energy Efficiency, Education	Project WARM (non-profit organization)	Community donations	Low-Income Households
Kentucky	Summer Cooling	-	Appliance Donation	Community Action Council	Community donations	Low-Income Households with people of poor health
Kentucky	Helping Hands	-	Emergency Assistance, Energy Efficiency	Local government agency or local non-profit organization	The utility and/or customer donations	Low-Income Households
Kentucky	Home Energy Assistance	-	Payment Assistance	The utility	The utility	Low-Income Households
Kentucky	Duke Energy	-	Energy Efficiency, Education	The utility	The utility	Low-Income Households
Kentucky	WeCare	-	Energy Audit, Energy Efficiency	The utility	The utility	Low-Income Households
Kentucky	Sharing the Warmth	-	Emergency Assistance	Local Community Agency	The utility, Private Donations	Low-Income Households
Kentucky	WinterCare Fund, Winterhelp	1984	Emergency Assistance	Local Community Agency	The utility, Private Donations	Low-Income Households
Louisiana	Senior Discount Program	-	Payment Assistance	The utility	The utility	Senior Low-Income Households
Louisiana	Elderly and Handicapped Emergency Assistance Fund	-	Emergency Assistance	Local Community Agency	The utility	Senior and disable low-income households
Louisiana	Low-Income Energy Efficiency	-	Energy Efficiency	The utility	The utility	Low-Income Households
Louisiana	Sharing the Warmth, Share Program, Good Neighbor Fuel Fund, Energy Assistance Program	-	Emergency Assistance	energy assistance agency	The utility, Private Donations	Low-Income Households
Louisiana	Operation Roundup	-	Payment Assistance	The utility	The utility, Private Donations	Low-Income Households
Louisiana	Power of Sharing Fund	-	Emergency Assistance, Energy Efficiency	Local community agencies	The utility, Private Donations	Low-Income Households
Louisiana	The Power to Care	-	Emergency Assistance	The utility	The utility	Low-Income Households
Louisiana	Beat the Heat	-	Appliance Donation	The utility	The utility	Low-Income Households
Louisiana	Share the Light	1983	Emergency Assistance	The utility and local non-profit organization	The utility and local non-profit organization	Low-Income Households
Louisiana	Lights On	-	Emergency Assistance	The utility and local community agencies	The utility and local community agencies	Low-Income Households
Louisiana	Neighbor to Neighbor	-	Emergency Assistance	The United Way	The utility and customer donations	Low-Income Households
Louisiana	Empowering the Community	-	Emergency Assistance	Local government agency	The utility	Low-Income Households
Maine	General Assistance Program	-	Emergency Assistance	The State	The State	Low-Income Households
Maine	Rural Housing Repair Loans and Grants	-	Financing Mechanism	Federal Government	Federal Government	Low-Income Households
Maine	Low-Income Assistance Program (LIAP)	-	Payment Assistance	State	The utilities	Low-Income Households
Maine	Bangor Hydro Electric	-	Payment Assistance	Community Action Program Agency	The utility	Low-Income Households
Maine	Emergency Assistance Program	-	Emergency Assistance	The utility	The utility	Low-income households with minors
Maine	Electricity Lifeline Program	-	Payment Assistance	The utility	The utility	Low-Income Households
Maine	PowerPact	-	Payment Assistance	The utility	The utility	Low-Income Households
Maine	Low-Income Refrigerator Replacement	-	Appliance Replacement, Energy Efficiency	Local Community Agency	State	Low-Income Households
Maine	Low-Income Energy Management Program	-	Energy Efficiency	The utility	The utility	Low-Income Households
Maine	Maine Sea Coast Mission	-	Emergency Assistance	Non-profit organization	Private Donations	Low-Income Households
Maryland	Electric Universal Service Program (EUSP)	-	Payment Assistance, Energy Efficiency	State	State	Low-Income Households
Maryland	Universal Service Protection Program	-	Payment Assistance	State	State	Low-Income Households

## Appendix K Continued: Policies and Programs in the United States

Region	Name of Initiative	Date of Implementation	Type of Initiative	Lead Organization	Source of Funding	Target Population
Maryland	Transitional Emergency, Medical and Housing Assistance	-	Payment Assistance	State	State	Low-Income Households with Disabled Persons
Maryland	Rate Assistance	-	Payment Assistance	The utilities	The utilities	Low-Income Households
Maryland	Customer Assistance Maintenance Program (CAMP)	-	Payment Assistance	The utilities	The utilities	Low-Income Households
Maryland	Residential Essential Service (RES)	-	Payment Assistance	The utilities	The utilities	Low-Income Households
Maryland	Low-Income Weatherization Program	-	Energy Audit, Energy Efficiency	Local Community Agency	The utilities	Low-Income Households
Maryland	Maryland Energy Assistance Program (MEAP)	-	Payment Assistance	Local Community Agency	State	Low-Income Households
Maryland	Income Limited Energy Efficiency Program	-	Energy Audit, Energy Efficiency	Local Home Energy Programs Office	The utilities	Low-Income Households
Maryland	Energy Assistance Program	-	Emergency Assistance	Non-profit Organization	Town and community donations	Low-Income Households
Maryland	Sharing Program	-	Emergency Assistance	Non-profit Organization	The utilities	Low-Income Households
Maryland	Dollar Energy Fund Hardship Program	-	Emergency Assistance	Local Community Action Agency	The utilities	Low-Income Households
Maryland	Good Neighbor Fuel Fund, Washington Area Fuel Fund	-	Emergency Assistance	Salvation Army	The utilities and customer donations	Low-Income Households
Maryland	Fuel Fund of Maryland, Inc.	-	Emergency Assistance	Fuel Fund of Maryland, Inc.	Community donations	Low-Income Households
Maryland	The Victrola Q. Adams Fuel Fund	1979	Emergency Assistance	Local agency	The utility and community donations	Low-Income Households
Maryland	Community Energy Fund	-	Emergency Assistance	Local agency	The utility and customer donations	Low-Income Households
Maryland	HeatShare	-	Emergency Assistance	The utility	The utility	Low-Income Households
Maryland	Tri-County Fuel Fund	-	Emergency Assistance	The utility	The utility and community donations	Low-Income Households
Massachusetts	Restructuring	1997	Payment Assistance	The State/The utilities	The utilities	Low-Income Households
Massachusetts	R2 Discount Rate, KeySpan Energy Delivery, Massachusetts Electric, Nantucket Electric, Residential Discount Rate, Discounted Residential Rates, Essex County Gas Company, Discount Rate Program, Residential Assistance A5	-	Payment Assistance	The utilities	The utilities	Low-Income Households
Massachusetts	Senior Discount, Senior Citizen and Disabled Customer Discounts	-	Payment Assistance	The utilities	The utilities	Senior and disabled low-income households
Massachusetts	On Track	-	Education, Payment Assistance	The utilities	The utilities	Low-Income Households
Massachusetts	NUStart	-	Payment Assistance	The utility	The utilities	Low-Income Households
Massachusetts	Residential Arrearage Management Program (RAMP)	-	Payment Assistance	Local Community Agency	The utility	Low-Income Households
Massachusetts	Residential Assistance for Families in Transition (RAFT)	-	Emergency Assistance	The county	The State	Low-Income Households at risk for homelessness
Massachusetts	Heat Assistance Program (CEDHAP)	-	Payment Assistance	Non-profit organization	The utility	Low-Income Households
Massachusetts	Energy Efficiency Program, HEATWAP	-	Energy Efficiency	Local Community Agency	The utility	Low-Income Households
Massachusetts	HeatWorks	-	Energy Efficiency	The Municipality	The municipality, The utility, community organization	Senior Low-Income Households
Massachusetts	Senior Home Emergency Home Repair Program	-	Energy Efficiency	Local Community Agency	The municipality, The utility, community organization	Senior Low-Income Households
Massachusetts	KeySpan Energy Delivery, Massachusetts Electric Energy Efficiency and Conservation Programs	-	Energy Audit, Energy Efficiency	Local Community Agency	The utility	Low-Income Households
Massachusetts	MassSAVE	-	Education, Energy Audit, Energy Efficiency	Local Community Agency	The utility	Low-Income Households
Massachusetts	Good Neighbor Energy Fund	-	Emergency Assistance	Salvation Army	The utility and customer donations	Low-Income Households
Michigan	Home Heating Credit	-	Payment Assistance	State	State	Low-Income Households



## Appendix K Continued: Policies and Programs in the United States

Region	Name of Initiative	Date of Implementation	Type of Initiative	Lead Organization	Source of Funding	Target Population
Michigan	State Emergency Relief (SER)	-	Emergency Assistance	State	State	Low-Income Households
Michigan	Positive Billing System	-	Payment Assistance	The utilities	The utilities	Low-Income Households
Michigan	Winter Protection Plan	-	Payment Assistance	The utilities	The utilities	Senior and Low-Income Households
Michigan	REAP	-	Energy Audit, Education, Energy Efficiency	The utility	The utility	Low-Income Households
Michigan	The Heat and Warmth Fund (THAW)	1985	Payment Assistance, Education, Energy Efficiency	Non-profit organization	The utilities, customer donations, community donations	Low-Income Households
Michigan	PeopleCare	1983	Payment Assistance	Salvation Army	Consumers Energy, customer donations and private donations	Low-Income Households
Michigan	Operation Roundup, Energy Share, Pennies for Power Program	-	Payment Assistance	Local organization	Customer Donations	Low-Income Households
Michigan	The Salvation Army	-	Payment Assistance, Education	Salvation Army	Private Donations	Low-Income Households
Michigan	People Fund	1993	Financing Mechanism	The utility	Customer Donations	Low-Income Households, Community Organizations
Minnesota	Emergency Crisis Assistance	-	Emergency Assistance	State	State	Low-Income Households
Minnesota	xCEL Energy	1994	Legislation	The utility	The utility	Low-Income Households
Minnesota	Gas Affordability Program	2007	Legislation, Payment Assistance	The utility	The utility	Low-Income Households
Minnesota	Power On	-	Payment Assistance	Local agency	energyCENTS	Low-Income Households
Minnesota	Energy CENTS	-	Advocacy Organization	EnergyCENTS	EnergyCENTS	Government
Minnesota	Low Income Senior Discount	-	Payment Assistance	Energy Assistance Program	Federal Government	Senior Low-Income Households
Minnesota	Low Income Energy Assistance Program	-	Payment Assistance	-	Federal Government	Low-Income Households
Minnesota	Energy Conservation Improvement	1998	Energy Efficiency	Local community agency	The utilities	Low-Income Households
Minnesota	Reach out for Warmth (ROFW)	1992	Emergency Assistance	Local community agency	Private Donations, Corporate Donations	Low-Income Households
Minnesota	HeatShare	-	Emergency Assistance	Salvation Army	The utilities and customer donations	Low-Income Households
Minnesota	Operation Round Up	-	Emergency Assistance	The utility	The utilities and customer donations	Low-Income Households and Organizations
Minnesota	Caring Members	-	Emergency Assistance	Local community agency	The utilities and customer donations	Low-Income Households
Mississippi	Mississippi Power	-	Payment Assistance	The utility	The utility	Low-Income Households
Mississippi	Helping Hands	-	Energy Efficiency, Skills Training	The utility	The utility	Low-Income Households
Mississippi	Sharing the Warmth, Share One, Energy Concern, Project SHARE, Tupelo Cares	-	Emergency Assistance	Local community agencies	The utility and customer donations	Low Income Households
Mississippi	Beat the Heat	-	Appliance Donation	The utility	The utility	Low-Income Households
Missouri	Keeping Current, Dollar Aide, Dollar-Help	-	Payment Assistance	The United Way or local community agency	The utility	Low-Income Households
Missouri	Empire's Action to Support the Elderly (EASE)	-	Payment Assistance	The utility	The utility	Senior Low-Income Households
Missouri	Independence Rate Assistance Program (IRAP)	-	Payment Assistance	Local community agencies	The utility	Senior Low-Income Households
Missouri	Weatherization Program, Community Services League	-	Energy Efficiency	Local community action agency	The utility	Low-Income Households
Missouri	Operation Weather Survival (OWS)	-	Advocacy Organization, Energy Efficiency, Appliance Donation	The city and local agencies	The utility, the city and local agencies	Senior and Low-Income Households
Missouri	EnergySmart - Customer Education Program	-	Education	Local community agencies	The utility	Low-Income Households
Missouri	Missouri Public Service	-	Energy Efficiency	Local community action agencies	The State	Low-Income Households
Missouri	HeatShare	-	Emergency Assistance	Salvation Army	Private Donations	Low-Income Households
Missouri	Heat-Up St. Louis	-	Emergency Assistance	Local community agency or the Salvation Army	Private Donations	Low-Income Households
Missouri	Dollar More	-	Emergency Assistance	Human Services Agencies	The utility and customer donations	Low-Income Households
Missouri	Sharing the Warmth	-	Emergency Assistance	energy assistance agency	The utility and customer donations	Low-Income Households

## Appendix K Continued: Policies and Programs in the United States

Region	Name of Initiative	Date of Implementation	Type of Initiative	Lead Organization	Source of Funding	Target Population
Missouri	Heat Energy and Light Program (HELP), Citizens Assisting Seniors and Handicapped (CASH)	-	Emergency Assistance	County Health Department	The county	Low-Income Households
Missouri	Project Share	-	Emergency Assistance	Local community agency	The utility and customer donations	Low-Income Households
Missouri	Operation Roundup	-	Emergency Assistance	The utility	The utility and customer donations	Low-Income Households
Missouri	Project Help	-	Emergency Assistance, Energy Efficiency	The Red Cross	The utility and customer donations	Low-Income Households
Missouri	Ishare	-	Emergency Assistance	Local community agency	The utility and customer donations	Low-Income Households
Missouri	Energy Assistance	-	Emergency Assistance	The county	The county	Low-Income Households
Missouri	Neighbors Helping Neighbors	-	Emergency Assistance	Local community agency	The utility and customer donations	Low-Income Households
Missouri	Extra Help	-	Payment Assistance	The utility	The utility	Low Income Households
Montana	NorthWestern Energy, Missoula Electric Cooperative, Vigilante Electric Cooperative	-	Payment Assistance	The utility	The utility	Low-Income Households
Montana	Flathead Electric Cooperative	-	Payment Assistance	The utility	The utility	Low-Income Households
Montana	Lincoln Electric Co-op, Park Electric Co-op	-	Payment Assistance	The utility	The utility	Senior Low-Income Households
Montana	Free Weatherization Program, Sun River Electric Coop	-	Energy Efficiency	State government	The utility and the state	Low-Income Households
Montana	Energy Share	-	Emergency Assistance	State government	The utility	Low-Income Households
Montana	Keep the Lights On	-	Emergency Assistance	The utility	The utility	Low-Income Households
Montana	Neighbors in Need	-	Emergency Assistance	Local community agency	The utility	Low-Income Households
Nebraska	Heat Aid Fund	-	Emergency Assistance	Salvation Army	The utility	Low-Income Households
Nebraska	HeatShare, Share Some Warmth	-	Emergency Assistance	Salvation Army	The utility and customer donations	Low-Income Households
Nebraska	Operation Round Up, Pennies for Power	-	Emergency Assistance	The utility	The utility and customer donations	Low-Income Households
Nebraska	Energy Assistance Program	1988	Emergency Assistance	The Red Cross	Customer Donations and newsletter advertising revenues	Low-Income Households
Nevada	Universal Energy Charge (UEC)	2001	Legislation	The State	Utility Customers	Low-Income Households
Nevada	Lincoln County Power District	-	Payment Assistance	The utility	The utility	Low-Income Households
Nevada	Comfort Savings	-	Energy Audit, Energy Efficiency	The utility	The utility	Low-Income Households
Nevada	Sierra Air (private business)	-	Appliance Repairs	Private Business	Private Business	Low Income Households
Nevada	Southwest Gas Corporation	-	Energy Efficiency	Local Community Agency	The utility	Low-Income Households
Nevada	Project REACH	-	Emergency Assistance	The United Way or local community agency	The utility and customer donations	Low-Income Households
Nevada	Special Assistance Fund for Energy (SAFE)	-	Emergency Assistance	Local Community Agency	Customer and public donations	Low-Income Households
Nevada	Energy Share, Lighthouse Assistance Program	-	Emergency Assistance	Local Community Agency	The utility and customer donations	Low-Income Households
New Hampshire	Statute	1840s	Legislation	Local Community Agency	Local Property Taxes	Low-Income Households
New Hampshire	Tiered-discount Program	2002	Legislation, Payment Assistance	Local Community Agency	The utility	Low-Income Households
New Hampshire	System Benefits Charge (SBC)	2002	Legislation, Energy Audit, Energy Efficiency	Local Community Agency	The state and the utility	Low-Income Households
New Hampshire	Neighbors Helping Neighbors	-	Emergency Assistance	Local Community Agency	The state and the utility	Low-Income Households
New Hampshire	Project Care	-	Emergency Assistance	Social Service Agencies	Round Up Program	Low-Income Households
New Jersey	Lifeline Assistance Program	-	Payment Assistance	The State	The State	Senior or disabled low-income households
New Jersey	Universal Service Fund	2004	Legislation, Payment Assistance	The State	The State	Low-Income Households
New Jersey	Temporary Relief for Utility Expenses	-	Payment Assistance	Affordable Housing Alliance	The utility and public utilities board	Low to Middle-Income Households
New Jersey	New Jersey Comfort Partners	-	Energy Efficiency, Education	New Jersey Clean Energy Program (the state)	The utilities	Low-Income Households
New Jersey	Societal Benefits Charge	2001	Legislation, Energy Efficiency	The State	The utilities	Low-Income Households
New Jersey	NJ SHARES	1998	Emergency Assistance	NJ SHARES (a non-profit organization)	The utilities and customer donations	Low-Income Households
New Jersey	Gift of Warmth	-	Emergency Assistance	The United Way or local community agency	The utilities and customer donations	Low-Income Households

## Appendix K Continued: Policies and Programs in the United States

Region	Name of Initiative	Date of Implementation	Type of Initiative	Lead Organization	Source of Funding	Target Population
New Mexico	Good Neighbor Fund, Heat New Mexico	-	Emergency Assistance	Salvation Army	The utility and customer donations	Low-Income Households
New Mexico	St. Vincent De Paul	-	Emergency Assistance	Local Roman Catholic Parish	Parish Donations	Low-Income Households
New Mexico	Home Education Livelihood Program (HELP)	1965	Emergency Assistance	HELP (non-profit organization)	Public and Private Sources, Revenue-Producing Activities	Low-Income Households
New Mexico	Silver Horizons	-	Emergency Assistance	County	County	Senior Low-Income Households
New Mexico	Project Care	-	Emergency Assistance	Local government agency	The utility and customer donations	Low-Income Households
New York	Home Energy Allowance	-	Legislation, Payment Assistance	The utility	State and Local Funds	Low-Income Households
New York	Powerful Opportunity Program	-	Payment Assistance	The utility	The utility	Low-Income Households
New York	Low-Income Plan	-	Payment Assistance	The utility	The utility	Low-Income Households
New York	Arrears Avoidance Program	-	Payment Assistance	The utility	The utility	Low-Income Households
New York	AffordAbility Payment Plan	-	Payment Assistance	The utility	The utility	Low-Income Households
New York	Energy Assistance Program (EAP)	-	Payment Assistance	County	The utility	Low-Income Households
New York	Home Energy Assistance Program (HEAP)	-	Payment Assistance, Emergency Assistance, Appliance Repair	The State	Federal Government	Low-Income Households
New York	Matching Incentive Payment Program	-	Payment Assistance	The Red Cross	The utility	Low-Income Households
New York	Elderly, Blind or Disabled Payment Troubled Residential Assistance	-	Payment Assistance, Appliance Repair/Replacement, Education	The utility	The utility	Senior or disabled low-income households
New York	Low Income Customer Affordability Assistance Program	-	Payment Assistance	The utility	The utility	Low-Income Households
New York	Residential Reduced Rate	-	Payment Assistance	The utility	The utility	Low-Income Households
New York	On Track	-	Payment Assistance, Education	The utility	The utility	Low-Income Households
New York	Income-Eligible Senior Energy Assistance Program	-	Payment Assistance	The utility	The utility	Senior Low-Income Households
New York	Assisted Home Performance with ENERGY STAR	-	Energy Efficiency	State	SBC	Low to Moderate-Income Households
New York	EmPower New York	-	Energy Efficiency, Appliance Replacement, Education	State	SBC	Low-Income Households
New York	Low-Income Forum on Energy (LIFE)	-	Advocacy Organization	State	State, Systems Benefit Charge	Organizations and individuals
New York	Residential Energy Affordability Partnership (REAP)	-	Energy Efficiency, Education, Appliance Maintenance	The utility	The utility	Low-Income Households
New York	Affordability Program, Power Partner Program	-	Energy Efficiency, Appliance Replacement	The utility	The utility	Low-Income Households
New York	The Good Neighbor Fund, Neighbor for Neighbor Heat, The Neighbor Fund	-	Emergency Assistance	Salvation Army	The utility and customer donations	Low-Income Households
New York	Last Stop Heating Assistance Program	-	Payment Assistance	Local community action agency	The county	Low to Moderate-Income Households
New York	Neighborhood Heating Fund	-	Emergency Assistance	Local community agency	The utility	Low-Income Households
New York	Project Warmth	-	Emergency Assistance	The United Way	The utility and customer donations	Low-Income Households
New York	Care and Share	-	Emergency Assistance	The Red Cross	The utility	Senior or Disabled Low-Income Households
New York	Project Share, Heating Fund	-	Emergency Assistance	The Red Cross	The utility and customer donations	Senior or Disabled Low-Income Households
New York	Orange County Fuel Fund	-	Payment Assistance	The United Way	The county	Low-Income Households
New York	Matching Incentive Payment Program	-	Payment Assistance	The utility	The utility	Low-Income Households
North Carolina	Weatherization Program	-	Energy Efficiency, Appliance Repairs	State	State	Low-Income Households
North Carolina	Operation RoundUp, EnergyShare, Share the Warmth, Round Up Program	-	Emergency Assistance	The utility	The utility and customer donations	Low-Income Households

## Appendix K Continued: Policies and Programs in the United States

Region	Name of Initiative	Date of Implementation	Type of Initiative	Lead Organization	Source of Funding	Target Population
North Carolina	Cape Hattera Electric Foundation	-	Emergency Assistance	The utility	The utility and customer donations	Low-Income Households and Non-profit Organizations
North Carolina	Member Cares, Helping Each Member Cope	-	Emergency Assistance	County	The utility and customer donations	Low-Income Households
North Carolina	Cooling Assistance Program	-	Emergency Assistance	Local Community Agency	The utility and customer donations	Low-Income Households
North Carolina	Fan-Heat Relief Program	-	Appliance Donation	State	The utility	Senior Low-Income Households
North Carolina	People Who Care	-	Emergency Assistance	Salvation Army	The utility and customer donations	Low-Income Households
North Carolina	LREMC Cares, Project Helping Hand	-	Emergency Assistance	Local Community Agency	The utility and customer donations	Low-Income Households
North Carolina	Mecklenberg County Crisis Assistance Ministry	1985	Emergency Assistance	The Ministry	Private Donations, Municipality, Corporate Donations, Non-profit Organizations	Low-Income Households
North Carolina	Project Help	-	Emergency Assistance	Non-profit organization	The utility and customer donations	Low-Income Households
North Carolina	Share the Warmth	-	Emergency Assistance	Local service agency or the Ministry	The utility and customer donations	Low-Income Households
North Carolina	Energy Neighbour Fund	-	Emergency Assistance	Foundation	Employees, customers, churches and civic organizations	Low-Income Households
North Carolina	Heat Care Fund	-	Emergency Assistance	Salvation Army	The utility and customer donations	Low-Income Households
North Carolina	People Helping People	-	Emergency Assistance	The utility	The utility and customer donations	Low-Income Households
North Carolina	Warmth for Wake	-	Emergency Assistance	Local Community Agency	Private donations, churches and other civic organizations	Low-Income Households
North Carolina	Operation Round-Up	-	Emergency Assistance	County	The utility	Low-Income Households
North Dakota	State Program	-	Appliance Donation	Local Community Agency	The state	Disabled Low-Income Households
North Dakota	Energy Share	-	Emergency Assistance	Local Community Agency	The utility, customer donations and LIHEAP	Low-Income Households
North Dakota	Operation Roundup	-	Emergency Assistance	The utility	The utility and customer donations	Low-Income Households and Organizations
Ohio	PIPP Plus (Percentage of Income Payment Plan)	-	Legislation, Payment Assistance	State, Local Community Agencies	State	Low-Income Households
Ohio	Winter Reconnect Program	-	Payment Assistance	Local community agency, utility	State	Households at risk for disconnection
Ohio	Ohio Energy Credit (OEC) Program	-	Payment Assistance	State	State	Senior or disabled low-income households
Ohio	Electric Partnership Program (EPP)	1999 (legislation) and 2002 for energy efficiency program	Energy Audit, Energy Efficiency	State	Electric Universal Service Rider	Low-Income and High Consumption Households
Ohio	Crisis Response Fund	-	Payment Assistance, Energy Efficiency	Local Community Agency	The utility	Low-Income Households
Ohio	Fresh Start	-	Payment Assistance	The utility	The utility	Low-Income Households
Ohio	Ohio Electric Residential Low Income Program	-	Payment Assistance	The utility, Local Community Agency	The utility	Low-Income Households
Ohio	Warm Choice	-	Energy Efficiency	The utility, Local Community Agency	The utility	Low-Income Households
Ohio	Housewarming Program	-	Energy Efficiency, Education	The utility	The utility	Low-Income Households
Ohio	Home Weatherization	-	Appliance Repair, Education, Energy Efficiency	The utility	The utility	Low-Income Households
Ohio	TEEM	-	Energy Efficiency	The utility	The utility	Low-Income Households
Ohio	Neighbor to Neighbor Program	-	Emergency Assistance	The utility, Local Community Agency	The utility and Dollar Energy Fund	Low-Income Households
Ohio	Auction Fuel Fund	-	Emergency Assistance	The utility, Local Community Agency	The utility	Low-Income Households
Ohio	Utility Fuel Fund	-	Emergency Assistance	The utility, Local Community Agency	The utility	Low-Income Households
Ohio	Winter Crisis Fuel Fund	-	Emergency Assistance	The utility, Local Community Agency	The utility	Low-Income Households
Ohio	Heatshare, EnergyShare, Project Reach, Community Outreach Opportunity Program, Neighbors Helping Neighbors	-	Emergency Assistance	Salvation Army	The utility and customer donations	Low-Income Households
Ohio	The People Fund	-	Emergency Assistance	The utility	The utility and customer donations	Low-Income Households, Non-profit organizations
Ohio	Operation Round Up, Operation Helping Others	-	Emergency Assistance	The utility	The utility and customer donations	Low-Income Households, Non-profit organizations

## Appendix K Continued: Policies and Programs in the United States

Region	Name of Initiative	Date of Implementation	Type of Initiative	Lead Organization	Source of Funding	Target Population
Oklahoma	Oklahoma Gas & Electric	-	Payment Assistance	Local Community Agency	The utility	Low-Income Households
Oklahoma	Oklahoma Natural Gas	-	Payment Assistance	The utility	The utility	Low-Income Households
Oklahoma	Hand-N-Hand	-	Energy Efficiency	The utility	The utility	Senior Low-Income Households
Oklahoma	Light A Life Energy Fund, Lend-A-Hand	-	Emergency Assistance	Salvation Army	The utility and customer donations	Low-Income Households
Oklahoma	Operation Roundup	-	Emergency Assistance	The utility	The utility and customer donations	Low-Income Households
Oklahoma	Operation Warm	-	Emergency Assistance	Local Community Agency	The utility and customer donations	Low-Income Households
Oklahoma	Northeast Operation Roundup	1998	Emergency Assistance	The utility Trust	The utility and customer donations	Low-Income Households or Organizations
Oklahoma	Share the Warmth	-	Emergency Assistance	Salvation Army	The utility and customer donations	Senior Low-Income Households
Oregon	Public Purpose Charge	2002	Legislation, Energy Efficiency	Local community agency	The utility	Low-Income Households
Oregon	Oregon Energy Assistance Program	2000	Legislation	State LIHEAP Office	The utility	Low-Income Households
Oregon	Low Income Rate Assistance Program (LIRAP)	-	Payment Assistance	Local Community Agency	The utility	Low-Income Households
Oregon	Universal Service Plan	-	Payment Assistance, Energy Efficiency, Emergency Assistance	Human Services Commission	The utility	Senior or disabled low-income households
Oregon	Deposit Guarantor Program	-	Payment Assistance	The utility	The utility	Low-Income Households
Oregon	Customer Care Plus	-	Payment Assistance	The utility	The utility, Private Donations, the Municipality	Low-income Households
Oregon	Military Assistance	-	Payment Assistance	The utility	The utility	Military households
Oregon	Utility Discounts	-	Payment Assistance	The utility	The utility	Senior Low-Income Households
Oregon	Senior and Disabled ALIEAP	-	Payment Assistance	The utility	The utility	Senior and disabled low-income households
Oregon	Low-Income and Military ALIEAP	-	Payment Assistance	The utility	The utility	Low-Income Military Households
Oregon	Special Waiver Program	-	Payment Assistance	The utility	The utility	Low-Income Households
Oregon	ERAP	-	Payment Assistance	The county	The utility	Senior or disabled low-income households
Oregon	Gas Assistance Program	-	Payment Assistance	Local community agencies	The utilities and customer donations	Low-Income Households
Oregon	Winter Heating Assistance Program	-	Payment Assistance	The utility	The utility	Senior or disabled low-income households
Oregon	Community Energy Project	-	Energy Efficiency, Education	The utility	The utility	Senior or disabled low-income households
Oregon	Low-Income Weatherization Program	-	Energy Efficiency	The utility	The utility	Low-Income Households
Oregon	Low-Income Weatherization Program	-	Energy Efficiency	County	The utility and County	Low-Income Households
Oregon	Residential Energy Assistance Challenge	-	Education, Energy Efficiency	County	The utility and County	Low-Income Households
Oregon	Customer Care Plus	-	Energy Efficiency, Education, Appliance Replacement/Repair	Local community agency	The utility, customer donations, the City	Low-Income Households
Oregon	Idaho Power	-	Energy Efficiency	Local Community Agencies	The utility	Low-Income Households
Oregon	Lane Electric Cooperative, Salem Electric Weatherization	-	Energy Efficiency	The utility	The utility	Low-Income Households
Oregon	Oregon HEAT	-	Emergency Assistance	Local Community Agency	State	Low-Income Households
Oregon	Project Share	-	Emergency Assistance	Local Community Agency	The utility and customer donations	Low-Income Households
Oregon	Blachly-Lane Energy Share (BLES)	-	Emergency Assistance	Salvation Army	The utility and customer donations	Low-Income Households

## Appendix K Continued: Policies and Programs in the United States

Region	Name of Initiative	Date of Implementation	Type of Initiative	Lead Organization	Source of Funding	Target Population
Oregon	Energy Assistance Program, Winter Help, Project Helping Hand, SOS Program, Heat and Roundup, Energy Assistance Program, Share the Warmth Fund, Give Light Offer Warmth (GI OW), Helping Hand, Customer Care, Customers Helping Customers, Monmouth Power and Light, Oregon Trail Power and Light, UCARE	-	Emergency Assistance	The utility or local community agency	The utility and customer donations	Low-Income Households
Oregon	Utility Customer Assistance Fund	-	Emergency Assistance	Municipality	Municipality	Low-Income Households
Oregon	Operation Round Up	-	Emergency Assistance	The utility	The utility	Low-Income Households, Non-profit organizations
Oregon	Project Share	-	Emergency Assistance	Local Community Agency	The utilities and customer donations	Low-Income Households
Oregon	Customer Assistance Program	-	Emergency Assistance	Local Community Agency	The utilities and customer donations	Low-Income Households
Pennsylvania	Customer Assistance Program	1996	Legislation	The utilities	The utilities	Low-Income Households
Pennsylvania	Low-Income Usage Reduction Program	1987	Legislation	The utilities	The utilities	Low-Income Households
Pennsylvania	CAP, LIRAP	-	Payment Assistance	The utilities	The utilities	Low-Income Households
Pennsylvania	LIURP	-	Energy Efficiency, Appliance Replacement, Education	The utilities	The utilities	Low-Income Households
Pennsylvania	Warm Choice	-	Energy Audit, Energy Efficiency	The utility	The utility	Low-Income Households
Pennsylvania	Emergency Repair Fund	-	Appliance Maintenance, Repair, Replacement	The utility	The utility	Low-Income Households
Pennsylvania	Smart Comfort	-	Energy Audit, Energy Efficiency, Education	The utility	The utility	Low-Income Households
Pennsylvania	Energy Assistance Program (EAP)	-	Payment Assistance, Education	The utility	The utility	Low-Income Households
Pennsylvania	WARM Program	-	Energy Efficiency, Education	The utility, Local Community Agency, Local Contractors	The utility	Low-Income and High Consumption Households
Pennsylvania	Elderly, Blind or Disabled Payment Troubled Residential Assistance	-	Payment Assistance, Appliance Repair or Replacement, Education	The utility	The utility	Senior or disabled low-income households
Pennsylvania	OnTrack	-	Payment Assistance	Local community agency	The utility	Low-Income Households
Pennsylvania	WRAP	-	Energy Efficiency, Education, Appliance Replacement	Local community agency	The utility	Low-Income Households
Pennsylvania	Customer Responsibility Program	-	Payment Assistance	The utility	The utility	Low-Income Households
Pennsylvania	Conservation Works	-	Energy Audit, Energy Efficiency, Education	The utility	The utility	Low-Income Households
Pennsylvania	Energy Help Fund, Partners Program, Low Income Self Help Program	-	Payment Assistance	The utility	The utility	Low-Income Households
Pennsylvania	Dollar Energy Hardship Fund	1983	Emergency Assistance	Local community agency	The utility, Private Donations, community organizations	Low-Income Households
Pennsylvania	Philadelphia Utility Emergency Services Fund	-	Emergency Assistance	Local community agency	The utility, Private Donations, community organizations	Low-Income Households
Pennsylvania	Neighbor for Neighbor Heat Fund, Matching Energy Assistance Fund, Operation Help, Operation SHARE, Project Outreach, Project Helping Hand, \$ Energy Fund, Member to Member, Members Sharing with Members Fund	-	Emergency Assistance	The utility, local community agencies	The utility, Private Donations	Low-Income Households
Pennsylvania	Reach Hardship Fund, Family Fund Energy Assistance Program	-	Emergency Assistance	Salvation Army	The utility, Private Donations	Low-Income Households
Pennsylvania	Centre County Fuel Bank	-	Emergency Assistance	County	County	Low-Income Households

## Appendix K Continued: Policies and Programs in the United States

Region	Name of Initiative	Date of Implementation	Type of Initiative	Lead Organization	Source of Funding	Target Population
Pennsylvania	Operation Round-Up	-	Emergency Assistance	Local Community Agency	The utility, Private Donations	Low-Income Households
Pennsylvania	Montgomery County	-	Emergency Assistance	County	County	Senior or disabled low-income households
Pennsylvania	Family in Need Fund	-	Emergency Assistance	Local Community Agency	The utility, Private Donations	Low-income households with minors
Pennsylvania	Project Outreach	-	Emergency Assistance	Local municipality	Local municipality	Low-Income Households
Rhode Island	Rate Assistance	-	Payment Assistance	The utility	The utility	Low-Income Households
Rhode Island	Appliance Replacement Program	-	Energy Audit, Energy Efficiency, Appliance Replacement	Local Community Agency	The utility	Low-Income Households
Rhode Island	Good Neighbor Energy Fund	-	Emergency Assistance	Salvation Army	The utility, Private Donations	Low-Income Households
Rhode Island	UniBank Fuel Assistance Fund	2000	Emergency Assistance	Local Community Agency	The county and local bank	Low-Income Households
South Carolina	Share the Warmth	-	Emergency Assistance	Local Community Agency	The utility, Private Donations	Low-Income Households
South Carolina	Cooling Assistance Program	-	Emergency Assistance	Local Community Agency	The utility, Private Donations	Low-Income Households
South Carolina	Fan-Heat Relief Program	-	Appliance Donation	State	The utility	Senior Low-Income Households
South Carolina	Project Good Neighbor, Share the Warmth	-	Emergency Assistance	The utility, local community agency	The utility, Private Donations	Low-Income Households
South Carolina	Energy Neighbour Fund	-	Emergency Assistance	The utility	The utility, Private Donations, community organizations	Low-Income Households
South Carolina	Project Share	-	Emergency Assistance	Local government, local community agency, Salvation Army	The utility, Private Donations	Low-Income Households
South Carolina	Operation Round Up	-	Emergency Assistance	The utility	The utility, Private Donations	Low-Income Households or non-profit organizations
South Dakota	I CARE	-	Payment Assistance, Energy Efficiency	Local community agency	The utility, Private Donations	Low-Income Households
South Dakota	Operation Round Up	-	Emergency Assistance	The utility Trust	The utility, Private Donations	Low-Income Households and Non-Profit Organizations
Tennessee	On Track	-	Payment Assistance, Education, Energy Efficiency	The utility	The utility, Private Donations	Low-Income Households
Tennessee	EnergySmart Memphis	-	Energy Efficiency, Education	The utility	The utility	All households
Tennessee	Neighbor-to-Neighbor Program	-	Emergency Assistance	Dollar Energy Fund	The utility, Private Donations	Low-Income Households
Tennessee	Warm Neighbors Program, Sharing the Warmth, Project Help, Share the Warmth	-	Emergency Assistance	The utility, local community agencies	The utility, Private Donations	Low-Income Households
Tennessee	Project HELP	-	Payment Assistance	The utility, local community agencies	The utility, Private Donations	Senior or disabled low-income households
Tennessee	Round Up Program, Heisse Johnson Hand Up Program, Project Help, Plus-1	-	Payment Assistance, Emergency Assistance	Local Ministry, Local community agency, Salvation Army	The utility, Private Donations	Low-Income Households
Tennessee	Operation Pocket Change	-	Emergency Assistance	The utility	The utility, Private Donations	Low-Income Households, Non-profit organizations
Texas	System Benefit Fund	-	Legislation, Energy Efficiency	State	State	Low-Income Households
Texas	Low-Income Discount	-	Payment Assistance	The utility	The utility	Low-Income Households
Texas	Lite-Up Texas	-	Payment Assistance	Public Utility Commissions	The utility	Low-Income Households
Texas	Low Income Rider	-	Payment Assistance	The utility	The utility	Food Stamp Recipient
Texas	Deposit Waivers	-	Payment Assistance	The utility	The utility	Senior Low-Income Households
Texas	Disconnection Moratorium	-	Payment Assistance	The utility	The utility	Low-Income Households
Texas	Low Income Deposit (LID) Program	-	Payment Assistance	Local community agency	The utility	Senior, Disabled or Low-Income Households with children under 6
Texas	Keeping the Warmth	-	Energy Efficiency	The utility, local community agency	The utility	Low-Income Households
Texas	Energy Home Improvements	-	Energy Efficiency	The utility	The utility	Low-Income Households
Texas	Sharing the Warmth	-	Emergency Assistance	Local Community Agency	The utility, Private Donations	Low-Income Households
Texas	PLUS 1	-	Emergency Assistance	Local Community Agency	The utility, Private Donations	Low-Income Households
Texas	The Power to Care	-	Emergency Assistance	The utility	The utility, Private Donations	Senior or Disabled Low-Income Households
Texas	Beat the Heat	-	Appliance Donation	The utility	The utility	Low-Income Households
Texas	Operation Round Up	-	Emergency Assistance	The utility	The utility, Private Donations	Low-Income Households and Non-Profit Organizations
Texas	PLUS One Program	-	Emergency Assistance	Local Community Agency	Private donations	Low-Income Households
Texas	Care to Share	-	Emergency Assistance	The utility	The utility, Private Donations	Low-Income Households
Texas	Residential Energy Assistance Partnership (REAP)	-	Payment Assistance, Education	Municipality	The utility, Private Donations	Low-Income Households
Texas	Project WARM	-	Payment Assistance	Municipality	Royalty Interests	Low-Income Households

## Appendix K Continued: Policies and Programs in the United States

Region	Name of Initiative	Date of Implementation	Type of Initiative	Lead Organization	Source of Funding	Target Population
Texas	Project Helping Hands	-	Payment Assistance	Local Community Agency	The utility, Private Donations	Low-Income Households
Texas	Utility Bill Assistance	-	Payment Assistance	Salvation Army	The utility, Private Donations	Low-Income Households
Texas	CARE	-	Emergency Assistance	Local Community Agency	The utility, Private Donations	Low-Income Households
Texas	Helping Hands Program	-	Emergency Assistance	The utility	The utility, Private Donations	Low-Income Households
Texas	Operation Roundup	-	Emergency Assistance	The utility	The utility, Private Donations	Low-Income Households
Texas	Neighbor to Neighbor	-	Emergency Assistance	Local Community Agency	The utility, Private Donations	Low-Income Households
Utah	Energy Assistance Fund	-	Payment Assistance	The utility	The utility	Low-Income Households
Utah	Home Electric Lifeline Program (HELP)	-	Payment Assistance	Local Community Agency	The utility	Low-Income Households
Utah	Residential Energy Assistance through Community Help (REACH), Lend a Hand	-	Emergency Assistance	The Red Cross	The utility, Private Donations	Senior or disabled low-income households
Utah	Catholic Community Services	-	Emergency Assistance	Local Community Agency	The utility and customer donations, community organizations	Low-Income Households
Utah	HELP	-	Emergency Assistance	Local Community Agency	The utility, Private Donations	Low-Income Households
Utah	Military Assistance	-	Payment Assistance	Municipality	The utility, Private Donations	Military households
Vermont	General Assistance Program	-	Emergency Assistance	State	State	Low Income Households
Vermont	Weatherization Trust Fund	1990	Energy Efficiency	The utility	The utility	Low-Income Households
Vermont	Low-Income Rate Assistance	-	Payment Assistance	The utility	The utility	Low-Income Households
Vermont	Efficiency Vermont	2000	Energy Efficiency, Education	The utility	The utility	All households and businesses
Vermont	Low-Income Single Family Program	2000	Energy Efficiency, Appliance Replacement	The utility	The utility	Low-Income Households
Vermont	Weatherization Service	-	Energy Audit, Energy Efficiency	Local Community Agency	The utility	Low-Income Households
Vermont	WARMTH, The Shareheat Fund	-	Emergency Assistance	Local Community Agency	Private donations	Low-Income Households
Virginia	State Sales Tax Exemption	-	Payment Assistance	The utilities	The state	Low-Income Households
Virginia	Security Deposit Waived	-	Payment Assistance	The utilities	The utilities	Low-Income Households
Virginia	Fan Care	-	Appliance Donation	State	The utilities	Senior Low-Income Households
Virginia	Virginia Natural Gas	-	Energy Efficiency, Appliance Replacement/Repair, Education	Local Community Agency	The utility	Low-Income Households
Virginia	Neighbor-to-Neighbor	-	Emergency Assistance	Dollar Energy Fund	The utility, Private Donations	Low-Income Households
Virginia	Sharing the Warmth	-	Emergency Assistance	The utility	The utility, Private Donations	Low-Income Households
Virginia	Heatshare, EnergyShare, Washington Area Fuel Fund	-	Emergency Assistance	Salvation Army	The utility, Private Donations	Low-Income Households
Virginia	EnergyShare	1983	Emergency Assistance	Local Community Agency	The utility, Private Donations	Low-Income Households
Virginia	Operation Roundup	-	Emergency Assistance	State	The utility, Private Donations	Low-Income Households
Virginia	Gas Assistance Program	-	Emergency Assistance	Municipality	Municipality	Low-Income Households
Washington	Puget Sound HELP	-	Payment Assistance	The utility	The utility	Low-income Households
Washington	HomeWise	-	Energy Efficiency	Municipality	Municipality	Low-income Households
Washington	Tacoma Public Utilities	-	Payment Assistance	The utility	The utility	Low-income households 62 years or older or disabled
Washington	Tacoma Power Family Need	-	Payment Assistance	The utility	The utility	Low-income Households
Washington	Seattle City Light Discounted Rates	-	Payment Assistance	The utility	The utility	Seniors; persons with disabilities; or low-income households
Washington	Project SHARE	-	Payment Assistance	The utility	The utility	Low-income Households
Washington	Seattle City Light Emergency Low Income Assistance	-	Payment Assistance	The utility	The utility	Low-income Households
Washington	Senior Energy Outreach	-	Payment Assistance	The utility	The utility	Low-income households 60 years or older
Washington	Low Income Rate Assistance Program (LIRAP)	-	Payment Assistance	The utility	The utility	Low-income Households
Washington	Senior Discount Program / Disabled Discount Program / Low Income Winter Discount	-	Payment Assistance	The utility	The utility	Low-income households 62 years or older or disabled
Washington	Pacific Power Yakima Valley Opportunities Industrialization Center	-	Education, Energy Efficiency	The utility	The utility	6th Grade Students



## Appendix K Continued: Policies and Programs in the United States

Region	Name of Initiative	Date of Implementation	Type of Initiative	Lead Organization	Source of Funding	Target Population
Washington	Spokane Neighborhood Action Program (SNAP)	-	Advocacy Organization, Education	Local Community Agency	Private Donations	Low-Income Households
Washington, D.C.	Economic Opportunity Studies (EOS)	2002	Research and Development, Education	EOS	Private Donations	Organizations
West Virginia	Commission Order	1984	Legislation, Payment Assistance	The utility	The utility	Senior Low-Income Households
West Virginia	West Virginia Utility Assistance Program	-	Emergency Assistance	Salvation Army	Dollar Energy Fund	Low-Income Households
West Virginia	Heat Fund	-	Emergency Assistance	Salvation Army	The utility, Private Donations	Low-Income Households
Wisconsin	Public Benefits Fund	1999	Emergency Assistance, Energy Efficiency	Local community agency	Private Donations, LIHEAP funding, the utility	Low-Income Households
Wisconsin	General Assistance Program	-	Emergency Assistance	Local community agency	State	Low-Income Households
Wisconsin	Sales Tax Waiver	-	Payment Assistance	Local community agency	State	Low-Income Households
Wisconsin	Housing Cost Reduction Initiative Utility Payment Program	-	Payment Assistance	Local community agency	State	Low-Income Households
Wisconsin	Focus on Energy	-	Energy Audit, Energy Efficiency, Education	Local community agency	The utility, State	Low-Income Households
Wisconsin	Energy Assistance Program, Commitment to Community Program, Weatherization Assistance, Home Weatherization Program, Customer Credit Program	-	Payment Assistance, Energy Efficiency, Appliance Replacement	Local community agency	The utility, State	Low-Income Households
Wisconsin	Keep Wisconsin Warm Fund (KWWF)	1996	Emergency Assistance, Energy Efficiency	KWWF	Public Donations, Private Donations	Low-Income Households
Wisconsin	Hometown Care Energy Fund, Energy Fund, Operation Round Up, Project Share Fund, Helping Hand	-	Emergency Assistance	Local community agency	The utility, Private Donations	Low-Income Households
Wyoming	Senior Tax Rebate	-	Payment Assistance	Local community agency	State	Senior or disabled low-income households
Wyoming	Rate Assistance	-	Payment Assistance	The utility	The utility	Low-Income Households
Wyoming	Weatherization Service	-	Energy Efficiency	State	The utility, State	Low-Income Households
Wyoming	Energy Share of Wyoming	-	Emergency Assistance	Salvation Army	The utility, Private Donations, community organizations	Low-Income Households
Wyoming	Operation Round Up	-	Emergency Assistance	The utility	The utility, Private Donations	Low-Income Households

## Appendix L: Energy Audit Readings

Interview	Initial Reading	Potential Reading	Final Reading	Potential Met	Overall Improvement	Renovations Performed
2	55	63	67	Yes	12	Exterior doors, windows, insulated attic and walls
3	40	na	87	na	47	Insulated basement, new furnace, new windows and doors
8	11	67	na	na	na	Insulated exterior walls and attic
9	42	78	66	No	24	Replaced furnace, insulated basement, weatherstripping
12	36	68	70	Yes	34	Weatherstripping, replaced furnace, programmable thermostat, insulated exterior walls, installed more efficient hot water tank
17	60	74	na	na	na	Insulated basement
19	30	na	60	na	30	Insulated basement, weatherstripping, programmable thermostat

# Appendix M: Ethics Approval



UNIVERSITY  
OF MANITOBA

OFFICE OF RESEARCH  
SERVICES  
Office of the Vice-President (Research)


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208 - 194 Dafoe Road  
Winnipeg, MB R3T 2N2  
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[www.umanitoba.ca/research](http://www.umanitoba.ca/research)

## APPROVAL CERTIFICATE

April 15, 2010

(Advisor -David Van Vliet)

TO: **Kari Schulz**  
Principal Investigator

FROM: **Wayne Taylor, Chair**   
Joint-Faculty Research Ethics Board (JFREB)

Re: **Protocol #J2010:050**  
**"Energy in my yard: Utilizing local Renewable Energy to Reduce  
Energy Poverty in the Daniel McIntyre and St. Matthews  
Neighbourhoods"**

Please be advised that your above-referenced protocol has received human ethics approval by the **Joint-Faculty Research Ethics Board**, which is organized and operates according to the Tri-Council Policy Statement. This approval is valid for one year only.

Any significant changes of the protocol and/or informed consent form should be reported to the Human Ethics Secretariat in advance of implementation of such changes.

**Please note:**

- If you have funds pending human ethics approval, the auditor requires that you submit a copy of this Approval Certificate to **Eveline Saurette** in the Office of Research Services, (e-mail [eveline\\_saurette@umanitoba.ca](mailto:eveline_saurette@umanitoba.ca), or fax 261-0325), including the Sponsor name, before your account can be opened.
- If you have received multi-year funding for this research, responsibility lies with you to apply for and obtain Renewal Approval at the expiry of the initial one-year approval; otherwise the account will be locked.

The Research Ethics Board requests a final report for your study (available at: [http://umanitoba.ca/research/ors/ethics/ors\\_ethics\\_human\\_REB\\_forms\\_guidelines.html](http://umanitoba.ca/research/ors/ethics/ors_ethics_human_REB_forms_guidelines.html)) in order to be in compliance with Tri-Council Guidelines.

*Bringing Research to Life*

# Appendix N: Consent Form for Structured Interviews



Fort Garry Campus Research Ethics Boards  
CTC Building, 206 - 194 Dufferin Road  
Winnipeg, MB R3T 2N2  
Phone: (204) 474-7122  
Fax: (204) 269-7173

## CONSENT FORM

**Research Project Title:** Energy in My Yard: Utilizing Local Renewable Energy to Reduce Energy Poverty in the Daniel McIntyre and St. Matthews Neighbourhoods

**Researcher:** Kari Schulz, Graduate Student, University of Manitoba

**Sponsor (if applicable):** N/A

This consent form, a copy of which will be left with you for your records and reference, is only part of the process of informed consent. It should give you the basic idea of what the research is about and what your participation will involve. If you would like more detail about something mentioned here, or information not included here, you should feel free to ask. Please take the time to read this carefully and to understand any accompanying information.

1. A brief description of the purpose of the research.  
The purpose of the research is to understand the experiences of local residents in regards to their energy consumption and ability to increase the energy efficiency of their homes.

The objectives of the study are:

- To recount the experiences of local residents; and,
- To develop a profile from the interviews of energy poverty in the Daniel McIntyre and St. Matthews neighbourhoods.

The data will be used to answer the following research question: What is the nature, extent and impact of energy poverty in the Daniel McIntyre and St. Matthews neighbourhoods?

2. A description of the procedures involving the subject, including their nature, frequency and duration.  
The subject will be interviewed only once, in a place agreed upon by the subject and the researcher and lasting approximately 30 to 45 minutes. The interview will consist of four topic areas: the current accommodations of the individual; household costs and characteristics; personal questions related to employment and income; and knowledge of housing and "green" initiatives undertaken by the community association. The approach is structured. The subject will be asked to identify him or herself but may decline to do so or may give an alias. The subject may refuse to answer any questions that they are not comfortable answering.

3. A description of risk (i.e., potential harm greater than that which one might experience in the normal conduct of one's everyday life).  
No risk is anticipated.

4. A description of any recording devices to be used.  
No recording devices will be used.

5. A description of the degree of confidentiality that will be maintained. Explain who will have access to information collected and to the identity of the subject, including a description of how confidentiality will be protected. If confidentiality or anonymity cannot be guaranteed, participants should be made aware of possible consequences.

Only the researcher will have access to the information collected and to the identity of the subject. Confidentiality will be protected by keeping all documentation of the interview accessible only to the researcher in a locked filing cabinet. The subject will not be required to provide any personal information apart from that which the subject wishes to give, and anonymity will be guaranteed by using aliases in place of real names in the final thesis; anything

## Appendix N Continued: Consent Form for Structured Interviews

said by a subject may appear in the paper, but no true identity will be attached to any statement. This will be stated outright at the interview. Data will be stored on a personal computer, accessible with a password known only to the researcher, and backed up on disc accessible only to the researcher in a locked filing cabinet in a secured residence. On or before February 2011, following submission of the final draft of the thesis, all digital transcriptions will be erased and all hard copies of transcriptions will be destroyed in a paper shredder.

6. Feedback to subjects is desirable. Include a statement of how the findings or other study-related feedback will be made available to the subjects.

Do you wish to receive feedback from your interview? Please circle one: Yes or No

Feedback will be made available to the subject following the analysis of the interview if the subject wishes. This will be given to the subject by email or delivered in person by the researcher, whichever the subject prefers.

7. Details of any form of credit or remuneration.

No credit or remuneration will be provided.

Your signature on this form indicates that you have understood to your satisfaction the information regarding participation in the research project and agree to participate as a subject. In no way does this waive your legal rights nor release the researchers, sponsors, or involved institutions from their legal and professional responsibilities. You are free to withdraw from the study at any time, and /or refrain from answering any questions you prefer to omit, without prejudice or consequence. Your continued participation should be as informed as your initial consent, so you should feel free to ask for clarification or new information throughout your participation.

Researcher: Kari Schulz:  
Supervisor: Dr. David van Vliet:

This research has been approved by the Joint Faculty Research Ethics Board. If you have any concerns or complaints about this project you may contact any of the above-named persons or the Human Ethics Secretariat at 474-7122, or e-mail [margaret\\_bowman@umanitoba.ca](mailto:margaret_bowman@umanitoba.ca). A copy of this consent form has been given to you to keep for your records and reference.

---

Participant's Signature \_\_\_\_\_ Date \_\_\_\_\_

---

Researcher and/or Delegate's Signature \_\_\_\_\_ Date \_\_\_\_\_

# Appendix O: Consent Form for Semi-Structured Interviews



Fort Garry Campus Research Ethics Boards  
CTC Building, 208 - 194 Dafoe Road  
Winnipeg, MB R3T 2N2  
Phone: (204) 474-7122  
Fax: (204) 269-7173

## CONSENT FORM

**Research Project Title:** Energy in My Yard: Utilizing Local Renewable Energy to Reduce Energy Poverty in the Daniel McIntyre and St. Matthews Neighbourhoods

**Researcher:** Kari Schulz, Graduate Student, University of Manitoba

**Sponsor (if applicable):** N/A

This consent form, a copy of which will be left with you for your records and reference, is only part of the process of informed consent. It should give you the basic idea of what the research is about and what your participation will involve. If you would like more detail about something mentioned here, or information not included here, you should feel free to ask. Please take the time to read this carefully and to understand any accompanying information.

1. A brief description of the purpose of the research.

The purpose of the research is to assess the current programs, renewable energy trends and institutional barriers.

The objective of the study is:

- To use the findings from the interviews with professionals to make recommendations for future policies and programs to reduce energy poverty through the use of local renewable energy.

The data will be used to answer the following research questions:

- Are there renewable energy options at the local level that can be used to address energy poverty?
- What are the institutional barriers between government, the community association and local residents that prevent a reduction in poverty and in what ways can they be overcome?

2. A description of the procedures involving the subject, including their nature, frequency and duration.

The subject will be interviewed only once, in a place agreed upon by the subject and the researcher and lasting approximately one hour. The interview will consist of questions based on the literature review. The questions asked are dependent on the group the subject is placed based on their profession. The approach is qualitative and the questions are open-ended in this way to allow the subject to speak freely. The subject will be asked to identify him or herself but may decline to do so or may give an alias.

3. A description of risk (i.e., potential harm greater than that which one might experience in the normal conduct of one's everyday life).

No risk is anticipated.

4. A description of any recording devices to be used.

A digital audio recorder will be used. The subject may decline to be audio-taped.

5. A description of the degree of confidentiality that will be maintained. Explain who will have access to information collected and to the identity of the subject, including a description of how confidentiality will be protected. If confidentiality or anonymity cannot be guaranteed, participants should be made aware of possible consequences.

Only the researcher will have access to the information collected and to the identity of the subject. Confidentiality will be protected by keeping all documentation of the interview accessible only to the researcher in a locked filing cabinet. The subject will not be required to provide any personal information apart from that which the subject wishes to give, and anonymity will be guaranteed by using aliases in place of real names in the final thesis; anything said by a subject may appear in the paper, but no true identity will be attached to any statement. This will be stated

## Appendix O Continued: Consent Form for Semi-Structured Interviews

outright at the interview. Additionally, the subject may decline to be audio-taped. Data will be stored on a personal computer, accessible with a password known only to the researcher and backed up on disc accessible only to the researcher in a locked filing cabinet in a secured residence. On or before February 2011, following submission of the final draft of the thesis, all digital transcriptions will be erased and all hard copies of transcriptions will be destroyed in a paper shredder.

6. Feedback to subjects is desirable. Include a statement of how the findings or other study-related feedback will be made available to the subjects.

Do you wish to receive feedback from your interview? Please circle one: Yes or No

Feedback will be made available to the subject following the analysis of the interview if the subject wishes. This will be given to the subject by email or delivered in person by the researcher, whichever the subject prefers.

7. Details of any form of credit or remuneration.  
No credit or remuneration will be provided.

Your signature on this form indicates that you have understood to your satisfaction the information regarding participation in the research project and agree to participate as a subject. In no way does this waive your legal rights nor release the researchers, sponsors, or involved institutions from their legal and professional responsibilities. You are free to withdraw from the study at any time, and /or refrain from answering any questions you prefer to omit, without prejudice or consequence. Your continued participation should be as informed as your initial consent, so you should feel free to ask for clarification or new information throughout your participation.

Researcher: Kari Schulz:  
Supervisor: Dr. David van Vliet:

This research has been approved by the Joint Faculty Research Ethics Board. If you have any concerns or complaints about this project you may contact any of the above-named persons or the Human Ethics Secretariat at 474-7122, or e-mail [margaret\\_bowman@umanitoba.ca](mailto:margaret_bowman@umanitoba.ca). A copy of this consent form has been given to you to keep for your records and reference.

\_\_\_\_\_  
Participant's Signature Date

\_\_\_\_\_  
Researcher and/or Delegate's Signature Date