

**Environmental Sustainability Through Residential Development: Canadian
Experiences on Implementation at the Municipal Level**

By:

Alex E. Menjivar

A capstone project submitted to the Faculty of Graduate Studies of
The University of Manitoba
In partial fulfillment of the requirements of the degree of

MASTER OF CITY PLANNING

Department of City Planning
Faculty of Architecture
University of Manitoba
Winnipeg

Copyright © 2019 Alex E. Menjivar

Acknowledgements

I would like to express my appreciation to Dr. David Van Vliet and Dr. Orly Linovski for their expertise and guidance through the development of this research work. I would also like to acknowledge Dr. Alan Diduck of the University of Winnipeg for this role as the external committee member and for his valuable comments for this project. I would also like to thank the interview participants for taking time from their busy schedules to speak to me and contribute their invaluable input to this research. I would also like to acknowledge the financial contributions from the MGEU Peter Olfert Scholarship and the Thomas B. Yauk – MPPI Scholarship for the success of my studies.

I am especially thankful to Anton Metalnikov, Felipe Mogollon, Andrew Treger, and my co-workers at Manitoba Housing for their supportive friendship throughout my studies. I must also express my profound gratitude to my wife, Yessenia Menjivar, and my family for their continuous encouragement and for providing me with much needed respite during my years of studying. Completing my studies and this project would not have been possible without their unfailing support.

Executive Summary

As municipalities are choosing to grow more sustainably, residential development has been identified as a vehicle to contribute to these efforts. Currently, there is a knowledge gap in how Canadian municipalities are utilizing policies to contribute to environmental sustainability through residential developments. The purpose of this research is to understand what policies Canadian cities are using to implement environmental sustainability, understand how these policies are working, and how they could be improved. This research provides decision makers with lessons and experiences to improve policies that contribute to sustainable development.

The first research method used a content analysis which analyzed policies within municipal development plans from Toronto, Ottawa, Calgary and Edmonton. Municipal development plans were scored based on the number of policies related to environmental sustainability through residential development and the level of authority given to policies. Policies were also classified to determine what types of policies municipal development plans are using. The second research method included conducting interviews with city employees from the highest scoring city from the content analysis. The interviews provided information on how policies are working and how they could be improved on.

The content analysis found that high scoring cities had a high number of required policies. The policy classification found that required policies mostly influenced urban form and suggested policies mostly influenced green building features. The interviews resulted in four themes, which are policy level of authority, incremental environmental sustainability policy, metrics and goals to implement policy, and political and government leadership. Decision makers and planners could use the findings to understand what types of policies could be used to contribute to sustainable development, utilize the experiences on how to implement policies, and lessons overcome potential barriers. Additional research in the future that addresses limitations the limitations in this study could help in verifying results.

Table of Contents

1.0 Introduction	5
1.1 Background and Context	5
1.2 Research Question	5
1.3 Document Structure	6
2.0 Methods	7
2.1 Data Collection Phase 1: Content Analysis	7
2.2 Data Collection Phase 2: Semi-Structured Interviews.....	10
2.3 Limitations	11
3.0 Municipal Planning Regulatory Framework	12
3.1 Province of Ontario.....	12
3.2 Province of Alberta.....	13
4.0 Literature Review	15
4.1 Defining Sustainable Development	15
4.2 The Role of Residential Development in Environmental Sustainability	16
4.3 Experiences in Implementing Environmental Sustainability Policies	17
5.0 Results	19
5.1 Content Analysis Results	19
5.2 Semi-Structured Interviews	28
6.0 Discussion.....	31
6.1 Content Analysis Discussion	32
6.2 Semi-Structured Interviews Discussion.....	32
6.3 Research Question Responses	34
7.0 Recommendations and Conclusion	35
8.0 References	36
9.0 Appendices	40
Appendix A: Interview Guide.....	40
Appendix B: CORE Certificate of Completion	41
Appendix C: Recruitment Email.....	42
Appendix D: Information Sheet and Consent Form	43

List of Figures

Figure 1: Hierarchy of Land Use Plans in Alberta 14

Figure 2: Policy Strength, by City 20

Figure 3: Required Policies for all Cities - Classification Results 22

Figure 4: Suggested Policies for all Cities - Classification Results 22

Figure 5: Required Policies for the City of Toronto - Classification Results 23

Figure 6: Suggested Policies for the City of Toronto - Classification Results 24

Figure 7: Required Policies for the City of Edmonton - Classification Results 24

Figure 8: Suggested Policies for the City of Edmonton - Classification Results 25

Figure 9: Required Policies for the City of Calgary - Classification Results 26

Figure 10: Suggested Policies for the City of Calgary - Classification Results 26

Figure 11: Required Policies for the City of Ottawa - Classification Results 27

Figure 12: Suggested Policies for the City of Ottawa - Classification Results 28

List of Tables

Table 1: Content Analysis Policy Rubric 8

Table 2: Content Analysis - Municipal Development Plan Documents 9

Table 3: Policy Classification Schema 10

Table 4: Total score, by city 21

List of Appendices

Appendix A: Interview Guide 40

Appendix B: CORE Certificate of Completion 41

Appendix C: Recruitment Email 42

Appendix D: Information Sheet and Consent Form 43

1.0 Introduction

1.1 Background and Context

In 2016, the Habitat III Summit brought representatives from governments and organizations from around the globe to create the New Urban Agenda, which renews political commitments and sets action for future sustainable development. The agenda describes several commitments, including the development and provision of sustainable housing towards creating sustainable communities. The New Urban Agenda contributes to the broader global implementation of the 2030 Agenda for Sustainable Development and to the achievement of the Sustainable Development Goal (SDG) 11: Sustainable Cities and Communities (United Nations, 2017). Within Canada, the federal government has committed to implementing the New Urban Agenda and SDGs. The Government of Canada has committed to working with provincial and municipal governments to support environmental sustainability, including achieving sustainability through housing (Employment and Social Development Canada, 2016). Additionally, the Federation of Canadian Municipalities passed a resolution titled *Federal-Municipal Partnership to Achieve Paris Agreement Goals* in 2018, which commits to working with the federal government to develop policies and programs that achieve targets under the Paris Agreement (Federation of Canadian Municipalities, 2018).

Although there is general knowledge and consensus about what sustainability should accomplish, there continues to be a gap in our understanding of how sustainability goals should be implemented at the municipal level. The lack of progress in implementation is due to factors such as the lack of knowledge in the design of mechanisms for advancing sustainability and variety in interpretations of what is sustainability (Vojnovic, 2014).

1.2 Research Question

As housing (or residential development) has been identified as a vehicle to achieve GHG reduction targets, this study aims to understand how environmental sustainability through residential development is being implemented at the municipal level. This paper argues that municipal policies are falling short in contributing to environmental sustainability through residential development. The research questions this study addresses are the following:

- What policies are communities in Canada using to implement sustainability through residential developments?
- How are implementing these policies working?
- How could the policies be improved?

This research explored Canadian municipal policies that attempt to implement environmental sustainability by influencing the built form of residential developments. It also examined policies that influence the inclusion of green building features within residential developments. Additionally, this research looked closely at one city to have a deeper understanding of how policies are working and how they can be improved on. Sustainability was previously often thought of as a concept with no clear targets or implementation strategies for cities. However more recently, it is seen as “dynamic and evolving and will change over time as understanding of the local and global environment becomes more sophisticated and shared” (Greed, 2014, p. 235). As Canadian cities seek to grow in a more environmentally sustainable manner through residential development, this research could inform decision-makers of the policies currently being used in Canada, how their implementation is working, and guidance to improve implementation.

1.3 Document Structure

This document is structured in eight sections, including; introduction, methods, municipal planning regulatory framework, literature review, results, discussion, and recommendations and conclusion. The introduction provides a background and context of the research, research questions, and the significance of the results. The methods section describes the strategy used to answer the research questions, data collection and analysis methods, and study limitations. The municipal planning regulatory framework section provides an overview and description of the planning policy frameworks for each municipal development plan included in this study. The literature review section describes what sustainable development is, the role of residential development in environmental sustainability, and experiences in implementing environmental sustainability through residential developments. The results section describes the data collection findings and the discussion section discusses the data collection findings as they relate back to the literature. The discussion section also describes how the findings relate back to the research

questions. The recommendations and conclusions section provides direction for how this study could be extended in future research, provides recommendations based on the research findings, and conclusion statements.

2.0 Methods

This section outlines the research strategy used to answer the research questions, data collection phases, and data limitations. This study used two data collection phases, which are a content analysis phase and a semi-structured interview phase.

2.1 Data Collection Phase 1: Content Analysis

The content analysis data collection phase involved searching through municipal planning documents to identify policies related to environmental sustainability through residential development. Municipal planning documents (e.g. *A Sustainable Winnipeg* for the City of Winnipeg) outline policies that provide direction on how a city grows, including policies on environmental sustainability. The cities selected for this study were based on the Canadian entries in the C40 cities network (excluding Montreal) and an additional three cities, chosen by largest population. Cities were chosen by largest population based on the assumption that cities with a higher population would be able to draw upon more resources to implement their policies. The chosen cities for this study were Toronto, Calgary, Edmonton, and Ottawa.¹ The first data collection phase used criteria to assess municipal planning documents and select a city for the second data collection phase. The criteria were based on Berke & Conroy (2000), a study that assessed sustainability policies found in comprehensive plans by assigning points. The study assigned points using the following criteria: sustainable development principles promoted, type of development management technique used (e.g., zoning and subdivision regulations), and the use of the permissive or mandatory language dichotomy, i.e. suggested (e.g. words such as *encourage*, *consider*, *intend*, or *should*) or required (e.g. words such as *shall*, *will*, *require* or *must*). The content analysis for this study used similar criteria in analyzing policies in municipal planning documents that are related to environmental sustainability through housing. The criteria for this study allocated points for each document based on the number policies and the language used in each policy (suggested vs. required). Each policy was assigned 0.5 points to account for

¹ Vancouver was originally intended to be included in the study but was removed due to the incomparability of Vancouver's municipal development plan to other documents in this study.

the number of policies, 1.0 point for policies that used suggested wording and 2.0 points for policies that used required wording (Table 1: Content Analysis Policy Rubric). This rubric was designed to give credit for the number of policies within a planning document, while recognizing the importance of policy enforceability. Allocated points were added up and each municipal document received a corresponding score. Selecting a city based on these criteria determined which municipal development plan is the strongest example in terms of number of policies and policy strength for the second research phase.

Table 1: <i>Content Analysis Policy Rubric</i>		
<u>Rubric Factor</u>	<u>Point allocation per policy</u>	<u>Description</u>
Policy Count	0.5	Every policy was allocated 0.5 points to account for the number of references.
Suggested policy language	1.0	Policies with suggested language were given an additional 1.0 point because of their non-binding and unenforceable nature.
Required policy language	2.0	Policies with required language were given an additional 2.0 points because of their binding and enforceable nature.

Municipal development plans from each city were chosen for the content analysis because they are mandated by the province and reflect both provincial and municipal priorities. Municipal development plans provide policy statements on how development should occur, including statements related to environmental sustainability. Municipal councils use these policy statements to ensure that a city is growing in a way that reflects its priorities and examining these policies provides insight on how a municipality is working towards environmental sustainability. Documents included in the content analysis are outlined in Table 2.

Table 2:

Content Analysis - Municipal Development Plan Documents

<u>City Name</u>	<u>Municipal Development Plan Title</u>	<u>Council Adoption Date</u>
Edmonton	Municipal Development Plan - The Way We Grow	2010
Calgary	Municipal Development Plan	2009
Ottawa	Ottawa Official Plan	2003
Toronto	Toronto Official Plan	2002

In addition to analyzing and scoring policies according to the rubric, policies from each municipal development plan were also classified into categories and sub-categories based on classes outlined in Roseland (2012). Classifying the policies in this manner provides an understanding of the types of policies Canadian cities are using to work towards environmental sustainability. As this study is concerned with factors that influence the urban form and green building features in residential developments, these two categories were used in classifying policies.

The urban form category included location and density as sub-categories. The location sub-category was used to classify policies that guide residential development to a particular location, such as a transit station. The density sub-category was used to classify policies that increase the population density in residential developments. The green buildings category included five sub-categories: building design; energy efficiency and renewables; waste reduction and recycling; water, wastewater, and sewage; and other. The building design sub-category refers to the use of broad policies that influence low environmental impact residential design. The energy efficiency and renewables sub-category refers to policies that utilize elements that promote energy efficiency and the use of renewable energy in residential developments. Waste reduction and recycling refers to policies that reduce waste and promote recycling within a residential development. The water, wastewater, and sewage sub-category refers to policies that reduce water consumption and wastewater. The final category, other, refers to all other policies that do not fit within the listed sub-categories. Both the urban form and green building categories, their corresponding sub-categories, and policy examples are outlined in Table 3.

Table 3:

Policy Classification Schema

<u>Category</u>	<u>Sub-Category</u>	<u>Policy Example</u>
Urban Form	Location	“Direct a greater share of new growth to the Main Streets identified.”
	Density	“Support the development of a greater variety of medium and higher density housing forms.”
Green Buildings	Building Design	“Incorporate sustainable development design into new developments.”
	Energy Efficiency and Renewables	“Encourage the incorporation of micro energy systems, solar panels or similar.”
	Waste Reduction and Recycling	“Support and encourage building designs that facilitate waste reduction and recycling.”
	Water, Wastewater, and Sewage	“Promote water conservation initiatives, including on-site stormwater and wastewater reuse and treatment.”
	Other	“Take a leadership role in facilitating the creation of environmentally sustainable neighbourhoods.”

2.2 Data Collection Phase 2: Semi-Structured Interviews

Semi-structured interviews were chosen for the second data collection phase to gain insight on how policies are achieving their purpose, possible implementation barriers, and how these barriers could be overcome. Appendix A provides the interview guide that was used with interviewees. Semi-structured interviews allowed for a conversation that was led by pre-determined questions, while allowing flexibility to speak on other related topics. The second data collection phase involved conducting semi-structured interviews with public employees from the City of Toronto, which was the city selected as a result of the content analysis. Interview recruitment was expanded to include the City of Edmonton due to low recruitment from the City

of Toronto. Two interviews were conducted as part of the second data collection phase. One interviewee was a municipal employee from the City of Edmonton, who is involved in implementing programs and policies related to energy transition. The second interviewee was a municipal employee from the City of Toronto, who is involved in environmental policy.

2.3 Limitations

The first limitation is with the scope of this study. As this study only considered policies related to environmental sustainability through residential developments, policies that contribute to other types of sustainability (i.e. cultural and social) or environmental sustainability through other municipal infrastructure (e.g. water, sewer, or landfill facilities) or development (e.g. industrial facilities) were not considered in this study. Analyzing policies from municipal development plans also presents a limitation as each city typically has dozens of subsidiary plans outside of the main municipal development plan. These subsidiary plans outline dozens of additional goals and objectives that may be related to environmental sustainability and including them would have greatly increased the scope of this study. This limitation was the reason why Vancouver was not included in this study, as its municipal development plan explained that only policies related to the regional context are covered and all other policies are within subsidiary plans. Reviewing subsidiary plans for Vancouver would have introduced data collection inconsistencies.

There are also limitations in both the content analysis and semi-structured interview data collection phases. As the first data collection phase used a rubric that assessed municipal development plans based on number of policies and the language used, there was no consideration on whether some policies are more valuable than others in reducing GHGs. The rubric does not account for whether some policies contribute more to environmental sustainability than others. The classification schema used in the content analysis presented a limitation as policies were not always mutually exclusive in their categorization. An example of this limitation is a policy that states “high density development should be located in close proximity to transit”. As this policy could be classified in either the location sub-category or the density sub-category, a certain degree of subjectivity was used in interpreting the main intent of the policy. Another limitation is the lack of interviews in the second phase of data collection. The small number of interviews presents a bias as it only represents one perspective for the

municipality and would not provide the thorough understanding that multiple interviews would achieve. The limited interview recruitment was the result of interviewee scheduling constraints, study time constraints, and possibly a small amount of suitable interview candidates.

3.0 Municipal Planning Regulatory Framework

Municipal development plans for the Canadian cities in this study are bound by provincial regulatory frameworks and legislation. These frameworks describe overarching provincial and regional priorities with which policies in municipal development plans must be consistent. The following outlines the planning regulatory framework for each city involved in this study.

3.1 Province of Ontario

Planning in Ontario begins with the *Planning Act*, which is the provincial legislation that describes regulations for land use in the province. The Act outlines planning processes, integrates provincial policies with municipal land use planning systems, encourages co-operation and coordination with various interests, and recognizes the authority and accountability of local municipal councils (Province of Ontario, 2018a).

The province's role, as defined by the *Planning Act*, includes issuing provincial policy statements that promote provincial interests and preparing provincial plans (e.g. Growth Plan for the Greater Golden Horseshoe). All provincial policy statements are meant to be read together and all decisions affecting planning matters must be consistent with the statements. Provincial plans address specific issues in specific geographic areas and are to be read in conjunction with provincial policy statements. Provincial plans take precedence over provincial policy statements if there are any conflicts, unless relevant legislation states otherwise (Province of Ontario - Municipal Affairs, 2014). The municipality's role, as defined by the *Planning Act*, includes the preparation of an official plan that outlines general planning goals and policies for the municipality. Official plans outline a municipality's general land use planning policies, coordinates growth to meet the community's needs, and helps all community members understand how their land may be used now and in the future. Official plans provide a framework for establishing zoning bylaws to set local regulations or standards (e.g. size of lots and heights of buildings) to control development and provide a way to evaluate and settle

conflicting land uses while meeting local, regional and provincial interests (Province of Ontario, 2018a). Once approved, official plans must be consistent with the provincial policy statements and must be followed by council and municipal officials. Zoning and bylaws must also conform to the plan once it comes into effect (Province of Ontario, 2018b).

The Toronto Official Plan is the culmination of many other plans, including the Council Strategic Plan, Toronto's Food Charter, and the Social Development Strategy. As per the *Planning Act*, policies under the Toronto Official Plan conform to the provincial policy statements and the provincial plan titled *Growth Plan for the Greater Golden Horseshoe*. The Ottawa Official Plan works in parallel with other subsidiary plans that take direction from the official plan. The official plan uses main supporting plans, which are the Transportation Master Plan, Infrastructure Master Plan, and Greenspace Master plan (The City of Ottawa, 2017).

3.2 Province of Alberta

Under the *Municipal Government Act*, Alberta municipalities are required to create municipal development plans (MDP). Municipal development plans must align with provincial policies and strategies stated in regional plans, while including municipal and local planning priorities. The regional plans integrate economic, environmental, and social outcomes and provide direction for municipal development plans, while recognizing their own authority in local decision making. Regional plans also provide provincial government planners and decision makers insight on local planning priorities as the plans consider inputs from local First Nations and Metis communities, stakeholders, and the public (Province of Alberta, 2008).

Figure 1 provides a visual representation of the planning framework hierarchy in Alberta.

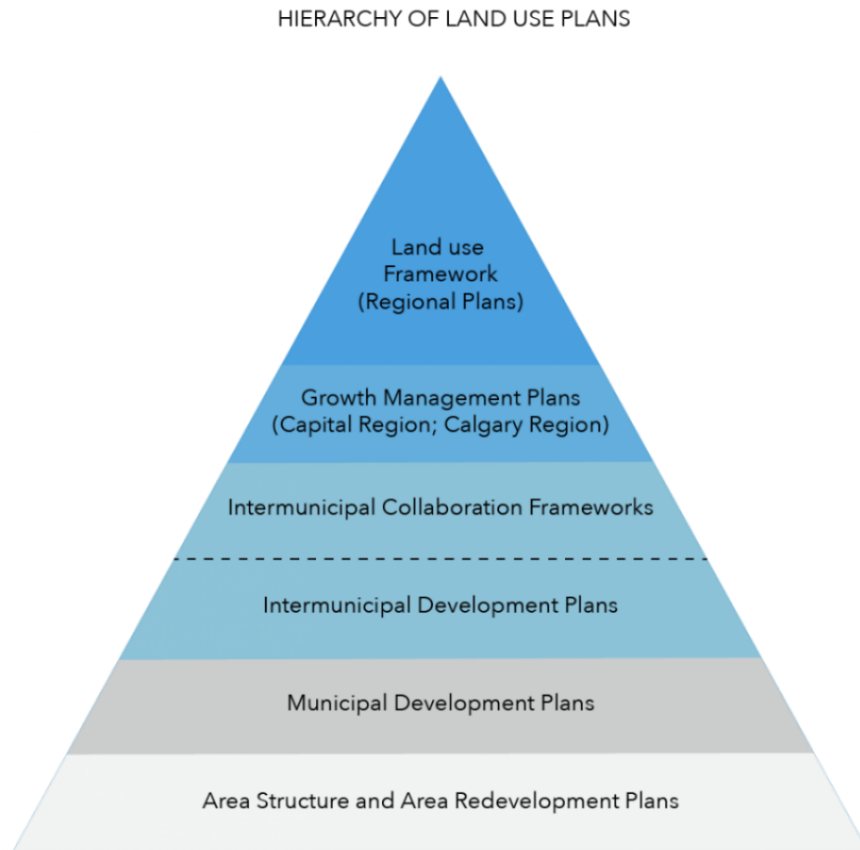


Figure 1: Hierarchy of Land Use Plans in Alberta (Alberta Urban Municipalities Association, n.d.-b)

As both Edmonton and Calgary are part of a regional growth management board, the cities are not subject to Intermunicipal Collaboration Frameworks or Intermunicipal Development Plans (Alberta Urban Municipalities Association, n.d.-a). The City of Edmonton’s MDP, titled *The Way We Grow*, is subject to the North Saskatchewan Regional Plan and the Edmonton Metropolitan Region Growth Plan, although the North Saskatchewan Regional Plan is not yet completed. Calgary’s Municipal MDP is subject to the South Saskatchewan Regional Plan and is aligned with the Calgary Metropolitan Plan. The provincial government has not accepted the Calgary Metropolitan Plan but has created a Calgary Metropolitan Growth Board in charge of preparing and adopting a growth plan in the future.

4.0 Literature Review

Themes that have been identified for the literature review include defining sustainable development, the role of residential development in environmental sustainability, and experiences in implementing environmental sustainability policies. The following will describe each of the themes and their related academic literature.

4.1 Defining Sustainable Development

This section provides background information on how sustainable development has been defined and discusses criticisms against the various definitions. The definition of sustainable development has evolved since the 1987 Brundtland report, where sustainable development was described as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (Brundtland, 1987, p. 43). The extension of the sustainable development definition in the Brundtland report to include meeting the needs of the world’s poor and to change the global economic injustice has also been met with criticism. Rees (1996) criticizes this definition as it suggests a growth-based model that calls for rapid growth in industrial and developing countries to move past present levels of industrial activity, which is seen as the cause of current environmental decline. For industrial and developing countries to move up to first world levels is a paradox that intensifies environmental and ecological strains (Rees, 1996). Kuhlman and Farrington (2010) also criticize this definition of sustainability for being vague and removing the emphasis on the environment. Arguments for the definition emphasize that advancing other dimensions of sustainability are vital to enable conditions to achieve environmental sustainability. These conditions include democracy and human capital investment, which fall under the other sustainability dimensions (Goodland & Daly, 1996). This expansion of the definition of sustainability to include social and cultural dimensions shows a movement towards a more holistic approach and the importance of connecting sustainability outside of the traditional environmental thought. The expansion of the sustainability definition to include an economic perspective is key, as sustainable development could be seen as implying economic growth, without sacrificing the environment.

Degrees of environmental sustainability refer to sustainability in economic terms and the ability to substitute natural capital with manufactured capital. Pearce (1989) further discusses this approach by presenting two broad views on the economic perspective of sustainable

development. The first view is that future generations should be provided as much capital wealth (i.e. roads, buildings, and factories) as is available to the current generation. This view, known as ‘Weak Sustainability’, allows for any generation to degrade the natural environment as long as it compensates future generations with the equivalent in capital wealth. The second view, known as “Strong Sustainability”, is that compensation for future generations should be achieved by passing on as much natural capital (i.e. forest, wildlife, and water) as is available to current generations, as wealth capital cannot be reverted back to natural capital. An argument against weak sustainability is that wealth capital gained by the loss of natural capital is grossly insufficient and that “natural capital should only be destroyed if the benefits of doing so are very large or if the social costs of conservation are unacceptably large” (Roseland, 2012, p. 10).

4.2 The Role of Residential Development in Environmental Sustainability

As this study explores the role of residential development in achieving sustainable development, this section provides the theoretical links between the two concepts. This section also outlines how urban form and green buildings contribute to environmental sustainability. Bhatti (1994) provides the theoretical intersection between sustainability and residential development when describing the development process as a transformation of resources into liveable spaces. Residential units provide benefits to society such as shelter, but also produce outputs such as waste and emissions. Hence, achieving sustainable residential development involves living within the limits imposed by Earth’s resources and capacities. The urban form of residential buildings relates to land use decisions that influence the production of GHGs and energy consumption. A study by Newton (2000) examining the influence of city form on fuel efficiency found that the compact city was the most fuel efficient and had the lowest output of carbon dioxide emissions compared to business-as-usual forms of development. These forms of developments are characterized as low density urban sprawl that promotes car dependency.

Other studies have found that dense and mixed use communities increased local walking and cycling trips (Handy, 1992), increased commuting by walking (Frank & Pivo, 1994), and discouraged car commuting and encouraged public transportation when retail outlets were within 300 feet of a residence (Cervero, 1996). One must be careful in overstating the benefits of compact development as the impacts of residential development and urban form on travel behaviour is complex and could include many factors not considered in the previously mentioned

studies. It is important to note that the outcomes from the previously mentioned studies are specific to their local context and may not be replicable in other contexts. Considering this, many municipalities are utilizing policies to create mixed use and compact communities to achieve environmental sustainability.

The role of buildings in implementing environmental sustainability is important because of their environmental impact and contributions to GHGs. In the United States, buildings account for 39% of energy consumption, 40% of raw materials, and 38% of carbon dioxide emissions during construction. Green building design and related construction methods provide the opportunity to improve energy efficiency by 30%, emit 35% less carbon dioxide, and produce 50-90% less waste from building construction and operation (Roseland, 2012). Technologies such as alternative energy sources and greywater recycling systems, in conjunction with green design elements (such as building orientation to maximize natural light and ventilation, improved insulation, and sourcing of recycled and sustainable construction materials), help in achieving green buildings (Roseland, 2012).

4.3 Experiences in Implementing Environmental Sustainability Policies

As this study focuses on policies related to both the urban form and promotion of green buildings, this section will draw on literature that describes the experiences in implementing policies related to both categories.

Policies influencing the urban form of residential development (i.e. high density residential clusters or low density curvilinear residential street patterns) have led to various outcomes. In examples from Vienna and Stockholm, land-use policies to combat sprawl, encourage public land-banking and affordable new construction, and maintain existing housing stock, have been effective in intensifying core urban areas (Tosics, 2004). In Amsterdam, a key factor in successfully implementing policies to create compact and dense urban form was extensive housing regulation by national and local government (Frans & Martin, 1999). In Portland, controlling sprawl and promoting compact development through an urban growth boundary was effective because of the involvement of a government regional planning agency (Dieleman & Wegener, 2004). The U.K. had negative experiences in implementing *Planning Policy Guideline 13 (PPG13)*, a national planning policy statement linking land use with transportation. The planning policy aimed to reduce the growth in length and number of

motorised journeys through alternative forms of travel that have less environmental impact. The research on the experience in implementing PPG13 outlines a general lack of education and awareness of local authorities about how the policy would impact their decisions. The majority of stakeholders (including local authority areas, businesses, and developers) were unaware of how the new policy would impact their proposals and plans. The same research also found many stakeholders preferred to resist the change for as long as possible, if it was left to their own responsibility, or unless their customers and clients expected the change. A developer interest group also expressed the need for incentives to encourage changes in land use and travel patterns and resistance to using contaminated land and mixed use development (Breheny et al., 1996). Common themes revealed through these experiences show the importance of educating stakeholders on land use policy changes so that there is better understanding of the policy rationale. The experiences outlined also reveal the importance of strong political will to implement government policies that control sprawl. Enforceable regulations, along with a government role in housing development, have the ability to successfully implement policies that influence urban form.

When considering the success of green building policies, research shows a number of barriers to implementing sustainable residential development. In research from Ireland, interviews with organizations involved in housing development described a lack of shared vision about sustainable housing, inadequate building regulations, non-compliance with existing regulations, limited knowledge and expertise in green building methods, and negative perceptions of higher density housing as barriers (Winston, 2010). These experiences have also been seen in the Netherlands, where a broad definition of sustainable development from the government resulted in minimal effort in constructing sustainable residential development (Priemus, 2005). In the UK, a study on attitudes towards the government's sustainability initiatives in public housing revealed the initiatives to be of low priority for landlords due to the lack of momentum in implementation and lack of knowledge in defining sustainable development (Hall & Purchase, 2006). The lack of priority by stakeholders in implementing environmentally sustainable development is also consistent with another study in England, which found that environmental sustainability was only considered by residential or mixed use developers when required by policy or regulation (Williams & Dair, 2007).

Within the Canadian context, municipalities have the ability to use policies to influence environmental sustainability through residential developments within their development plans and zoning by-laws. However, municipalities are challenged with addressing climate change through development policies because of the lack of recognition of climate change as a local issue, a lack of capacity and expertise, and a lack of education for municipal staff and politicians (Robinson & Gore, 2005). Research on Calgary's *Sustainable Suburbs Study* found that Calgary's residential developers listed municipal resistance to change, regulations and development standards, approval processing times, high risks and costs for demonstration projects, and community resistance as barriers to providing innovative solutions towards environmental sustainability (Shivji, 1995). Further, the research outlines the importance of incentives, an ecological-design culture, and the establishment of local sustainable design expertise for successful implementation of environmentally sustainable residential developments (Shivji, 1995). A more recent study on municipal sustainable development projects in Canada found that stakeholder involvement was a key factor in the success of a project and that it is crucial to identify and include all stakeholders in the process from the beginning. The study also identified education, awareness and support from the both community members and local government council members as important factors for successful projects (Parkinson & Roseland, 2002).

5.0 Results

The results section provides the outcomes of both the content analysis and the semi-structured interview data collection phases. The results from the content analysis data collection phase are in two parts; first are the results from the policy grading rubric and the second are results from the policy classification. The results from the semi-structured interviews are organized into topic themes, which are policy level of authority, incremental environmental sustainability policy, metrics and goals, and leadership support.

5.1 Content Analysis Results

Across the four municipal development plans, over 2,000 policies were analyzed for their relevance to environmental sustainability through residential development. The analysis resulted in filtering the 2,000 policies to 177 policies for all four documents. Of the four cities analyzed, Calgary had the highest number of policies with 53 and Toronto had second most at 51.

Edmonton was third with 44 policies and Ottawa had lowest count at 29. When analyzing the total number of policies and the proportion of these that were of the suggested variety, Calgary had the highest count at 39 out of 53 policies (74% suggested) and Toronto had the second highest at 20 out of 51 policies (39% suggested). Edmonton had the second lowest amount at 14 out of 44 policies (32% suggested), and Ottawa had the lowest amount at 8 out of 29 (28% suggested). When considering required policies, Ottawa had the highest percentage of required policies at 72% (21 of 29 policies). Edmonton had the second highest percentage of required policies at 68% (30 of 44 policies) and Toronto had third highest percentage of required policies at 60% (31 of 51 policies). Calgary was last for percentage of required policies, with 26% (14 of 53 policies) (Figure 2: Policy Strength, by City).

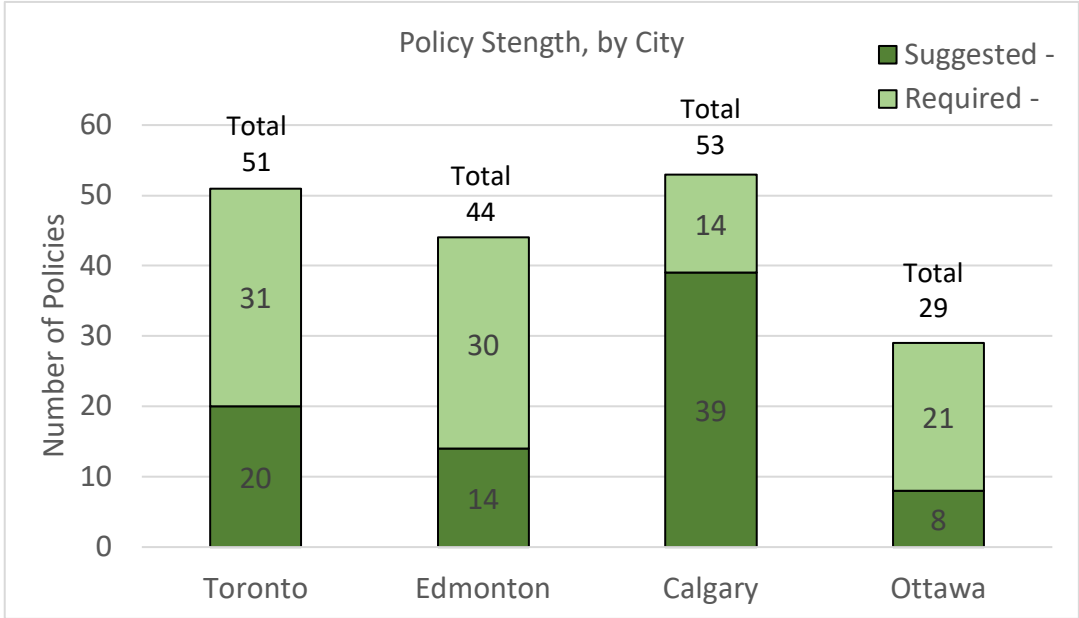


Figure 2: Policy Strength, by City

Using the scoring rubric previously indicated, Toronto scored the highest out of all four cities with a total score of 107.5. Edmonton was at second at 96, Calgary scored third at 67, and Ottawa was last place at 64.5 (Table 4).

Table 4: <i>Total score, by city</i>	
<u>City Name</u>	<u>Total Score</u>
Toronto	107.5
Edmonton	96
Calgary	67
Ottawa	64.5

Policy Classification

Moving from the analyses of number of policies in each municipal development plan, and policy strength based on language used, this section provides the results of the policy classification analysis.

The analysis shows that 79% of required policies were classified under the urban form category and 21% under the green buildings category. Within the urban form category, the location sub-category accounted for 74% of policies and the density sub-category accounted for 26%. Within the green buildings category, the building design sub-category accounted for 50% of policies and the energy efficiency and renewables sub-category accounted for 30%. The water, wastewater, and sewage sub-category and the waste reduction and recycling sub-category each accounted for 5% of policies. The remaining 10% are from the other sub-category (Figure 3).

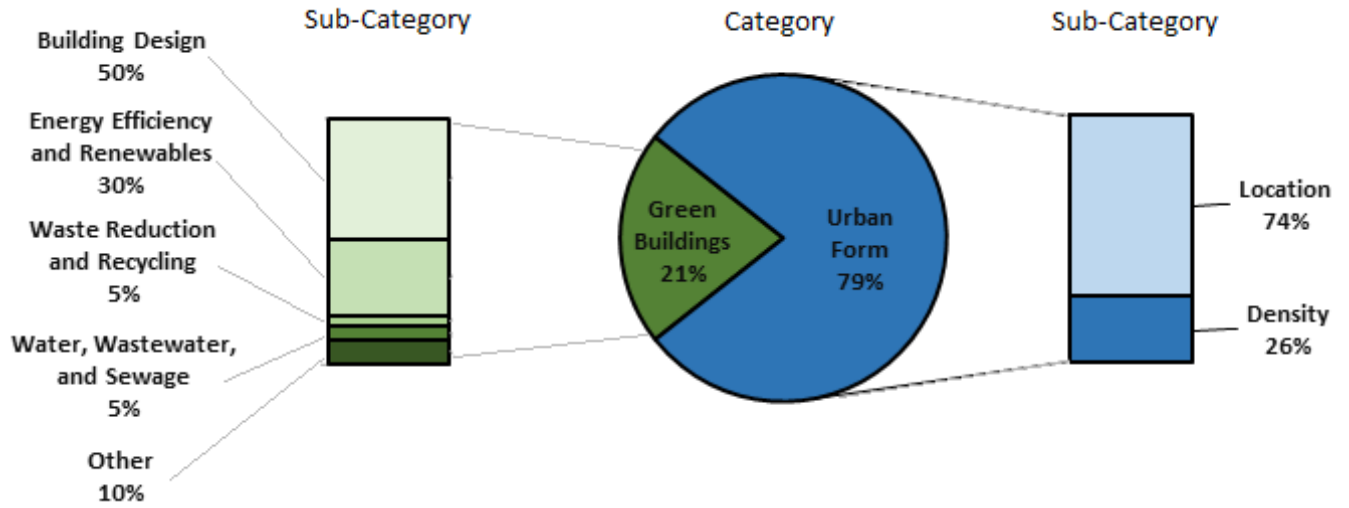


Figure 3: Required Policies for all Cities - Classification Results

When considering the results for suggested policies, the predominant category switched from urban form to green buildings. The green building category had 67% of the suggested policies and the urban form category had 32%. Within the urban form category, the location sub-category contained 62% of policies and the density sub-category had 38%. The sub-categories within green buildings is similar to the results of the required policies as the building design and the energy efficiency and renewables categories were the most common classification types, at 35% and 21% respectively. The waste reduction and recycling sub-category and the water, wastewater, and sewage sub-category were both at 19% (Figure 4).

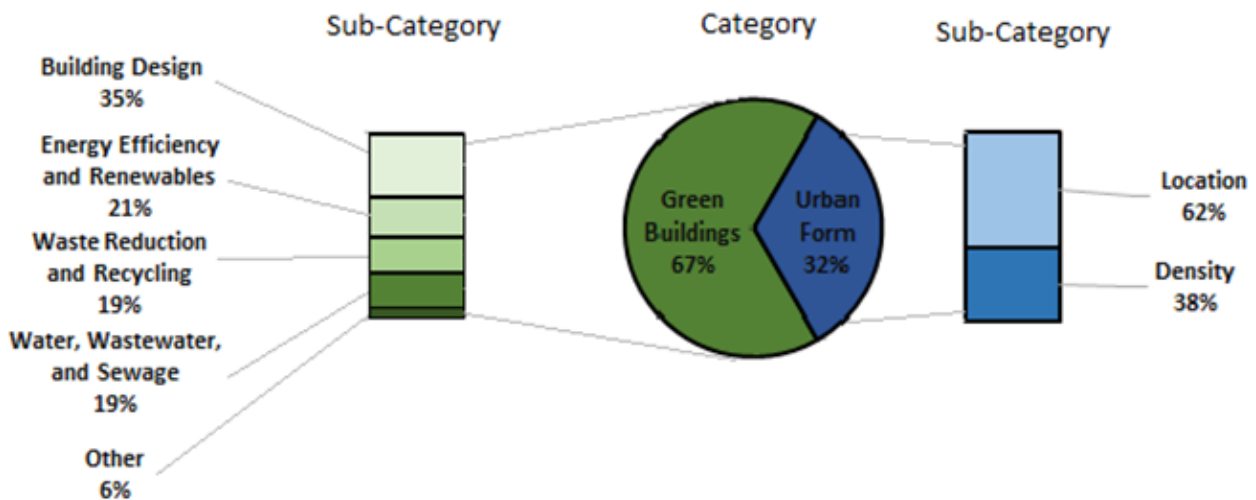


Figure 4: Suggested Policies for all Cities - Classification Results

City of Toronto Policy Classification Results

The classification results of Toronto’s required policies show that the urban form category contains 81% of policies and the green buildings categories contained 19%. Within the urban form category, the density sub-category contained 84% of policies while the location sub-category contained 16%. Within the green buildings category, the energy efficiency and renewables sub-category contained the highest number of policies at 33% with the remaining sub-categories tied at 17% (Figure 5).

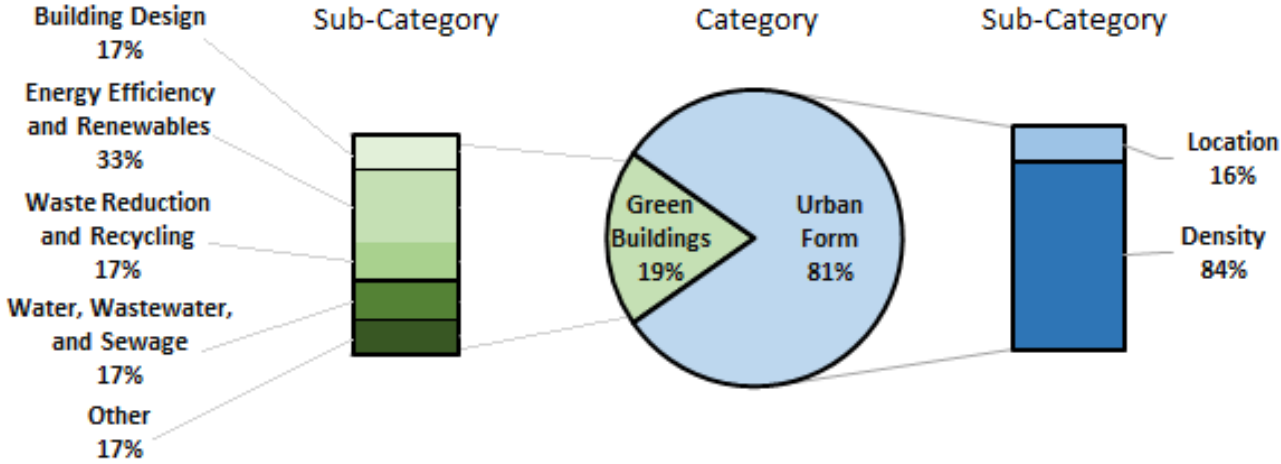


Figure 5: Required Policies for the City of Toronto - Classification Results

The classification results for Toronto’s suggested policies are 72% for green buildings and 28% for urban form. Within the urban form category, 80% of policies were in the location sub-category and 20% in the density sub-category. Within the green buildings category, the energy efficiency and renewables sub-category contained 31% of policies and the remaining sub-categories each had 23% (Figure 6).

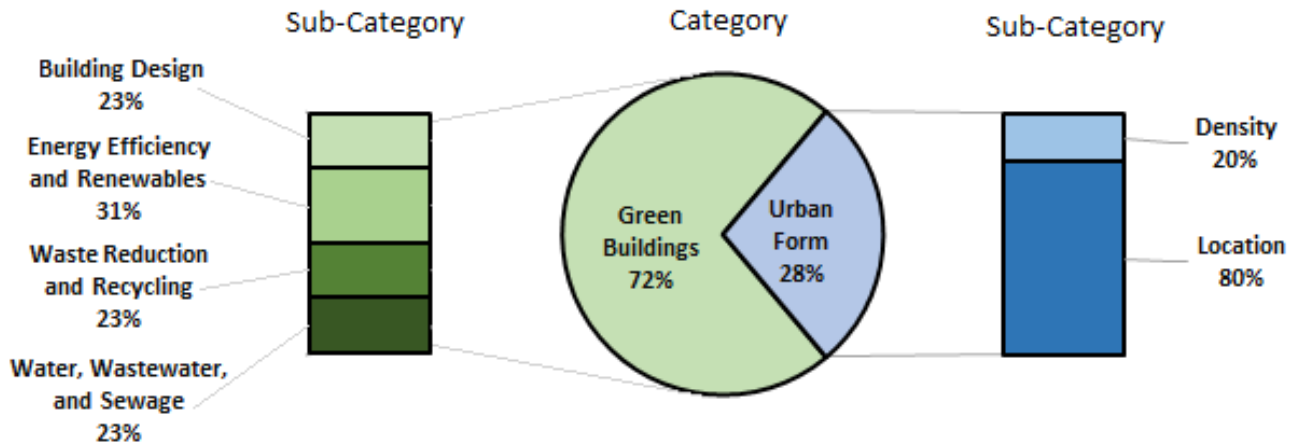


Figure 6: Suggested Policies for the City of Toronto - Classification Results

City of Edmonton Policy Classification Results

Classification results for required policies within Edmonton’s municipal development plan show that the urban form category contained 73% and the green building category had 27%. Within urban form, the location sub-category contained 82% of policies and the density sub-category contained 18%. Within the green buildings category, the building design sub-category contained 87% of policies while the remaining 13% were in the other sub-category (Figure 7).

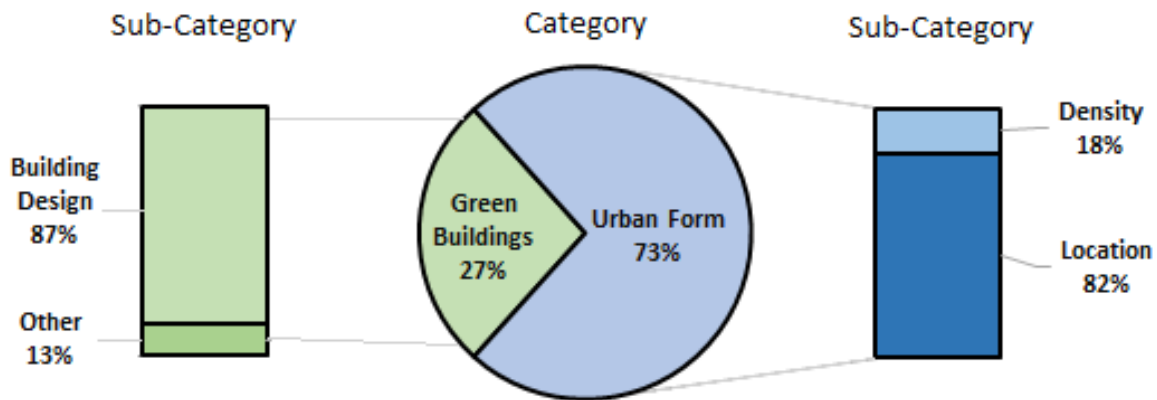


Figure 7: Required Policies for the City of Edmonton - Classification Results

Classification results for Edmonton’s suggested policies show 57% of required policies in the urban form category and 43% in the green buildings category. Within the urban form category, the location sub-category contained 75% of policies and the density sub-category contained the remaining 25%. Within the green buildings category, the energy efficiency and renewables sub-category had the largest number of policies at 31%, followed by a three-way tie among the remaining other sub-categories at 23% each (Figure 8).

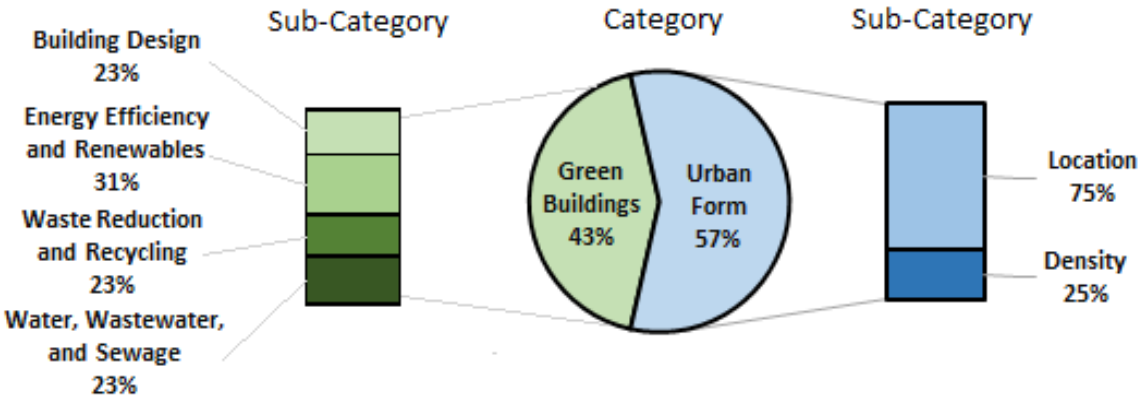


Figure 8: Suggested Policies for the City of Edmonton - Classification Results

City of Calgary Policy Classification Results

For Calgary, the urban form category had 62% of required policies and the green buildings categories had 38%. The urban form category was further separated with 63% of policies within the location sub-category and 38% within the density sub-category. The green buildings category contained 80% of required policies within the energy efficiency and renewables sub-categories and the building design sub-category contained 20% of required policies (Figure 9: Required Policies for the City of Calgary - Classification Results).

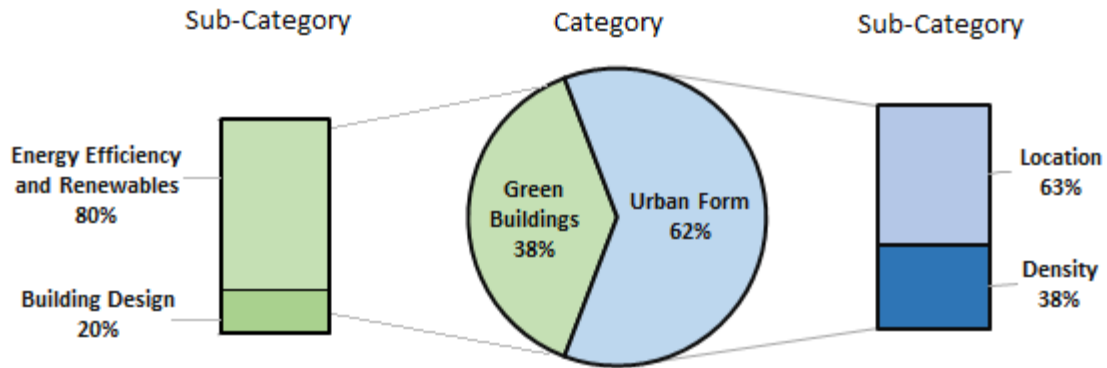


Figure 9: Required Policies for the City of Calgary - Classification Results

The green buildings category contained the largest amount of suggested policies for Calgary at 82% and the urban form category contained the remaining 18% of suggested policies. When considering the policies within the green buildings category, the building design sub-category had the most policies at 32%. The sub-category that had the second highest number of suggested policies was the waste reduction and recycling sub-category at 23%. The energy efficiency and renewables sub-category and the water, wastewater, and sewage sub-category each had 19% of suggested policies. The remaining 6% of suggested policies was classified under the Other sub-category classification (Figure 10: Suggested Policies for the City of Calgary - Classification Results).

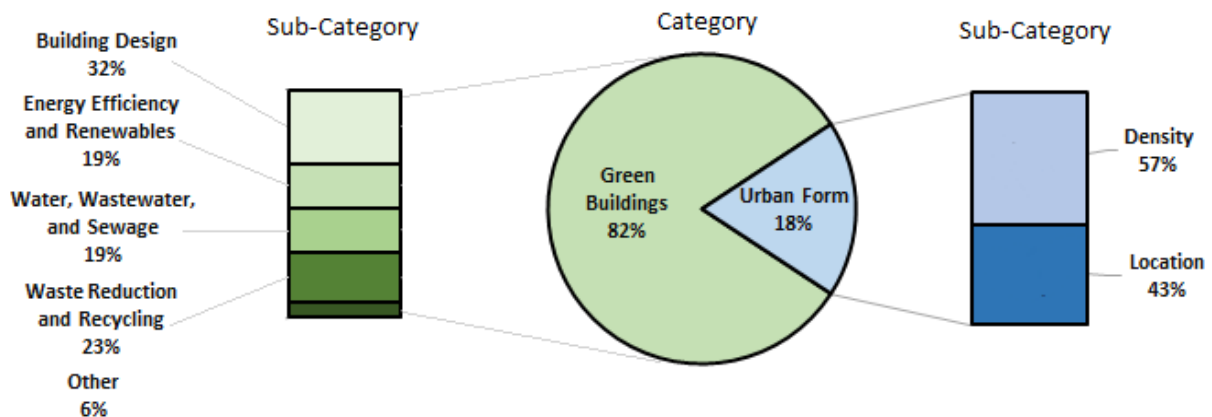


Figure 10: Suggested Policies for the City of Calgary - Classification Results

City of Ottawa Policy Classification Results

Almost all required policies from Ottawa fell into the urban form category, which accounted for 95% of policies. The green buildings category accounted for the remaining 5% of required policies. Within the urban form category, 58% of policies were classified in the location sub-category and 42% of policies were classified in the density sub-category (Figure 11: Required Policies for the City of Ottawa - Classification Results).

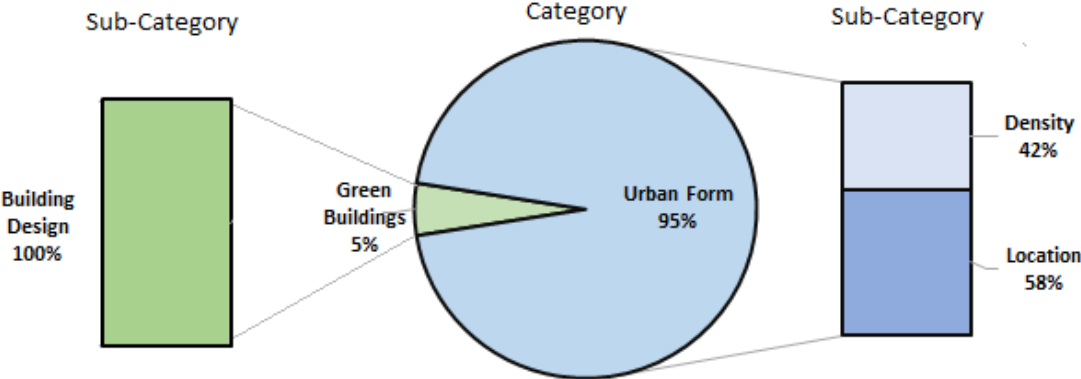


Figure 11: Required Policies for the City of Ottawa - Classification Results

Ottawa’s suggested policies were classified as 75% in the urban form category and 25% in the green buildings category. Within the urban form category, policies were split 50% within the location sub-category and density sub-category. This is the same case for the suggested policies within the green buildings, as they are split 50% between the building design sub-category and the energy efficiency and renewables sub-category (Figure 12).

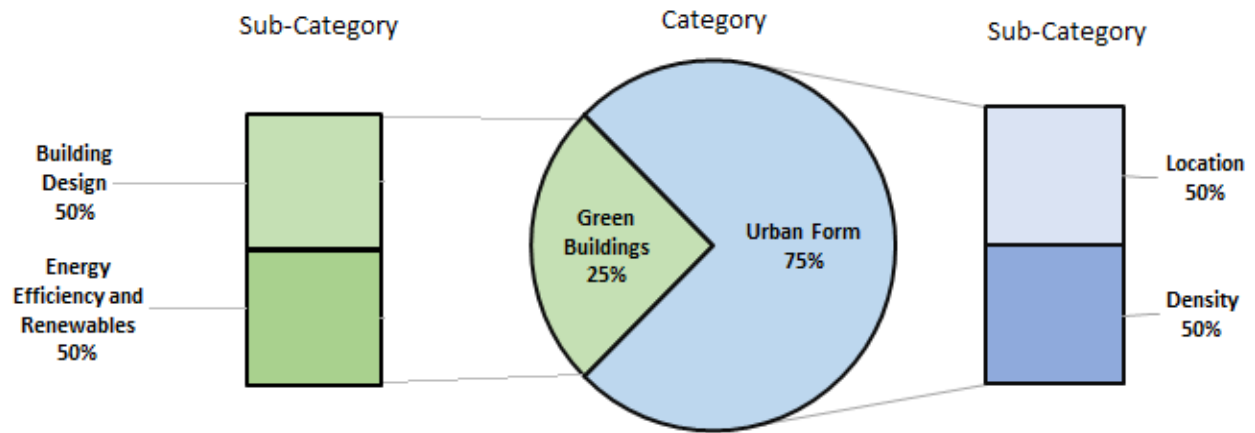


Figure 12: Suggested Policies for the City of Ottawa - Classification Results

5.2 Semi-Structured Interviews

Responses from the City of Toronto and the City of Edmonton interviews were classified into common themes: policy level of authority, incremental environmental sustainability policy, metrics and goals to implement policy, and political and government leadership. The following sections describe each theme and relevant interview responses.

Theme 1: Policy Level of Authority

This theme relates to level of strength or authority that is given to a policy. Policies with a high level of authority are binding and developers must comply, while policies with a low level of authority are non-binding and developers do not have to comply. Both the Edmonton and Toronto interviewees experienced varying levels of success in implementing policies that promote environmental sustainability due to varying levels of authority. The Edmonton interviewee expressed concerns with creating required policies due to the unwillingness of developers to be innovative in creating green buildings. In one example, the Edmonton interviewee described the use of suggested guidelines for developers to construct residential buildings to a higher standard, but the result was that the city “seldom [saw] these things occur and that most of the housing is just built to the code and [did not] include the suggestions” for a higher building standard. The experience of the Edmonton interviewee was that suggested policies and guidelines “have nice language in them, but because none of [the guidelines are] mandatory, none of the developers will ever follow them.” When considering the level of authority in required policies, the Edmonton interviewee spoke about the ability to enforce

policies. The Edmonton interviewee cited the importance of metrics and baseline measurements to enforce required policies and to show the “standard that [the city] is looking for [the developer] to achieve.”

The Toronto interviewee experienced a higher level of success in creating and implementing required policies because of the use of the Toronto Green Standard. The Toronto Green Standard requires certain buildings to include a number of design features that promote environmental sustainability and is given authority by the *City of Toronto Act* (2006) and the Toronto Official Plan. Certain developments are required to comply with Tier 1 of the Toronto Green Standard, while Tier 2 outlines suggested design features that are not required. The Toronto interviewee experienced that because Toronto “has the right [residential market] conditions, the [city] could ask for anything under [its] legislative authority.” The interviewee gave an example of the green roof by-law, which is required for certain buildings under the Toronto Green Standard. The Toronto interviewee mentioned that the city “had success at about 60 to 100 new green roofs every year” as a result of the new by-law. Although the City of Toronto experienced success in implementing policies because of the high pressure residential market and enabling legislation, the interviewee expressed that there were still policies that did not experience the same level of success because of the lack of legislative authority for the city to require them. The interviewee explained the importance of balancing required policies with “what’s responsible because [the city] does not want to be shut down because [the city] is asking for too much.” Policies to include certain design elements that cannot be made required by the city were introduced in Tier 2 of the Toronto Green Standard. The Toronto interviewee explained that Tier 2 was “everything [the city] couldn’t ask for under [the] legislative authority but thought was important and offered a refund on development charges” for developer uptake.

Theme 2: Incremental Environmental Sustainability Policy

Another common theme that became evident in both interviews was the importance of incrementally changing development culture to contribute to environmental sustainability. The process of incrementally introducing policies that contribute to environmental sustainability helps educate local developers and builds expertise before the policies become required.

The Edmonton interviewee spoke on the importance of following “a market transformation curve, where [the city’s] first step is education and outreach, then capacity

building, then incentives, then bylaws and regulations at the end so that you've primed the market and citizens for the changes that will happen." This experience speaks to the need to take advantage of opportunities to create a change in the development culture. The Edmonton interviewee provided examples of these education opportunities through the use of incentives and demonstration projects. An example of this is seen in Blatchford, which is a new community on municipally owned land and where the city is acting as the developer. The goal is for the community to become carbon neutral, where the city has chosen to set planning principles, innovative road networks and stormwater management systems, use zero single family homes, and promote active and public transportation.

The first buildings will be built this year, so that's something that the city is really proud of and it's supposed to be a market transformation project for builders. We're setting very high building standards in Edmonton and to show buildings can meet these standards. Then it sort of shows the conventional market that they could start setting some stretched goals in sustainability. —Edmonton Interviewee

The Blatchford development is an example of how a demonstration project could help incrementally shift the culture of development to a new standard that better contributes to environmental sustainability.

The interviewee from Toronto described a similar preference for using the incremental approach through the use of incentives on Tier 2 policies in the Toronto Green Standard. The Toronto interviewee mentioned the need to offer incentives to continuously push towards a higher environmental standard because if the city does not, developers "would only meet the minimum requirement and the bar won't get raised until [the city] changes the regulation." The interviewee expressed that if the city "offers the incentive, [the city] would get the leading edge developer to [include Tier 2 policies] so that next time the bar will be raised to a new minimum." The incentive provides ambitious developers opportunity for innovation, to help blaze the trail for future developers seeking similar innovations.

Theme 3: Metrics and Goals to Implement Policy

The third theme that was apparent from the interviewees was the importance of metrics and goals to implement and measure the success of policies. The Edmonton interviewee explained the importance of metrics and measurable goals to determine whether policies are

being achieved. The interviewee explained that if Edmonton uses policy statements to guide the city to “look and function a certain way, but doesn’t create mechanisms and metrics to achieve [the goals], then it will never occur.” The interviewee mentioned that the use of metrics to show policy performance helps council determine if “more money, resources, or policy changes are needed to achieve [policy performance] targets.” The Toronto interviewee expressed the practicality of utilizing metrics to determine whether developers have met Tier 1 requirements but also expressed the need for improvement to collecting fine grained data on whether other policies are being implemented (e.g. counting the number of trees in a given neighbourhood to ensure a net increase).

Theme 4: Political and Government Leadership

The last theme that both interviews spoke on was the importance of leadership buy in from their respective governments and political bodies for the success of implementing policies. The Edmonton interviewee gave an example of this when city council “recognized the importance of infill development because of implications on emissions reduction and benefits from municipal finance perspective” and that this stance had implications for the success of infill policies. The interviewee described how this support has been shown when council “put their foot down saying that [Edmonton] created plans to support [infill development] in Edmonton” and has taken a stand against residents in opposition to infill development. The same sentiments were expressed by the Toronto interviewee, who said that they have “always had very strong support [from] council to approve new ideas and see them through and that sometimes they’d like to push for more but there is no legislative authority.”

6.0 Discussion

This section discusses the results from the content analysis and the themes resulting from the semi-structured interviews. Connections between the interview experiences and the experiences from the literature review are also compared and contrasted. This discussion consists of the following subsections; content analysis discussion, semi-structured interviews discussion, and research question responses.

6.1 Content Analysis Discussion

The content analysis findings show that having a high number of policies does not translate to having a high score and that the amount of required policies was a large factor in the score of municipal planning documents. This is evident when comparing the municipal development plans from Calgary and Ottawa. Although Calgary had nearly double the number of policies compared to Ottawa, the two plans scored similarly due to the influence of policy strength. Initially, it may seem that Calgary is contributing the most effort to environmentally sustainable development through their policies, but a closer look reveals that the majority of the policies were not required. The influence of policy strength is also observed when comparing municipal development plans from Edmonton and Toronto. Although Toronto had more policies than Edmonton, the two scored similarly because Edmonton had a higher number of required policies. Although the findings do not provide information on whether some policies contribute more to environmental sustainability than others, the findings show the importance of giving strength and authority to policies for more successful implementation.

When considering all cities, the results of the policy classification analysis show a preference for municipal planning documents to use required policies to influence urban form over the inclusion of green buildings features. This preference switches for suggested policies as the number of policies in the green buildings category outnumber those in the urban form category. This may be due to council having more power through development plans and zoning by laws to guide where development occurs than to require green building features.

6.2 Semi-Structured Interviews Discussion

The experiences of the interviewees have a number of consistencies with the experiences from the literature. In considering Theme 1, policy level of authority, the literature outlined experiences in the U.K in implementing PPG13, where a study found that developers and business owners would not conform to the policy change if conformance was not mandatory (Breheny et al., 1996). This is also consistent with survey research which found that stakeholders would not consider sustainable development unless a policy was mandatory and enforceable (Williams & Dair, 2007). These experiences are consistent with both the Edmonton and Toronto interviewees as they both described that policy strength as a limitation in implementation. The Edmonton interviewee expressed concerns that developers may not have the capacity or may be

unwilling to implement new required policies that include environmentally sustainable design features. While the Toronto interviewee explained that the limitation was not the capacity or willingness of developers to implement new required policies, but the limitation was the legislative authority for the city to make developers comply.

The experiences of Theme 2, incremental environmental sustainability policy, from the literature detailed the need for providing education, incentives, and demonstration projects to encourage change in policy. This is consistent with experiences from Winston (2010), who identifies that barriers to implementing sustainable residential development included a lack of public education and developer education, and the lack expertise in green building methods. In addition, another study in the UK had a similar experience when a developer interest group expressed the need for incentives to encourage changes in land use and travel patterns (Breheny et al., 1996). Experiences outlined from the Edmonton interviewee are consistent with the literature because the interviewee described the importance of educational outreach, incentives, and model projects in stretching sustainable development expectations. This is further emphasized by the interviewee when explaining the need to use a market transformation curve, which seeks to first provide education and outreach, then build capacity and provide incentives, and finally implement new bylaws and regulations after the market is primed for change. The Toronto interviewee experienced the need to use a similar approach with Tier 2 policies under the Toronto Green Standard. The interviewee described the importance of incentivizing cutting edge developers who would meet non-binding standards to raise the level of expectation for future developers. Providing incentives to these leading projects helped change the culture of development and began the process of raising expectations in environmentally sustainable development.

Theme 3, the use of metrics and measurable goals to implement policy, had varying experiences in the literature and in the interviews. The use of metrics and measurable goals was not as evident as other themes in the literature. Chan et al. (2010) mentions the importance of metrics and having defined sustainable development goals for the success of green buildings but these propositions were not evident in the other research. However, both interviewees spoke on using metrics to implement policy. The Edmonton interviewee emphasized the importance of using metrics and measurable goals to implement policies because they provide clear

expectations to developers and provide a quantitative performance measure for policy improvements. The Toronto interviewee expressed similar sentiments on the importance of utilizing metrics to ensure developers are meeting Tier 1 required policies. Both interviewees expressed the need to use metrics more often, but were not able to due to the lack of resources.

Experiences in the literature under Theme 4, political and government leadership, outlined successful implementation of policies that contribute to environmental sustainability through residential development because of strong leadership. This success is experienced in the example from Amsterdam, where the role of government was a key factor in creating compact and dense urban form (Frans & Martin, 1999) and in with the experience in Portland, where the involvement of a regional planning agency implemented the urban growth boundary (Dieleman & Wegener, 2004). More specifically, these experiences show how government involvement was key in successfully implementing policies that create a compact urban form. Additionally, the research by Parkinson and Roseland on Canadian experiences (2002) similarly described the importance having support from local government council members as a key factor for successful projects. Experiences outlined in the literature are consistent with the discussions from both interviewees, who similarly described having a supportive council that understood the need for the policies and provided political and government backing when it was needed. The interviewees did not speak extensively on whether certain types of policies are more supported than others, but the Edmonton interviewee mentioned that city council was supportive in approving infill developments.

6.3 Research Question Responses

The research questions asked what policies Canadian cities are using to implement environmental sustainability through residential development and within a selected community, how are these policies working and how could these policies be improved on. The content analysis answered the question of exploring policies that are being used to implement environmental sustainability by describing the number of policies and providing an account of the strength of these policies and their comparison to the other cities. The question of how the policies are working and how could they be improved on has been addressed by the interviews that were conducted. The interviews provide insight on how policies are working by describing a slow process of implementation by incrementally priming the market to introduce future required

policies, bylaws, and regulations. The interviewees described the importance of incremental policy implementation as a method to change the current development culture to create sustainable development. The experience of the interviewees, along with the experiences identified through the literature, describe the importance of binding regulation in making developers implement sustainable development policies that they otherwise would not pursue. In the experience in Toronto, the high pressure market conditions help in implementing non-binding sustainable development policies in a way that does not occur in a city such as Edmonton. Toronto has experienced success in implementing their Tier 2 non-binding sustainable development policies because of the availability and willingness of aggressive developers to explore innovation with the help of incentives. Further, the interviewees expressed that the use of metrics and goals was an additional tool to better improve policy implementation and development in the future.

7.0 Recommendations and Conclusion

As this study has a limited scope in the policies that were reviewed and the documents that were analyzed, there are a number of recommendations for future exploration within this subject. In considering the rubric used to score policies, including a factor that takes into account the effectiveness of a policy in contributing to sustainable development would provide a vital dimension to analyze municipal development plans. As previously mentioned, municipalities often have dozens of subsidiary plans outside of their mandated development plan which are not always mentioned due to document decentralization. Exploring not only the policies within municipal development plans but expanding to include all other authoritative subsidiary plans and strategies could help provide a more holistic view of the level of effort that a city is seeking to accomplish sustainable development. Further, conducting additional interviews with participants from various city departments would also provide multiple perspectives on the performance of sustainable development policies.

Given the limitations of this study, the content analysis found that cities have been more successful in implementing policies related to urban form than policies related to green buildings. Considering this, cities should explore methods to bring green building policies at the same level of strength by working on the experiences outlined in the interview themes. This includes utilizing incremental sustainable development policy, using goals and metrics, and

gaining political and government support in turning suggested policies into required policies. In addition, including framing documents at higher levels in the content analysis could potentially provide insight in how the influence of provincial policies influence municipal policies. The results of this study show that government plays a large role in pushing environmentally sustainable developments. Even in high intensity and demanding real estate markets, such as Toronto, the government plays a large role in pushing developers to include sustainable development features within their buildings.

In conclusion, this study has provided an inventory of policies that Canadian cities are using to implement environmental sustainability through residential development, provided insights on public sector experiences in implementing these policies, and insight on how the policies could be improved. The study has shown that although there are difficulties in implementing policies, there is guidance to overcome issues and create better policy.

8.0 References

- Alberta Urban Municipalities Association. (n.d.-a). Intermunicipal Planning. Retrieved February 3, 2019, from <https://auma.ca/advocacy-services/programs-initiatives/municipal-planning-hub/land-use-planning-alberta/subregional-planning/intermunicipal-planning-0>
- Alberta Urban Municipalities Association. (n.d.-b). Land use planning in Alberta. Retrieved February 3, 2019, from <https://auma.ca/advocacy-services/programs-initiatives/municipal-planning-hub/land-use-planning-alberta>
- Berke, P., & Conroy, M. (2000). Are we planning for sustainable development? an evaluation of 30 comprehensive plans. *Journal of the American Planning Association*, 66(1), 21.
- Bhatti, M. (1994). Environmental Futures and the housing question. *Housing and the Environment: A New Agenda, Coventry: Chartered Institute of Housing*, 14–33.
- Breheny, M., Gurney, A., & Strike, J. (1996). The compact city and the need to travel: the implementation of UK planning policy guidance. In *The Compact City: A Sustainable Urban Form* (pp. 302–317).
- Brundtland, G. (1987). *Our common future: Report of the 1987 World Commission on Environment and Development*. Oslo: United Nations.

- Cervero, R. (1996). Mixed land-uses and commuting: Evidence from the American housing survey. *Transportation Research Part A*, 30, 361–377. [https://doi.org/10.1016/0965-8564\(95\)00033-X](https://doi.org/10.1016/0965-8564(95)00033-X)
- Chan, E. H. W., Chau, C. K., Poon, C. S., Chun, K. P., & Lam, P. T. I. (2010). Factors affecting the implementation of green specifications in construction. *Journal of Environmental Management*, 91, 654–661. <https://doi.org/10.1016/j.jenvman.2009.09.029>
- Dieleman, F., & Wegener, M. (2004). Compact city and urban sprawl. *Built Environment*, 30(4), 308–323. <https://doi.org/10.2148/benv.30.4.308.57151>
- Employment and Social Development Canada. (2016). *Habitat III Canada National Report*. Retrieved from canada.ca/publiccentre-ESDC
- Federation of Canadian Municipalities. (2018). FCM Resolutions. Retrieved February 23, 2019, from <https://data.fcm.ca/home/about-us/corporate-resources/fcm-resolutions.htm?lang=en-CA&resolution=dffab624-a669-e811-adbf-005056bc2614&srch=%25climate%2520change%25&iss=&filt=false>
- Frank, L. D., & Pivo, G. (1994). Impacts of Mixed Use and Density on Utilization of Three Modes of Travel: Single-Occupant Vehicle, Transit, and Walking. *Transportation Research Record*, 1466, 44–52.
- Frans, M., & Martin, J. (1999). Planning the Compact City: the Randstad Holland Experience. *European Planning Studies*, 7(5), 605–621. Retrieved from <http://eds-1a-1ebscohost-1com-1ebsco.han.buw.uw.edu.pl/eds/pdfviewer/pdfviewer?vid=31&sid=4786ab56-79c2-4393-9621-1f4e976faeff%40sessionmgr4001&hid=4113>
- Goodland, R., & Daly, H. (1996). Environmental Sustainability: Universal and Non-Negotiable. *Ecological Applications*, 6(4), 1002–1017. Retrieved from <https://www.jstor.org/stable/226958>
- Greed, C. (2014). *No Title. Investigating town planning: Changing perspectives and agendas*. Routledge.
- Hall, M., & Purchase, D. (2006). Building or Bodging? Attitudes to Sustainability in UK Public Sector Housing Construction Development. *Sustainable Development*, 14, 205–218.

- Handy, S. (1992). Regional Versus Local Accessibility: Neo-Traditional Development and its Implications for Non-work Travel. *Built Environment*.
- Kuhlman, T., & Farrington, J. (2010). What is Sustainability? *Sustainability*, 2, 3436–3448. <https://doi.org/10.3390/su2113436>
- Newton, P. (2000). Urban Form and Environmental Performance. In *Achieving Sustainable Urban Form* (pp. 46–53).
- Parkinson, S., & Roseland, M. (2002). Leaders of the Pack: An analysis of the Canadian “Sustainable Communities” 2000 municipal competition. *Local Environment*, 7(4), 411–429. <https://doi.org/10.1080/135498302200002752>
- Pearce, D., Markandya, A., & Barbier, E. (1989). *Blueprint for a Green Economy*. London: Earthscan Publications Ltd.
- Priemus, H. (2005). How to make housing sustainable? The Dutch experience. *Environment and Planning B: Planning and Design*, 32, 5–19. <https://doi.org/10.1068/b3050>
- Province of Alberta. (2008). *Land-Use Framework*.
- Province of Ontario. (2018a). *Citizens’ Guide 1: The Planning Act*.
- Province of Ontario. (2018b). *Citizens’ Guide 2: Official Plans*.
- Province of Ontario - Municipal Affairs. (2014). *Provincial Policy Statement*.
- Rees, W. (1996). Urban ecological footprints: why cities cannot be sustainable- and why they are key to sustainability, *16*, 223–248.
- Robinson, P. J., & Gore, C. D. (2005). Barriers to Canadian municipal response to climate change. *Canadian Journal of Urban Research*, 102–120.
- Roseland, M. (2012). *Toward Sustainable Communities: solutions for citizens and their governments* (4th ed.). New Society Publishers.
- Shivji, M. (1995). *Sustainable Community Design and Subdivision in Calgary: Development Industry Attitudes and Opinions Regarding the Sustainable Suburbs Study and Improve Environmental Practices*. University of Calgary. <https://doi.org/10.1016/B978-012397720->

5.50034-7

The City of Ottawa. (2017). *Ottawa Official Plan: Section 1 — Introduction*.

Tosics, I. (2004). European urban development: Sustainability and the role of housing. *Journal of Housing and the Built Environment*, 19, 67–90.

United Nations. (2017). *New Urban Agenda*. [https://doi.org/ISBN: 978-92-1-132757-1](https://doi.org/ISBN:978-92-1-132757-1)

Vojnovic, I. (2014). Urban sustainability: Research, politics, policy and practice. *Cities*, 41, 30–44. <https://doi.org/10.1016/j.cities.2014.06.002>

Williams, K., & Dair, C. (2007). What Is Stopping Sustainable Building in England? Barriers Experienced by Stakeholders in Delivering Sustainable Developments. *Sustainable D*, 147(September 2006), 135–147.

Winston, N. (2010). Regeneration for Sustainable Communities? Barriers to Implementing Sustainable Housing in Urban Areas. *Sustainable Development*, 18, 319–330. <https://doi.org/10.1002/sd.399>

9.0 Appendices

Appendix A: Interview Guide

The following are questions that were used during the semi-structured interviews with research participants:

Q1: What is your name and what organization do you work for?

Q2: What role does your organization have in implementing sustainability initiatives and goals?

Q3: What is your position within your organization?

Q4: What is your role within your organization in implementing sustainability initiatives or goals?

Q5: What are the existing initiatives or policies related to implementing sustainability?

Q5-A: Are these initiatives or policies succeeding?

Q5-B: If not, what are the barriers to success?

Q5-C: What improvements could be made?

Q6: Are there any initiatives or policies targeted to implementing sustainability through housing?

Q6-A: Are these initiatives or policies succeeding?

Q6-B: If not, what are the barriers to success?

Q6-C: What improvements could be made?

Appendix B: CORE Certificate of Completion



Appendix C: Recruitment Email



UNIVERSITY
OF MANITOBA

“Dear _____,

My name is Alex Menjivar, and I am student in the City Planning program at the University of Manitoba. I am conducting a project on sustainability through housing and I would like to interview you because of your experience with implementing sustainability at the municipal level. The interview will take about one hour and will be confidential. Would you be willing to participate in this interview?

Research confidentiality will be maintained, and I would like to assure you the study has been reviewed and received ethics clearance through the University of Manitoba Joint-Faculty Research Ethics Board. If you have questions for the Ethics Board, you can contact umanethics@umanitoba.ca or telephone 204/474-7122. If you have any questions about the study, please let me know.

[Participant replies.]

If Yes:

“Thank you for agreeing. I truly appreciate it. Please keep in mind you can decline to participate in the study at any point whatsoever, without any negative reaction from anyone involved in the study. When would be most convenient for us to talk?”

[Participant replies.]

“Thank you. I look forward to our meeting and to providing you with more information about the study. If you are unable to meet as planned for some reason, you may reach me via email at menjiva4@myumanitoba.ca.”

If No:

“I certainly respect your decision. Thank you for your time. Have a wonderful day.”

Appendix D: Information Sheet and Consent Form



UNIVERSITY
OF MANITOBA

INFO SHEET

CITY 7050 CITY PLANNING CAPSTONE PROJECT

Department of City Planning, Faculty of Architecture

(Course Instructor: Dr. Richard Milgrom and Dr. Orly Linovski)

Name of Student: Alex Menjivar

Title of Project: City Planning Capstone Project: Environmental Sustainability Through Residential Development: Canadian Experiences on Implementation at the Municipal Level.

Summary of Project:

Although there is general knowledge and consensus of what sustainability should accomplish, there is a currently a disconnect in how sustainability goals should be implemented at the local level. The lack of progress in implementation is due to factors such as the lack of knowledge in the design of mechanisms for advancing sustainability and variety of interpretations of what sustainability is. The proposed research aims to explore how environmental sustainability through residential developments is being implemented at the municipal level. Residential developments have been identified as a possible tool to implement policies that could contribute towards environmental sustainability goals. This research will develop an inventory of municipal policies across the current Canadian landscape and look closely at one community to have a

deeper understanding of how policies are working and how they can be improved on. The research questions are listed below:

- What municipal policies are communities in Canada using to implement environmental sustainability through residential development?
- Within the selected community for a deeper understanding, how are implementing these policies working?
- How could these policies be improved?

Specific Activities to be Completed by Project Participant and Time Frame: The project participant will be interviewed for approximately one hour

CONTACT INFORMATION:

Student Name: Alex Menjivar

Student's University Contact Information: Email:
Phone:

Course Instructors: Dr. Richard Milgrom, Associate Professor
Department of City Planning, University of Manitoba
Telephone: e-mail:

Dr. Orly Linovski, Assistant Professor
Department of City Planning, University of Manitoba
Telephone: e-mail:



UNIVERSITY OF MANITOBA

CONSENT FORM

CITY 7050 CITY PLANNING CAPSTONE PROJECT
Department of City Planning, Faculty of Architecture
(Course Instructor: Dr. Richard Milgrom and Dr. Orly Linovski)

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.

Name of Student: Alex Menjivar

Title of Project: City Planning Capstone Project: Sustainability Through Housing: Experiences on Implementation at the Local Level.

Specific Activities to be Completed by Project Participant and Time Frame: The project participant will be interviewed for approximately one hour.

Description of Course Assignment

City Planning graduate students must complete a Capstone Project as part of their Master's degree. The goal of the project is for students to conduct in-depth research on an issue of importance for planning practice. The students' information-gathering projects will be presented in class and will form the basis for a written report at the end of term. In this case, the objective of the student is to better understand how policies related to sustainability are being implemented through housing at the municipal level.

The projects are undertaken under the supervision of the Course Instructors, Dr. Richard Milgrom and Dr. Orly Linovski (see contact information below), in accordance with the protocols of the Human Ethics Secretariat of the University of Manitoba for research involving human subjects. The research has been reviewed by the Joint-Faculty Research Ethics Board (JFREB) at the University of Manitoba and approved. A copy of this Consent Form has also been reviewed and approved. Consent Forms listing Project Title and the specific activities to be completed by participants will be submitted to the Instructor and kept on file for information purposes only for two years (or until the next City Planning program accreditation), in accordance with University ethics policies. It is anticipated that interviews with participants will last no longer than approximately an hour.

Risk

The risk of participating in an interview is no greater than risks encountered in everyday life. One potential risk is a breach of confidentiality: that information may be shared in ways that enable you to be identified. To minimize the risk of this occurring, the following procedures will be undertaken.

Confidentiality

The data collected through this research is confidential. This means that participants' names or any other personal or identifiable information will not be included in presentations or reports arising from the study, unless permission has been granted through the Consent Form.

Audio-Taping

With your permission, activities, interviews or other kinds of sessions may be audio-recorded and transcribed at a later date, so that analysing the material will be completed with greater ease and efficiency. Such audio-recordings will be kept in a secure place and destroyed after they have been transcribed. Your name or any other personal information will not be included in the presentation or report materials arising from the study. Where information occurs within a session transcript that will be included in the final project report or presentation, names and other identifying personal information will be omitted, unless such permission has been explicitly granted. Interviews will be conducted over the telephone or via skype. If there are in person interviews, they will be conducted at a mutually agreeable location.

Use of Data, Secure Storage and Destruction of Research Data

Information collected from participants will be used as part of the Capstone Project. It may be used for conference presentations and/or publication in journals and other academic and professional resources. Students' completed Capstone Projects will be publicly available through the University of Manitoba's website. All information will be treated as confidential and stored in a private and secure place with password protection, and subsequently destroyed at the end of the course. The student is responsible for destroying the data. The destruction date for raw data and all other collected data will be June 2019.

Copies of consent forms will be securely kept on file by the Course Instructor for information purposes only for two years and then destroyed, in accordance with University ethics policies.

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 refrain from answering any questions you prefer to omit, without prejudice or consequence. The final date you are able to withdraw as a participant is March 2019. 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.

The University of Manitoba may look at your research records to see that the research is being done in a safe and proper way.

This research has been approved by the University of Manitoba Joint-Faculty Research Ethics Board (JFREB). If you have any concerns or complaints about this project you may contact any of the above-named persons or the Human Ethics Coordinator at humanethics@umanitoba.ca; or 204-474-7122. A copy of this Consent Form has been given to you to keep for your records and reference.

CONTACT INFORMATION:

Student Name: *Alex Menjivar*

Student's University Contact Information: *Email:*
Phone:

Course Instructors: Dr. Richard Milgrom, Associate Professor
Department of City Planning, University of Manitoba
Telephone: e-mail:

Dr. Orly Linovski, Assistant Professor
Department of City Planning, University of Manitoba
Telephone: e-mail:

Thank you for participating in this project. Your cooperation and insights are very valuable, and are greatly appreciated!

I, _____, consent to the dissemination of material provided
[Name of Participant: please print]

to the student for use in their Capstone Project and in course materials. I understand that the information I provide will be incorporated in a presentation and report. I understand also that all research data will be treated as confidential, stored in a private and secure place, and subsequently destroyed at the end of the course by the student.

I agree to be audio-recorded.

Yes ___ No ___

I would like to receive a summary of the results from this project. If yes, please provide your email address or mailing address below.

Yes ___ No ___

Signature of Participant

Date

Participant's contact information (in order to receive a summary of the results from this project):