“It Comes Down to What They Value”: Understanding How Energy is Integrated Into Rural Manitoba Land Use Plans.

by

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ABSTRACT

“IT COMES DOWN TO WHAT THEY VALUE”: UNDERSTANDING HOW ENERGY IS INTEGRATED INTO RURAL MANITOBA LAND USE PLANS

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Canada is committed to achieving net-zero greenhouse gas emissions by 2050. This requires Canada’s energy systems to transition from fossil fuels towards low emission sources. As this occurs, energy infrastructure will become a predominant land use, especially in rural areas. This poses a challenge for rural municipalities who need to adapt land use planning frameworks to renewable energy. Using a novel plan quality evaluation framework, 57 land use plans and 18 semi-structured interviews were used to assesses the state of energy planning and land use planning integration in rural Manitoba. Results highlight that integration of energy within official plans is poor. However, some communities are creating energy-inclusive plans. These changes are being driven by enthusiastic individuals, termed champions, who are advocates for local sustainability action. While improved funding and changes to provincial policy are needed to overcome capacity barriers, local leaders are critical for enabling rural energy planning.

DEDICATION

This thesis is dedicated to the memory of my mum, Margie. She always pushed for me to be my best and encouraged my passion for learning. Most importantly, she taught me to be conscious of the world I walk in and to always make sure my presence made it better than when I started.

I love you mum.

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Firstly, I need to thank my participants. Without you this research would not have been as interesting, insightful, or useful. Getting to meet each one of you and spend time with you exploring this topic from your perspective was the most invigorating part of this research. Thank you for sharing your experience and wisdom with me.

Thank you to my advisor, Dr. Leith Deacon for giving me support, direction, and patience through my many questions and revisions. Thank you to my committee member Dr. Dave Guaydeen for guiding me through a plan quality evaluation, and for your edits that greatly improved all my writing.

Most importantly, a very big thank you to all my friends and family who supported me. Thank you to all of you in SEDRD who were with me my first year in Guelph. Thank you to all my friends in Winnipeg, especially Anya, Jami, Katrina, and Luke who helped me through this process with study dates, walks, coffee and DnD. Thank you, Dad, for always encouraging me. Thank you to everyone in my life who was there for me and believed in me. The love and support you gave means so much.

PREFACE

This thesis is an original work by Michael Kvern. This project contributes knowledge on energy planning and land use planning in rural Manitoba. This research project received research ethics approval from the University of Guelph's Research Ethics Board (See Appendix H).

Project title: Evaluating energy integration in rural Manitoba development plans
REB # 22-04-009, July 11, 2022.

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LIST OF ABBREVIATIONS

CEP – Community energy planning

GHG – Greenhouse gas

kW - Kilowatt

KWh – Kilowatt-hour

MT – Megatonne

PJ - Petajoule

PLUP – Provincial Land Use Policies

LIST OF APPENDICES

1 Introduction

Anthropogenic climate change is a widely recognized global threat (Canada, 2021; IPCC, 2021; UN Environment, 2019). In response to this threat, Canada has committed to achieving net-zero greenhouse gas (GHG) emissions by 2050 (Canada, 2021). Canada must transition its energy systems away from GHG emitting fossil fuels to mitigate severe climate change impacts. Canadian communities have long been shaped by fossil-fuel use, but to achieve net-zero, communities will need to be shaped instead by renewable energy, electrification, energy storage, and smart technologies (Calvert et al., 2019; Gooding et al., 2023; C. Walker et al., 2021). The biggest challenge facing municipalities today is how to embrace the ongoing energy transition from fossil fuels to renewables (Calvert, Kantamneni, et al., 2021; McVey et al., 2017). There is a need to better understand how municipalities are integrating energy and land use planning to enable the energy transition.

The transition to low-carbon energy systems is ongoing and increasing in technological and spatial scope (Benson et al., 2022; Blondeel et al., 2021; Hoicka & MacArthur, 2019; International Energy Agency, 2021). Energy transitions are also expanding beyond purely technical exercises to encompassing larger socio-economic aspects such as community development, governance, equity, and just transition (Cha & Pastor, 2022; Macarthur et al., 2020; Middlemiss & Parrish, 2010). Canadian municipalities have oversight over nearly 60% of GHG emissions (Evenson et al., 2013; Natural Resources Canada, 2020). Yet, there is a need to understand how local governments are involved in energy transitions through their land use planning frameworks. Little is known about how rural land use plans in Manitoba incorporate or consider energy planning and the energy transition (Calvert, Smit, et al., 2021; Guyadeen & Henstra, 2023; Winfield et al., 2021). Plan quality evaluation has the potential to effectively assess how energy is included in rural Manitoba land use plans. Further, the barriers and success factors that rural municipalities in Canada face when attempting to plan for the energy transition in Manitoba are not well understood. Research is needed to document and understand the barriers and opportunities to the integration of land use planning and energy planning in rural Manitoba. Additionally, the role of local renewable energy solutions remains unclear, despite the importance of renewable energy systems for mitigating climate change.

1.1 Research Context & Justification

Manitoba is a useful case study for examining rural planning and the energy transition. It has a large rural population and a scarcity of existing research on both land use planning and energy systems. Manitoba has a sizeable rural population, with 38% of the population living outside of urban centres, while 29% of Canadians live outside urban centres (Kelly et al., 2021). Winnipeg, the provincial capital of Manitoba, has recently committed to achieving net-zero by 2050 in its 2022 municipal official plan (City of Winnipeg, 2021). However, progress towards integrating energy and land use planning in rural communities less known. Innovation and knowledge in rural planning will be

disproportionately helpful in Manitoba, given the propensity of rural residents and lack of knowledge on the state of energy planning.

Most research on Manitoba's energy system are large national studies which only partially focus on the province (MacArthur, 2017; Riva et al., 2021; Sherren et al., 2019; Thompson, 2022; Valiante, 2013). Some Manitoba-specific research does examine the impact of hydroelectric development (Buckland & O'Gorman, 2017; Martin & Hoffman, 2008; Thompson, 2015), but most research focuses on northern communities (Bhattarai & Thompson, 2016; Kvern et al., 2022). No research was found that explored energy planning in Manitoba. Studies on Manitoba's land use planning system were limited, and almost no research explored the connections between rural places and energy in the province. The relationship between land use planning and energy planning in Manitoba is not well known, and further research is needed to address this.

1.2 Research Purpose

This study identifies the barriers to integrating land use planning and energy planning that are preventing rural Manitoba rural municipalities from achieving a low-carbon energy transition. Specifically, if issues of political will and values, or lack of capacity are the primary barrier to integration. For this work, an explanatory mixed methods case study was conducted. A quantitative evaluation of rural Manitoban municipal development plans, supported by key-informant interviews, demonstrates the current extent of integration between energy planning and land use planning, and how to overcome barriers to integration.

1.3 Research Goals and Objectives

The goal of this research is to identify the barriers to integrating land use planning and energy planning that are preventing rural Manitoba rural municipalities from achieving a low-carbon energy transition. The objectives of this research are:

1. Develop a systematic plan quality evaluation framework to assess the inclusion of energy planning in rural municipal development plans.
2. Explore why municipal planners decided to pursue, or not pursue, energy considerations within development plans.
3. Identify success factors and barriers to the integration of energy planning into rural land use planning frameworks.

1.4 Significance and Contributions of Research

Energy transitions, and particularly rural energy transitions, are a growing field of study. A sizeable body of research has focused on rural energy transitions (Clausen & Rudolph, 2020; Jefferson, 2018; Naumann & Rudolph, 2020), but few researchers have examined connections between energy transitions and land use planning within rural contexts (Calvert, Smit, et al., 2021; Herington et al., 2017; Littlejohn & Laszlo, 2016). A significant body of research on urban energy planning exists in Canada (See: Burch, 2010; Jaccard et al., 1997, 2019; Murphy et al., 2021; St Denis & Parker, 2009) but only

a handful of studies examine rural Canada (Calvert, Smit, et al., 2021; Guyadeen & Henstra, 2023). This research provides much needed understanding of the unique context of rural places.

This research is the first of its kind in Manitoba. It is some of the first academic research to examine the energy transition in Manitoba and is one of a few studies to contemplate planning and land use policy in the province. This thesis adds understanding to the state of Manitoba's planning system and adds an important rural perspective to the discourse.

This thesis develops a novel plan quality evaluation framework for assessing how statutory land use plans consider energy planning and the energy transition. This thesis is of the first studies to examining energy planning from a plan quality perspective. It is one of the first plan quality studies to focus exclusive on rural communities and plans, and the first plan quality evaluation focused solely on Manitoba. The unique combination of plan quality evaluation and qualitative interviews allows this thesis to provide both detailed analysis and rich description on the state of energy plan and land use planning integration in rural Manitoba.

1.5 Positionality

Research involving participants is a shared space, influenced by both the researcher and the participants (England, 1994). Positionality is a recognition of how the researcher's and participants' identities and experiences shape the research process (Bourke, 2014; England, 1994). Positionality is most often understood through the exercise of reflexivity, which provides the researcher the opportunity to be aware of their own experiences and knowledge and that may influence the design, collection, and interpretation of the research data (Bourke, 2014; Dowling, 2006). Reflexivity allows a researcher to identify their own background and perspective in an effort to strengthen the quality of researcher (Creswell & Creswell, 2018). Journalling and reflection during research design, data collection, analysis, and writing stages was done by the researcher to reflect upon their positionality and its influence on the research.

The researcher is a white, cisgender male who has lived in Manitoba for most of his life. Prior to this thesis, the researcher completed an undergraduate degree in Manitoba. As part of that degree, he studied community energy planning in a remote northern Manitoba community. This provided foundational knowledge and interest in the topic of the current research. This recognition allows the researcher to be aware of how their race, nationality, age, gender, and socio-economic status influence the research (Palaganas et al., 2017). All attempts were made to set aside personal knowledge of the case study when interviewing participants and analyzing their responses.

The gender distribution of interview participants (12 males and 6 females) may have occurred because the researcher is male. Further, it is recognized that the research is influenced by a male researcher of Manitoba origin that collected and analyzed the data. While the researcher's perspective, experience and identity do not discredit the research findings, it is important to acknowledge their existence.

1.6 Thesis Structure

This chapter introduces the need for integrated energy and land use planning. It presents the context of the research as well as justification. Additionally, the purpose of this research along with the research goals and objectives are presented. Further, this research's contributions to academic knowledge and policymaking are shared.

Chapter two presents a review of the literature that has informed this research. A review of Canada's energy systems, the connections between energy and climate change, and the history and current state of community energy planning (CEP) in Canada provide the necessary background knowledge for this research. The literature review gives a deeper understanding of energy transition scholarship and helps justify the need for further energy transition research in the rural Canadian context.

Chapter three describes the methods used in this thesis. A rationale for the use of mixed-methods, plan quality evaluation and semi-structured interviews is presented. An in-depth description of the procedures is reviewed, including case selection, the plan quality evaluation framework, participant selection, and the interview process. Data analysis procedures are discussed, along with methods for establishing qualitive rigour are also discussed. Limitations of this research are also discussed in this chapter.

Chapter four presents the results of the plan quality evaluation framework. In total, 57 plans were evaluated. This chapter is organized around the key plan elements assessed: fact base, goals, policies, and implementation.

Chapter five provides the results of the 18 semi-structured interviews. Results are organized thematically based on barriers, success factors, and the role of Manitoba Hydro.

Chapter six presents a discussion of the results of this research contextualized within the knowledge gained from the literature review. This chapter outlines how the findings achieve the research objectives and frames the discussion around the three major themes from the findings: values over capacity, support from senior governments, and municipal conceptualizations of energy. Further, this chapter provides direction for future research and recommendations on how to better integrate energy planning and land use planning.

Lastly, chapter seven concludes this thesis with a summary of the key findings and contributions.

2 Literature Review

This chapter presents a review of academic literature to provide the relevant context and justification for this research. The goal of this literature review is to characterize how rural Manitoba municipalities are integrating energy planning into their official plans. Literature was collected from Omni, Google Scholar, and Web of Science. Grey literature was also collected online from relevant non-profits, utilities, and other groups.

The first portion of this chapter provides an overview of energy and examines the energy systems of Canada and Manitoba. The second portion of this literature review provides a review of the ongoing energy transition, followed by contextualizing the specifics of rural energy transitions. The fourth section examines land use planning frameworks and their connections to energy. The fifth and final section examines the connections between planning, energy, and climate change. This chapter concludes with a summary of the literature reviewed and its significance.

2.1 Energy

2.1.1 Necessity of Energy

Energy is essential for modern life. However, many people in developed nations take functional, reliable energy systems for granted. Canadians largely assume that energy systems will be secure, reliable, and affordable (International Energy Agency, 2022). Modern developed nations consume significant amounts of fuel to produce large amount of energy that power increasingly complex systems and societies. The development of energy systems is deeply tied to human history and the development of societies.

Much of human history can be defined by the energy conversions available. Figure 1 illustrates the progression of energy sources and energy transitions throughout history. Originally, food was the primary biofuel for humanity, used to fuel muscles and kinetic energy (Fanchi, 2005; Smil, 1994). Other biofuels, like plant and animal matter, enabled the creation and control of fire, allowing for heat, light, and cooking (Fanchi, 2005; Smil, 1994). This was the primary energy source prior to the Industrial Revolution in the 1800s.

The widespread discovery and use of coal in the late 1700s and early 1800s ushered in the Industrial Revolution and the steam engine. This allowed for dramatically more power to be created, and it was largely applied to resource extraction and manufacturing, prompting the major economic and social restructurings associated with the Industrial Revolution (Hodge & Gordon, 2014; Smil, 1994). The use of coal in steam engines is the first wide-spread use of a fossil fuel in human history (Fanchi, 2005; Smil, 1994).

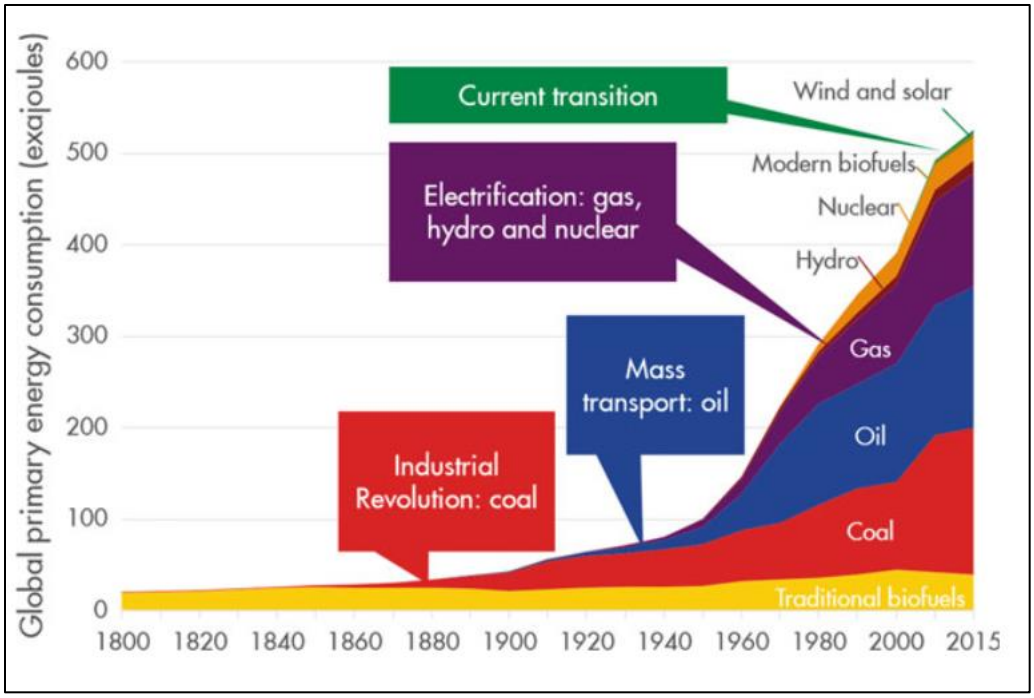

Figure 1: Overview of historical energy transitions. From Zhaoyuan and Ishwaran (2020)**.**

In the nineteenth century mainstream extraction and use of liquid fossil fuels began (Fanchi, 2005). Oil is approximately 50 percent more energy dense than coal (Smil, 1994), meaning an equivalent amount of oil generates 50 percent more power than the same amount of coal. The efficiency of oil, combined with its low price, relative abundance, and ease of transport made oil the dominant energy source for transportation and heating (Fanchi, 2005; Natural Resources Canada, 2020; Smil, 1994).

Electricity is a secondary energy source generated from primary sources like natural gas or the sun (Fanchi, 2005; Natural Resources Canada, 2020). Electricity made the widespread use of electric motors, lights, and circuitry possible (Fanchi, 2005). Demand for electricity is predicted to grow as global population increases and developing nations improve their energy infrastructure (Fanchi, 2005; Hoicka & MacArthur, 2019). The International Energy Agency estimates that electricity demand will rise 50 to 76 percent by 2040 (Hoicka & MacArthur, 2019). This trend aligns with a global shift towards embracing renewable energy sources and decarbonizing energy (Adil & Ko, 2016; Aslani & Wong, 2014; Benson et al., 2022; Fanchi, 2005; Hoicka & MacArthur, 2019; Rutherford & Coutard, 2014).

Energy generation systems – the fuels and infrastructure that produce energy for our use – are transitioning away from fossil fuels and centralized distribution towards small-scale decentralized systems that use renewable sources (Aslani & Wong, 2014; Brown et al., 2017; Hoicka & MacArthur, 2019, 2018). This transition may just be the next significant shift in energy technology and history, and its impacts remain unclear.

2.1.2 Energy in Canada

Energy consumption can be broken down into two types, primary and secondary. Primary energy is directly harvested from natural resources like wind, solar, or fossil fuels (Fanchi, 2005). Primary energy includes all the energy consumed by end users; energy used during the transfer from one form to another (e.g., natural gas to electricity); energy used to transport energy to consumers (e.g., pipelines); and industrial uses of energy sources in non-energy formats (e.g., natural gas used in chemical processes like fertilizer) (Natural Resources Canada, 2020). Secondary or end use energy is the energy used by consumers (Natural Resources Canada, 2020). For example, the energy used to heat buildings, fuel vehicles, or run machinery are all secondary energy.

Canada is an energy rich nation; third in the world for proven oil reserve, uranium reserves, and hydroelectricity capacity (Natural Resources Canada, 2020). In 2017, total primary energy use in Canada was 12,983 petajoules (PJ), and Canadians consumed an estimated 9,090 PJ of secondary energy (Natural Resources Canada, 2020). The breakdown of secondary energy by fuel type is shown in Table 1. Overwhelmingly, Canada's secondary energy use is fossil fuel based with natural gas dominating nearly a third of use, and gasoline and oil consumption accounting for more than another third (Canada Energy Regulator, 2022a; Natural Resources Canada, 2020).

Table 1: Secondary energy use in Canada by fuel type, 2017.

Energy Type	Proportion	PJ
Natural Gas	30%	2,727.00
Electricity	20%	1,818.00
Gasoline	18%	1,636.20
Oil	14%	1,272.60
Other oil products	9%	818.10
Biomass	6%	545.50
Other	3%	272.70
Total	**100%**	**9,090.10**

Source: Natural Resources Canada (2020)

Table 2: Electricity in Canada by source.

Energy Source	Proportion
Hydro	60%
Nuclear	15%
Gas, diesel, & oil	11%
Coal	7%
Other renewables	7%
Total	**100%**

Source: Natural Resources Canada (2020)

Table 2 illustrates the proportion of fuels used to produce electricity in Canada. Electricity use is comparatively emissions free, with 60% coming from hydro and 15% coming from nuclear (Natural Resources Canada, 2020). A quarter of the nation's electricity is still produced using fossil fuels. While higher rates of renewable energy generation within electricity sources is promising, electricity only accounts for 20% of Canada's total energy consumption (Natural Resources Canada, 2020).

As a result of high fossil fuel use, 82% of Canada's GHG emissions come from energy generation and consumption, higher than the global average of 78% (Natural Resources Canada, 2020). This is not entirely surprising, as only 20%-25% of energy is carbon free in Canada (Torrie et al., 2013). Canada's energy system emitted about 750 megatonnes (MT) of carbon dioxide in 2018 (Natural Resources Canada, 2020).

Canadians have some of the highest per capita energy consumption and emissions rates in the world (Barrington-Leigh & Ouliaris, 2017; Natural Resources Canada, 2020; Torrie et al., 2013). Canadians consume about 200 kilowatt-hours (kWh) per person per day, comparatively the average European consume about 120 kWh per person per day (Barrington-Leigh & Ouliaris, 2017). Per capita, Canadians consume nearly four times more energy than the global per capita average (Benson et al., 2022). This higher consumption is largely explained by Canada's size, resource extraction-based economy, and high standard of living (Barrington-Leigh & Ouliaris, 2017; Benson et al., 2022). The impact of Canada's colder climate on energy consumption is also clear, with 40% of energy being consumed by space heating (Natural Resources Canada, 2020).

The energy landscape is incredibility diverse across Canada. Given the county's size and variable geography, patterns of generation and consumption different greatly between regions and provinces (Barrington-Leigh & Ouliaris, 2017; Benson et al., 2022). Under the 1982 *Constitution Act*, non-renewable natural resources, forestry, and electricity are provincial jurisdiction. As a result, energy is managed at the provincial or territorial level, resulting in a patchwork of different energy systems with different sources (Barrington-Leigh & Ouliaris, 2017; Haley, 2014; Stringer & Joanis, 2022).

Canada's northern territories and prairie provinces, especially Saskatchewan and Alberta, tend to have the highest energy consumption and most reliance on fossil fuels (Barrington-Leigh & Ouliaris, 2017). British Columbia, Manitoba, Quebec, and Newfoundland and Labrador all have strong hydroelectricity systems, increasing their proportion of low-carbon energy (Haley, 2014; Stringer & Joanis, 2022). Ontario and the Atlantic provinces have a lower amount of low-carbon electricity but do incorporate nuclear energy (Richardson & Harvey, 2015; Stringer & Joanis, 2022). Prince Edward Island is an outlier, generating a significant amount of electricity from wind (Natural Resources Canada, 2020) While Nova Scotia has a large reliance on coal powered electricity (Natural Resources Canada, 2020). However, fossil fuels dominate the overall energy mix in all provinces (Canada Energy Regulator, 2022a; Stringer & Joanis, 2022).

Canada has strong potential for renewable energy generation (Richardson & Harvey, 2015; Torrie et al., 2013). Renewable sources can generate much more energy than current and projected future energy demands; Canada's renewable energy potential is nearly 150% of current energy demand (Barrington-Leigh & Ouliaris, 2017). Research has found that North America has the resources and technology to embrace a 100% renewable energy system by 2030 (Aghahosseini et al., 2017; Benson et al., 2022). The transition to clean energy is financially attainably and presents benefits for most Canadian provinces (Barrington-Leigh & Ouliaris, 2017; Stringer & Joanis, 2022).

Through this understanding of Canada's energy demand, it is clear the energy system remains heavily dependent on fossil fuels. Consequently, energy systems are a major contributor to GHG emissions and climate change. Actions to mitigate and adapt to climate change must consider the energy system if they are to be effective.

2.1.3 Energy in Manitoba

Manitoba's total secondary energy consumption in 2017 was 323 PJ (Canada Energy Regulator, 2022b). Table 3 breaks down Manitoba's end use energy by fuel type. Nearly 72% of energy consumed is from fossil fuels (Canada Energy Regulator, 2022b; Natural Resources Canada, 2020). Refined petroleum – which includes products refined from crude oil such gasoline, diesel, jet fuel, and heating oil – accounts for 43% of energy consumption and natural gas 28% of consumption. Biofuels like ethanol and biodiesel, represent 4% of consumption, largely related to transportation. Twenty-four percent of overall energy is electricity, 97% of which is produced from hydro, nearly 3% from wind, and less than 0.2% from fossil fuels (Natural Resources Canada, 2020). The prevalence of hydroelectricity illustrates that electrification may be a pathway to reduced emissions (Hoicka & MacArthur, 2019).

Table 3: Manitoba end use energy by fuel, 2017.

Fuel	Proportion	PJ
Refined petroleum	43%	138
Natural gas	28%	92
Electricity	24%	79
Biofuels	4%	14
Total	**100%**	**323**

Source: Canada Energy Regulator (2022b)

Understanding the sectoral distribution of energy use has important implications for how communities may transition to new energy sources. Table 4 outlines where energy is consumed in Manitoba. Slightly more than a third is consumed by the industrial sector. Transportation accounts for 29% of energy use, commercial 19% and residential 17%.

Table 4: Manitoba end use energy by sector, 2017.

Sector	Proportion	PJ
Industrial	35%	113
Transportation	29%	94
Commercial	19%	61
Residential	17%	55
Total	**100%**	**323**

Source: Canada Energy Regulator (2022b)

Manitoba's energy consumption results in approximately 21.7 MT of carbon dioxide emissions each year (Canada Energy Regulator, 2022b). On a per capita basis, Manitobans emit 16.2 tonnes of carbon dioxide annually, about 17% below the Canadian average (Canada Energy Regulator, 2022b). This is largely due to its high prevalence of carbon-free electricity provided by hydroelectricity.

Much of rural Manitoba relies on electric heat. Natural gas service extends to Winnipeg, Brandon, and southern rural communities. Most rural area, especially in the north and east of the province, are not connected to the natural gas network (Laszlo Energy Services, 2019; Manitoba Hydro, n.d.-b).

Energy is tightly controlled by the province, with electricity and natural gas provision centralized through Manitoba Hydro – a crown corporation (Manitoba Hydro, n.d.). The ability to supply electricity in the province is given solely to Manitoba Hydro through *The Manitoba Hydro* Act, 1987. Centra Gas, owned by Manitoba Hydro, distributes natural gas for home heating in the south of the province (Manitoba Hydro, n.d.-a). Manitoba Hydro is "responsible for the design, construction, and operation of hydro facilities, and is the largest producer of electricity in Manitoba" (Canada Energy Regulator, 2022b, para. 7). Two commercial wind farms exist in Manitoba that are privately owned and sell power to Manitoba Hydro (Environment Climate and Parks, n.d.). While a provincial monopoly on electricity and natural gas generation and provision exist, other energy sources are not as tightly regulated. Sale of gasoline, diesel, and other fuels are regulated by provincial statues, but are subject to competition within the free market.

While Manitoba has significant capacity for wind, solar, and geothermal (Barrington-Leigh & Ouliaris, 2017), the prevalence of cheap hydroelectricity has prevented development other renewable energy sources (Canada Energy Regulator, 2022b; Manitoba Sustainable Development, 2017; Robb & Fitzpatrick, 2020; Thompson, 2022). The transition to net-zero is financially beneficial, and possible, for Manitoba, but its existing use of renewable hydroelectricity reduces the financial incentive (Stringer & Joanis, 2022). The centralized nature and province-wide jurisdiction of Manitoba Hydro has limited exploration of community energy and local generation (Robb & Fitzpatrick, 2020). While private generation of electricity by individuals is permitted, it is limited to 100 kilowatts (kW), any larger projects require provincial approval and a power-purchase agreement (Manitoba Hydro, n.d.-b; Robb & Fitzpatrick, 2020). Further, the net-billing rate that Manitoba Hydro buys power from independent generators at, is substantially lower than the residential rate Manitoba Hydro charges consumers. For example, in 2021, the excess energy rate is $0.065/kWh compared to standard residential rates of about $0.093/kWh (Manitoba Hydro, n.d.-b).

Limited social science research exists on Manitoba's energy system. Most research focuses on Manitoba as part of larger national studies (MacArthur, 2017; Riva et al., 2021; Sherren et al., 2019; Thompson, 2022; Valiante, 2013) or examines the impacts of hydro development on northern Manitoba First Nations (Buckland & O'Gorman, 2017; Martin & Hoffman, 2008; Thompson, 2015). Energy planning research has largely focused on northern communities (Bhattarai & Thompson, 2016; Kvern et al., 2022). Almost no research explores the connections between rural places and energy in the province. The relationship between land use planning and energy planning in Manitoba is not well known or well communication, and further research is needed to address this.

2.2 The Energy Transition

The scientific consensus on climate change and its high potential for negative impacts to humans and the planet is overwhelming (IPCC, 2021; UN Environment, 2019). To prevent these negative impacts, reducing the greenhouse emissions which are fueling climate change is essential (IPCC, 2021). The Government of Canada has reaffirmed its commitment to achieving net-zero GHG emissions by 2050 to mitigate future climate change (Canada, 2021). Practically speaking, this means that the anthropogenic emission of GHGs into the atmosphere are balanced by their removal from the atmosphere over a specified period (Canada, 2021). Meeting the challenge of net-zero requires a massive reduction of emissions from Canadians. This can be achieved either through reduced consumption and use of emitting sources, or by switching to systems, services, and technologies that produce vastly less emissions in their operation.

The Government of Canada's commitment to net-zero will require a fundamental shift in how energy is produced, transmitted, and consumed. Presently, Canada's energy systems are largely centralized and focused on fossil fuels. Over 80% of Canadian emissions are associated with energy generation and use (Natural Resources Canada, 2020). Transportation and heating, which predominately rely on fossil fuels, are two of Canada's largest sources of emissions (Natural Resources Canada, 2020). Canada's high rates of fossil fuel consumption directly produce its high rates of GHG emissions.

Restructuring the energy system to one that does not consume fossil fuels is essential to achieving Canada's commitment to net-zero.

Canadian communities have long been shaped by fossil fuel use, which has entrenched fossil fuel-based systems as the default (Burch, 2010b; Calvert et al., 2019). This can be observed in the rise of suburban sprawl and freeway expansions since the 1950s, as cheap fossil fuels enabled development of energy intensive land use patterns (Marr, 2015; Muratori, 2014). As a result, car-dependency and fossil fuel dependency are high because communities are designed around fossil fuels. To achieve net-zero, municipalities will need to be shaped instead by renewable energy use.

The restructuring of energy systems is already occurring around the globe. The low-carbon energy transition is operating as a two-fold process; phasing out of fossil-fuels while simultaneously embracing renewable energy - like wind, solar, biomass, or geothermal – to meet energy needs (Blondeel et al., 2021). Many nations and local communities are creating decentralized energy systems that operate on low-carbon sources (Cha & Pastor, 2022; International Energy Agency, 2021; Koirala et al., 2016; McLaren Loring, 2007; Sperling et al., 2011). Overall, the proportion of renewable energy has been increasing steadily in the past several decades. Since 2007, renewable electricity generation around the globe has more than doubled (Hoicka & MacArthur, 2019). Within Canada renewable energy has jumped by 14% between 2010 and 2018 (Natural Resources Canada, 2020).

In addition to pivoting to renewables, it is expected that the energy system will turn increasingly towards electricity to meet a greater diversity of needs (Blondeel et al., 2021; Bouffard & Kirschen, 2008; Hoicka & MacArthur, 2019). This is largely because most renewable energy technologies are designed to produce electricity. The International Energy Agency (2022) expects electricity demand to double under net-zero policies. Electricity is a reasonable power source to transition to, given its low-cost and ability to be produced without fossil-fuels (Aghahosseini et al., 2017; Bogdanov et al., 2021). A consensus among climate and energy researchers, is that the attainment of net-zero will result in a shift towards more electricity (Adil & Ko, 2016; Barrington-Leigh & Ouliaris, 2017; Benson et al., 2022; Hoicka & MacArthur, 2019).

Research suggests that the transition to net-zero energy is financially feasible and beneficial. All provinces in Canada can see economic benefit from transition to clean energy infrastructure (Benson et al., 2022; Stringer & Joanis, 2022). The transition to net-zero is also technically feasible, with sufficient capacity for wind, solar, and hydro to supply predicted energy demand (Barrington-Leigh & Ouliaris, 2017). Further, regions with large amount of clean electricity from hydropower will be better suited to the energy transition (Stringer & Joanis, 2022). A supply of already clean energy, and entrenched electricity infrastructure will enable the transition to electricity more easily. This has important implications for the Manitoba context, as nearly all of Manitoba's electricity is derived from hydropower (Natural Resources Canada, 2020). However, the low-cost of hydroelectricity in Manitoba may also prohibit the development of other renewable sources (Haley, 2014).

Energy transitions are as much a technical process as they are social ones. Social aspects, primarily the inclusion of community and individual groups is important to facilitating energy transitions (Macarthur et al., 2020; Middlemiss & Parrish, 2010; Young & Brans, 2017). Many researchers have focused on how social aspects of energy transition consider equity and justice (Carley & Konisky, 2020; Cha & Pastor, 2022; Thompson, 2022; C. Walker et al., 2022). Others have focused on how local communities can become politically empowered and find greater independence through community energy (Coy et al., 2022; Middlemiss & Parrish, 2010). Political and social elements are critical to energy transitions, and they must be included if transitions are to succeed.

2.3 Energy and Space

A significant impact of the transition to renewable energy will be a spatial expansion and relocation of energy generation infrastructure. Increasing electrification through renewable energy generation will require more generation sites and renewable energy technologies. A sustainable society based on renewable energy will "have to draw on space as its ultimate fundament for wealth" (Stoeglehner et al., 2011, p. 2). Renewable energy technologies are significantly more decentralized than fossil-fuel based energy generation, thus renewables will be dependent on space for their success (Barrington-Leigh & Ouliaris, 2017; Bridge et al., 2013; Hoicka & MacArthur, 2019; Osorio-Aravena et al., 2020; Stoeglehner et al., 2011). As energy systems change, overall societal structure will shift in tandem, with societal wealth changing from an emphasis on natural resources, to an emphasis on the spatial sites used for energy production (Blondeel et al., 2021; Bridge et al., 2013). As a result, ensuring the efficient and effective use of spatial resources will be paramount for facilitating the transition to a society powered by renewables. This need for strong spatial efficiency cements the role of land use planning in enabling the energy transition.

Given the decentralized nature of renewable energies, the role of space is key for the energy transition. While physical space, landscape, and land base are important to facilitate renewable energy infrastructure (Osorio-Aravena et al., 2020; Stoeglehner et al., 2011), so is the social construction of space. Territoriality is how social and political power are organized and exercised over space – identified by Bridge et al. (2013) as part of the geography of the energy transition. Diffusion of new technologies, like renewable energy infrastructure, depends both the aspects of the technology, and how the technology and the natural resources it relies upon are "embedded in national systems of significance and cultural routines" (Bridge et al., 2013, p. 336). Essentially, how political, and social structures value specific resources and places will influence how new technologies are deployed. When considering the expansion of the energy transition into rural areas, territoriality informs policy makers that converting existing land uses for renewable energy production will invoke social and political reactions.

Canada is a geographically and demographically diverse nation. Equally diverse are the energy systems within each province and territory (Stringer & Joanis, 2022). As a result, Canada will experience a diversity of energy transitions, unique to a given place. This evaluation of how rural municipalities in Manitoba are planning for the energy transition,

allows for a place-specific analysis of energy planning that fits Bridge et al. (2013) assessment of the spatial nature of energy transition.

2.4 Rural Communities and the Energy Transition

There is a growing recognition that rural areas are becoming “significant battlegrounds for the implementation of energy transitions” (Clausen & Rudolph, 2020, p. 1). Globally, research and policy have recognized that rural areas will be the location of renewable energy generation (Brown et al., 2017; Calvert, Smit, et al., 2021; Jefferson, 2018; Naumann & Rudolph, 2020; Poggi et al., 2018). Supranational policies of the European Union explicitly target rural and sparsely populated areas as site for renewable energy generation (Clausen & Rudolph, 2020). While Canada has not issued specific directives on renewable energy in rural places, the existence of rural places as sites of resource production combined with these global trends illustrate the pivotal role of rural Canada within the nation’s quest for net-zero.

In Canada, about 29 percent of the population lives outside of cities and urban cores (Statistics Canada, 2022). Rural communities are as diverse as urban ones, but comparatively understudied (Adua & Beaird, 2018; Hodge et al., 2016; Mayer & Knox, 2010; Schiff, 2019; Weeden et al., 2021). In the specific context of energy planning and achieving net-zero to mitigate climate change, rural areas face a particular dearth of knowledge. Most research on spatial energy planning has occurred in Asian and European urban centers (Herington et al., 2017; Osorio-Aravena et al., 2020).

The bulk of municipal climate change and energy planning literature in Canada focuses on urban places (Baynham & Stevens, 2014; Guyadeen, 2019; Guyadeen et al., 2019; St Denis & Parker, 2009; Stevens & Senbel, 2017; Tozer, 2013). This is consistent with the broader literature and discourse surrounding sustainability, climate change and energy which almost exclusively focuses on urban places (Hodge et al., 2016; Mayer & Knox, 2010; Schiff, 2019). Calvert et al. (2021) completed one of the few studies on rural energy planning in Canada, they examined the content of 10 municipal official plans to understand how energy transitions are associated rural conceptions of place and landscape. Another study from Ontario evaluated rural municipal climate change plans. It concluded that rural plans lack meaningful fact base and had weak policies (Guyadeen & Henstra, 2023). While a strong foundation of research on renewable energy policy in Ontario exists, there is a lack of focus on the needs and experiences of rural communities and the connections between energy and rural land use, Canada-wide. Limited research exists on rural experiences, capacities, and desires regarding energy planning.

Rural places have unique perspectives and relationships to energy. Overall, rural places experience higher incidences of energy insecurity, spending more on energy and having less choice of consumer energy products (Adua & Beaird, 2018; MacDonald et al., 2020; Muratori, 2014; Riva et al., 2021). A report from Laszlo Energy Services (2019) found that rural Manitoba residents spend more on than urban residents on energy due high transportation costs and reliance on electric heat. Rural places are vulnerable to climate change in different ways than urban areas. High dependence on climate-

sensitive industries such as agriculture and other resource-based industries will directly affect rural communities (Lal et al., 2011; Vodden & Cunsolo, 2021; Weeden et al., 2021) and will have national and global trickle-down affects (Kelly et al., 2021; Pittman et al., 2011). Rural communities tend to be less affluent than urban ones, with lower average incomes, lower education rates, and high unemployment (Weeden et al., 2021). Secure and reliable energy is essential for rural communities, especially considering climate change increasing the frequency of severe weather and natural disasters. The low-carbon energy transition provides opportunities to increase local generation and improved energy security in rural areas. These unique conditions merit rural-specific analysis of the energy transitions in rural places.

Renewable energy sources have low energy densities when compared to fossil fuels, meaning that less units of energy are generated per area of land (Hoicka & MacArthur, 2019; Osorio-Aravena et al., 2020). For example, wind turbines require significant height (upwards of 18m) and open space to achieve sufficient wind speed for energy generation (Kaza & Curtis, 2014). Given these requirement, rural and agricultural areas are most amenable to wind development (Kaza & Curtis, 2014; Stoeglehner et al., 2011). The same principle holds true for other renewable energy sources, meaning increased land base will be needed for energy production.

Place-based, grassroot approaches to the energy transition are required if rural communities are to receive the most benefits from renewable energy development (Bridge et al., 2013; Clausen & Rudolph, 2020). Adaptations of urban policies that incorporate place-based applications of policy solutions can be successful in rural and remote contexts (Schiff, 2019). Planning frameworks, operationalized through development plans, can begin to frame the energy transition in a local way to enable the placed-based, local approaches needed to connect renewable energy and rural development.

Also important in facilitating the low-carbon energy transition is inclusion of the social aspects of energy transition. Young and Brans (2017) found that democratic participation structures, along with local elected officials championing renewable energy led to successful energy transitions. The agency of local actors and policy entrepreneurs (King & Roberts, 1992), was found to be especially important in advancing the political and social aspects of energy transitions. Grassroots community leadership builds capacity to develop energy planning policies and projects while simultaneous increasing social acceptance of energy planning (Coy et al., 2022; Middlemiss & Parrish, 2010; G. Walker, 2011). Ensuring congruent values among the public, elected official and municipal staff is also key to acceptance of climate action and energy planning (Bedsworth & Hanak, 2013; Hamin et al., 2014). These community-level social factors, particularly the role of individuals and elected officials, was found to be crucial in facilitating energy transitions in the European union (Biresselioglu et al., 2020; Mees, 2022; Ruggiero et al., 2014).

2.5 Land Use Planning Frameworks

2.5.1 Rural Planning Considerations

Rural planning has a substantial history in Canada (Hodge et al., 2016). The role of rural areas as producers and providers of natural resources has led to development of rural planning schemes focused on resource extraction (Hodge et al., 2016; Schiff, 2019). The next resource to be part of this paradigm is renewable energy, a logical extension of current energy infrastructure and development that exists in many rural areas globally (Brown et al., 2017; Herington et al., 2017; Naumann & Rudolph, 2020). Rural areas have a key role in producing and supplying society with natural resources, the newest of which is renewable energy (Calvert, Smit, et al., 2021; Harrison & Heley, 2015; Naumann & Rudolph, 2020).

Planning practice and theory remains largely fixated on urban places. This prevents planning from effectively addressing the unique land use challenges arising from rural area's unique physical and social environments (Harrison & Heley, 2015; Hibbard & Frank, 2021; Lal et al., 2011). This is especially pronounced in deeply rural areas that are geographically distant from urban fringes, which often face declining populations and economies (Lal et al., 2011; Schiff, 2019).

2.5.2 Manitoba's Planning System

Planning in Manitoba is governed by *The Planning Act* (C.C.S.M c. P80), and its regulations. Provincial legislation and policy provides for the implementation of municipal development plans (synonymous with official plans) and zoning bylaws. The Provincial Land Use Policies (PLUP), contained within the *Provincial Planning Regulation* (Man Reg 81/2011), outline provincial interests regarding planning; however, municipalities are relatively autonomous and can interpret the policies liberally. Development plans must conform with the PLUP but plans only need to embody the principle of the policies, not any specific policy.

Manitoba's land use planning framework provides several rural-specific considerations, largely focusing on resource extraction and agriculture. The Planning Act requires development plans to contain a section on livestock management. Further, many rural development plans contain language protecting rural character and agriculture.

2.6 Planning, Energy, and Climate Change

Land use planning has a long history of considering and connecting with energy systems. The concept of integrating energy planning and land use or spatial planning together has been considered by professionals and academics since the 1970s, largely in response to the energy crises of that decade (Jaccard et al., 1997; Mirakyan & De Guio, 2013; Owens, 1986).

In Canada, Jaccard et al. (1997) were among the first to consider how planning and energy could be intertwined in municipal policy documents, using a sustainability lens.

Their research examined how local level energy management through planning could reduce GHG emissions (Jaccard et al., 1997). Within a few years, the federal government had produced white papers and guides on the topic of community energy planning (CEP). A 2003 report identified the need for community energy management, and how municipalities can reduce GHG emissions through land use planning (Canada Mortgage and Housing Corporation, 2003). A guide for municipalities wishing to pursue CEP was also published by the federal government (Natural Resources Canada, 2007). This guide outlined the benefits and rationale for CEP, and provided step-by-step instructions, consultant lists, case studies and resources. Seven Canadian community energy plans are referenced in this report as case studies, indicating that even in the early 2000s, municipalities were beginning to take local action on climate change and energy (Natural Resources Canada, 2007). At the same time, the federal government tied Gas Tax funding for municipal infrastructure projects to the creation of sustainability plans (Stuart et al., 2016). As a result, municipal sustainability planning became more formalized and more frequent as municipalities moved to secure project funding.

Canadian communities represent almost 60% of national energy consumption and GHG emissions, with most coming from buildings and transportation (Evenson et al., 2013; Natural Resources Canada, 2020). Accordingly, Canadian communities have started tackling climate change within their own boundaries. Many municipalities have adopted plans to tackle energy, emissions, and climate while working to reduce their consumption of fossil fuels (Burch, 2010a; Guyadeen et al., 2019; St Denis & Parker, 2009; Tozer, 2013). Transitioning away from fossil fuels and implementing CEP has many benefits, including job creation through infrastructure construction and retrofitting, reduced long-term energy costs via conservation and efficiency, lower long-term municipal infrastructure costs, improved local energy security, reduced emissions, and associated ecological improvements (Canada Mortgage and Housing Corporation, 2003; MacArthur, 2017; G. Walker & Devine-Wright, 2008).

2.6.1 Community Energy Planning

Community energy planning (CEP) is the locally led management of energy production, delivery, and consumption that includes “citizens’ ideas and opinions, but also engage[s] them as active stakeholders” (St Denis & Parker, 2009, p. 2089). CEP usually involve public participation, and several instances of CEP have been grassroots initiative (Middlemiss & Parrish, 2010; St Denis & Parker, 2009). CEP is often viewed by scholars as new ways of producing, living, and working with energy (Bridge et al., 2013; Creamer et al., 2018). CEP seeks to formalize the known ways of reducing emissions and producing clean energy at the local level, for a specific community or area.

A significant body of research argues that the energy transition and municipal climate change efforts are intrinsicality linked (Bonnett & Birchall, 2022; Burch et al., 2014; Dale et al., 2020; Joshi & Agrawal, 2021; Wheeler, 2011). Municipal energy transitions need to consider local political, social, and geographic realities, and CEP has been a generally effective way to do so. However, CEP has failed to produce meaningful climate action.

To be effective, CEP needs to focus on the use and integration of renewable energy generation within communities. In their review of Canadian CEP, St. Denis and Parker (2009) found that municipalities emphasize energy conservation and energy efficiency over integrating renewable energy sources into the local energy mix. Energy efficiency is one of the most effective and most accessible avenues of GHG emissions reduction for municipalities. Straightforward actions to reduce consumption, and switch energy sources can reduce municipal emissions, and energy related spending, significantly (Philp & Cohen, 2020). Municipalities can also impose greater emissions reductions through enforcement of building and energy codes (Hoicka & Das, 2021; Klein & Coffey, 2016; Philp & Cohen, 2020). This reluctance to include renewable energy sources, or the generation of energy writ-large, is a substantial barrier to advancing the energy transition and meeting net-zero goals. However, community energy plans from rural and remote communities were more likely to prioritize local renewable energy generation and emphasized the need for multiple types of renewables (St Denis & Parker, 2009).

Previous research has identified several barriers to integrating energy and land use planning such as a lack of political will, limited financial resources, insufficient staffing, and poor communication with decision-makers (Liao et al., 2020; Murphy et al., 2021; Oulahen et al., 2018; Robinson, 2005) A survey of nearly 400 municipalities identified very similar barriers, with limited staff knowledge, lack of political will, and lack of funds as the top three barriers to municipal climate change planning (Robinson, 2005). Other studies note that local land use planning systems are not equipped for energy planning (Calvert, Kantamneni, et al., 2021; Kaza & Curtis, 2014). Murphy et al. (2021) note that more research on the capacity of Canadian municipal governments to plan for energy is needed, as much of the current research focuses on climate change planning. Further research on barriers and how they manifest in a municipal planning context is needed.

Participatory planning processes lead to greater public acceptance of energy transitions and increase the likelihood of renewable energy project success. Aligning the values of municipal officials and the public is important for climate adaptation on the energy transition (Hamin et al., 2014; Young & Brans, 2017). Yet, research indicates that public engagement with energy planning, while critical to success, is low (Corsini et al., 2019; Dall-Orsoletta et al., 2022; Guyadeen et al., 2019; McLaren Loring, 2007; Sperling et al., 2011). Recent research conducted on CEP processes in Halifax, NS, and Oakville, ON, indicate that community energy plans still face issues surrounding their ability to engage various publics (Walter et al., 2021). While improvements are being made in planning processes that facilitate greater integration, and thus more effective implementation (Walter et al., 2021), further study is needed on how communities' statutory plans are tackling the climate crisis and challenge of net-zero.

Research has found that CEP often faces barriers to effectively integrating climate and energy goals across various municipal departments and policy areas (Oulahen et al., 2018; Tozer, 2013; Walter et al., 2021). While Walter et al., (2021 developed a tool for increasing this integration, their study only examined dedicated community energy plans. Further research on the role, and efficacy of official plans as tools for integrating energy planning is needed.

CEP is effective when it is supported by higher levels of government, particularly provincial governments which set land use and energy policy (Linton et al., 2021; Murphy et al., 2021; Winfield et al., 2021). Enabling legislation, allowing for local control is a key determinant of success. Within British Columbia, legislative authority for municipalities to undertake climate planning was key to the rise of that practice (Baynham & Stevens, 2014; Littlejohn & Laszlo, 2016).

Financial support to draft community energy plans, and technical expertise to produce accurate plan content are some of the most effective things senior governments can do to support CEP (Winfield et al., 2021). For example, British Columbia's Climate Action Revenue Incentive Program resulted in CEP being nearly ubiquitous within that province (Dale et al., 2020; Winfield et al., 2021). The federal government's connection of the Gas Tax Fund to municipal climate planning was also very successful in Nova Scotia, enabling municipalities to create comprehensive climate action plans (Philp & Cohen, 2020).

2.6.2 Energy and Land Use Planning Integration

Supportive national strategies are needed to facilitate an effective transition to renewable energy, and the achievement of net-zero (Dale et al., 2020; Leonhardt et al., 2022; Winfield et al., 2021). However, as Stinger and Joanis (2022) observe, provincial governments are the most important policy makers surrounding the decarbonization of energy and achievement of net-zero. The nearly exclusive control over energy systems that provinces exert results in Canada possessing many disconnected energy systems. Provincial governments must commit to achieving net-zero and transition their energy systems if Canada is to meet its 2050 target.

The provincial control of energy systems aligns with the provincial control of land use planning. This illustrates the critical role provinces play as the senior-level government to municipalities in terms of setting the agenda and framework for embracing renewable energy and net-zero. As seen with CEP, without strong provincial support municipal action is limited (Dale et al., 2020; Jaccard et al., 2019; Winfield et al., 2021). Further, CEP is often not afforded the statutory authority of official plans (Tozer, 2013). As a result, communities can leave plans on the shelf and disregard them. Integration of energy planning and land use planning is needed to overcome these limitations.

2.7 Conclusion

This chapter highlights the need for integration between land use planning and energy planning within rural Canadian communities. Climate change is the most pressing issue of the 21st century, combining energy within land use frameworks is critical to achieving sustainability (Macarthur et al., 2020; Wheeler, 2011). The prairies of rural Manitoba are forecasted to be substantially and disproportionately impacted by climate change (Government of Manitoba, 2016). Understanding how to integrate energy and land use planning in these provinces is critical to achieving net-zero and mitigating climate change impacts in Canada.

Local governments must reform how they plan to disrupt fossil fuel dependency and meet international climate commitments (Canada, 2021). Rural communities are at the forefront of the renewable energy transition, but existing land use planning frameworks cannot to enable it (Burch et al., 2014; Naumann & Rudolph, 2020). Many communities have attempted to integrate energy within their land use plans, only to see limited results (Burch et al., 2014). This research helps understand *why* this implementation gap exists, and how it can be addressed. More importantly, this research contributes critical knowledge on how to include rural communities in the global energy transition.

3 Research Design

This chapter presents the research design used in this study. It begins by re-introducing the study's goal and objectives, along with explaining the theoretical framework that informed the research design. Second, the methods applied to collecting primary and secondary data are presented and discussed. The primary sources of data for this research are the plan quality evaluation and the semi-structured interviews. This chapter also presents a detailed description of how data were analyzed, and the tools used to do so. The chapter concludes with a discussion on qualitative rigor, what it is composed of and how this study's methods ensure it produced valid, trustworthy results.

3.1 Research Goal & Objective

The goal of this research is to identify the barriers to integrating land use planning and energy planning that are preventing rural Manitoba rural municipalities from achieving a low-carbon energy transition. The objectives of this research are:

1. Develop a systematic plan quality evaluation framework to assess the inclusion of energy planning in rural municipal development plans.
2. Explore why municipalities decided to pursue, or not pursue, energy considerations within development plans.
3. Identify success factors and barriers to the integration of energy planning into rural land use planning frameworks.

3.2 Theoretical Considerations

3.2.1 Paradigm

This research employs a pragmatic worldview. Pragmatism is a problem-solving oriented research approach (Creswell & Creswell, 2018) and focuses on the complexity of problems that exist within real-world social, political, and historical contexts (Creswell & Creswell, 2018). This paradigm is particularly well suited to mixed methods, as it embraces a variety of viewpoints with an ultimate view towards providing the best understanding of a situation or problem (Creswell & Creswell, 2018).

3.2.2 Mixed Methods Design

This study uses an explanatory sequential mixed methods design. In this approach, quantitative data is collected and analyzed first, and findings then inform qualitative data collection and analysis (Creswell & Creswell, 2018; Fetters et al., 2013). This combined approach allows for qualitative findings to help explain the quantitative results and provide a deeper description of the issues and potential resolutions under examination. The use of qualitative data to verify quantitative findings aligns with the pragmatic orientation of this research and is a common application of explanatory sequential mixed methods design (Creswell & Creswell, 2018; Fetters et al., 2013).

This study uses a quantitative plan evaluation framework to assess the inclusion of energy planning in rural municipal development plans. The plan quality results helped inform knowledge about the scale, type, and location of existing energy planning policy in Manitoba. Knowledge gained from the literature review and quantitative data collection informed the development of the interview guide and facilitate semi-structured interviews with municipalities, planning consultants, and utility staff. These key-informant interviews further explain the quantitative results. Finally, combining the quantitative and qualitative data identifies both individual experiences and structural factors influencing development plans. Combination of the two methods also allows for identification of conformity between the results and provides description and details to indicate where qualitative and quantitative results differ.

3.2.3 Case Study

This research uses a mixed methods case study design integrating quantitative and qualitative data collection, analysis, and results to present in-depth evidence (Creswell & Creswell, 2018). The rationale for undertaking mixed methods research is that neither qualitative nor quantitative methods alone are enough to capture the context of a particular case (Bryman & Bell, 2019; Creswell & Creswell, 2018). By combining qualitative and quantitative data, mixed methods research can increase validity while providing a comprehensive understanding of phenomena (Fetters et al., 2013).

A case study deeply investigates a phenomenon within real-world context (Yin, 2018). Case studies are both a method and approach to conducting research and are particularly useful when the boundaries between the phenomena under study and its context are not clear (Creswell & Creswell, 2018; Yin, 2018). Case studies are commonly paired with explanatory mixed methods due to its ability to provide detailed investigation (Fetters et al., 2013).

Rural municipalities within Manitoba are selected as a case study because of limited existing research, significant rural population, and the existing dichotomy between energy and planning in urban and rural communities. No previous research has explored how energy is integrated into development plans in the province.

3.3 Literature Review

The first method employed in this study was a systematic literature review of relevant academic literature and policy on CEP. The review focused primarily on the Canadian and Manitoban contexts, but incorporated sources from the United States, Western Europe, and Australia. This review identified the state of knowledge on CEP and the integration of land use planning and energy planning.

This method contributed to knowledge of the study area and their policy landscapes. As described in the literature review (Chapter 2), the gathered knowledge highlights gaps in the planning and community energy fields of research that require further study. This review helped identify existing barriers and opportunities to planning for community energy and assisted in developing the interview guide. The review also was

fundamental to identifying previous plan quality evaluation research that was used in created the plan quality evaluation framework. This review contributed to objectives 1, 2, and 3.

3.4 Plan Quality Evaluation

To assess the inclusion of energy planning in rural municipal development plans, a plan quality framework was used. Plan quality is a subset of plan evaluation research. Plan evaluation identifies the outputs and outcomes of a plan to establish if, and to what degree, planning has been successful (Alexander, 2002; Guyadeen & Seasons, 2016). Plan quality is an established framework for analyzing the contents of plans and evaluating them. It has been defined as "the process by which plan content analysis data is linked to normative criteria of what constitutes a better plan" (Lyles & Stevens, 2014, p. 434). Plan quality research seeks to identify what makes for a 'good' plan (Baer, 1997; Berke & Godschalk, 2009a), and does this through developing sets of criteria and assessing a given plan for conformance with said criteria (Baer, 1997; Guyadeen & Seasons, 2016; Lyles & Stevens, 2014).

The broader discipline of program evaluation has heavily informed plan quality research (Guyadeen & Seasons, 2016; Seasons, 2021). Program evaluation illustrates for decision-makers whether a program or policy is "achieving or have achieved its intended goals and objectives, and how effectively" (Seasons, 2021, p. 43). Weiss (1998) defined program evaluation as the "systematic assessment of the operations and/or outcomes of a program, compared to a set of explicit or implicit stands, as a means of contributing to the improvement of the program" (4). In essence, program evaluation uses a structured process to empirically assess and demonstrate how well a program is operating and the impacts it is creating (Guyadeen & Seasons, 2018).

Building off the use of indicators in program and plan evaluation, plan quality measures the extent of the presence or absence of certain components within a plan. The common characteristics of plan quality, things that make for a good plan, include fact base, goals, policies, implementation, monitoring and evaluation, inter-organization coordination, participation, and plan organization (Berke et al., 2006; Berke & Godschalk, 2009a; Lyles & Stevens, 2014). However, since this analysis focuses not on the quality of the plan overall, but quality in addressing energy, it uses a simplified framework. The framework focuses only on fact base, goals, policies, and implementation in line with the evaluation of climate change planning by Baynham and Stevens (2014) and Bonnett and Birchall (2022). These elements are discussed below:

- Fact base is how the plan presents and analysis the current and future conditions of the planning area (Berke & Godschalk, 2009b). It is the empirical foundation of the plan and provides explanation and reasoning (Baker et al., 2012). Plans should include factual details on local energy systems, energy-climate relationships, and emissions (Baynham & Stevens, 2014).

- Goals reflect the public's desired future, they are often broad aspirational statements based on fact base and public input (Baker et al., 2012; Berke &

Godschalk, 2009b). Goal statements in plans should include aims for local energy production, energy conservation, and connections between energy and land use (Baker et al., 2012; Baynham & Stevens, 2014; Tang et al., 2009).

- Policies are action-oriented implementation principles to guide decision-making and achieve goals (Berke & Godschalk, 2009b; Guyadeen et al., 2019; Tang et al., 2010). The policy components of a plan should consider energy efficient land use, energy conservation and generation, increasing renewables, green building standards, and providing tools and incentives (Baynham & Stevens, 2014; Bonnett & Birchall, 2022; Tang et al., 2011).

- Implementation characteristics consist of commitments to implement plan policies (Baker et al., 2012; Berke & Godschalk, 2009b). This includes the steps need to carry out actions including specific responsibilities, timelines, cooperation and partnerships, measurable objectives, and monitoring and follow-up (Baynham & Stevens, 2014; Berke & Godschalk, 2009b; Guyadeen et al., 2019; Tang et al., 2009)

Plan quality evaluation has been previously used by scholars to consider climate change planning in Canada (Baynham & Stevens, 2014; Dale et al., 2020; Guyadeen et al., 2019) and the United States and Europe (Baker et al., 2012; Berke, 1994; Dovlén & Khakee, 2017; Elgendawy et al., 2020; Fu & Li, 2022; Lyles & Stevens, 2014; Tang et al., 2011; Wretling & Balfors, 2021). The focus of climate change planning on reducing GHG emissions means there is significant consideration of energy within existing frameworks (Baker et al., 2012; Baynham & Stevens, 2014; Bonnett & Birchall, 2022; Guyadeen et al., 2019; Tang et al., 2011). The application of plan quality methods to a range of plans in a range of contexts makes it well suited to evaluating the consideration of energy within rural Manitoba development plans. Given the lack of energy-specific plan quality research, existing climate change plan quality frameworks were adapted.

3.5 Plan Selection

Manitoba was chosen as the site for this research due to lack of academic research on planning systems or energy planning. Additionally, the province's high rate of clean electricity, energy monopolies, and high rural population provide a unique opportunity to explore energy planning in the Canadian rural context. The knowledge gained may provide insight into the challenges, barriers, and advantageous conditions faced by municipalities, provincial governments, utilities, and consultants in planning for net-zero.

The City of Winnipeg and the Winnipeg Metropolitan Region have committed to achieving net-zero in their planning documents (City of Winnipeg, 2021; Winnipeg Metropolitan Region, 2021). Given that, this research explored how municipalities outside of the Winnipeg Metropolitan Region integrated energy planning into their development plans. Municipalities were included in the sample if they were located outside the Winnipeg Metropolitan Region and met the Statistics Canada definition of rural. A rural area has a population density of less than 400 people per square kilometre (Statistics Canada, 2017).

Of Manitoba's 137 municipalities, 104 meet these criteria. Only 67 development plans applied, as many municipalities are members of a planning district – a shared board which oversees planning matters in member jurisdictions (Manitoba Municipal Relations, 2022). Most plans were collected from municipal websites and via email with municipal staff.

Of the 67 total possible plans, 57 were included in the sample. Several municipalities did not respond to requests from the researcher, one municipality did not have a digital copy of their development plan available, and one did not have a development plan. The communities and planning districts included in the study are listed in Appendix A. The appendix also presents the 2021 population and population densities of the communities. Map 1

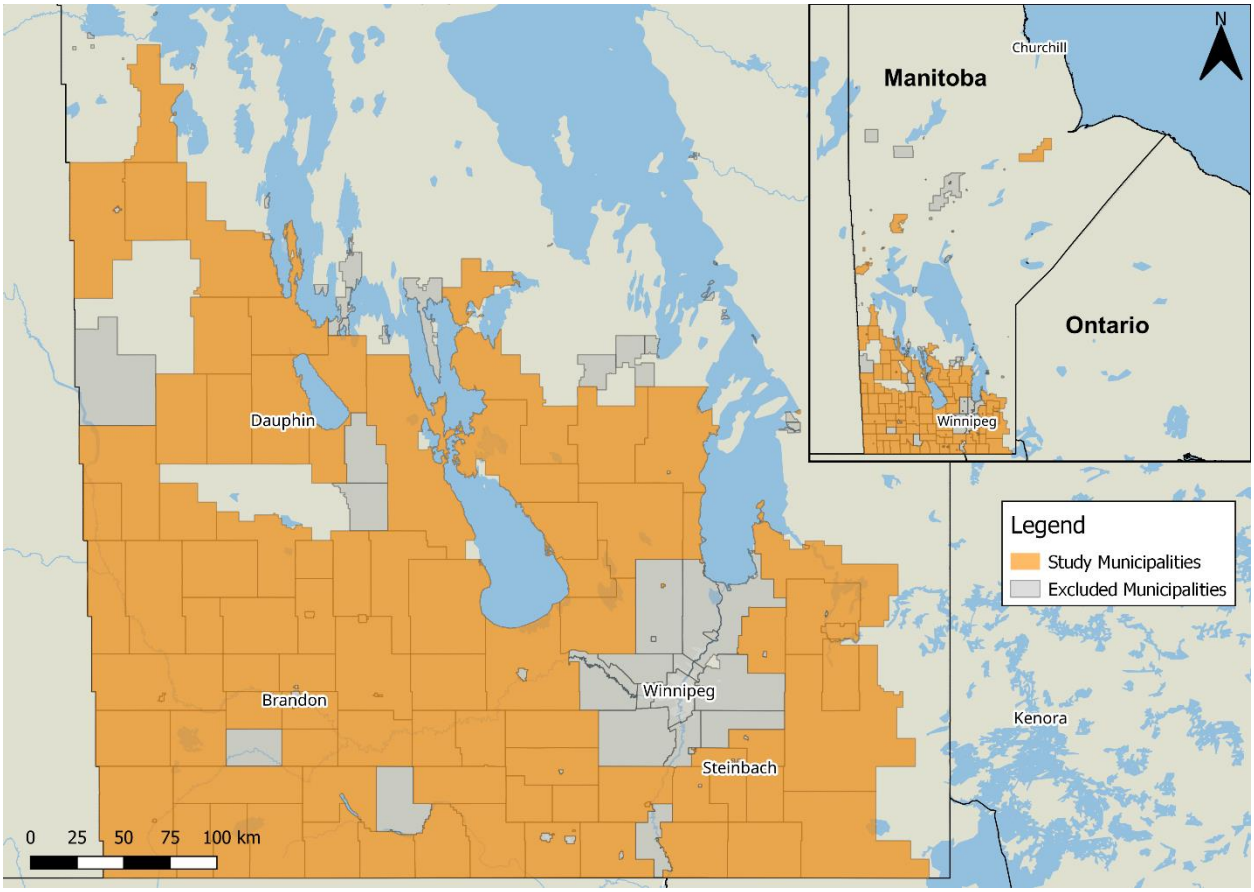

Figure 2: Map of study communities.

Created by Michael Kvern with data from Manitoba Municipal Relations, Statistics Canada, and ESRI.

3.6 Semi-Structured Interviews

Semi-structured interviews are a common method of interviewing participants that uses an interview guide with a standard list of questions or themes but allows participants to depart from theme and the interviewer to modify the guide if needed (Bryman & Bell,

2019). Prompts, follow-up questions, and new questions may also be added by the researcher as topics emerge in the interview. The strength of a semi-structured interview is its flexibility, and location between the extremes of structured and unstructured interviews (Berg, 2007; Bryman & Bell, 2019). The interviewer maintains control of the interview but has enough freedom for the interviewee to introduce new topics.

The interviews were designed to understand how, and to what degree, municipalities are considering energy and the need for net-zero within their development plans. The semi-structured nature of the interviews allowed for a flexible and conversation like process that encouraged open responses from participants (Longhurst, 2010). Interview questions were the same for all participants but were re-worded or re-ordered to suit the particular interview (Bryman & Bell, 2019; Longhurst, 2010). Questions also included prompts and sub-question to help probe responses from participants (Longhurst, 2010).

3.7 Interview Participant Selection

Participants were selected from a pool of municipal staff, elected officials, planning consultants, provincial planning staff, and utility staff in Manitoba who have familiarity with the development planning process. The pool was intentionally broad to capture a diversity of views from stakeholders involved in different aspects of municipal planning and energy management. All potential interviewees and organizational were solicited by email and phone. Interview participants were identified by contacting municipalities reviewed in the plan evaluation stage and planning consulting firms in the province. The Municipal Relations Department, and Environment, Climate and Parks Department of the Government of Manitoba, Efficiency Manitoba, and Manitoba Hydro were also contacted. Interviewees were also solicited through snowball sampling, where interviewees were asked to suggest other potential interviewees (Bryman & Bell, 2019). A copy of the participant solicitation script and participant information letter are in Appendix B and Appendix C, respectively.

In total 18 participants were interviewed. Twelve participants were male, and six participants were female. As shown in Table 5, most participants (N=8) were municipal employees, including development officers and administrative staff. Five (N=5) participants were planning consultants with experience drafting development plans for rural municipalities. Three (N=3) participants were provincial employees consisting of planners and policy analysts. One participant (N=1) was employed by a utility, and one (N=1) was a municipal elected official and planning board member.

Table 5: Employment categories of interview participants

Participant group	Number
Municipal Employee	8
Planning Consultant	5
Provincial Employee	3
Elected Official	1
Utility Employee	1
TOTAL	**18**

3.8 Interview Guide

The interview guide (see Appendix D) was drafted based on findings from the literature review and plan quality evaluation framework. The research goal and objectives also guided the interview guide's development. The interview guide collected data on:

- Organizational and role information
- Specific aspects that lead to successful and functional policy
- Energy planning and climate change knowledge
- Perceived challenges and opportunities to planning for energy
- The intersection between land use planning and energy planning

Bryman and Bell (2019) identify several types of questions that can be asked in semi-structured interview. Questions in the interview guide were designed to flow from easier, introduction questions, to direct question, to more complex theoretical indirect questions at the end. The last two questions allowed for snowball sampling and for participants to ask questions and add final comments. The first question was an "introducing question", which aims to learn about the participant, and are purposefully easy to answer (Bryman & Bell, 2019, p. 245). This question was asked first to establish trust and comfort in the interview (Longhurst, 2010). The remaining questions are largely "specifying questions" and "direct questions" that ask participants about their experiences, feelings, and actions on a topic (Bryman & Bell, 2019, pp. 245–246). Questions 12 and 13 are "indirect questions" that seeks to understand how participants view a topic not directly related to them (Bryman & Bell, 2019, p. 246). The final questions. 14 and 15 were

“ending questions” which concluded the conversation and received practical information from the interviewee. Follow-up, probing, and interpreting questions were also used during the interviews as needed to provoke responses, examples of which can be seen in the prompts within the interview guide (Bryman & Bell, 2019, pp. 245–246).

3.9 Data Analysis

3.9.1 Plan Quality Evaluation

Following best practice identified by Berke & Godschalk (2009), and previous plan quality research (Baynham & Stevens, 2014; Guyadeen, 2019; Guyadeen et al., 2019; Stevens & Senbel, 2017; Tang et al., 2011) an index score was compiled for each characteristic. Indicators were evaluated using a 0-1-2 coding scheme, commonly used in plan quality literature (Baynham & Stevens, 2014; Bonnett & Birchall, 2022; Elgendawy et al., 2020; Guyadeen, 2019). A score of 0 means the indicator is not mentioned in the plan, a score of 1 means the indicator is present, but mentioned generally, and a score of 2 means the indicator has a specific or detailed mention. The plan quality coding framework is adapted from Baynham and Stevens (2014), Guyadeen (2019), and Guyadeen et al., (2019) with new energy specific indicators included. The plan quality coding framework is contained in Appendix E.

Content analysis was used to determine if these pre-determined criteria are present within the selected plans. Plans were coded by the researcher using the plan quality evaluation framework. Plans were coded manually, with notes and scores kept on a score sheet in MS Excel. Each plan had an individual scoresheet, a sample of which is show in Appendix F. Data from the individual plan score sheets was transferred to a master scoresheet to enable comparison and statistical analysis. After the first round of coding, the researcher re-read and re-scored each plan to ensure accurate and consistent evaluation.

From each coding result, an index score was calculated allowing plans to be compared more easily. The scores for the indicators were summed for each plan quality characteristic. The summed scores were then divided by the total possible score for each characteristic. The resultant score was multiplied by ten placing it on a 0–10 scale (Guyadeen, 2019, p. 7). Individual scores for each indicator and characteristic were tracked across all plans, allowing for identification of trends within individual indicators and characteristics. The plan quality framework contributed to the achievement of objective 1.

A correlation analysis was conducted to assess the relationship between plan year and score. The same analysis was completed for plan length and score and municipal population and score. All analyses were inconclusive as they were statistically insignificant at the 0.05 level using a t-test.

3.9.2 Semi-Structured Interview

Following each interview, a transcript was produced by the researcher. This transcript was uploaded to NVivo and were then coded. Transcripts were coded by the researcher using an iterative and inductive approach to group responses thematically (Creswell & Creswell, 2018). Responses were coded by questions, using the interview guide as an initial frame (Bryman & Bell, 2019). Coded data was then reviewed to form themes and interpretate the interview findings. The interview findings contributed to the achievement of objective 2 and 3.

3.10 Triangulation

Within qualitative research, triangulation is the use of multiple methods and sources of information to increase internal validity (Berg, 2007; Bryman & Bell, 2019). Data triangulation is based upon using multiple sources of data on the same phenomenon in one study (Creswell & Creswell, 2018). Triangulation is defined as "the use of more than one method or source of data so that findings may be cross checked" (Bryman & Bell, 2019, p. 409). Triangulation between qualitative and quantitative sources and the literature review ensures the validity of the findings.

Within this study, triangulation was achieved by examining two different sources of data to build justification for the identified themes. First the plan quality evaluation and second the semi-structured interviews. Quantitatively the plan quality evaluation provided a more objective perspective on the content of Manitoba development plans with respect to energy planning. Qualitatively, the semi-structured interviews provided in-depth insights into how and why municipalities consider energy planning and factors that support or prevent local energy planning. A thorough literature review, including academic sources, provincial policies, and legislation contributed to the triangulation of data sources in the research. Findings between the sources and methods were also compared to corroborate them. The researcher confirmed key themes and pieces of information with multiple interview informants and other data sources, noting discrepancies or diverging opinions. The convergence of these data sources and methods along with their conclusions contribute to the reliability and validity of the research.

3.11 Qualitative Rigor

Reliability refers to consistent accuracy over time (Bryman & Bell, 2019). To ensure reliability this study is designed following established methodological best practices. Having only one coder for the plan quality framework eliminates inter-coder variability. The unbiased semi-structured nature of the interviews and the incorporation of all divergent opinions into the findings will lead to high credibility and trustworthiness of this research (Bryman & Bell, 2019). This is further strengthened by member-checking of transcripts by participants, and the use of multiple rounds of qualitative data coding (Bryman & Bell, 2019; Cope & Kurtz, 2016).

In their evaluation of rigor, Baxter and Eyles (1997) identified four components that allow for critical assessment of qualitative research: credibility, transferability, dependability, and confirmability. These criteria enable judgement of the "honesty, integrity and plausibility of design and accounts" (Baxter & Eyles, 1997, p. 521). Detailing the research process and design, along with specific accounts of participant selection, data collection and analysis help increase the trustworthiness of the research (Baxter & Eyles, 1997).

3.11.1 Credibility

Credibility is the connecting of research findings with reality (Baxter & Eyles, 1997). It involves the clear linking of a researchers' interpretation of a phenomenon to how others recognize that phenomena (Baxter & Eyles, 1997). Credibility is comparable to the principle of validity in quantitative research and is one of the most critical principles in establishing qualitative rigor (Creswell & Creswell, 2018).

In this study, verbatim quotes from participants were used to increase credibility. Verbatim quotes ensure the links between data and themes are clear and that data was accurately interpreted (Baxter & Eyles, 1997). Triangulation of sources was also done to ensure credibility. Data collected from the interviews were compared within findings from the literature review and plan quality evaluation to meet research objectives and ensure trustworthiness.

3.11.2 Transferability

While direct transferability, or generalization, is not the main goals of this research, the 'rich' descriptions around the context and methods of the study may allow findings to transfer to another context (Creswell & Creswell, 2018). The similarity of planning systems across Canada and shared challenges in rural areas may make parts of the findings generalizable.

3.11.3 Dependability

Dependability refers to the consistent design and application of methods in a study to ensure consistent data interpretation (Lincoln & Guba, 1985). This research achieved dependability in several ways. Interviews were digitally recorded, and verbatim transcripts created ensuring participants' original wording was maintained throughout the analysis (Baxter & Eyles, 1997). The coding and categorizing of data into themes and subthemes allowed for management of the large volume of text data. Through the iterative analysis process of coding, relationships between codes and prominent themes emerged.

3.11.4 Confirmability

Confirmability encompasses the objectivity of the results, and the extent to which bias of the researcher influence analysis and findings (Lincoln & Guba, 1985). It helps prevents researcher bias by considering researcher positionality and utilizing neutral methods. Confirmability requires that findings are determined by interview participants (or other

qualitative sources), not the researcher's perspective (Baxter & Eyles, 1997; Lincoln & Guba, 1985). In this research, positionality was accounted for in the reflexivity section in the introduction and use of memos. While analyzing the data, memos reflecting on the initial thoughts and feelings of the data were produced by the researcher. These memos allowed for reflection on possible bias, and re-contextualizing data into codes (Baxter & Eyles, 1997).

3.12 Reflexivity

Within qualitative research, particularly interviewing, understanding how the research has influenced the interviewee and con-constructed finding is important. Bryman & Bell (2019) observe that the researcher's interactions, what they said or did not say can influence what interview participants discuss. In this way, the findings of qualitative interview are co-constructed by both the interview participant and the researcher.

The interview sampling method (snowball and targeted) resulted in twelve (n=12) male and seven (n=6) female participants. It is recognized that because the researcher is male, this may have influenced whom existing participants chose to refer. Further, the researcher's position as a male originating from Manitoba influenced the collection and analysis of data. While the researcher's perspective and experience do not discredit the findings, it is important to recognize.

3.13 Limitations and Challenges

3.13.1 Single Coder Reliability

For the plan quality evaluation, this study relied on a single coder meaning there is no intercoder reliability to increase reliability of the evaluation (Lyles & Stevens, 2014). In content analysis and plan quality research, multiple coders achieving high frequency of agreement is considered more reliable (Stevens et al., 2014). However, inter-coder reliability has potential shortcomings as well (Stevens et al., 2014). To help improve reliability of the study, a detailed list of the evaluation protocol and sample coding sheet are included for review and application by other researchers.

3.13.2 Plan Availability and Type

Of the potential 67 development plans, 57 were included in the research. Two communities indicated they did not possess a development plan, while one indicated there was no digital copy available. The remaining seven municipalities did not have their development plans available online and did not respond to requests for a copy of the plan from the researcher. While the sample represents 85% of plans and is representative, further details could have been gained from the inclusion of the other ten plans.

This research only examined development plans. Other documents, such as climate change plans, strategic plans, and zoning bylaws were not included. Assessing these documents may yield additional findings.

3.13.3 Low Response Rate

There was a low response rate for participants in the interview portion of the research. In total, 104 municipalities and 27 planning districts were contacted several times via email soliciting participation. Additionally, 15 planning consulting firms, eight employees of Manitoba Hydro, three provincial planning offices, two provincial energy policy advisors, and two contacts at Efficiency Manitoba were contacted at least twice via email. Numerous potential key informants were also followed up with by phone. No response of any kind was received from many of the municipalities and planning firms. Government agencies initially replied but few individuals were made available for participation. In total 18 respondents participated in the semi-structured interviews. While theoretical saturation was reached around the 15th interview, this study may have uncovered additional perspectives had there been a greater response rate.

Several respondents, particularly municipalities and planning boards, cited a lack of interest in the topic and declined to participate. Many municipalities cited a lack of time and capacity to participate in research interviews, largely due to pressing workloads. The interviews were conducted in the fall of 2022 and winter of 2023, immediately following Manitoba's municipal elections in October 2022. The need to adjust to new elected officials, set budgets, and implement new priorities may have contributed to the inability of municipalities to participate. Additionally, it is believed the low response rate among municipalities and provincial departments may be indicative of low staffing levels and high workloads.

3.13.4 Transferability

The final limitation of this research is transferability. Given the nature of the case study, this research focuses on a specifically on planning in Manitoba, and the research findings can only speak to that context. Many provincial planning systems, while not identical, are similar and general findings from this research could be extrapolated and applied to other regions within Canada and North America. Jurisdictions with clean low-cost energy - similar to Manitoba – could also extrapolate findings from this research to their contexts.

3.14 Conclusion

This chapter presented an overview of the research design used in this study. This chapter began by re-introducing the research objectives and presented the theoretical framework that influenced its design. Then, the specific methods used to collect data were discussed and justified. The two sources primary data in this research were a plan quality evaluation, and semi-structured interviews. Following the presentation of data collection methods was a detailed review of the tools and processes used to analyze the data. Lastly, the components of qualitative rigor and how they were used in this research were displayed. The next chapter will present the results of the plan quality evaluation and findings from the semi-structured interviews.

4 Quantitative Results

Results from this study are presented over two chapters. This chapter describes the results of the plan quality evaluation outlined in Chapter 3. Findings from the plan quality evaluation are presented in this chapter, while the results of the semi-structured interviews are presented in Chapter 5.

The plan quality evaluation results presented in this section help provide insights into the overall trends within rural Manitoba's planning systems, and the degree to which energy planning is considered within development plans. Descriptive statistics and summarizes of the plan evaluations will be presented.

4.1 Plan Quality Findings

An energy focused plan quality evaluation framework was used to assess how local development plans considered and included energy planning. The characteristics of fact base, goals, policies, and implementation were assessed by measuring the presence or absence of key indicators within plans. These indicators were developed from previous plan quality literature (Baker et al., 2012; Baynham & Stevens, 2014; Bonnett & Birchall, 2022; Guyadeen et al., 2019; Tang et al., 2011). If an indicator was not present it was scored 0, if it was generally present it was scored 1, and if it was specifically mentioned it was scored 2. Scores across characteristics were added together to calculate an index score out of 10.

A summary of the plan quality evaluation is presented in Table 6 and Figure 3. The mean index score across all the plans (N=57) is 2.39, with a standard deviation of 1.39. The highest scoring plan is the Eastern Interlake Planning District's development plan at 7.24. The lowest scoring plans are the Town of Snow Lake and Fisher Armstrong Planning District development plans both at 0.53.

Table 6: Plan quality evaluation scores out of 10 (n=57).

Plan quality characteristics	***M***	***SD***
Policies	3.46	1.89
Goals	2.98	1.58
Implementation	1.65	0.91
Fact base	1.21	1.47

While mean scores varied substantially among plans, the results indicate that policies and goals are the strongest elements, while fact base and implementation score the poorest. The remainder of this chapter will provide a brief breakdown of the results by characteristic.

4.2 Policies

The policy components of a plan are action-oriented principles that guide decision-making (Berke & Godschalk, 2009b). Plans scored well on the policy section if they included policies on energy efficiency, renewable energy, or green building standard. The mean index score for the policy characteristic is the highest of all the characteristics at 3.46 out of 10. Again, the high standard deviation suggests significant variability, but the high score in the policy characteristic is encouraging for energy planning in Manitoba. Similarly, to goals, all plans included at least one policy promoting efficient land uses. Thirty-eight plans (67%) included policies for the generation of renewable energy and 41 plans (72%) encouraged local power generation. Over half of plans (N=32; 56%) included references to active transportation as a land use tactic that complements compact development and reduces GHG emissions.

Policies on community-wide energy conservation were more prevalent than policies that encouraged local government action. Community energy conservation policies were present in 29 nine plans (51%) while policies supporting conservation by local governments were only present in 10 plans (17%). Policies encouraging green building standards were only present in 16 plans (28%) and only 8 plans had any mandatory language in their energy related policies. No plans surveyed included provisions for incentives or financial support of energy planning initiatives.

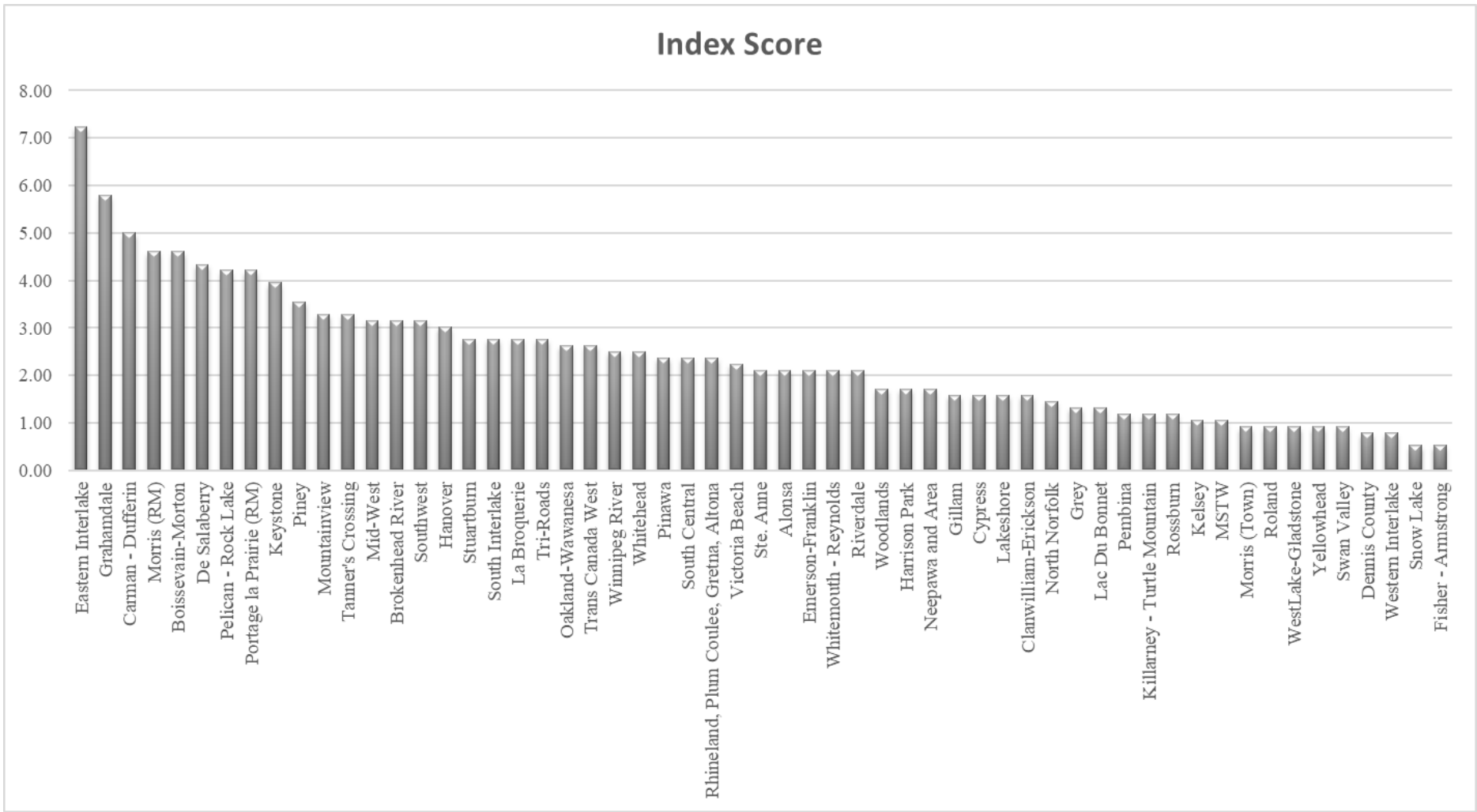

Figure 3: Individual plan index scores (n=57).

4.3 Goals

The goals in a plan reflect the desired future of a community (Baker et al., 2012). Goal statements scored points if they aspired for local energy production, energy conservation, and connected energy and land use. Goals were a strong component of most plans, with a mean score of 2.98 out of 10. However, the large standard deviation does indicate considerable variation between plans. All plans included at least one goal promoting efficient land use, such as infill, mixed use, or smart growth. Almost all plans (N=50; 88%) included provisions for energy supply within the municipality or planning district, however many of these references are to the provincial utility, Manitoba Hydro. Encouragingly, 25 plans (44%) included references to generating renewable energy within their jurisdiction. Energy conservation at the community level was mentioned in more than half the plans (N= 30; 53%), but only nine plans (16%) mentioned municipal government conservation actions.

Consideration of the need to reduce community emissions was only present in 16 plans (28%). However, awareness of the need to shift transportation modes was higher. Goals for increased active transportation and reducing transportation emissions was present in 31 plans (54%). General energy transition related goals were present in 10 plans (18%), but only one plan (2%) contained a specific energy transition related goal. Sixteen plans (28%) contained goals encouraging decentralized energy systems, and community energy was contemplated in the goals of six plans (11%).

4.4 Implementation

Implementation characteristics are clear directions on how plan policies will be implemented (Berke & Godschalk, 2009b). Plans scored well on implementation if specific roles, timelines, and objectives related to energy planning were articulated. Implementation has the second lowest score at 1.65 out of 10, and the lowest standard deviation of 0.91. Overall, most plans had poor implementation policies, and the bulk of implementation efforts (91%) focused on cooperation with utilities and neighbouring municipalities. Only two plans (4%) included robust implementation sections for energy policies, while 26 others did include vague implementation sections. Two (4%) plans placed some priority on energy, and one plan included a measurable objective related to energy. Four plans (8%) did outline roles and responsibility for government entities related to plan implementation and energy.

4.5 Fact base

Fact base constitutes the presentation and assessment of current and future conditions within a plan (Berke & Godschalk, 2009b). Plans had a high fact base score if they included factual details about local energy systems, climate change and emissions. The mean score for the fact base characteristic was 1.21, the lowest of all the characteristics. However, the large standard deviation indicates that there is significant variability among plans. Of plans evaluated, a third (N=19) have a score of zero for this characteristic, suggesting that many rural Manitoba municipalities do not have a compressive fact base informing their development plans. Only nine plans (16%)

somewhat acknowledge the energy transition and a need to prepare for it. Three plans included a basic energy inventory. No plans acknowledge the energy transition in a significant manner. Similarly, no plans include a detailed energy consumption breakdown.

Most plans (65%) do not explicitly recognize climate change as an issue, with only 20 plans (35%) doing so. Even fewer plans (n=12; 18%) recognize climate change as anthropogenic. Five plans (9%) contain a basic emissions inventory, one of which includes an emissions breakdown. Somewhat encouragingly, of the plans that do recognize climate change 13 of the 20 (65%) do so in a substantial and detailed manner.

Over a third of plans (n=21; 37%) recognize a relationship between climate change and the energy systems. Fifty-four percent of plans (n=31) also recognize a relationship between land use and energy systems. While 28 (49%) plans recognize this relationship in a vague or superficial manner, the high degree of recognition does indicate that a solid foundation for energy planning to achieve net-zero exists within rural Manitoba.

4.6 Age & Length

Plans that were produced more recently, tended to have higher scores than older plans. The average index score for plans produced within the past 5 years (n= 29; 51%) is 3.07. Plans produced within the past 2 years (n=9; 16%) have an even higher average index score of 3.89. Conversely, plans produced prior to 2017 (n=29; 51%) have an average index score of 1.73.

An increased plan length is correlated with increased index score. Plans over 75 pages in length (n=23; 40%) have an average score of 2.61, while those under 75 pages (n=24) have an average score of 2.24. Plans over 100 pages (n=15; 26%) in length had the highest average score, 3.97. Regression analysis was preformed to explore these relationships, but it was determined not to be statistically significant.

5 Semi-Structured Interview Results

This chapter presents results from the semi-structured interviews (N=18) outlined in Chapter 3. Results presented are from the interviews with participants in municipal administration, land use planning, and utility sector. Interviews explored the land use planning process in Manitoba and how it considers energy planning. Inquiry focused on the barriers and opportunities to integrating land use planning and energy planning that are preventing rural Manitoba rural municipalities from achieving a low-carbon energy transition. This section highlights additional subthemes emerged throughout the interviews, providing a rich description of the energy planning landscape within Manitoba. Further, this section uses verbatim quotes to showcase participants' individual experiences and ensure data is accurate.

5.1 Barriers to Energy Planning

Participants were asked about the barriers towards integrating energy planning within development plans. Participants who worked in municipalities, planning consulting and the provincial government were asked what barriers their organization and role faced and perceived towards integrating energy planning and development plans.

5.1.1 Political Will

The barrier highlighted by every participant (N=18) was the role of political will. Especially as it related to elected decision makers determining the content of policy and regulatory documents, like development plans. The lack of political will for considering energy at a municipal level is multifaced and linked to many other themes in the data, including values, capacity, lack of knowledge, public support, and municipal finances.

> *"I mean, if the elected officials that are approving these policies, don't believe in them or don't agree with them, it's not going to happen." (Participant 13; Municipal employee)*

Another participant observed that many rural councillors *"just do not care about long term planning or energy policy"* (Participant 4; Planning consultant). This participant also observed that any matter of policy or planning is often deferred or ignored until funding makes the prospect attractive, or a higher-level government *"pokes them and says, you really have to do this"* (Participant 4; Planning consultant). Another participant noted that energy planning, climate change, and sustainability issues are simply not considered:

> *"I don't regularly have conversations with clients, municipal clients, about climate change or energy policy. It's not something that is at the top of their list. When I'm talking to them about planning and policy." (Participant 7; Planning consultant)*

Municipalities not prioritizing energy planning due to low political will was a common sub-theme. Nearly all participants (N=14; 78%) noted that municipalities often felt they could only focus on immediate concerns or issues of a local nature. As a result, items like energy planning policy were considered outside of a municipalities jurisdiction or capacity.

> *"In reality there is nothing is stopping energy planning, we could do it all today, but it just is not a priority." (Participant 11; Provincial employee)*

> *"It's all about priorities. So, at the moment, if we need roads rebuilt so people can safely travel to their work to be able to sustain their families that is more of a priority than green energy, that's not really a tangible benefit for them." (Participant 13; Municipal employee)*

> *"So, for a municipality [energy planning] is low on the priorities because it's not immediate consequences for not dealing with it, right? I could worry about that tomorrow, but right now I have to worry about this other stuff." (Participant 8; Municipal employee)*

This lack of priority was because municipalities have limited capacity to be proactive in their operations, and instead focus their resources reacting to various immediate situations.

> *"If conventional issues like roads or drainage are taking up all the room in municipal discussions, there is no room for discussion of up-coming issues. Municipalities need to deal with the here and now issues and have a limited capacity to think for the long term. Both the policy and capacity of municipalities are limited." (Participant 11; Provincial employee).*

> *"There are some communities where they don't want to talk about future growth and development, they want to talk about, you know, the price of a grader." (Participant 6; Municipal employee).*

Some comments about the low priority for energy planning were centred on the fact that municipalities felt energy was not their responsibility. Most participants felt that energy in Manitoba was the responsibility of Manitoba Hydro and that innovation or changes regarding energy generation or efficiency should come from the provincial level.

> *"I guess it's not necessarily their direct role to be there and do [energy planning]." (Participant 12; Provincial employee)*

> *"There's not really the demand that makes energy planning a high priority. Just because of the lack of municipal infrastructure. So, its interesting, I don't think we need additional tools and legislation, there just isn't really the demand for it, there's not like the reason." (Participant 15; Municipal employee)*

> *“The mentality is not here yet. Yes, we need to recycle. Yes, we need to reduce whatever, and I think around garbage dumps and recycling and that kind of stuff there's awareness. But around energy use again, that's more Manitoba. Hydro, the municipalities don't necessarily get involved with that, because it's more at a provincial level.”*
> *(Participant 16; Municipal employee)*

Further reducing the priority of energy planning, was a lack of public interest or support. A majority of participants (N=13; 72%) shared that because the public was not demanding action on energy planning, it was not a priority for municipal officials and thus there was little political will. One planning consultant noted that interest in energy planning is slowly rising, but there are still limits to what a rural community would accept. *“I want to go farther but I only go up to a certain point where I think this is what the community is willing to change or accept”* (Participant 1; Planning consultant). Another participant noted that, *“there's not pressure from the public. You know if the general public said this is important, I think council would listen to them”* (Participant 18; Municipal employee). Public support was noted as an essential ingredient in the minds of elected officials and creation of political will as one participant observed:

> *“You're elected to represent your municipality, and you have to know what the wants and needs of your ratepayers are. So, you know, that can also sometimes, or should help decide some of the direction of where you go with this. So, you know if the industry in your area and say the agriculture area doesn't believe in any of this and doesn't want to be involved, you have to find a way to get their support in order to spend their dollars, their tax dollars that are going towards it, right? Sometimes it's not just the council and the staff that need to understand or have that belief or direction or desire, you also have to have that from the entire population of your municipality, right? Because at the end of the day, they're the bosses. You know, and if you could spend four years fully going into the, you know, we're going to be carbon neutral, and we're going to have electric vehicles, and we're not going to cut a tree down, and we're going to do all these things. And if your ratepayers and the citizens don't believe it, there's gonna be a whole new council there in four years then all that work was for naught anyway.” (Participant 14; Elected official)*

> *“You need a cheerleader, and you need a vision to actually do that. And that's, one of the most difficult things we do is because we make recommendations, and even though they are practical, and might be more sustainable in the long term. If there's no political will, my application is not going to get approved.” (Participant 2; Planning consultant)*

Participants noted that if the public demanded greater standards or action on energy planning and sustainability from elected officials, those actions would be much more likely to occur.

While most participants focused on the lack of political will at the municipal level, some participants (N=7; 54%) expressed that a lack of political action by the province on energy planning is a barrier. Given the governance structure of municipalities in Canada, provincial decisions have wide-reaching impacts on local governments. Participant felt stronger direction from the province was essential for municipal level energy planning.

> *"The province really has to step up, and there's a lot more than has to do with their role. But there will be things municipalities can do too. (Participant 16; Municipal employee)*

> *"Climate change is definitely at least partially an issue of design. Where does this design come from? In Manitoba it comes from the province and the Planning Act and the provincial planning regulation. They don't require density - there's no strong language about climate change. We would need [the provincial] government to take the lead and making changes." (Participant 10; Provincial employee)*

One reason for the lack of political will at the provincial level was a change in government, and the resulting change in policy priorities:

> *"With the change of government in 2016 energy policy at the provincial level moved to a climate change mitigate lens. As a result of that the province hasn't really pursued energy development. The present policy is oriented on greenhouse gas reductions through policies like the climate and green plan, not really involving municipalities." (Participant 11; Provincial employee)*

5.1.2 Capacity

Another barrier to the integration of energy planning and land use planning among rural municipalities in Manitoba was a lack of capacity. All participants (N=18) discussed how low capacity for all types of planning and policy making was a key barrier. Several types of capacity were mentioned by participants, including financial resources and the cost of planning, low staffing levels, and poor knowledge about energy planning. Participants eight and one summarize the lack of capacity within Manitoba's rural municipalities quite succinctly:

> *"I give myself a failing grade in the sense that we just don't have the resources… we're more worried about that bare minimum, right?" (Participant 8; Municipal employee).*

> *"Rural municipalities simply don't have the financial resources, expertise, or human power to dedicate to this issue. For example, a few of the ones I have worked with did not even have the resources for building inspectors to follow up on construction of structures to ensure compliance with the Manitoba Building Code." (Participant 1; Planning consultant)*

5.1.2.1 Financial Capacity

Almost all participants (N=15; 83%) noted the high cost of energy planning, from development policy to installing energy generation infrastructure was beyond the capacity of most rural municipalities. Among planning consultants, participants reported difficulty in convincing municipal officials of the long-term benefit of energy planning due to the high initial costs. One participant noted that:

> *"You can advocate as much as you want, until your face turns blue - for all these other things that could be done. But on the client side it comes down to cost." (Participant 3; Planning consultant).*

Another participant stated that within municipalities there is an understanding of long-term savings, but it is difficult to justify in the face of high up-front expenditures.

> *"Money is the biggest barrier, right? With a lot of that stuff, it's very expensive, and I know it has long term savings, but the initial start-up is the hard part, right . . . But I'd say at the end of the day money is really the big thing, holding a lot of people back from being energy efficient. (Participant 9; Municipal employee).*

Similarly, when participants were asked about barriers to energy planning at the municipal level, they often mentioned that costs were the primary factor used in decision making by elected officials.

> *"It's all about economics. If it makes financial sense, then it makes sense. If it doesn't, you know, the economics drives a ton of decisions. Rather than being just one driver, it tends to be the one that drives everything." (Participant 18; Municipal employee).*

When updating current development plans to include new content for energy planning, municipalities are hesitant to do so unless they are forced to by the province because of cost. When asked about barriers to energy planning this participant responded that,

> *"I would say the fact that this [development plan] is in effect, and we don't want to touch it, because it costs a lot of money to redo it." (Participant 16; Municipal employee).*

While cost was considered a large barrier to energy planning by participants (N=15; 83%), only half of participants (N=9: 50%) identified access to funding opportunities as a barrier. The short-term and unpredictable nature of funding models at federal and provincial levels was citied as a barrier, as municipalities cannot make long-term financial commitments with short-term grant programs.

> *"If there was less of a hurdle when it came to, you know, finding that source, that income source, but, you know, if they have the ability to bring in different forms of energy into those spaces, [decision makers] y*

would find the resources to make that work." (Participant 6; Municipal employee)

One of the challenges that we face, not just when it comes to energy, but in general is unpredictable funding models from the province and the feds. You never know what program is going to be available from year to year. (Participant 18; Municipal employee)

5.1.2.2 Human Capacity

A substantial portion of participants (N=14; 78%) stated that limited human resources and small staffs prevent rural municipalities from working on energy planning. Both a lack of staff power, not enough employees to conduct all the work needing to be done, and a lack of employees with professional or specialized skills and knowledge was mentioned by participants.

Seven of the eight municipal development officers interviewed were the only staff member in their organization responsible for planning and building duties. One (N=1; 6%) participant worked in a two-person office, and one (N=1; 6%) of the participants was a part-time staff. Four participants (N=4; 22%) were employed by planning districts, meaning their role encompassed multiple municipalities, ranging from three to seven. All eight (N=8; 44%) participants were responsible for not only planning functions like variances or development plan amendments, but also preforming inspections under the building code for residential and commercial buildings. Participants frequently commented on the lack of human capacity within their organization in relation to planning functions, but also in terms of fulfilling general municipal obligations.

"I mean absolutely, we're a small office everyone is wearing multiple hats." (Participant 15; Municipal employee)

"I work for a planning district that comprises of four municipalities. I am currently the development officer and I'm also a building inspector, a fire inspector, and the secretary treasurer."
(Participant 16; Municipal employee)

I'm only in my office two days a week for them and I have to do all the permitting for anything that that triggers the requirement for a development permit or building permits. So I assess our zoning bylaw and sit in council meetings and engage with council to educate them on we all the planning related issues so subdivisions, zoning, right to bylaws all go through me. When there's a requirement for a public hearing . . . that's quite a lot of work to facilitate that plan to that public hearing and to do all your mail outs, engage with the public, and to hold that meeting and chair that. So we do through all those and then your conventional variance applications, all those type of things, right, relative to that, and then development of policy on top."
(Participant 8; Municipal employee).

Other participants who worked in provincial government departments, utilities, or planning consultant firms noted that limited human capacity in rural municipalities was a key challenge. Consults noted that they were often involved not just on large policy projects like development plans, but also in assisting municipalities with their day-to-day operations.

> *That's also sometimes why we get hired to be that consultant to help them process that influx of permitting approvals. We've dealt with something similar in Alberta, where they had very few, they only had a few planners, some of which had left and they hired us because they needed to handle this very crazy influx of permits that we had to like rush through in a number of months. So it's not just Manitoba that's facing it. There's other smaller municipalities and other provinces as well. But yeah, it's a tricky one." (Participant 3; Planning consultant)*

Limited human capacity was cited by participants as a key reason that long-term planning efforts were not undertaken. Policy work was seen as less important and continually deferred due to limited staff.

> *"Being a small organization, a lot of us wear multiple hats . . . we run a pretty lean organization here, when it comes down to our staff numbers. When you consider the volume that we put through versus the number of staff we have, we're very lean. The challenge that we're faced with that is we really don't have the resources to put into long term visioning. A lot of what we do is reactionary, it's putting out the fire that's in front of us today. And using that metaphor of a fire means we're more firefighters rather than the fire prevention. And, yeah, from a planning angle, to have to have that time - whether it's to meet with colleagues, or consultants, or people who have dealt with this stuff. It's just we don't have a lot of that." (Participant 18; Municipal employee)*

Furthering limiting rural municipalities is the fact that almost no rural municipalities in Manitoba employee professional planning staff. Larger urban centers like Brandon or Selkirk have professional planners, but most communities rely on the advice of planners employed by the province government in regional service centres.

> *"We don't actually retain a planner on staff, which is another issue all together." (Participant 6; Municipal employee)*

The lack of professional staff like planners, who posses specialized skillsets and knowledge was identified by nine (N=9; 50%) participants as a barrier to general policy planning, including energy planning.

> *"We don't have a planner here, like we don't have professional planners, we're a very rural municipality without a planning district, we don't have those resources, so we hire consultants."*
> *(Participant 13; Municipal employee).*

I think it's, it's about planning capacity. Especially in some more northern communities where they may not have the resources in terms of knowledge. It's more challenging for them to attract like skilled workers or skilled planners. And I'm not saying that in a bad manner, we do have some municipalities that have development officers and planning officers but they did not necessarily train or have a planning background, they just became endorsed position through administration. So they certainly ask us a lot of questions to understand the planning framework, legislation, planning documents, so even if we draft a policy, in terms of sustainability, and climate change, and conservation, even if we draft those policies at a high level for them to put that in practice into their zoning document and standards, that's where they will be challenging for them . . . but this is where it's probably more capacity issues for them to have the knowledge and the expertise to do that. (Participant 12; Provincial employee)

Most rural municipalities in Manitoba, as with many rural communities across Canada, do not have full-time elected officials. Three (N=3; 17%) participants stated that the part-time nature of council positions means elected officials often do not have the same amount of time or experience with their positions as in urban centers. Participants commented on the fact the rural elected officials must balance their duties with full-time employment while being expected to preform to a very high standard.

"I guess the struggle for any council member is fully understanding, you know, all of your documents and knowing policies and development plans and everything to a level when it's, you know, it's not your full-time job. Trying to get the time to fully understand everything is difficult" (Participant 14; Elected official)

5.1.2.3 Knowledge

Building off the struggles associated with limited staff, many participants (N=13: 72%) stated how their organizations and staff lacked knowledge on energy planning. While a lack of skilled staff with specialized knowledge is a barrier, as discussed above, participants noted there was a general lack of understanding about energy planning and its importance. The connections between energy planning, land use, sustainability, and climate change were not well known by the public, municipal staff, or elected officials. This was evident among participants, as only six (N=6; 33%) participants mentioned the concept of net-zero and four (N=4; 22%) mentioned energy transitions. Only two (N=2: 11%) of the participants that mentioned these concepts worked in municipalities. All other participants in the municipal sector generally considered energy through a *business-as-usual* lens. This understanding about net-zero and the need for an energy transition is a key barrier to effective energy planning.

"Lack of knowledge is the biggest thing that stops a municipality from planning for energy." (Participant 1; Planning consultant)

> *Our challenge is knowledge, or like expertise, it's just how do you learn that? And because we don't have planners working in every municipality you know, it's really hard. (Participant 4; Planning consultant)*

One participant who worked as a planning consultant recognized the lack of knowledge within rural municipalities. However, it was not viewed as a major barrier and that consultants existed to fill the gaps municipalities could not address on their own.

> *"And nobody expects municipalities to be experts in every aspect, right? And that's why they hire technical experts to do what they need to do." (Participant 7; Planning consultant)*

Conversely, municipal participants lamented the lack of in-house expertise. Municipal participants felt that they relied heavily on consultants, which was not fiscally prudent due to the higher costs of consultants compared to municipal staff. Further, participants felt that if consultants or provincial policy did not dictate certain actions, municipalities did not have the independent capacity to add specific provisions to their policies or fully understand what they were implementing.

> *"But overall if our staff are not knowledgeable, and if the consultants aren't thinking in that direction either, it doesn't happen. So that's one of the challenges that we found is again on our staff, we don't have municipal engineers, we don't have lawyers, we don't have professional planners, or those types of expertise in our offices, because we're a small rural government. So yes, that's probably why you see more initiatives in larger urban centers, because they can afford to have that expertise. And right now, we hesitate to consult with professionals due to the cost, right? Because the cost is the charge of like those professionals compared to our salaries is quite high." (Participant 13; Municipal employee)*

Similarly, nine (N=9; 50%) participants felt expanding the role of provincial staff was needed to increase the level of knowledge and capacity within rural municipalities. One participant observed that without provincial support or consultants municipal staff end up "*doing research on the side. And, you know, like, I don't have time to go through things properly"* (Participant 9; Municipal employee).

Participants also reported that municipalities have limited knowledge of planning. Thirteen (N=13; 72%) noted that municipalities struggled to understand provincial planning policy, including legislative requirements and the planning process. Several consultants and provincial planning staff noted that rural municipalities struggled with knowledge of long-term planning benefits, which restricts the overall capacity for integrating energy planning into development plans.

> *I struggle on a daily basis trying to work with councils to help them to understand the long-term costs of large lot developments in their*

communities. How that plays out, it obviously doesn't play out over their four-year council term, but in terms of longevity of services in those areas. Even roadways, maintenance, all that kind of stuff at all, it all plays out over very long timeframes and gets passed back to the taxpayer in terms of maintenance and all kinds of stuff too. (Participant 2; Planning consultant).

I had a municipality I was talking to, and they specifically did say that they have a problem where the council, the elected officials support, strongly support, residential rural development, which is a pretty wasteful type of development. Like larger acreages and so on. They see that as a good thing, they think it's a revenue and income source of revenue, they don't see the long-term impact . . . more country residential development, may generate more tax, but it's not a revenue, it's not something that functions a positive thing that will give them more money, it's more service demand that they will have to impact or deal with in the long term. So, I think that we still there in terms of, it's not the bad intention is this problem, a lot of education that needs to be done in the local level. (Participant 12; Provincial employee)

The lack of knowledge about energy planning extends into the broader public. This limited understand was seen as preventing public support for energy planning initiatives.

"Honestly, I think I think the communities need to understand what energy planning is, like, before you even start talking about implementation, they need to really understand what it is that we're talking about." (Participant 6; Municipal employee)

Two participants (N=2; 11%) stated that in many cases there is too much information available. Information overload presents conflicting perspectives, confusing individuals. The information overload can also be a deterrent to exploring the topic further. Two other (N=2; 11%) participants were concerned that misinformation posed a challenge on connecting with and educating the public

The amount of information out there, it's overwhelming. I'm someone that gets paid to do this every day and I'm overwhelmed by the amount of different things out there." (Participant 4; Planning consultant)

"I mean, whether it's energy efficiency, or any other controversial topic, the amount of misinformation out there is astronomical, and it's unfortunate how much of it is influencing decision making." (Participant 18; Municipal employee).

5.1.3 Provincial Support

A lack of support or capacity from the provincial government was identified by many participants (N=13; 72%) as limiting municipalities ability to conduct energy planning. Participants stated that Municipal Relations, the provincial government department

responsible for planning services to rural communities, had reduced its staff and funding levels. In turn, this limited rural communities' ability to plan. Reduced funding and incentive programs from provincial entities have also reduce the attractiveness of energy planning for municipalities. Participants also identified that current policy framework managed at the provincial level limit the integration of energy planning and land use planning in municipalities. Policy changes to enable more integration within development plans that participants desired would also need to occur at the provincial level. One (N=1: 6%) participant noted that the emphasis for changes in energy planning would need to come from the provincial government, and that municipalities need provincial support:

> *"It's just the infrastructure [for energy planning] is not there. I think they need some assistance from probably the provincial government to be able to provide that infrastructure." (Participant 1; Planning consultant)*

Three other (N=3: 17%) participants stated that the provincial government has seen budget cuts and staffing reductions to the point that government departments struggle to support municipalities with requests for information or services. The lack of support is particularly detrimental for rural municipalities, who rely significantly on the province for expertise in a variety of areas, including building, planning, and land use policy.

> *"Support from the province has definitely gone down since I've started. Like, at one time, when we did development plan reviews and stuff, the province had people there that would help us do that. We wouldn't be paying consultant, hundreds of thousands of dollars. But they're seriously understaffed." (Participant 5; Municipal employee)*

> *"We actually just passed a resolution recently asking the Province of Manitoba to do a review of their internal systems and to provide better supports for their departments to be able to assist us when we're applying for grants we're applying for funding. Disaster management is one that came up this year. I mean, it took forever to get responses back from the province on those Disaster Financial Assistance requests. So many municipal administrators were extremely frustrated with the delays and with the lack of understanding from those staff members. In some departments because the high staff turnover, you talk to one person to get an answer you talk to someone else, you get a different answer. So, the level of training that's there is not always the same. More mistakes are made with that high staff turnover with being short staffed, of course everybody, it's understandable, you make more mistakes when you're carrying to full time workloads. So, like, definitely to have more provincial support would be an asset because right now, when we have questions, we have to wait for an answer from this department. And that leads to okay, well maybe I should ask this question to the other department when we finally get the first response. Then you have to again wait another couple of weeks until you get the other one, so it's there's a lot of increased delays because you don't*

have access to consult those experts immediately right." (Participant 13; Municipal employee)

"On all sides, even the building codes, so you've got the office of the Fire Commissioner that oversees the building inspection and is supposed to take over that responsibility for municipalities that don't have the resources to do it themselves. And you see budget cuts and budget cuts, and they've funneled, they pushed them from three different departments as the OFC." (Participant 8; Municipal employee).

Another participant (N=1; 6%) stated how reduced funding and incentive programs have resulted in limited interest in energy planning by municipalities:

> *"There were grants a while ago with Manitoba Hydro and the province for solar panel installation, but they were so expensive at the time, it wasn't a drop in the bucket, and then they went away. So, from the provincial level there's not a lot of help to push the agenda forward" (Participant 16; Municipal employee).*

One (N=1; 6%) participant observed that many services and responsibilities once under provincial jurisdiction, have been downloaded to municipalities. However, there has not been a corresponding increase in funding or staffing to appropriately carry out those responsibilities

> *"All of the responsibility has been pushed to a municipal level, right? It's all just, 'it's your responsibility'. They've deferred it all to the municipality." (Participant 8; Municipal employee).*

In addition to a lack of resources and support from provincial departments, participants identified that policy specific supports were also lacking. Policy interpretation by provincial staff was seen as unclear and inconsistent, leading to confusion and frustration.

> *"We wish there was more clarity from province." (Participant 15; Municipal employee)*

> *"One of the challenges is how that policy is interpreted and how that policy is applied, can change from day to day based on the guidance, or who's reading it. You know, we've often had it where we have, you know, well established track records of this is how we do things and how, and why applies to a policy, all of a sudden, you know, there's a change in personnel at the provincial level. And, you know, they, they read it differently. And now everything we've had years of precedent gets thrown out the door." (Participant 18; Municipal employee)*

Along with poor policy interpretation, participants stated that there is a dearth of policy directing energy planning in Manitoba. One participant (N=1) employed with a provincial utility noted how needed provincial direction is:

> *"Well, I mentioned like energy policy, right, clear energy policy from the province would be a big step forward." (Participant 17; Utility employee)*

When discussing land use planning, several (N=4; 22%) participants stated how there is no consideration of energy planning, and very limited consideration of climate change within Manitoba's land use policy. The PLUP does not contain any mandatory or even suggested aspects surrounding energy planning. As such, many municipalities do not consider energy because they don't need to.

> *“If we put something about energy planning in [the provincial regulations], then the consultants would be required to work with the municipality to put something in there. Which I don't think is in there right now. Not written out as such. I mean, it's implied. But better direction from [the province], I think, would be one key” (Participant 10; Provincial employee)*

5.1.4 Values

Values are a crucial part of what determines public interest in various areas. Political will is driven by what the public values and is interested in. Many participants (N=14; 78%) stated that value systems in rural Manitoba were often opposed to energy planning or increased regulation, and that values determined what municipal staff and councils wanted to develop policy on, and what those policies worked towards.

> *“It really comes down, I think, to the client, what their interests are, and what they value.” (Participant 4; Planning consultant)*

> *“But there's a lot of things that when we are hired to work on a development plan, there's a lot of things that need to get tackled, and sometimes regrettably, I'll be honest, it seems like the forward thinking, energy, climate change related policies tend to get pushed off to the side, or they're just not on councils horizon. So that is also making it a bit difficult to implement. Or add that policy context is because council just doesn't want to support it or doesn't think it's something that they could do.” (Participant 2; Planning consultant).*

Another planning consultant identified that values determine a municipalities actions and priorities. The participant noted that finding a technical or policy solution is rarely the challenge, but convincing elected officials and the public in the need for, or value of a solution, is the primary hurdle.

> *“There's a technical solution out there for every problem that you have, you're not the first city to go through it, it's the changing of people's mind that’s hard” (Participant 1; Planning consultant).*

Similarly, a municipal official noted that municipalities are aware of their deficiencies or rural mindset, but it is still a slow progression to change.

> *“But yeah, rural Manitoba. we're just, you know, we’re just not quite there yet. We're getting there. But it's a slow kind of progression into it.” (Participant 6; Municipal employee)*

Even in communities where change is desired and there is support for energy planning, the values held by community members or elected officials play a crucial role in determining what projects and policies are realized.

“We've just gone through an election, and we have a progressive council. That's one of the biggest problems too, right is that everyone has to be on a team and has to be a united front, then have the same goal to unite it. And sometimes it can take one bad councillor that can just put a kink in all of that stuff and slow that progress, or just pull resources away.” (Participant 8; Municipal employee)

“It depends on the attitudes of the elected officials and the staff who work together to put these plans in place to enforce them. It also depends on the cultures in the communities. If you have the community buy in, it is so easy to actually run with these types of programs. But if the community does not support the government's initiatives, then it's much more challenging to actually have everyone working on the same page. So yeah, especially like, for example, natural gas, right. Some people desperately want it and want to hang on to it. So that's something that we can't prohibit altogether. We have to have to have that balance.” (Participant 13; Municipal employee)

Over half of participants (N=10; 56%) felt that the values opposed to energy planning and were a function of rural mindsets. Fewer participants (N=7; 39%) stated that municipalities had a general resistance to change or learning from elsewhere.

“Yeah, I mean, I think the values have to be there, right? People have to care about this. Being from a small town in rural Manitoba, I know when I went off to university to an environmental degree, people did not care. And they thought I was crazy. And they immediately started labeling me a tree hugger. And this is a very long time ago now, because I'm getting old. But I think that there's still a fair amount of that rural sentiment, right?” (Participant 17; Utility employee)

“Manitobans just don't like to think that they should be learning from Ontario and BC, which I find is very sad, because they're the ones that are facing the highest population demand. And all that population is going to run out in those provinces and start filtering into the prairies. So, we do need to be learning from our fellow municipalities and provinces on how they're handling things and what they've done wrong and what we can do better.” (Participant 3; Planning consultant)

The limited interaction between municipalities and the utility has led to energy not being conceptualized as a local matter, but one that is solely the domain of Manitoba Hydro. One (N=1; 6%) participant stated that:

“Hydro is considered clean energy to most people. So why would you go and try and do a bunch of alternatives? But again, it's hard for the older generations to have that mindset necessarily. They're like, no, we get our power from Manitoba Hydro, and that's our only option and the other ones are just too expensive. So, there's that mentality to fight as well.” (Participant 16; Municipal employee)

Thirteen (N=13; 72%) participants discussed how levels of climate change knowledge and acceptance influence values and attitudes towards energy planning in rural Manitoba. Five (N=5; 28%) participant noted communities have variable or mixed levels of climate knowledge. Three (N=3; 17%) expressed concern about the influence of misinformation on climate change and the energy transition. Four (N=4; 22%) participants explored how denial of climate change in rural communities resulted in low prioritization of energy planning

> *"I mean, we have one, for sure, one vocal councillor, who is do quite the climate change denier. And doesn't believe that any of this is important, yet, we have others who maybe are a little bit more neutral on the subject." (Participant 18; Municipal employee)*

> *"When we wrote the development plan, we sort of had a separate section almost on, like climate change and policies. And yeah, I, we had comments from Council after we like put it in that, oh, well, this isn't really like happening, we don't need these policies."*
> *(Participant 7; Planning consultant)*

5.1.5 Desire for Growth

Many participants (N=11; 61%) stated economic growth is viewed as essential to rural municipalities in Manitoba. Because of this, rural communities oppose restrictions to development. Municipalities emphasized simplifying policy and reducing regulatory burdens. This desire for growth translated into opposition to energy planning, as it was considered another bureaucratic hurdle limiting development.

> *"Rural areas want to encourage development and don't want any strings attached. They want to make it as open as possible to attract economic development to their communities. So, anything that would require someone to jump through some extra hoops. They're just being practical and that they don't want any hurdles for development coming into the community." (Participant 2; Planning consultant)*

> *"I think some municipalities, particularly ones that don't experience high demand for development, they're reticent to tag on any additional requirements for developers, because they already see it as their opportunities is limited for development." (Participant 7; Planning consultant).*

This desire for growth and reduced bureaucracy was also communicated by participants (N=11; 61%) as a desire for flexibility in the planning process. In particular, the ability to amend development plans. Flexibility in policy documents and process was seen to enable development. Participants, especially in the municipal sector, noted flexibility allowed for consideration of development proposals not covered by development plans, and easier amendment procedures would be more effective given limited staff capacity.

> *“You can't build the documents to cover every eventuality, and again being a small municipality, we want to encourage development wherever possible. We don't want to be in position to say no, unless there are very good reasons. So, we try to build in as much flexibility as possible and to work with people that come to us with applications to make them fit or make them work.” (Participant 15; Municipal employee)*

However, some (N=5; 28%) professional planners expressed reservations about this desire for flexibility. They emphasized a need for selective growth in rural areas that promoted sustainability, climate friendly design, density, and walkability rather than any project being accepted for the sake of economic development.

> *“Rural municipalities are really wanting development. And sometimes that means they're not that stringent on their choices if that makes sense. Because they want to make things as easy as possible for development, which isn't always in their best interest. But they seem to think that growth is the only way to go forward.” (Participant 10; Provincial employee)*

A select few participants (N=3; 17%) felt that the pro-growth mindset of rural municipalities was linked to the property tax system. They noted the property tax system is a perverse incentive, forcing municipalities to solicit any and all development to increase revenue. Participant 11 stated the property tax system puts developers at an unfair advantage. Developers leverage future tax revenue from their projects to encourage approval from rural councils, even if it is not sustainable or in the municipalities long-term interest.

> *“Municipalities depending on property taxes gives developers an unfair advantage. It limits progressive policies or projects because a municipality can’t afford it. Municipalities feel they have to chase property taxes and results in lost opportunities to advance clean energy or greenhouse gas reducing initiatives.” (Participant 11; Provincial employee)*

5.1.6 General Planning Challenges

Participants (N=14; 72%) observed that most development plans do not consider net-zero or low-carbon energy outside of references to Manitoba Hydro. Some participants (N=7; 39%) noted inclusion of sustainability and energy planning considerations within development plans is growing. However, barriers to energy planning do not exist in isolation. Rural communities face general planning challenges which limit the integrating of energy planning into development plans. Eleven (N=11; 61%) participants stated rural municipal struggle to effectively use development plans or recognize their importance.

> *“In rural municipalities the development plan is something that they just have to have, and sometimes, like the link from what a policy direction could allow them to do is sort of maybe lost a little bit . . . I do think because a development plan is high level in nature, it's sometimes hard for the general public to see how it impacts them.” (Participant 7; Planning consultant)*

One participant (N=1; 6%) working in consulting observed there was an onus on professional planners to engage with the public better and provide education. The participant highlighted that many communities do not understand the role of a development plan and see no interest in engaging with policy.

> *“I think there is a disconnect, or like misunderstanding, or maybe we're just doing a bad job of explaining development plans, why they're important and how they attach to, you know, citizen values. You might get more engagement or champions if, you know, there's some ownership of the document. But at the same time, it's just like, people don't want to engage.” (Participant 4; Planning consultant)*

Conversely, five (N=5; 28%) municipal participants stated development plans are not effectively used, and that content is dictated by the province. Participants stated many aspects of a development plan are ignored by elected officials and only exist to placate provincial requirements. During the study, several potential interviewees while speaking to the researcher indicated that their development plan was “useless” or was “never used” and were not documents worthy of academic research.

> “We’ve got some policies in our development plan about environmental sustainability, I'll be honest, it's fluff, we put it in there because the province makes us. Does it direct us? No. Is it something that influences the decisions of council? No.” (Participant 18; *Municipal employee*)

5.1.7 Communication

A barrier to effectively implementing energy planning in Manitoba is poor communication. There is a lack of coordination and communication between and within different levels of government. Five (N=5; 28%) participants stated that a lack of communication within and between municipalities, the provincial government, and Manitoba Hydro is a significant barrier to implementing energy planning.

> *“We have some lack of connection between municipalities and school boards and municipalities and Manitoba Hydro. I feel like they need to be working more together. Again, I've seen more of that happening in Ontario, where the municipalities having to directly work with their local hydro provider to create policies. And from all the work that I've heard of in Manitoba, where we do our development plans we don't include or*

have a lot of direct contact with Manitoba Hydro." (Participant 3; Planning consultant)

"From my context, like, as a provincial employee in planning, we need more inter intra-departmental work. We need to get out of our silos. Because the departments that deal with energy are completely different departments then the departments that deal with planning and I wouldn't say we don't talk, but we're certainly not doing policy planning together." (Participant 10; Provincial employee)

When discussing the role of Manitoba Hydro, another participant observed that *"Manitoba Hydro is one of the last government agencies to be contacted…. in the development process"* (Participant 2; Planning consultant). An employee of Manitoba Hydro also observed that:

"I don't know that we have anyone that's participating actively in long term planning with municipalities." (Participant 17; Utility employee)

5.2 Success Factors

Participants were asked to speak about factors that led to the successful inclusion of energy planning within development plans. In these discussions, participants highlighted the numerous opportunities for increased energy planning in Manitoba and identified several ways it could be implemented more effectively. The following sections present the most significant success factors and opportunities that emerged, such as the important role of grassroots champions, greater provincial support, energy planning incentives and the benefits of collaboration.

5.2.1 Champions

The most prominent success factor for achieving energy planning integration within land use planning identified by participants (N=15; 83%) was the presence of devoted individuals to champion the cause. Champions included both individuals (staff, elected officials, public) and organizations. Municipalities who have made headway on energy planning issues, like the City of Brandon, City of Selkirk, and the City of Dauphin were often cited by participants as inspiration and encouragement for their own communities. Rural communities like Ste. Anne or Kilarney – Turtle Mountain that recently pursued renewable energy projects were also cited as inspiration.

"If any of that's being driven in my planning districts or municipalities, it's mostly individuals who are knowledgeable about it, driving the idea. But again, they run into those constraints of lack of resources and higher priorities." (Participant 10; Provincial employee)

Champions were cited by participants as effective agents of change. Individuals who are passionate about transition to low-carbon energy and embracing sustainability begin sharing their passion with community members and advocating local government for energy planning and energy transition policies. When discussion champions, most

participants (N=13; 72%) stated how active and engaged individuals help create buy-in among the broader community and municipal government. Individuals creating this buy-in were essential for the adoption of energy planning into development plans, and the broader adoption of energy planning and sustainability initiatives.

> *"I've seen that residents who are active in supporting local initiatives with grassroots organizing have been successful. The passion of local elected officials has also driven energy planning." (Participant 11; Provincial employee).*

> *"It's one of those things. you know, you have to have the positive and progressive thinking councils, you have to have members within the community that are willing to put the time and effort in because honestly, it's boots on the ground in rural Manitoba. If you don't have the community involvement and community buy in, regardless of what the project is, it's not going to get off the ground." (Participant 6; Municipal employee)*

In addition to creating community buy-in for energy planning, champions were also the conduit that brought progressive policy ideas to rural communities. Champions pioneered values that supported energy planning. Eight (N=8; 44%) participants discussed how one individual, be it an elected official or staff member, with information and passion for the topic can push effectively for policy changes.

> *"We got one councillo/;r that she's all green energy vehicles, right. She's 100% electric vehicles, she pushed really hard. We actually just got one of the only level five charging stations in Manitoba, there's three of them going in and we just got one of them." (Participant 8; Municipal employee)*

The crucial role of individuals in creating positive change was highlighted by several participants. One stated that their municipality was adopting progressive policies and embracing energy planning because they have *"a planning officer that sees it as a priority and yells at them every two weeks that they need to reinvest in this and think about the future"* (Participant 8; Municipal employee). Another participated echoed this sentiment saying that Selkirk was a prime example of sustainability and energy planning because the community has *"a gung-ho CAO, who's really sort of particularly personally interested in that"* (Participant 7; Planning consultant).

Participants repeatedly mentioned several Manitoban communities where local governments had embraced energy planning and sustainability. The City of Selkirk (N=10; 55%) was most frequently lauded for its commitments to renewable energy generation and sustainable land use. The cities of Dauphin (N=3; 17%) and Brandon (N=3; 17%) were also repeatedly cited as local governments that emphasis energy efficiency and embracing sustainability.

> *"I've been really encouraged to see [energy planning] in some municipalities in Manitoba for sure. Like Selkirk is a great example*

where they've had the leadership with (name removed[1]) to really push for climate action and renewable energy planning and incorporating it into all aspects of their community plan. So that's been exciting to see, you know." (Participant 17; Municipal employee).

"For Dauphin, we've sort of established they want to be a leader in climate adaptation. They've done a corporate emission study at one point, and they had done some goals corporately for energy transition. I mean, they have electric vehicle chargers on site at their municipal office and they want to be leaders. But that was somebody in the community, that champion, that found a grant to get hired by the to do city that." (Participant 4; Planning consultant)

Champions were discussed more often in the context of communities with increased capacity and populations, like Brandon and Winnipeg. However, in the case of Dauphin, participants explained grassroots initiatives led to capacity building through applying for and receiving grants. In all cases, champions were essential to creating the community priority and the political will necessary to achieve energy planning related goals.

"We are doing that in Brandon right now. We're working on writing their city plan in-house for the most part, but we're supporting them through a review of best practices and looking at trends across the country to support that. At the same time, we're writing their climate action plan with them. So, we can take a lot of those, you know, goals of net zero by 2050, and then feed that into the policies that we're going to put into the city policy. But they're community that really, you know, has a climate change staff person, and resources and funds to do that. So, we're able to sort of make those connections right away." (Participant 4; Planning consultant).

"I started hearing from Dauphin and seeing them showing up at some of the energy planning workshops that were happening in Winnipeg and learning about the fact that there was like this really interesting grassroots group of people who wanted to do this work in Dauphin. And they had applied for an FCM grant to have a two-year position, like a climate change advisor type role at the City of Dauphin, and that was where things like, in my opinion, where I started to see like, oh, now they have a plan on climate action. They're doing their GHG work. They're looking at energy." (Participant 17; Utility employee)

Ultimately, champions were considered by almost all participants (N=15; 83%) as an essential factor to achieve energy planning. While champions on their own are beneficial, the greatest power of champions is to influence and led governments in decision making.

[1] This information has been redacted to protect participant confidentiality.

> *“Manitoba has a wealth of policy and technical experts, but none of it matters if government does not champion or lead in a progressive fashion. Manitoba needs leadership with vision at all levels, especially at the provincial level, to achieve desired outcomes.” (Participant 11; Provincial employee).*

Having champions will create progressive leaders, and cultures that foster desire and interest in net-zero energy planning. Champions will help produce governments that value achieving net-zero and acting upon the connections between land use and energy planning.

5.2.2 Communication

Along with the role of champions, almost half of participants (N=8; 44%) discussed the importance of education to facilitate social acceptance and positive values. Participants discussed the need for public education campaigns to raise awareness about net-zero energy and energy planning, but also the need for specialized knowledge within government and decision-makers. Many participants (N=13; 72%) identified a lack of knowledge as a key barrier, making education a logical remedy.

> *“I think, like we just discussed there, there needs to be some maybe consultation with the experts on these matters, about how we can move forward with it. You know, I don't, I don't claim to be an expert in anything, you know, it's, sometimes it's a matter of surrounding yourself with those experts, and figuring out okay, how do we do this in finding the right people involved?” (Participant 9; Municipal employee)*

> *“And so that goes back to the education thing, not just of the consumer, but the people that are in those positions of responsibility, right? They have an obligation of due care, that is their responsibility.” (Participant 8; Municipal employee).*

Participants made connections to the success of broader education campaigns, such as recycling. These programs were seen as examples to build off of that could create the necessary public interest and political will to facilitate increased energy planning. Again, community buy-in and engagement was seen as the key goal of education and necessary to improve the transition to net-zero.

> *“So through our social media in the past, we've supported those publications quite a bit, what is recyclable? What is not? How simple can it be? What, what can you do with all those types of things? Our schools are also really great at teaching our children in general, on what is recycling and why is it important? And how can we recycle. So those initiatives definitely help our population buy in.” (Participant 13; Municipal employee).*

When discussing education, a few participants (N=3; 17%) also noted that there is a wealth of publicly available information. Greater emphasis should be placed on

communicating that information more effectively, but also incorporating existing knowledge into policy and regulation.

> *"Yeah, education is definitely a piece of the puzzle. But at the same time, it's like the information is out there. Some places you also need like, this is a requirement. You need just to be telling municipalities that this is a planning requirement and needs to be done. We need to see it just like we saw with the infrastructure funding from the federal government." (Participant 17; Municipal employee).*

5.2.3 Positive Values

The second most prominent success factor identified by participants (N=13; 72%) was the role of positive progressive values and the social acceptance of low-carbon energy transitions. Positive values noted by participants included being open minded, encouraging of forward thinking, and placing an emphasis on sustainable growth versus growth for growth's sake. Increasing social acceptance of the renewable energy, energy efficiency, and the need to shift to low-carbon energy sources.

> *"The council that was elected was much more progressive, and they had much more forward thinking, big picture goals. So that's where we really started to see the drive towards more environmental considerations, more big projects, more development, and growth, which has been wonderful. It's come with growing pains, but it's been wonderful. But with those, those initiatives, we've been working furiously at upgrading our policies and developing our policies to meet that growth and to try to be proactive, when with those requests coming in." (Participant 13; Municipal employee)*

> *"You're always going to have people who believe in those things and are strongly on board with that, that vision. You're also going to have people who maybe don't believe that so much. So I think having people who have the passion and desire and information to push that forward is always a good thing. And I think having the open mindedness to listen and see the value that can bring your municipality is certainly there." (Participant 14; Elected official)*

A significant portion of the discussion on positive values and social acceptance of net-zero and energy planning centered around the role of elected officials. This is important to understanding the framing of planning and energy projects among participants as government driven action that must be led at a local level.

Participants also identified that communities which embrace energy planning embrace broader sustainability trends such as compact development and being selective about growth.

> *"Definitely what I see is they have the mindset for it when you talk to them, and when they are the ones who proactively tell me, you know,*

not all development is good for us, for our community." (Participant 12; Provincial employee)

"And that's the big one is I think, you know, when I look historically, at how, how we would look at growth, historically, it was all growth is good. But as time progresses, you become more and more aware that sustainable growth is good, and there's some growth that actually is harmful. And so trying to look for those sustainable opportunities those gems that are out there. And it means sometimes saying no to opportunities that maybe on the surface might look like it's a decent opportunity. But when you actually take the time to step back and really evaluate it, you realize that's not as good as it looked originally. So, but it does take takes planning, it takes talking, consulting, coordinating with other people." (Participant 18; Municipal employee)

This trend of communities which plan for energy being more selective about their development patterns may provide an opportunity for economic development in rural Manitoba. A number of participants (N=8; 44%) identified that rural Manitoban communities have a strong desire for independence. Distributed energy generation and its associated industries could provide both an economic base for rural communities seeking investment, and a mechanism which to be more self-sufficient.

Two (N=2; 11%) participants stated how high levels of climate change knowledge and acceptance resulted in progressive planning policies and embracing energy planning. Awareness of the need to transition to net-zero energy systems and embrace renewable energy at the local level was more prominent in communities where energy planning was taking place. Positive values were also linked to clear public support for energy planning and working towards net-zero

"Yeah, I think that a lot of people are aware of it and know that there needs to be something done about it . . . Council has jumped on board too, they've received a lot of positive feedback from the community on it, which helps them dish out the money." (Participant 9; Municipal employee).

While positive values are a key driver of energy planning, two (N=2; 11%) participants stated how climate change acceptance is becoming divorced from the need for action. Both participants noted that climate change impacts occur regardless of belief, and that actions should occur regardless of ideology.

"People are wrestling with the future of climate and energy right now, but a low climate knowledge doesn't negate presence of climate-driven impacts. It is past the time for understanding climate change, we need to frame things from a reliability and resilience perspective. Climate mitigation and adapting needs to focus on how it can protect peoples' self-interest, and we should focus on actions that avoid climate impacts. Opportunities should be emphasized regardless of climate beliefs and

should focus on preparing for impacts, impacts that occur regardless of belief. Action to prepare is mitigation and adaption. An answer is better than the right answer" (Participant 11; Provincial employee)

"I think it's a lot of those things are just becoming, you're not doing it because you believe in climate change, or you don't believe in climate change. You're doing it just because a lot of those things are just the right things to do when you can." (Participant 14; Municipal employee)

5.2.4 Changes to Provincial Policy

A majority of participants (N=15; 83%) stated that greater policy action on energy planning was needed from the provincial government to facilitate Manitoba transition to a net-zero energy system. Policy changes identified by participants ranged from mandating energy planning at the municipal level to creating point-based incentive systems. Participants identified changes that could be applied to various laws and regulations including *The Planning Act* and Manitoba's building code. Expanding the role of Manitoba Hydro to include facilitating municipal energy planning was also suggested.

"You could have the policy developed directly with Manitoba Hydro and ways that the energy system could be adapted and made more efficient. And then Manitoba Hydro could be the one implementing instead of all that pressure being on the municipality." (Participant 3; Planning consultant)

"So climate change is definitely at least partially an issue of design. Where does this where does this design come from? In Manitoba comes from the province, and, and the Planning Act and the provincial planning regulation. They don't require density they don't require - there's no strong language about climate change that just like what I said, just mentioned. Yep. So absolutely. We would need government to take the lead and making changes I think." (Participant 10; Provincial employee)

When discussing the role of policy support for active transportation in rural communities, one participant stated that a policy framework allows for staff to achieve the municipality's goals more easily. Clear policy allows for actions to be taken more easily and provides the necessary background and support for municipal staff to convince elected officials of the benefits of certain actions.

"This trails master plan from (name removed[2]), that really helped. It helped provide the backbone to show us maybe where we should focus on, how we should secure land, how we should secure funding for it. So that and not only that, but then whenever anybody questions it, we have

[2] This information has been redacted to protect participant confidentiality.

that to fall back on. Right. And so we go to council say, you know, you guys pass this in 2016. This is a trails plan, and this is how we should implement it." (Participant 9; Municipal employee).

Participants identified that the province was best placed to initiate policy changes since they regulate both municipalities and energy. Further, changes at the provincial level would affect all communities in fair manner, creating a level playing for development.

> *"It goes back to like, what the Planning Act says for municipalities, right? Like, I think that's where things need to be integrated is that the province needs to be providing direction in the Planning Act to municipalities on the need for energy planning and for, again, like a clear direction on where they should be headed with their transition off of fossil fuels or their low-carbon planning in general. I think municipalities they still want freedom to be able to say what that looks like for them, whether that's density or whether that's about electric, transit and electrification of transit are what it is. But there needs to be a clear direction from the province that that's a requirement in their plans." (Participant 17; Utility employee)*

> *"So for those climate change policies to be put in place, which are often a bit of a barrier for development, we really need the province to take the leadership here and implement it province wide, so that it makes the playing field easier between municipal jurisdictions." (Participant 13; Municipal employee)*

> *"So again, if the, if there's an opportunity for the province to step in and sort of make that a requirement, then that helps even the playing field again, for those developers, right. If they have to do that everywhere, then it's, it's less of a risk for municipality to require that." (Participant 7; Planning consultant)*

One participant also observed that provincial planning staff need to play a greater role in advocacy and policy creation to facilitate net-zero:

> *"What's the role of like the province and the planners that work at the province and those regional offices? Like is that an area that needs to maybe transition where instead of just being subdivision reviewers, and we're just reviewing things that come in. Like, do they play a larger advocacy role, rather than just a regulatory or review role in the province." (Participant 4; Planning consultant)*

Another participant noted that any policy changes must include flexibility for municipalities. Parallels were drawn to the building code, which sets outs objectives but allows for multiple pathways to achieve those objectives.

> *"I forget which year or which code, it was. I want to say it was in the early 2000s. I don't know the exactly when, they switched it to an*

objective based code. Everything was based off of objectives of what we're trying to hit. So whether that objective was a certain level of energy efficiency, or whether that objective was you had to deal with a certain type of safety or structural integrity or whatever, this was the objective. But what had been allowed for was what is now called alternative solutions. It allows for creativity. You know, we've had engineers and architects come. And this is, you know, what, traditionally, this is how we would do it. We are proposing to do it this way, for these reasons. And here's how and why we're still going to be hitting the objectives of the code is trying to, you know, we're not circumventing the intent of the code, nor are we reducing what the code requires. But we want to do in a different way, I think we need for things to be better implemented, we need to take more of an approach like that with our planning." (Participant 18; Municipal employee)

Requiring municipalities to consider net-zero and incorporate energy planning was seen by some participants (N=4; 22%) as the only way municipalities would change. Participants felt that requirements would be more effective as it would create a necessity and that many rural municipalities would not prioritize planning for net-zero unless mandated too.

"If I'm being blunt, we're going to be forced to do it, even if we don't believe in it anyway. Because I think in the future, you're going to start seeing grants and all those sorts of things become attached to that kind of behavior." (Participant 14; Elected official)

"I think it's a lot of it's being driven by provincial and federal policies. So, as we're especially as we're looking for grant funding, there are a lot of climate adaptation specific grants that obviously mean the municipality has to start thinking in those terms." (Participant 15; Municipal employee)

"So just having that provincial leadership to say, this is what your plan must include, rather than should include." (Participant 17; Municipal employee)

5.2.5 Incentives and Funding

In contrast to policy changes mandating energy planning, several participants felt that increased funding (N=12; 67%) and incentives (N=11; 61%) for municipal energy planning was a key factor for success. Almost all participants (N=15; 83%) stated that cost was a barrier to energy planning for municipalities. As such, participants (N=12; 67%) noted that increased funding incentives from higher levels of government would raise the priority of energy planning, as funding was very closely tied to political will in rural municipalities.

> *“I think that the incentives and programs and grants will be the biggest factors in getting municipalities to move in those directions.” (Participant 14; Elected official)*

> *“But if [municipalities] see the incentive, and they see the business case, then they'll start working on it. So I think we need to pull more of those types of levers.” (Participant 17; Municipal employee)*

Participants stated that funding programs related to infrastructure delivery, energy retrofits, and policy development were most influential. Interestingly participants described that in rural municipalities funding programs dictated what policies a council will pursue, opposed to the conventional method of setting policy prior to determining funding sources and logistics. This illustrates the powerful nature of incentives, and the need for higher levels of government to provide leadership on energy planning.

> *“We're in the middle of doing a municipal renovation. And we did it to a higher level, we're going through the Efficiency Manitoba and we're building a better envelope. We're using these resources and the funding that's there to help stimulate them, even for our electrical and all that. We did future service for solar too, we built our roof that's ready to proceed.” (Participant 8; Municipal employee)*

> *“If we know funding is available for something we might direct policy, and that might influence how much effort we'll put into a policy . . . if there were some, some predictable programming, funding and programming towards these environmentally sustainable initiatives for energy or sustainability, all that kind of stuff. That would become a much easier way for us to start saying that we're actually going to really start modeling our policies around this.” (Participant 18; Municipal employee).*

One (N=1; 6%) participant explained the use of green energy reserves. Like other financial reserves used to fund the purchase of large capital assets, this fund finances energy efficiency projects. This is an effective model for municipalities that allows for targeted investments in low-carbon technologies and functions within Manitoba’s existing municipal finance framework.

> *“Our council is pretty progressive in that we've actually created a green energy reserve fund. So every year, we put a small amount in that reserve to be used for the purchase of larger, energy efficient initiatives down the line. Anytime that we develop our own new assets or acquire new assets, we do try to see wherever we can have energy savings.” (Participant 13; Municipal employee)*

Beyond direct funding programs, participants (N=11; 61%) stated other incentive tools were needed to encourage energy planning for net-zero in Manitoba. The main non-monetary incentive discussed by participants was green development standards. Through these standards, municipalities would reduce fees or processing times for

applications that incorporated more energy saving or energy producing elements. Several municipalities, such as the Rural Municipality of Rosser, already require a certain level of sustainability points in order to approve a projects.

> *"One good example actually is the inland port special planning area, the Rosser center port lands. That zoning bylaw is actually a provincial regulation under the Planning Act, and there's a certain number of points that every developer has to meet when they take out their development permit. And those points are loosely tied to things like LEED, or sort of like green globes and green building things like that. To me is like a real sort of implementation, like, it's quantifiable. A high level policy is only good if you then have something falling under it that you can implement." (Participant 7; Planning consultant)*

> *"An example that I'm thinking of is in Ontario, they have the green development standards that a lot of municipalities use to implement as a tool when an anyone comes in to make a development application. And depending on which municipality they can either if you achieve a certain level, you can actually have reductions in your development application fees, or other incentives and it encourage developers to do more than the bare minimum. And so if we can do something similar to that in other provinces, it might make it easier on us as professional planners to incorporate these things within the client's scope." (Participant 3; Planning consultant)*

Another participant expanded the concept of green development standards to the scale of a community. They suggested Manitoba Hydro could incentivise developers with upfront rebates if entire communities or subdivisions were designed to higher energy efficiency standards. Using development plans to require and enforce this would be an ideal mechanism within Manitoba's planning framework.

> *"How can you create a community kind of from scratch using development plan policy, maybe even regulatory documents, such as a zoning bylaw, to create a community that just based on design would use less energy? If you had something for developers that they could use, or maybe Manitoba Hydro would provide them with some upfront rebates or if you could demonstrate that there would be less energy consumption based on community design, just something that they could use that they could provide to developers to qualify for a strategy as basically a strategy to implement." (Participant 2; Planning consultant)*

5.2.6 Collaboration and Partnership

More than half of participants (N=10; 55%) felt greater collaboration was needed to improve energy planning and achieve net-zero in Manitoba. Participants stated

collaboration was needed between municipalities, professionals, levels of government, and utilities.

> *"The biggest tool we need is awareness and consultation. Ones where elected officials really listen in order to develop common solutions. Information sharing and networks to allow for collaboration, not competition, is needed." (Participant 11; Provincial employee)*

> *"You know, sometimes it's just a matter of as professionals is working together. We have like you said, there's how many municipalities in the province I forget 100, and whatever. We all do the exact same thing we just do it differently . . . I think to try and implement a lot of these things, you know, if we would, as planners and municipalities would start working together better. I think we could achieve more." (Participant 18; Municipal employee)*

Some participants noted it is difficult to be the only entity implementing stricter policies related to development. Participants suggested since municipalities are hesitant to restrict development, a regional or provincial approach to implementing energy planning policy would be more favorable.

> *"What we've seen is that it's difficult for us to implement change, when none of our neighbors are doing it" (Participant 13; Municipal employee).*

Many discussions of partnership and collaboration referred to improving working relationships with Manitoba Hydro. Participants (N=5; 28%) acknowledged Manitoba Hydro is not an active participant in the development plan process. Nor do they participant in planning beyond assessing specific electrical (or gas) concerns on individual projects. An increased role for Manitoba Hydro in land use planning was seen by participants as crucial to achieving net-zero energy systems and aligned with best practices in other provinces.

> *"What I do notice with hydro is that they are one of the last government agencies to be contacted in a subdivision or in a development application, typically, their comments are more reactive . . it's never consult hydro from the start." (Participant 2; Planning consultant)*

> *"In Ontario when we were updating our official plan, our utility provider was consistently involved, because they had a lot to say, with what was going to be happening. And they'd be the ones almost enforcing some of those policies as opposed to the municipality." (Participant 3; Planning consultant)*

5.3 Manitoba Hydro

As the utility for electricity and natural gas, Manitoba Hydro controls generation and distribution of energy in the province. Consequently, the operation and policies of

Manitoba Hydro has significant impact on energy planning. Participants (N=6; 33%) stated Manitoba Hydro's monopolistic structure has provided little support for energy planning at the local level, and that Manitoba Hydro is not involved with municipal development planning processes.

> *"Because again, knowing on how Manitoba Hydro operates, they are a difficult organization to break into to have those types of discussions." (Participant 5; Municipal employee)*

> *"What role do utilities play? How are we supposed to engage utilities? As you said, it's even hard to get them to comment on rezonings and things. And that's the only time they. You've never had a request for hydro to look at a development plan at a draft stage or anything that just doesn't happen. We can't even get data for the municipalities we're working with from Manitoba Hydro to support plans we're working on." (Participant 4; Planning consultant)*

Further, one (N=1; 6%) participant noted that Manitoba Hydro's monopoly provides limited incentives for system-wide efficiencies.

> *"With it being Manitoba Hydro for the entire province, I mean they definitely have as a Crown corporation, they have a monopoly in that regard. So they kind of run the show, there's nothing, aside from internal pressures and maybe pressures from customers to be more efficient. It's not like they have competition, in that regard. (Participant 2; Planning consultant)*

Within the utility, priority is placed not on local agency but on providing lowest cost reliable power. Participants (N=7; 39%) stated the emphasis on low cost has created low buy-back rates from non-utility producers, like municipalities or individual. As a result, there is limited financial incentive for non-hydroelectric energy or the innovative local solutions that a net-zero energy transition requires.

> *"You know, the other major constraint is going to be doing everything at the lowest cost possible, right? Because no one wants to see our energy rates going up. So people expect low cost hydro in Manitoba, that's been our experience our whole lives, and for generations that we've had some of the lowest costs of energy in all of North America and the world. So there's a very high bar for expectations on the cost side. lowest cost as possible. And also reliability. Like I think in Manitoba, we're really fortunate to have had a very reliable energy source. And as the climate continues to change, and climate risk becomes higher, that reliability factor I think becomes more and more of a challenge for people." (Participant 17; Utility employee)*

> *"When we've talked with a company that does solar the guy basically said that under the current rate program that Manitoba Hydro has for buying back power, it really only makes sense to do solar, if you're*

> *doing it for ideological reasons. If you're doing it for economic reasons, he says it that doesn't make sense. Your payback period is roughly the lifespan of the panels." (Participant 18; Municipal employee)*

Additionally, poor policy direction from the provincial government has limited Manitoba Hydro's ability to take meaningful action on the transition to net-zero energy.

> *"Well, I think there is, like a sense that because we are an animal of the province, we need to like, wait for that energy policy direction before we can take certain steps . . . And it's like, well, we don't have a clear energy policy answer on that yet from the province. But once we have it then we can do that. So I think there are things that we can offer, but we were still kind of waiting for that piece to fall in." (Participant 17; Utility employee)*

5.4 Conclusion

This chapter illustrated the unique barriers and success factors for the integration of energy planning and land use planning. Participants in the study expressed a range of experiences and opinions on land use planning, municipal administration and energy planning. All participants acknowledged that limited political support for energy planning policy at municipal and provincial levels has resulted in the current state of minimal action on achieving a net-zero energy system. All participants also acknowledged that capacity challenges, including insufficient funding, poor staffing, and inadequate knowledge on energy produce low political will and poor integration. The success factors identified by participants focused on the role of individual champions in advocating for energy planning policy and creating community buy-in for sustainable energy initiatives. Participants observed that meaningful change in municipal policy requires provincial leadership. Incentives, financial and otherwise, to increase the capacity of municipalities and attractiveness of energy planning were also identified by participants as critical factors for success. The following chapter discusses the major themes in this study while addressing the objectives stated in the introduction.

6 Discussion

This chapter discusses relevant themes that emerged from the research findings. As the results of this research demonstrate, the lack of integration between land use planning and energy planning and low plan quality scores are the result of energy planning not being valued by rural Manitoba municipalities. A lack of support from the provincial government and provincial utility, along with municipalities fixed conceptualization of the energy system further prevent rural municipalities from integrating land use planning and energy planning.

The results of this analysis indicate development plans in rural Manitoba are not preparing communities for the transition to net-zero and increased renewable energy generation. Poor factual foundation and limited implementation make achieving net-zero challenging. Emphasis on efficiency over the generation of energy limits the ability of a plan to usher in new development. The limited consideration of energy in development plans illustrates Manitoba's centralized energy system. The influence of senior government is also preventing municipalities from fully considering energy within their development plans.

Section 6.1 will restate the research goal and objectives and outline how each objective was met. The following sections of this chapter discuss the three key themes that emerged from the study findings. Lastly, this chapter will present recommendations for how to better integration land use planning and energy planning and will provide some directions for future research related to this topic.

6.1 Revisiting the Research Goal and Objectives

The goal of this research was to identify the barriers to integrating land use planning and energy planning that are potentially preventing rural Manitoba rural municipalities from achieving a low-carbon energy transition. Three objectives were developed to address the research objective:

1. Develop a systematic plan quality evaluation framework to assess the inclusion of energy planning in rural municipal development plans.
2. Explore why municipalities decided to pursue, or not pursue, energy considerations within development plans.
3. Identify success factors and barriers to the integration of energy planning into rural land use planning frameworks

This research explored barriers and opportunities for integrating land use planning and energy planning in rural Manitoba communities. This research identified how rural communities can better prepare for the transition to low-carbon energy systems and assist with Canada's goal of producing net-zero emissions by 2050. Table 7 highlights the research objectives and how each one was met.

Table 7: Achievement of research objectives

Research Objective	How Objective Was Met
1. Develop a systematic plan quality evaluation framework to assess the inclusion of energy planning in rural municipal development plans.	Objective #1 is answered through the literature review, the plan quality evaluation framework created in Chapter 3, and the plan quality results presented in Chapter 4. These result help identify barriers and how they manifest within Manitoba's planning system.
2. Explore why municipalities decided to pursue, or not pursue, energy considerations within development plans.	Objective #2 is answered through the literature review and qualitative interviews outlined in Chapter 3. This objective will be relevant to addressing all themes within Chapter 6 but will play a prominent role in considering the role of **values over capacity.**
3. Identify success factors and barriers to the integration of energy planning into rural land use planning frameworks	Objective #3 is answered through the plan quality evaluation framework and the qualitative interviews. This objective will be relevant to addressing all themes in Chapter 6 but will play a prominent role in considering the role of **support from senior governments, municipal conceptualizations of energy**, recommendations, and areas for future research.

The following sections will provide a discussion on the central themes that emerged from the current research findings: 1) values over capacity; 2) support from senior governments; and 3) municipal conceptualization of energy.

6.2 Values Over Capacity

The most notable theme within the findings is the emphasis on values as a barrier to integrating land use planning energy planning within rural Manitoban development plans. While capacity elements are substantial and are a hurdle for municipal governments, values can be more influential than capacity in some circumstances.

Planning documents are policy tools, but they are also an expression of values. Vision statements and desired future are explicit statements of what a community wants to achieve in the future (Hodge & Gordon, 2014). More implicitly, the goals and policies of planning documents outline how a community wants to express its values across its land base and through the built environment. The low average plan quality scores from plans included in this thesis, indicate that energy planning is not well integrated within development plans. Interview participants observe that energy planning is not integrated

within land use plans because rural communities do not value it. Energy planning is not valued by the public, so it is not prioritized by local decision makers. An incomplete understanding of planning frameworks and energy transitions contribute to energy planning not being valued. Capacity challenges also make it difficult for municipalities to prioritize energy planning. However, communities with strong champions that value energy planning, climate change, and sustainability are producing higher quality plans with greater levels of integration.

Political will is the primary barrier identified by interview participants. This illustrates that capacity challenges can be overcome if energy planning is valued by decision makers. Lack of progress on climate change and energy transition policy is not because of inadequate technology nor prohibitive costs but lack of political will (Barrington-Leigh & Ouliaris, 2017; Biresselioglu et al., 2020; Oulahen et al., 2018; Stringer & Joanis, 2022). Low public interest in, and support for energy planning reduces the ability of governments to make change when other items are prioritized over transitioning to low-carbon energy.

Political will as a barrier can also be seen in the high degree of variability between plans. The plan quality scores ranged from 0.53 to 7.24 out of 10. While significant variation between plans is present in previous examinations of Canadian plans (Baynham & Stevens, 2014; Guyadeen et al., 2019; Guyadeen & Henstra, 2023), the degree of variation in this research indicates some communities are planning for energy, while others are not. This is partially due to the age of plans and provincial policy, but it is also an indicator that when communities are crafting development plans, they are making deliberate choices to include, or not include, energy planning content within them.

Researchers have identified that values, expressed as culture and institutions, pose a greater barrier to the adoption of net-zero and low-carbon energy systems than capacity challenges do (Burch, 2010a, 2010b; Hamin et al., 2014; Middlemiss & Parrish, 2010). Municipal governments are institutions which are part of “a complex web of human/environment interactions, political and economic trajectories, and public values that deeply shape the suite of available policy responses to climate change and their likely success” (Burch, 2010a, p. 7576). This is consistent with the findings from this research, which conclude that the values shaping political will are critical elements to creating successful policy responses to low-carbon energy transitions.

6.2.1 Poor Levels of Knowledge

Often, official plans struggle with strong factual foundations and implementation (Guyadeen, 2019; Seasons, 2021). Climate and energy plans also tend to struggle with implementation (Guyadeen & Henstra, 2023; Littlejohn & Laszlo, 2015; Murphy et al., 2021; Tozer, 2013). Poor fact base in plans related to energy planning is consistent with findings on climate integration in official plans (Baynham & Stevens, 2014; Bonnett & Birchall, 2022). The finding of poor fact base within this thesis is consistent with research from rural Ontario climate change plans (Guyadeen & Henstra, 2023). Interestingly, the poor performance of implementation characteristics specific to energy

is opposite that of other official and climate change plans in Canada (Guyadeen et al., 2019), indicating that energy in particular is not well considered within Manitoban development plans.

Interview participants note that municipal staff and officials had varying levels of energy transition and climate change knowledge. Participants also note that staff lack the professional knowledge necessary to perform energy planning and some land use planning functions. Literature on energy transitions concurs that lack of information is the most common barrier to effective transitions (Biresselioglu et al., 2020). Research from British Columbia finds municipal plans, and by extension municipal officials and the public lack key knowledge about climate change (Baynham & Stevens, 2014). Murphy et al. (2021) find that municipal staff need a strong knowledge of energy planning to work effectively with elected official in creating and implementing energy planning policies. Poor staff knowledge is also a key barrier to municipal climate adaptation mentioned by Oulahen et al. (2018) and Robinson (2005). Limited understanding of climate change leads to poor planning for climate change, and the same is true for energy planning.

Participants express that education is a solution that needs to be implemented. Increased education and knowledge sharing is necessary to address capacity constraints, as found by Bonnett and Birchall (2022). Burch (2010) observes that improved organizational knowledge is essential for increasing the political will to act on energy planning. Oulahen et al. (2019) and Biresselioglu et al. (2020) find that public awareness is critical to spurring action and increasing political will for climate action. Stevens and Senbel (2017) state that public awareness and commitment to climate change translate to higher quality climate change policies in official plans. Increasing education of planners elected officials, municipal staff, and the public is necessary for successful energy planning in Manitoba.

6.2.2 Resource Challenges

Capacity challenges are another barrier to integrating energy planning and land use planning, and one that makes it more difficult to prioritize energy planning. All participants expressed that various capacity challenges, such as limited budgets and small staffs, prevent rural municipalities in Manitoba from integrating energy planning and land use planning. Many capacity barriers were expressed in a general sense (for example: insufficient staffing, restricted budgets, inability to run deficits, increasing municipal responsibilities), limiting not just energy planning but all types of municipal action.

Existing research corroborates that limited resources and capacity constraints limit the integration of energy planning and land use planning by municipal governments. For example, Robinson's (2005) survey of Canadian municipalities finds that budget restrictions present the most significant barrier to climate change action among 47% of municipalities. Lack of staff time is the second most prominent barrier, with 36% of municipalities rating it as most significant (Robinson, 2005). Institutional capacity to properly create and implement plans is a continuous barrier to energy planning (Calvert,

Kantamneni, et al., 2021; Murphy et al., 2021). Interviews by Oulahen et al. (2018) found that municipal governments in British Columbia lacked the staff or financial capacity to conduct the studies, plans, and policies associated with climate planning. Limited capacity is most often present in communities with smaller populations (Oulahen et al., 2018), aligning with findings on climate action from the Untied States (Liao et al., 2020). As stated by participants, rural communities lack the necessary human and financial resources to properly integrate energy planning and land use planning.

Interview participants view energy planning as costly. Both the costs of energy related initiatives like solar panels and efficiency upgrades, but also the creation of policy. The additional cost of including energy planning language in development plans, when not required by the PLUP, is seen as beyond the financial means of local governments. The high capital costs of energy projects and energy planning meant some participants felt energy planning came at the expense of other municipal investments. This sentiment aligns with Robison (2005) and Tozer (2013), who found cost was commonly citied as a barrier to effective energy planning. Tozer (2013) noted that energy planning was more likely to be considered costly if it was viewed as additional to regular municipal spending. If integrated into long-term capital budgets, energy planning is more likely to viewed like any other capital investment. Rural municipalities in Manitoba would benefit from greater funding from higher orders of government (Winfield et al., 2021) if they are to integrate energy planning and land use planning.

Research collected in this thesis corroborates previous work that highlights how rural communities in British Columba, especially those without regional or upper tier municipalities, experienced greater capacity constraints that led to decreased likelihood of producing energy or climate change plans (Bonnett & Birchall, 2022). Rural Manitoba municipalities have no regional municipal governments, and self-report a lack of capacity to plan for the energy transition.

Capacity challenges are linked to a lack of support from senior levels of government (Jaccard et al., 2019; Murphy et al., 2021; Oulahen et al., 2018; Winfield et al., 2021). However, capacity challenges extend beyond municipalities, to provincial and federal governments as well. Oulahen et al. (2018) note that low-resourced provincial government departments directly reduce municipalities abilities to function, including reducing the ability to plan. Participants' discussion of a poorly resourced provincial government reducing their planning ability aligns with the literature. A greater discussion of the role of higher orders of government is presented in section 6.3

Participants note that capacity challenges are mitigated by generous funding programs from the federal government and non-governmental organizations Achieving low-carbon energy transitions and net-zero is financially beneficial, and possible, for Manitoba (Stringer & Joanis, 2022). But the existing use of renewable hydroelectricity reduces the financial incentive to do so (Robb & Fitzpatrick, 2020; Stringer & Joanis, 2022).

Capacity challenges can be further mitigated through partnerships between municipalities and non-governmental organizations. Middlemiss and Parrish (2010)

noted that strategic partnerships between municipalities and advocacy groups was an effective tool for advancing low-carbon policies at the municipal level. This research supports the empirical findings, as participants note the possibility of connections with organizations such as QUEST or the Federation of Canadian Municipalities to build both capacity and foster positive values.

Several studies that examine capacity in relation to municipal energy or climate change planning have exclusively used quantitative methods (Liao et al., 2020; Murphy et al., 2021; Robinson, 2005), while fewer have used interviews or focus group (Oulahen et al., 2018; Tozer, 2013). The mixed-methods approach of this research that integrates both quantitative plan quality results and quantitative interviews provides a robust understanding of state of energy planning in Manitoba and explanation of why that state exists.

Many participants cite capacity challenges as the barrier to energy planning in rural Manitoba, and this is valid. However, the findings indicate that communities that are willing to undertake energy planning have champions who value it. Those values are used to prioritize resources for energy planning or take initiative to find new resources to do so.

6.2.3 Champions and Positive Values

Pursuing energy planning and integrating energy planning into land use planning frameworks is complex and multifaceted (Cajot et al., 2017; Kaza & Curtis, 2014; Murphy et al., 2021). However, results from this research indicate that consideration of energy planning by rural municipalities is largely values driven. This is seen by the emphasis participants put on the role of political will. Municipal decisions are driven by the values of elected officials and municipal staff, and by extension the values held by the public. Similarly, participant highlighted the outsized positive influence of local champions, those who advocate for the inclusion and adoption of particular sets of values. Existing research supports these findings and concludes the role of local values and social systems is a key factor in the success of climate and energy initiatives, especially in rural communities.

Social science researchers observe that low-carbon energy transitions are often perceived to be exclusively technical processes (See: Adil & Ko, 2016; Biresselioglu et al., 2020; Rutherford & Coutard, 2014). However, the role of institutions, legal frameworks, social dynamics, beliefs, and motivations all have significant influence in shaping these transitions (Young & Brans, 2017). Energy transitions are both technical and social processes that involve the reconfiguration of economic and social activity (Blondeel et al., 2021; Bridge et al., 2013). Social considerations are as important as technical ones when managing energy transition (Young & Brans, 2017), these social considerations will also be influenced by local geography and vary place to place (Bridge et al., 2013). Because energy transitions involve changing socio-economic systems, institutions, and political systems, values become central to the facilitation of the transition (Biresselioglu et al., 2020; Hamin et al., 2014; Middlemiss & Parrish, 2010). These empirical findings align with the results of this research. Interview

participants observe that values play a prominent role in the social aspects of low-carbon energy transition. Interview participants note that positive values and social acceptance were aspect that allow for and encourage integration between energy planning and land use planning.

Conversely, values are also barriers to the integration of energy planning and land use planning. Participants observe that a lack of political will and the undervaluing of energy planning by decision-makers were key reasons that integration was not occurring. This aligns with findings from Hamin et al. (2014) who found that conflicting values and beliefs were the primary barrier to municipal climate adaption in small-town Massachusetts. Ignorance or denial of climate change is citied as a major barrier to public acceptance of climate change related planning (Hamin et al., 2014). Poor knowledge (discussed above) prevents community engagement and creation of champions (Coy et al., 2022; Hamin et al., 2014; Mees, 2022). The low scores for fact base within the sampled plans illustrate that energy planning knowledge is poor in rural Manitoba. Similarly, participants discussed that belief in climate change often informs action, and champions all believed in climate change the need for the energy transition.

Existing empirical research has determined that key individuals – termed champions in this thesis – play outsized roles in the creation of policy and the integration of energy planning and land use planning (Biresselioglu et al., 2020; Coy et al., 2022; Young & Brans, 2017). These champions, termed policy entrepreneurs, are local actors often involved in government as administrators or elected officials (King & Roberts, 1992). Champions have high levels of leadership, are strong critical thinkers, and are action oriented (King & Roberts, 1992). Additionally, champions are strong proponents of progressive ideals, and seek to bring change to their communities, often through formal decision structures like municipal councils and development plans (Biresselioglu et al., 2020; King & Roberts, 1992). Individuals who are champions of energy issues are more likely to be from affluent backgrounds, with high levels of formal education and strong activist tendencies (Biresselioglu et al., 2020). Interestingly, interview participants note that the most important quality for champions in the Manitoba context is knowledge and activism. Socio-economic factors are seen as less influential, as many champions are lower paid part-time staff.

Burch (2010b) find that the presence of a chief administrative officer (or similar) who is a champion is critical to achieving action on climate change. Additionally, leadership on energy planning at the local level is most effective given the proximity between the public and municipal politicians (Burch, 2010b). This aligns with findings from the interviews, where participants repeatedly express that key individuals - including chief administrative officers, development officers, elected officials and citizens – hold proportionally more influence than others in advocating for the adoption of energy planning within land use plans and the implementation of energy planning.

Participants state that champions in their communities took on dual roles. Firstly, as innovators who shared unique, progressive ideas about energy systems with their broader networks. Secondly, champions are important sources of influence in decision making systems, advocating for local councils to pursue energy planning. This aligns

with the findings of Biresselioglu et al. (2020) and Ruggiero et al. (2014) who found champions had multi-faceted roles in promoting community energy.

While values are central to effective energy planning, community action and champions do require community capacity. Interview participants note that the most successful champions are in medium-sized rural communities or located on urban fringes. These places are perceived by participants as having greater capacity and thus greater ability to advocate for and pursue energy planning. This aligns with the literature, which finds that while champions are key motivators for actions, community-level change will not occur without sufficient capacity (Biresselioglu et al., 2020; Middlemiss & Parrish, 2010). Similarly, Mees (2022) finds that citizens with higher incomes and a greater number of fellow climate-minded peers are more likely to take climate actions.

The influence of values is reflected across all themes and has a strong relationship to capacity. The lack of resources attributed to rural municipalities, particularly for generally policy and planning is the results of values and political will not prioritizing rural communities or energy planning. While capacity issues are a legitimate barrier values are an underassessed barrier in Manitoba, and overcoming it is essential to rural energy transitions.

6.3 Support From Senior Governments

6.3.1 Provincial Support

Over 80 percent of participants (N=16) discuss how the integration of energy planning and land use planning in rural Manitoba cannot effectively occur without greater support from provincial and federal governments. Almost all studies on climate change and energy planning in Canada agree that local energy transitions and effective energy planning can only occur with the proper support from senior levels of government (Bonnett & Birchall, 2022; Burch, 2010a; Dale et al., 2020; Jaccard et al., 2019; Murphy et al., 2021; Oulahen et al., 2018; Robinson, 2005; Winfield et al., 2021). Within the land use planning context this is particularly important, as provincial governments are responsible for setting both land use and energy policy and are often incredibly involved in land use planning processes (Guyadeen et al., 2019; Jaccard et al., 2019). Philp and Cohen (2020) note the same findings as this research: That rural communities play an important role in mitigating climate change impacts and facilitating the energy transition, but they need support from provincial and federal governments.

Interview participants have mentioned that greater support from provincial government is needed. Planning services and infrastructure delivery are highlighted as the most critical areas of provincial influence, as related to municipal energy planning. Greater direct support in these areas, such as more access to planning staff, is desired by participants. Additionally, the provincial government is perceived as most effective at setting policy and providing funding that would directly influence municipal policy and operations. The need for clear energy policy to direct Manitoba Hydro is also noted by participants. These findings align with research by Jaccard et al. (2019) who found significant GHG reductions and low-carbon energy transitions require supportive policy

from provincial and federal governments. Other researchers concur that provincial governments are best suited to bolster municipal capacity and integrate energy planning and land use planning (Dale et al., 2020; Murphy et al., 2021; Oulahen et al., 2018; Tozer, 2013; Winfield et al., 2021).

Within the Manitoban context, development plans must conform with provincial legislation and the PLUP. The PLUP contains policies that ensures local planning considers provincial interests. While the PLUP does support energy conservation, renewable energy generation, green building standards, compact development, and reducing GHG emissions, they are high-level and not mandatory. Because local development plans must only be generally consistent with the PLUP, energy is not often included. This aligns with research on rural climate change plans that find inclusion of climate change in rural plans is driven in large part by provincial policies (Baynham & Stevens, 2014; Burch, 2010a; Winfield et al., 2021). Stronger provincial policy will result in higher quality local plans.

Regional approaches are identified as preferred by municipal participants because it creates a “level playing field” (Participant 13) Several participants (N=7) express concern about strict rules in one municipalities driving away development to other jurisdictions. A regional or provincial approach to energy planning is the most efficient and equitable way to integrate energy planning and land use planning in Manitoba. Regional planning can also create higher quality plans and reduce GHG (Bonnett & Birchall, 2022). This is a further role for the provincial government to play. By making energy planning a mandatory requirement of the PLUP, no one municipal government will need to be a trailblazer or be at a disadvantage.

The isolation of energy planning and land use planning that prevents rural Manitoba communities from effectively preparing to achieve net-zero is likely a barrier elsewhere in Canada. Planning systems, while controlled at the provincial level, are rooted in shared history and have similar legal structures (Hodge & Gordon, 2014). Research on community energy plans finds that legislative mandates for utilities often restrict the municipal role in energy planning and silo energy planning and land use planning (Linton et al., 2021; Tozer, 2013). Conversely, provinces with more flexible utilities and energy system have seen a greater prevalence of energy planning (Littlejohn & Laszlo, 2016).

In Manitoba, several municipalities with recently updated plans are ‘paving the way’ with their inclusion of energy planning in statutory development plans. These leaders illustrate that it is indeed feasible for municipalities plan for energy and net-zero in rural communities. This aligns with the results of Baynham and Stevens (2014), Guyadeen and Henstra (2023), and Winfield et al. (2021) who found that supportive provincial policies lead to better energy and climate consideration in official plans. It is important to note, is that enthusiasm for policy reform on climate change and energy planning at the provincial level increases local level energy planning (Burch, 2010b). In short, provincial support and the championing of integrating energy planning and land use planning is essential if Manitoba is to achieve net-zero.

6.3.2 Federal Support

Participants did not discuss the federal government's role in supporting rural energy planning in depth. Participants perceive the federal government as being responsible for funding larger infrastructure projects and setting high level energy transition and climate change policy. Tying federal funding to climate change outcomes has created effective energy planning previously and should be explored further (Philp & Cohen, 2020; Winfield et al., 2021). The Canada Community-Building Fund, formerly the Gas Tax Fund, has been effective at facilitating environmentally sustainable infrastructure and should be leveraged to assist rural energy transitions (Stuart et al., 2016). Some participants state that clearer policy direction on the energy transition is needed from the federal government to push the province to act. Empirical findings agree that supportive national energy planning policy is a critical enabler of the low-carbon energy transition, and concrete action at the local level (Biresselioglu et al., 2020; Oulahen et al., 2018; Ruggiero et al., 2014).

6.3.3 Manitoba Hydro

As the provincial utility with a monopoly on electricity and natural gas generation and distribution, Manitoba Hydro is an essential partner in integrating energy planning and land use planning. Plan quality findings support this, as most references to the energy system mention Manitoba Hydro. Participants observe that many municipalities have a working relationship with Manitoba Hydro, but that the utility is not involved in local planning, nor does it support for non-hydro community energy. Legislative barriers restrict the generation of electricity to Manitoba Hydro (Manitoba Hydro, n.d.-b), and the utility has a limited number of community energy initiatives, focused on efficiency (Robb & Fitzpatrick, 2020). A key informant with Manitoba Hydro states the utility is not involved in land use planning, and that that Manitoba Hydro could play a larger role in integrating energy planning and land use. Numerous interview participants highlight the need for leadership by Manitoba Hydro on the province's transition to low-carbon energy. Greater cooperation with municipalities is desired, along with legislative changes that could enable more flexibility for community-scale electricity generation.

The low cost of electricity from Manitoba Hydro is a barrier to innovation and adoption of new technologies (Haley, 2014; Robb & Fitzpatrick, 2020). Stringer and Joanis (2022) note that at the policy level a net-zero transition in Manitoba is cost effective, but partially disincentivized by the abundance of low-priced hydroelectricity. Consumers are hesitant to invest in individual renewable energy generation systems, such as solar panels, because high upfront cost paired with low return on investment and affordable electricity rates do not incentivize household generation (Robb & Fitzpatrick, 2020).

6.4 Municipal Conceptualizations of Energy

6.4.1 Limited Consideration of Energy

Energy is often taken for granted and perceived as a low-value utility by individuals, businesses, and local governments (Biresselioglu et al., 2020). This aligns with the low

plan quality scores, where energy was not well considered within plans. It also aligns with the semi-structed interviews where participants report municipalities do not prioritize or place importance on energy. Because of the low value of energy, it is difficult to motivate organizations and individuals to invest in low-carbon solutions when there is no perceived need for a solution.

For rural Manitoban municipalities there is often no reason to consider energy. The legal responsibility for the energy system rests with the provincial government and Manitoba Hydro (Manitoba Hydro, n.d.-a). The low value of energy, as explained by Biresselioglu et al (2020), is heightened in a province where energy has been reliable and inexpensive for decades. Some of the most notable aspects of Manitoba's energy systems – affordability, social acceptability, and reliability – are barriers to adopting new decentralized low-carbon carbon energy systems that net-zero requires (Robb & Fitzpatrick, 2020; Stringer & Joanis, 2022).

Private generation of energy is tightly regulated in Manitoba with minimal economic incentives, further lowering the value of energy planning. The net-billing rate to sell electricity back to the grid is $0.065/kWh, about 40% less than the residential electricity rate of $0.093/kWh (Manitoba Hydro, n.d.-b, n.d.-d). The lack of economic incentive makes it unattractive for households or local governments to explore local renewable energy or other behind-the-meter options (Biresselioglu et al., 2020; Robb & Fitzpatrick, 2020). However, consumer surveys in Manitoba indicate the public is interested in pursuing local and community-level energy generation that is not controlled by the provincial utility (Robb & Fitzpatrick, 2020). This aligns with findings from more recently produced development plans, which score much higher on integrating energy considerations and planning for renewable energy generation. Interview participants, particularly champions, observe that interest in community energy is growing, but that a more supportive regulatory framework is needed.

Development plans in rural Manitoba have a limited consideration of energy and do not increase Canada's ability to reach net-zero goals within federally committed timelines. Poor fact base means that plans do not acknowledge the challenges associated with the energy transition or climate change. This lack of inclusion in plans is the primary barrier rural municipalities face. If official documents do not recognize a challenge, solutions are less likely to be considered. A significant body of research recognizes that development plans in various jurisdictions struggle to consider energy and climate (Baynham & Stevens, 2014; Robinson, 2005; Stevens & Senbel, 2017). Guyadeen and Henstra (2023) note a similar phenomenon with climate change inclusion in rural Ontario official plans. The limited attempt to mainstream energy planning into rural Manitoban development plans will be detrimental in the long term. These empirical findings further bolster the results of this research that find energy is not considered by municipalities, and thus not included within municipal policy or development plans.

Limited jurisdiction to control energy production and the low value of energy, makes it a seemingly unimportant aspect for municipalities to consider in their development plans. But this ignores the reality of future and immediate needs for rural land as energy producing space (Bridge et al., 2013; Jefferson, 2018; Naumann & Rudolph, 2020). It

also ignores the evolving energy needs of rural places, and the socio-economic opportunities new forms of energy can bring (Brown et al., 2017; Clausen & Rudolph, 2020; Lal et al., 2011). Development plans will need to better integrate energy planning and land use planning if rural Manitoba is to fully participate in the low-carbon energy transition.

6.4.2 Efficiency Over Generation

Goals and policies are comparatively strong aspects of the sampled plans, with an average score of 2.98 and 3.46 out of 10, respectively. This indicates that energy is included in development plans and that municipalities are engaged and interested in energy-related matters. Interview participants confirm that municipalities are interested in pursuing energy planning and felt that interest was growing across the province. Generally, goals and policies are centred around energy conservation, largely through mandating efficient land uses such as residential infill and mixed use. Energy conservation measures, such as green construction practices (e.g., LEED) and including energy efficient fixtures are also promoted by goals and policies. Within plans, mitigation measures like energy efficiency are prioritized over adaption measures, like energy generation. This is consistent with the prioritization of mitigation measures in climate change plans (Bonnett & Birchall, 2022; Burch, 2010a; Guyadeen et al., 2019; Tozer, 2013).

Interestingly, most energy conservation goals focus on community action, not local government actions. This contrasts with the findings of previous research where government actions are prioritized over community ones (Baynham & Stevens, 2014; Guyadeen et al., 2019; Stevens & Senbel, 2017; Tozer, 2013). One explanation may be that municipal government lack the capacity to implement energy efficiency upgrades for municipal operations. Municipalities may also be reluctant to include policies related to municipal operations within development plans, as that is not required in the legislative framework and is less common in Manitoba than in other provinces.

Two-thirds of plans analyzed in this thesis have policies encouraging renewable energy generation, and 72% have policies encouraging local generation of energy. This demonstrates municipalities have a clear willingness to develop a diverse energy mix. However, only 4% of plans articulate how these policies will be implemtated. The limited implementation of energy generation policies within plans may be a reflection of Manitoba Hydro’s control over development of energy infrastructure. The dominant nature of Manitoba Hydro does not allow for effective community level planning. Previous research highlights that unsupportive provincial policy is a key obstacle to local energy planning (Jaccard et al., 2019; Murphy et al., 2021; Winfield et al., 2021). The low-carbon energy transition will increase pressure on the rural land base for siting of renewable generation technology and will create greater demands for energy planning (Calvert, Smit, et al., 2021; Jefferson, 2018; Naumann & Rudolph, 2020). Present community planning frameworks do not support this.

Rural communities are expected to facilitate more renewable energy generation (Clausen & Rudolph, 2020; Osorio-Aravena et al., 2020; Stoeglehner et al., 2011).

Because of this, rural official plans will need to consider energy generation more explicitly. This is a change in how official plans and climate action plans are currently structured. Most urban plans focus on reducing energy consumption through increasing efficiency (St Denis & Parker, 2009; Tozer, 2013). Guyadeen, Thistlethwaite, and Henstra (2019) found climate change plans in Canada's most populous (i.e., urban) centres focused on energy efficiency goals and policies over providing for renewable energy generation. In rural Ontario, Guyadeen and Henstra (2023) found climate change plans also focused more on energy efficiency than energy generation. The emphasis on energy efficiency over energy generation by Manitoba municipalities aligns with the incremental approach most local governments take to climate action and sustainability (Baynham & Stevens, 2014; Tozer, 2013). Overall, development plans are not preparing rural communities to embrace energy generation. Planners and planning policy must recognize the unique energy needs of rural communities and the opportunities to improve local energy security, and shape plans accordingly so rural places can embrace those opportunities.

Goals and policies within planning documents are informed by provincial legislation and policy (Baynham & Stevens, 2014; Bonnett & Birchall, 2022; Guyadeen, 2019). The rise of energy generation policies in newer plans can partially be attributed to updates within the PLUP. To increase uptake of renewable energy generation goals and policies, the PLUP should shift from a general approach to energy and encourage rural places to begin planning for renewable energy generation. Enabling renewable energy generation through development plans will be essential to including rural communities in the energy transition.

6.5 Recommendations

Understanding the connections between capacity, values, and policy is essential to for integrating energy planning and land use planning. This integration is critical to achieving the low-carbon energy transitions necessary to reach net-zero by 2050. Contextualizing the state of development plans with the understandings of relevant stakeholders allows for deeper exploration of barriers and success factors at play. From this context, recommendations on how to overcome existing barriers and leverage ongoing success are offered.

There are several recommendations that can be made, especially on the local scale. However, every municipality is unique and experiences different challenges within their specific contexts. This thesis does not attempt to address every local situation, instead offers broader recommendations that can be implemented at various levels. The following four recommendations are broad suggestions for how to improve the integration of energy planning and land use planning in Manitoba. The recommendations also apply in a general sense to all Canadian jurisdictions, especially the fostering of local champions.

6.5.1 Clear Federal Policy on the Energy Transition

Participants expressed a powerful desire for a clear policy framework and a path for the energy transition. Participants and the literature agree that strong policy guidance from the federal government is required to advance low-carbon energy transitions (Jaccard et al., 2019; Murphy et al., 2021; Stringer & Joanis, 2022; Winfield et al., 2021). A clear set of expectations and direction on low-carbon energy transitions would provide the necessary framework for policy at provincial and municipal levels. National policies beyond the 2050 net-zero target that outline the *how* of the energy transition will reduce barriers to integrating land use planning and energy planning.

6.5.2 Increased Provincial Support to Municipalities

The most requested change from participants is greater support from the provincial government. Direct support, such as more staff in regional planning offices, greater access to funding, and formal networks for collaboration will reduce the barriers to energy planning. Formal networks of support will also help municipalities address capacity and values barriers simultaneously (Young & Brans, 2017).

6.5.3 Require Energy Planning Within the PLUP

Policy changes are perceived by municipalities to be a necessary push factor in achieving integrated energy and land use planning. Several participants suggest requiring stronger language on energy efficiency and explicit policies supporting renewable energy generation within the PLUP. This would make aspects of energy planning mandatory for all municipalities, removing concerns of unequal playing field and reducing the values related barriers.

It is important that this policy ‘stick’ is accompanied by ‘carrots’ in the form of greater provincial support. Capacity barriers are extensive, especially in rural and remote communities. Participants noted that while requiring energy planning will place the content within development plans, funding and support will ensure energy planning takes place on the ground.

6.5.4 Foster Municipal Champions

Energy planning literature is beginning to highlight the role of influential individuals who champion energy planning and sustainability initiatives within their communities (Biresselioglu et al., 2020; Mees, 2022; Ruggiero et al., 2014; Young & Brans, 2017). Many participants are aware of the positive influence of champions, but unsure of how to foster them within their own communities. Similar to recommendation 2, a formal energy planning network in Manitoba would help build the requisite awareness cited by participants and academics (Mees, 2022; Middlemiss & Parrish, 2010; Ruggiero et al., 2014). It would also provide a forum for capacity building and creation of collaboration needed to create grassroots action.

6.6 Directions for Future Research

This work contributes to the existing literature on energy planning, plan quality, and rural energy transitions. More research is needed to understand the connections between land use planning, energy planning and the attainment of net-zero in rural communities. Through this study four areas of additional study have been identified. The first is the application of the energy-focused plan quality evaluation framework to a broader sample of official plans. Examining how plans in Manitoba's urban communities compare to these findings would offer a more detailed picture of energy planning and land use planning integration. The plan quality framework should also be applied to official plans beyond Manitoba. More energy-specific plan quality research would advance the legitimacy of the approach and provide greater context for how Manitoba preform within Canada and the world.

The second area for further research is to explore other planning documents. Development plans are only one piece of the municipal policy toolbox, assessing other policy documents such as provincial planning acts, zoning bylaws, and dedicated climate plans or energy plans and how they influence rural communities is an important avenue for further research.

The third area for further study is focusing on how non-generation components of the energy system will be influenced by the energy transition in rural places. As all levels of government work towards net-zero, heating, transportation, and industry will increasingly electrify. The rise of electrification presents an opportunity for both emissions reductions and economic development in rural communities. The role of electric vehicles will be particularly important given the Government of Canada's commitment 100% of new vehicles being zero emission by 2035 (Transport Canada, 2022). Understanding how these changes will impact rural communities is critical.

Lastly, further research on the role of grassroots community action to advance energy planning in rural Canadian communities would be beneficial. Most of the research on the role of champions, policy entrepreneurs and community action has taken place in Europe and the United States (Biresselioglu et al., 2020; Hamin et al., 2014; Middlemiss & Parrish, 2010; Ruggiero et al., 2014; Young & Brans, 2017). Further examination of how community energy and champions manifest within rural Canadian contexts would provide greater insight into how to effectively achieve net-zero within rural communities.

6.7 Conclusion

This chapter analyzed the research finding and contextualized them within existing knowledge. Three central themes emerged from the research: 1) values over capacity; 2) support from senior governments; and 3) municipal conceptualization of energy. These themes outline the primary barriers to the integration of energy planning and land use planning in rural Manitoban development plans and suggests ways to improve integration. This chapter also outlined the limitations of this research, recommended actions to improve integration, and suggested areas for future researchers to investigate.

7 Conclusion

This thesis has contributed new understandings of how prepared rural municipalities in Manitoba are for the transition to low-carbon energy systems and the subsequent land use implications of that transition. Evaluation of 57 statutory land use plans from rural Manitoba communities established that levels of integration between energy planning and land use planning are low. Eighteen semi-structured interviews with key stakeholders explored why the current levels of integration exist and what can be done to bolster them. Through a case study approach, this research identified barriers to integrating land use planning and energy planning that are potentially preventing rural Manitoba rural municipalities from achieving a low-carbon energy transition. The findings of this research are helpful for contextualizing the state of energy planning in other Canadian provinces and similar North American planning systems, and in energy systems with low-emission, low-cost generation.

Mitigating climate change demands that GHG emissions be reduced (IPCC, 2021; UN Environment, 2019). To effectively reduce GHG emissions, energy systems must transition away from fossil fuels to renewable energy systems (Canada, 2021; IPCC, 2021). Federal government commitments to reach net-zero GHG emissions by 2050 also necessitate the transition to low-carbon energy systems (Canada, 2021). Achieving net-zero GHG emissions will require energy planning and land use planning systems to collaborate to facilitate the low-carbon energy planning transition (Benson et al., 2022; Hoicka & MacArthur, 2019; Osorio-Aravena et al., 2020; Stoeglehner et al., 2011). Yet, the literature has highlighted that integration between land use planning systems and energy planning systems is limited (Murphy et al., 2021; Osorio-Aravena et al., 2020; Oulahen et al., 2018; Walter et al., 2021). Canadian communities have struggled to included energy planning content within their official plans (Burch et al., 2014; Guyadeen et al., 2019; Stevens & Senbel, 2017).

Rural areas play an important role in the global transition to low-carbon energy systems. Rural places have long been sites of resource extraction and productive landscapes, and that history is evolving to include renewable energy generation (Brown et al., 2017; Calvert, Smit, et al., 2021; Clausen & Rudolph, 2020; Naumann & Rudolph, 2020). Rural communities and landscapes are fundamental to facilitating the low-carbon energy transitions needed to realize net-zero GHG emissions. Both through provision of land base for infrastructure, but also as participants in the energy transition. Higher energy costs (Adua & Beaird, 2018; Riva et al., 2021), increased vulnerability to climate change (Pittman et al., 2011; Vodden & Cunsolo, 2021) and need for diversified economies (Weeden et al., 2021) all provide strong incentives for rural communities to achieve localized energy systems through ongoing energy transitions.

Planning for the energy transition in rural Manitoba is in its infancy. Most plans do not integrate energy planning and land use planning, and most municipalities do not view energy planning as a priority or a municipal responsibility. Plans do not contain enough information about energy planning or climate change, and do not acknowledge the energy transition. Direction for implementation of energy planning is almost non-existent

within the sampled plans. While some plans are setting ambitious goals, there is no planning framework to support and operationalize those goals.

Energy planning scholars agree that most Canadian municipalities have significant room for improvement on energy planning (Murphy et al., 2021; Philp & Cohen, 2020; St Denis & Parker, 2009; Tozer, 2013; Winfield et al., 2021). Findings from this research align with Guyadeen and Henstra (2023) who found that climate change planning in rural Ontario is weak and underdeveloped. Similarly, Calvert et al. (2021) observed that land use plans in rural Ontario are not prepared to facilitate energy transitions. Municipalities and land use plans in rural Manitoba being unprepared for the energy transition is thus not surprising.

This research provides detailed descriptions of the motivations and barriers for energy planning within a rural context. The semi-structed interviews offer some explanation as to why plans and communities are not prepared. The lack of support, both in terms of resources and policy, hinders local governments' ability to plan for energy. This aligns with findings of almost all municipal climate or energy planning study in Canada (Baynham & Stevens, 2014; Burch, 2010a; Burch et al., 2014; Guyadeen et al., 2019; Jaccard et al., 2019; Philp & Cohen, 2020; Stevens & Senbel, 2017; Tozer, 2013). Energy is also not valued nor prioritized by local governments in Manitoba. Participants stated municipal officials perceive energy as an additional responsibility outside their jurisdiction and are sometimes reluctant to engage with it. The domineering position of Manitoba Hydro restricts municipal involvement in energy generation and broader public engagement in energy issues (Robb & Fitzpatrick, 2020). Most importantly, the interviews revealed that values and political will are critical elements influencing how and why rural Manitoban municipalities conduct energy planning.

Limited capacity of municipalities to conduct planning and policy functions was frequently cited by participants as a barrier. Limited budgets, lack of specialized staff, and part-time elected officials prevent rural Manitoba municipalities from pursuing energy planning. Murphy et al. (2021), Oulahen et al. (2018), and Robinson (2005) found that institutional capacity most often prevents municipalities from planning for energy. However, scholars have found that while lack of capacity is a legitimate barrier to municipal energy planning, values and political will are a more significant barrier to the integration of energy planning and land use planning (Burch, 2010a, 2010b; Hamin et al., 2014; Middlemiss & Parrish, 2010). Ultimately, the lack of integration between energy planning and land use planning is driven by values at every level governance, from municipalities, to utilities, provinces and the federal government.

The important inspirational and capacity-building role of champions was highlighted in this research. Participants stated how key individuals have outsized positive influence in promoting energy planning and policy adoption. Passionate staff members and elected officials share progressive ideas in their communities and advocate for energy planning as a strategy to achieve local goals. Researchers concurred with the positive influence of champions (Biresselioglu et al., 2020; Ruggiero et al., 2014; Young & Brans, 2017), and participants felt that fostering local champions was critical to increase the integration of energy planning and land use planning in Manitoba.

This research is one of the first studies to explore how rural communities are preparing for energy transitions and net-zero in Canada. This research is the first of its kind in Manitoba and adds to a growing community of rural energy planning research in Canada and globally. This research also contributes to the field of plan quality evaluation, providing a novel framework for evaluating the energy planning content of plans. This work is also one of the first academic studies to critically review Manitoba's planning system. This research adds to the growing subset of climate and energy plan quality evaluation literature, and contributes to literature on energy transitions, specifically for rural places.

This research has demonstrated that the integration of energy planning and land use planning, essential for meeting Canada's 2050 net-zero targets, is not occurring in rural Manitoba. Addressing the impacts of climate change is one of the most significant challenges facing Canadian municipalities. Scholars concur that the transition to low-carbon energy systems must occur if GHG emissions are to be reduced and climate change mitigated. Further, rural communities are essential to the energy transition as sites of production and the energy transition is essential to rural communities as a new form of empowerment, social-restructuring and economic opportunity. Encouragingly, this research found that passionate individuals in key leadership position – termed champions – are making strides in increasing the adoption of energy planning. The energy transition is a complex, multi-layered phenomena that will need support at all levels to be effective. This work contributes understanding the energy transition in rural Manitoba and should be used as a foundation and inspiration for further examination.

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APPENDIX A: STUDY COMMUNITIES

Appendix A: Study Communities

Municipality	Planning District	Population	Population Density
Alexander	Winnipeg River	3,854	2.5
Alonsa		1,210	0.4
Argyle	Pelican - Rock Lake	994	1.3
Armstrong	Fisher - Armstrong	1,967	1.1
Bifrost-Riverton	Eastern Interlake	3,320	2
Boissevain-Morton		2,309	2.1
Brenda-Waskada	Southwest	650	0.8
Brokenhead	Brokenhead River	5,414	7.2
Carberry	Cypress	1,818	379.1
Cartwright-Roblin	Pelican - Rock Lake	1,336	1.9
Clanwilliam-Erickson		1,012	2.8
Coldwell	Western Interlake	1,313	1.5
Cornwallis	Keystone	4,568	9.1
Dauphin	Lakeshore	2,136	1.4

De Salaberry		3,918	5.9
Deloraine-Winchester	Southwest	1,478	2
Dufferin	Carman - Dufferin	2,543	2.8
Ellice-Archie	Mid-West	831	0.7
Elton	Keystone	1,276	2.2
Emerson-Franklin		2,437	2.5
Ethelbert	Mountainview	648	0.6
Fisher	Fisher - Armstrong	1,845	1.2
Gilbert Plains	Mountainview	1,420	1.4
Gillam		1,007	0.5
Gimli	Eastern Interlake	6,569	20.7
Glenboro-South Cypress	Cypress	1,123	1
Glenella-Lansdowne	Neepawa and Area	1,133	0.9
Grahamdale		1,278	0.5
Grandview	Mountainview	1,419	1.2
Grassland	Dennis County	1,583	1.2
Grey		2,517	2.6

Hamiota	Mid-West	1,234	2.1
Hanover		17,216	23.6
Harrison Park		1,852	1.9
Kelsey	Kelsey	2,181	2.6
Killarney - Turtle Mountain		3,520	3.8
La Broquerie		6,725	11.6
Lac du Bonnet	Lac Du Bonnet	3,563	3.2
Lakeshore	Lakeshore	1,186	0.9
Leaf Rapids		351	0.3
Lorne	South Central	2,904	3.1
Louise	South Central	2,025	2.2
Melita	Southwest	1,041	326.4
Minitonas-Bowsman	Swan Valley	1,587	1.3
Minnedosa	Tanner's Crossing	2,741	183.4
Minto-Odanah	Tanner's Crossing	1,121	1.5
Morris (RM)		3,049	2.9
Morris (Town)		1,975	334.1

Mossey River	Lakeshore	1,450	1.3
Mountain (North)	Swan Valley	537	0.5
Mountain (South)	Swan Valley	443	0.3
Neepawa	Neepawa and Area	5,685	332.7
Norfolk-Treherne	South Central	1,770	2.4
North Cypress-Langford	Cypress	3,011	1.7
North Norfolk		3,915	3.4
Oakland-Wawanesa		1,758	3
Oakview	Mid-West	1,928	1.7
Pembina		2,406	2.1
Pinawa		1,558	12.3
Piney		1,843	0.8
Pipestone	Dennis County	1,422	1.2
Portage la Prairie	Portage la Prairie	6,888	3.5
Powerview-Pine Falls	Winnipeg River	1,239	257
Prairie Lakes	Pelican - Rock Lake	1,625	1.5
Prairie View	Mid-West	2,161	1.3

Reynolds	Whitemouth - Reynolds	1,344	0.4
Rhineland	Fisher - Armstrong	5,819	6.1
Riding Mountain West	Tri-Roads	1,442	0.9
Riverdale		1,803	3.1
Roland		1,145	2.4
Rosedale	Neepawa and Area	1,524	1.8
Rossburn		973	1.4
Russell-Binscarth	Tri-Roads	2,596	4.6
Sifton	Dennis County	1,239	1.5
Snow Lake		1,088	0.9
St. Laurent	Western Interlake	1,542	3.2
Stanley	MSTW	8,981	10.8
Ste. Anne		5,584	11.7
Stuartburn		1,731	1.5
Swan Valley West	Swan Valley	2,759	1.6
Teulon	South Interlake	1,196	370.3
The Pas	Kelsey	5,639	126.2

Thompson	MSTW	1,518	2.9
Two Borders	Southwest	1,120	0.5
Victoria	South Central	1,188	1.7
Victoria Beach		689	33.3
Virden	Trans Canada West	3,118	347.8
Wallace-Woodworth	Trans Canada West	2,748	1.4
West Interlake	Western Interlake	2,228	1.4
WestLake-Gladstone		3,273	1.7
Whitehead		1,679	2.9
Whitemouth	Whitemouth - Reynolds	1,630	2.3
Winnipeg Beach	Eastern Interlake	1,439	367.7
Woodlands		3,797	3.2
Yellowhead		1,841	1.7

APPENDIX B: PARTICIPANT SOLICITATION SCRIPT

Dear <INSERT PARTICIPANT NAME>

My name is Michael Kvern. I am a master's student at the University of Guelph studying how rural municipalities in Manitoba can better integrate energy planning and land use planning processes for my thesis.

I am emailing to invite you to participate in this research.

We are interested in how professionals in the planning, development, and energy sectors perceive the transition towards renewable energy and a low-carbon future. Further, want to learn about how municipalities are planning for the energy transition in their official plans. To understand this, I need to hear from you—the experts on the ground.

I have attached a letter outlining the project and consent process in detail.

Completing this interview will allow me to assess how professionals view the energy transition and to what degree it is included in municipal policy.

If you have any questions or concerns, please do not hesitate to reach out. You can email me at mkvern@uoguelph.ca or call me at (204) 223-4389.

This project has been reviewed by the Research Ethics Board for compliance with federal guidelines for research involving human participants (REB #22-04-009).

Thank you,

Michael Kvern
MSc. Rural Planning and Development Student
School of Environmental Design & Rural Development
University of Guelph | Guelph, ON

APPENDIX C: PARTICIPANT INFORMATION LETTER

Information Letter

Evaluating energy integration in rural Manitoba development plans

Greetings,

My name is Michael Kvern. I am a master's student at the University of Guelph. I am working under the supervision of *Dr*. Leith Deacon to study how rural municipalities in Manitoba can better integrate energy planning and land use planning processes.

We are writing to invite you to participate in this research.

We are interested in how professionals in the planning, development, and energy sectors perceive the transition towards renewable energy and a low-carbon future. Further, want to learn about how municipalities are planning for the energy transition in their official plans. The goal of this research is to contribute knowledge on how rural Manitoba municipalities are integrating energy planning into their official plans. Findings will inform my master's thesis and academic publications. I may make public presentations based on the findings. To understand this, we need to hear from you—the experts on the ground.

We are inviting municipal planners, utility staff, and developers from selected municipalities to participate in a 1-hour interview and a review of their information. Interviews will ask questions about what sort of barriers and opportunities to integrating energy planning into rural land use planning exist. Interview participants will be asked to review their transcribed comments for accuracy after their interview.

Research costs are paid by the University of Guelph and Dr. Deacon's research funds. My salary is being paid through Dr. Deacon's research funds, awards from the University of Guelph, the Ontario Graduate Scholarship, and the Social Science and Humanities Research Council of Canada. There is no corporate funding or partnership associated with this research.

There are benefits and risks of participating in this research. There are no direct benefits to participating in this research. The potential indirect benefits of this research include:

- Improving the inclusion and integration of energy planning in land use planning systems, such as official plans;
- Contributing to a body of knowledge about how municipalities plan for energy and natural resources.

The risks associated with this research are minimal and no greater than those experienced on a daily basis. You may you risk:

- Experiencing feelings of embarrassment or disappointment if you find that your views or opinions are not commonly held by your peers or do not represent optimum planning for energy transition. You will not be identifiable to others, but you may be able to identify yourself. To help minimize this risk, you do not need to answer any questions if you do not want to, and you may withdraw at any time during the interview.
- Breaching your privacy by taking part in an interview. Be aware that you are essentially making your views public, even though the researcher will not report your name in the final report. Individuals from small communities or organizations may be indirectly identifiable through their participation. You can control this risk by not providing any information that you would be uncomfortable making public.

Interviews will be conducted face-to-face, and I will record the interview using an audio recorder, unless you do not consent to being recorded. At the end of the interview, I will transfer the recording to a laptop with full disk encryption, and delete the recording from the recorder. I will transcribe our discussion from the recording and delete it once transcription is complete. I will assign you a unique participant ID number that will be used to identify your interview recording and transcript. This way, your name will never be associated directly with the recording or transcript. The list of ID numbers and names, along with the recording (until it is deleted) and the transcript will be stored on a personal laptop computer that full disk encrypted, so that even if the computer is stolen, the data will be un-readable. All data, including notes, recordings, transcripts, and participant ID numbers will be destroyed once my thesis and any academic articles are published. No later than September 30, 2025. We are all committed to keeping your identity confidential.

In the products of this research (master's thesis, reports, academic publications, and presentations) you will not be named. Quotes from your interview will be used, but they will not be attributed to you. Quotes will be attributed to your participant ID number, and / or to a generic job title such as "municipal planner", "consultant", "utility staff", or "developer".

You do not have to participate in this research, and you do not waive any legal rights by agreeing to take part in this study. You are free to change your mind and withdraw with no consequences. You do not need to answer any of the interview questions and may skip any question. You may withdraw from the interview at any point during, and your information will be discarded. You will be able to withdraw from this study until May 31, 2023. Beyond that date, the researcher will already have disseminated the information. You will still receive the final results of the research if you provide your contact information.

If you choose to give us your email address, you are agreeing to be contacted by us via email, and you understand that others may find and read the email messages because email can be forwarded or intercepted (accessed by someone through internet servers).

If you have any questions about this study, you are welcome to contact Michael at (204) 223-4389 or mkvern@uoguelph.ca

If you have questions or concerns regarding your rights and welfare as a research participant in this study (REB# 1234) please contact Director, Research Ethics; University of Guelph; reb@uoguelph.ca; (519) 824-4120 (ext. 56606).

This project has been reviewed by the Research Ethics Board for compliance with federal guidelines for research involving human participants.

Consent form

Evaluating energy integration in rural Manitoba development plans

I have read the information letter that explains this research project, or someone has read it to me. I have had the opportunity to discuss the research and ask questions. My questions have been answered to my satisfaction. I know whom to contact if I have questions that arise during my participation.

I consent to:

☐ Participating in an interview about what sort of barriers and opportunities to integrating energy planning into rural land use planning exist.

☐ My data being used in this study.

By consenting to participate in this research, I understand that:

☐ My participation in the interview will be recorded.

☐ I can withdraw my participation, resulting in all my data being destroyed, until May 31, 2023. Following that date I cannot withdraw my data from the study.

☐ At any time, I can withdraw my consent for all components of the project besides the interview by contacting Michael Kvern or Dr. Deacon.

I know that if I provide my contact information below, I consent to you contacting me by email, and accept the risks associated with electronic communications.

Signature: _____

Date: _____

Circle (Yes) and provide your email address or leave this section BLANK.

Yes	I would like to be contacted to review the findings and analysis before any results are published. Please contact me by email at:
Yes	I would like to receive a copy of the final report. Please send or email it to me at:

APPENDIX D: INTERVIEW GUIDE

Opening

1. What organization do you work with, and what do you do there?
2. How does your role intersect with land use planning?
3. How does your role intersect with energy systems and energy planning?
4. What are the major energy sources in your area?
    a. Follow-up: Are these based locally?
    b. Follow-up: Are these renewable sources?
5. What are some the unique planning challenges you see occurring in your area?
    a. Prompt: Housing challenges? MZOs? Economic development?
    b. Follow-up: Are these unique to your community / organization?
    c. Follow-up: Are these unique to rural communities?

Workplace / location specific barriers

6. What makes a plan or policy document successful in your context?
    a. Prompts: Political will, good data, funding?
7. Does your municipality have a dedicated plan that considers energy?
    a. Follow-up: why / why not?
8. Does your municipality consider energy within its official plan or other policies?
    a. Follow-up: How so?
    b. Follow-up: Why not?
9. (If applicable) What stops your municipality / organization for planning for energy at the local level?
    a. Prompts: funding, knowledge, political will, lack of jurisdiction?

General barriers

10. How can we create planning a culture that recognizes the fundamental design of North American cities needs to move away from fossil fuels?
11. How can planning create a culture that recognize that “traditional” dense mixed-use urban form is in fact a form of energy planning?
12. Can the energy implication of urban form and planning be holistically integrated into planning documents?

APPENDIX E: PLAN QUALITY FRAMEWORK

Fact base				**Goals**				**Policies**				**Implementation**		
Indicator	**Description**	**Coding**		**Indicator**	**Description**			**Indicator**	**Description**			**Indicator**	**Description**	
Energy transition an issue	Does the plan frame the low-carbon energy transition as an issue facing the local or global community?	0 = No mention of energy transition 1 = limited mention of energy transition, in local or global context 2 = Explicit mention of global and location nature of energy transition		Community emissions	Does the plan contain at least 1 goal, policy or target that is explicitly related to reducing community emissions?	0 = no goal or policy 1 = general statement on reducing emissions 2 = explicit goal to reduce emissions		Renewable energy	Does the plan include at least one policy on renewable energy (e.g., solar energy and wind energy)?	0 = No policy 1 = Generic policy encouraging RE 2 = Specific policy encouraging RE in particular areas or types		Implementation	Does the plan include direction how to implement the energy related aspects of the plan?	0 = no mention 1 = generic mention of implementation, ie zoning bylaw 2 = specific mention of implementation through energy or climate specific tool
Energy /climate relationship	Does the plan acknowledge that energy production and consumption relate to greenhouse gas emissions and climate change?	0 = No acknowledgement 1 = vague or minimal mention 2 = Clear and substantial acknowledgement		Energy transition	Does the plan contain at least one broad goal about transition to low-carbon or decentralized energy?	0 = no mention 1 = General mention of need to transition 2 = Broad mention of transition supported with local context		Local generation	Does the plan include at least one policy on generating renewable energy within the municipality?	0 = No policy 1 = General policy encouraging RE 2 = Specific policy permitting and encouraging RE		Measurable objective	Is there at least 1 measurable objective (other than GHG emission reductions) related to energy or climate change?	0 = no objective 1 = 1 objective, or vaguely mentioned 2 = multiple objectives, or clear and obvious objective
Energy / land use relationship	Does the plan acknowledge that energy production and consumption is tied to land use?	0 = No acknowledgement 1 = vague or minimal mention 2 = Clear and substantial acknowledgement		Energy transition specific	Does the plan contain at least one specific goal about transition to low-carbon or decentralized energy	0 = no mention 1 = One specific transition related goal 2 = Multiple specific transition related goals		Energy conservation (government)	Does the plan include at least one policy on energy efficiency (e.g., energy star ratings and green buildings) regarding municipal operations	0 = no mention 1 = General mention of supporting energy efficiency in gov't site 2 = Specific mention of need to increase efficiency with details		Cooperation	Does the plan reference inter-organizational or inter-governmental coordination related to energy?	0 = no cooperation 1 = cooperation related to utilities overall 2= cooperation specific to energy
Energy / transportation relationship	Does the plan acknowledge the relationship between transportation and energy use?	0 = no acknowledgement 1 = Relationship vaguely or minimally mentioned in passing 2 = Relationship clearly and purposefully acknowledged		Community energy	Does the plan contain at least 1 goal, policy or target that is explicitly related to implementing community energy?	0 = no mention 1 = General mention of CE 2 = Specific mention of CE supported with local context		Energy conservation (community)	Does the plan include at least one policy on energy efficiency (e.g., energy star ratings and green buildings) regarding the general public / community?	0 = No mention 1 = General mention of supporting energy efficiency 2 = Specific mentions of conserving energy with examples / details		Priority	Does the plan prioritize any energy related actions?	0 = no priorities 1 = vague or only 1 priorities 2 = multiple priorities
Climate change an issue	Does the plan frame climate change as an issue facing the local or global community?	0 = No acknowledgement 1 = vague or minimal mention 2 = Clear and substantial acknowledgement		Efficient land use	Does the plan contain at least 1 goal, policy, or target that encourages efficient land use?	0 = no mention 1 = 1 mention 2 = more than 1 mention		Efficient land use	Does the plan include at least one policy for efficient land use (e.g. compact development, mixed use, infill)?	0 = no mention 1 = 1 mention 2 = more than 1 mention		Roles and responsibilities	Does the plan assign specific departments, individuals or groups responsibility for energy related actions?	0 = no assignment 1 = Assigned broadly to municipality or planning district 2= specific direction to a department or staff member
Climate change as anthropogenic	Does the plan recognize climate change as at least partially anthropogenic and/or the plan speaks specifically to the kinds of human activities that cause climate change?	0 = No mention 1 = Climate change recognized as anthropogenic, or GHG producing activities mentioned 2 = Climate change recognized AND GHG producing activities mentioned.		Energy conservation (government)	Does the plan include at least one goal related to government energy conservation?	0 = no mention 1 = General mention of supporting energy efficiency in gov't site 2 = Specific mention of need to increase efficiency with details		Efficient land use climate acknowledged	Does the plan make the connection between efficient land use and climate change, energy use or GHG emissions?	0 = No mention 1 = Plan connect efficient land use with energy, GHG or climate 2 = Plan connects efficient land use with energy AND climate / GHG		Monitoring and follow-up	Does the plan include direction what needs to be done to monitor and evaluate the energy related aspects of the plan?	0 = not present 1 = General direction to monitor and follow-upf 2 = Clear direction on monitoring and follow-up with explicit instructions and timelines
Emissions inventory	Does the plan have, or provide for an emissions inventory?	0 = no inventory 1 = plan provides framework for inventory 2 = inventory included		Energy conservation (community)	Does the plan include at least one goal related to community energy conservation?	0 = No mention 1 = General mention of supporting energy efficiency 2 = Specific mentions of conserving energy with examples / details		Green building standards	Does the plan have at least 1 policy encouraging the use of green building materials and standards (eg. LEED).	0 = No mention 1 = Generic mention, encouraging sustainable materials 2 = Specific mention referencing standards or program				
Emissions inventory breakdown	Does the plan include a breakdown of the emission inventory, such as an inventory of emissions by sector?	0 = no breakdown 2 = Emissions broken down by sector		Renewable energy	Does the plan include at least 1 goal related to renewable energy?	0 = No goal 1 = Generic goal encouraging RE 2 = Specific goal encouraging RE in particular areas or types		Energy - mandatory	Does the plan have at least 1 energy policy is written in mandatory language (“will”, “shall”, “require”)	0 = None 1 = An energy policy is mandatory 2 = An energy policy related to RE, CE, or efficiency is mandatory				

Emissions trend	Is the inventory is broken down by sector and/or current per capita emissions?	0 = no breakdown 1 = broken down by sector or per captia 2 = sector AND per capita		Decentralized energy	Does the plan include at least 1 goal related to decentralized or local energy?	0 = No policy 1 = Generic policy encouraging local energy generation 2 = Specific policy supporting local energy generation in particular areas or types		Financial tools	Does the plan includes at least 1 policy for financial mechanisms to incentivize action or collect revenue for capital projects (e.g. offsets or funding for renewable energy projects)?	0 = No funding 1 = Generic policy for funding RE 2 = Specific funding mentioned for RE				
Energy consumption inventory	Does the plan include, or provides for the creation, of an energy consumption inventory?	0 = no inventory 1 = plan provides framework for inventory 2 = inventory included		Transport	Does the plan include at least 1 goal aspiring to increase low-carbon transportation (e.g. improved public transit, EV charging)	0 = No policy 1 = Generic policy encouraging low-carbon transportation 2 = Specific policy supporting low-carbon transportation with reference to energy / GHG savings		Transport	Does the plan have at least 1 policy that encourages low-carbon transportation?	0 = No policy 1 = Generic policy encouraging low-carbon transportation 2 = Specific policy supporting low-carbon transportation with reference to energy / GHG savings				
Energy consumption inventory breakdown	Are the results of the inventory is broken down by sector and/or current per capita consumption?	0 = no breakdown 1 = broken down by sector or per captia 2 = sector AND per capita		Energy supply	Does the plan contain at least one energy supply policy included – e.g., energy facilities and distribution?	0 = No policy 1 = Generic policy permitting energy facilities 2 = Specific policy encouraging development of local energy facilities								

APPENDIX F: SAMPLE PLAN QUALITY SCORING SHEET

	Title of plan:							Year:					
								Coding categories:					
								0 = Not Identified					
								1= Indentified vaugely					
								2 = Indentified and clear					
	Fact base			Goals			Policies			Implementation			
	Indicator	Description	Score	Indicator	Description	Score	Indicator	Description	Score	Indicator	Description	Score	
1	Energy transition an issue	Does the plan frame the low-carbon energy transition as an issue facing the local or global community?		Community emissions	Does the plan contain at least 1 goal, policy or target that is explicitly related to reducing community emissions?		Renewable energy	Does the plan include at least one policy on renewable energy (e.g., solar energy and wind energy)?		Implementation	Does the plan include direction how to implement the energy related aspects of the plan?		
2	Energy /climate relationship	Does the plan acknowledge that energy production and consumption relate to greenhouse gas emissions and climate change?		Energy transition	Does the plan contain at least one broad goal about transition to low-carbon or decentralized energy?		Local generation	Does the plan include at least one policy on generating renewable energy within the municipality?		Measureable objective	Is there at least 1 measurable objective (other than GHG emission reductions) related to energy or climate change?		
3	Energy / land-use relationship	Does the plan acknowledge that energy production and consumption is tied to land-use?		Energy transition specific	Does the plan contain at least one specific goal about transition to low-carbon or decentralized energy		Energy conservation (government)	Does the plan include at least one policy on energy efficiency (e.g., energy star ratings and green buildings) regarding municipal operations		Cooperation	Does the plan reference inter-organizational or inter-governmental coordination related to energy?		
4	Energy / transportation relationship	Does the plan acknowledge the relationship between transportation and energy use?		Community energy	Does the plan contain at least 1 goal, policy or target that is explicitly related to implementing community energy?		Energy conservation (community)	Does the plan include at least one policy on energy efficiency (e.g., energy star ratings and green buildings) regarding the general public / community?		Priority	Does the plan prioritize any energy related actions?		
5	Climate change an issue	Does the plan frame climate change as an issue facing the local or global community?		Efficent land use	Does the plan contain at least 1 goal, policy, or target that encourages efficienct land use?		Efficienct land use	Does the plan include at least one policy for efficient land use (e.g. compact development, mixed use, infill)?		Roles and responsibilitys	Does the plan assign specific departments, individuals or groups responsibility for energy related actions?		
6	Climate change as anthropogenic	Does the plan recognize climate change as at least partially anthropogenic and/or the plan speaks specifically to the kinds of human activities that cause climate change?		Energy conservation (government)	Does the plan include at least one goal related to government energy conservation?		Efficient land use climate acknowledged	Does the plan make the connection between efficient land use and climate change, energy use or GHG emissions?		Monitoring and follow-up	Does the plan include direction what needs to be done to monitor and evaluate the energy related aspects of the plan?		
7	Emissions inventory	Does the plan have, or provide for an emissions inventory?		Energy conservation (community)	Does the plan include at least one goal related to community energy conservation?		Green building standards	Does the plan have at least 1 policy encouraging the use of green building materials and standards (eg. LEED).					
8	Emissions inventory breakdown	Does the plan include a breakdown of the emission inventory, such as an inventory of emissions by sector?		Renewable energy	Does the plan include at least 1 goal related to renewable energy?		Energy - mandatory	Does the plan have at least 1 energy policy is written in mandatory language (“will”, “shall”, “require”)					
9	Emissions trend	Is the inventory is broken down by sector and/or current per capita emissions?		Decentralized energy	Does the plan include at least 1 goal related to decentralized or local energy?		Financal tools	Does the plan includes at least 1 policy for financial mechanisms to incentivize action or collect revenue for capital projects (e.g. offsets or funding for renewable energy projects)?					
10	Energy consumption inventory	Does the plan include, or provides for the creation, of an energy consumption inventory?		Transport	Does the plan include at least 1 goal aspiring to increase ow-carbon transportation (e.g. improved public transit, EV charging)		Transport	Does the plan have at least 1 policy that encourages low-carbon transportation ?					
11	Energy consumption inventory breakdown	Are the results of the inventory is broken down by sector and/or current per capita consumption?		Energy supply	Does the plan contain at least one energy supply policy included – e.g., energy facilities and distribution?								
SCORE			0			0			0			0	
Possible total			22			22			20			12	
Index score			0.00			0.00			0.00			0.00	
Grand Total	0												
Grand Possible	76												
Index score	0.00												

APPENDIX G: PLAN QUALITY RESULTS

	Fact base											Goals										Policies									Implementation					
Plan	Energy transition an issue	Energy /climate relationship	Energy / land-use relationship	Energy / transportation relationship	Climate change an issue	Climate change as anthropogenic	Emissions inventory	Emissions inventory breakdown	Emissions trend	Energy consumption inventory	Energy consumption inventory breakdown	Community emissions	Energy transition	Energy transition specific	Community energy	Efficient land use	Energy conservation (government)	Energy conservation (community)	Renewable energy	Decentralized energy	Transport	Energy supply	Renewable energy	Local generation	Energy conservation (government)	Energy conservation (community)	Efficienct land use	Efficient land use climate acknowledged	Green building standards	Energy - mandatory	Financal tools	Transport	Implementation	Measureable objective	Cooperation	Priority	Roles and responsibilities	Monitoring and follow-up
Alonsa	0	0	1	0	0	0	0	0	0	0	0	1	1	0	0	2	0	0	0	1	1	1	1	1	0	1	2	1	0	0	0	0	0	2	0	0	0
Boissevain-Morton	1	1	1	0	2	1	1	0	0	0	0	2	1	0	1	2	0	1	1	1	2	2	2	2	0	1	2	1	0	1	0	2	1	0	2	1	0	0
Brokenhead River	0	1	1	0	0	0	0	0	0	0	0	0	1	0	0	2	0	1	1	1	2	1	2	1	2	2	2	0	2	0	0	1	0	0	1	0	0	0
Carman - Dufferin	0	2	1	1	2	1	0	0	0	0	0	2	1	0	0	2	0	2	1	1	2	2	2	2	1	1	2	2	2	1	0	2	1	0	1	0	1	0
Churchill																																						
Clanwilliam-Erickson	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	1	1	0	0	2	0	0	2	0	0	0	0	2	0	0	0
Cypress	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	2	1	2	1	0	0	2	0	0	0	0	0	1	0	2	0	0	0
De Salaberry	1	1	1	2	2	1	0	0	0	0	0	2	0	0	0	2	0	1	0	0	2	1	2	2	0	2	2	1	1	2	0	2	1	2	0	0	0	0
Dennis County	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	1	0	0	0	0	2	0	0	0	0	0	0	0	1	0	0	0
Eastern Interlake	1	2	2	2	2	2	1	1	0	1	0	2	2	1	1	2	2	2	2	1	1	2	2	2	2	2	2	2	2	2	2	2	2	0	2	1	0	0
Emerson-Franklin	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	2	1	0	2	2	2	0	0	2	0	0	0	0	0	1	0	1	0	0	0
Fisher - Armstrong	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	2	0	0	0
Flin Flon																																						
Gillam	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	2	0	2	0	0	0	2	0	0	0	0	1	1	0	0	0	0	0	0	2	0	0	0
Grahamdale	1	2	2	2	2	2	1	0	0	0	0	2	1	0	0	2	2	1	2	0	0	2	2	2	2	2	2	2	2	2	0	0	2	1	0	2	0	1	0
Grand Rapids																																						
Grey	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	2	2	0	0	1	0	0	0	0	0	0	0	2	0	0	0
Hanover	0	1	1	2	2	0	0	0	0	0	0	2	0	0	0	2	1	2	0	0	0	0	0	0	1	0	2	0	0	2	0	0	0	0	1	0	0	0
Harrison Park	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	2	0	0	0	0	2	1	2	0	1	2	0	0	0	0	1	0	2	0	0	0
Kelsey	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	1	0	0	0	0	1	2	0	0	0	0	1	0	0	1	0	0	0
Keystone	0	0	1	1	0	0	0	0	0	0	0	0	2	0	1	2	0	2	1	2	2	2	2	2	0	2	2	1	1	0	0	2	1	0	1	0	0	0
Killarney - Turtle Mountain	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	2	0	1	0	0	0	1	0	0	0	0	2	0	0	0	0	0	0	0	2	0	0	0
La Broquerie	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	2	0	1	0	0	0	2	1	2	1	0	0	0	0	2	1	0	1	0	0	0	0	0
Lac Du Bonnet	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	1	1	1	0	1	1	0	1	0	0	1	0	0	1	0	0	0
Lakeshore	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	1	0	0	0	2	2	2	0	0	2	0	0	0	0	0	1	0	0	0	0	0
Leaf Rapids																																						
Lynn Lake																																						
McCreary																																						
Mid-West	1	1	1	0	0	0	0	0	0	0	0	0	1	0	0	2	0	2	2	1	0	2	2	2	0	2	2	0	0	0	0	0	1	0	2	0	0	0
Montcalm																																						
Morris (Town)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	1	0	0	0	1	0	0	0	0	2	0	0	0	0	0	0	0	1	0	0	0
Morris (RM)	0	1	1	1	1	1	2	0	0	2	0	2	0	0	0	1	2	1	1	0	1	1	1	1	2	1	1	1	1	2	0	2	2	0	2	0	1	0
Mountainview	0	1	1	2	1	1	0	0	0	0	0	0	0	0	0	2	1	2	0	0	2	1	1	1	2	2	1	0	0	0	0	1	0	0	2	0	0	0
MSTW	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	1	0	1	0	0	0	2	0	0	0	0	1	0	0	1	0	0	0
Neepawa and Area	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	2	2	2	0	0	2	0	0	0	0	0	1	0	0	0	0	0
North Norfolk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1	0	2	1	1	0	0	1	0	0	0	0	0	1	0	2	0	0	0
Oakland-Wawanesa	0	1	1	1	2	1	0	0	0	0	0	2	0	0	0	2	0	1	0	0	2	0	0	0	0	0	1	2	1	0	0	0	2	1	0	0	0	0
Pelican - Rock Lake	1	1	0	1	2	0	0	0	0	0	0	0	0	0	0	2	1	2	2	1	2	2	2	2	1	1	2	1	1	0	0	2	1	0	2	0	0	0
Pembina	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	1	1	1	0	0	2	0	0	0	0	0	0	0	2	0	0	0
Pinawa	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2	0	1	1	1	0	1	0	2	2	0	0	0	0	2	0	0	2	0	0	0
Piney	0	1	1	1	2	1	0	0	0	0	0	2	1	0	0	2	0	1	2	1	1	1	2	1	0	1	2	0	1	0	0	1	1	0	1	0	0	0
Portage la Prairie (RM)	0	1	1	1	2	0	1	0	0	1	0	1	0	0	1	2	0	2	2	0	1	2	2	2	0	2	2	1	0	0	0	1	1	0	2	0	1	0
Rhineland, Plum Coulee, Gretna, Altona	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	2	0	0	2	1	1	2	2	1	0	0	2	0	0	0	0	2	0	0	1	0	0	0
Riverdale	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	1	2	0	0	1	2	2	0	1	2	0	0	0	0	0	1	0	2	0	0	0
Roblin																																						
Roland	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	1	0	1	0	0	2	0	0	0	0	0	0	0	1	0	0	0
Rossburn	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	2	0	1	0	0	2	0	0	0	0	0	0	0	2	0	0	0
Snow Lake	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Souris-Glenwood																																						
South Central	0	0	0	0	2	1	0	0	0	0	0	0	0	0	0	2	0	0	1	0	0	2	2	1	0	0	2	0	0	2	0	0	1	0	2	0	0	0
South Interlake	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	2	1	0	0	1	1	2	1	0	1	2	2	0	1	0	0	0	1	0	0	0
Southwest	0	1	1	1	1	1	0	0	0	0	0	1	0	0	0	2	0	2	1	0	2	1	1	1	0	1	2	1	0	0	0	0	2	1	0	1	0	0	0
Ste. Anne	0	1	0	0	2	0	0	0	0	0	0	0	0	0	0	2	1	1	0	0	0	1	0	0	1	2	2	0	1	0	0	1	0	0	1	0	0	0
Ste. Rose																																						
Stuartburn	0	0	1	2	2	0	0	0	0	0	0	0	0	0	0	1	0	0	2	0	2	1	2	2	0	0	1	0	0	0	0	0	2	1	0	1	0	0	0
Swan Valley	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	2	0	1	0	0	2	0	0	0	0	0	0	0	2	0	0	0
Tanner's Crossing	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	2	1	1	0	1	2	2	2	2	1	1	2	0	1	0	0	2	1	0	1	0	0	0
Trans Canada West	0	0	1	0	0	0	0	0	0	0	0	0	1	0	1	2	0	0	2	1	1	1	2	2	0	0	2	1	0	0	0	1	1	0	1	0	0	0
Tri-Roads	0	1	1	1	1	1	0	0	0	0	0	0	1	0	0	2	0	1	1	0	1	1	1	1	1	0	1	2	2	1	0	0	1	0	1	0	0	0
Victoria Beach	0	0	1	1	0	0	0	0	0	0	0	1	0	0	0	2	0	1	0	0	2	1	0	0	0	1	2	2	0	0	0	2	0	0	1	0	0	0
Western Interlake	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	1	0	0	0	0	2	0	0	0	0	0	0	0	1	0	0	0
WestLake-Gladstone	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	1	0	0	0	0	0	2	0	0	0	0	1	0	0	1	0	0	0
Whitehead	0	1	1	1	1	1	0	0	0	0	0	1	0	0	0	2	0	1	0	0	2	1	0	0	0	1	2	1	1	0	0	1	0	0	1	0	0	0
Whitemouth - Reynolds	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	2	0	0	1	0	1	2	2	2	0	0	2	0	0	0	0	1	1	0	1	0	0	0
Winnipeg River	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	0	1	2	2	0	0	0	2	0	0	2	0	1	1	0	2	0	0	0
Woodlands	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	1	2	2	2	0	0	1	0	0	0	0	1	0	0	1	0	0	0
Yellowhead	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	1	0	1	0	0	2	0	0	0	0	0	0	0	1	0	0	0
# of Plans	9	21	31	19	20	12	5	1	0	3	0	16	10	1	6	57	9	30	25	16	31	50	38	41	10	29	57	20	16	8	0	32	28	1	52	2	4	0
1s	9	18	28	13	7	10	4	1	0	2	0	7	8	1	6	10	6	17	13	15	16	29	11	21	6	17	8	14	12	2	0	15	26	0	27	2	4	0
2s	0	3	3	6	13	2	1	0	0	1	0	9	2	0	0	47	3	13	12	1	15	21	27	20	4	12	49	6	4	6	0	17	2	1	25	0	0	0
% of plans	16%	37%	54%	33%	35%	21%	9%	2%	0%	5%	0%	28%	18%	2%	11%	100%	16%	53%	44%	28%	54%	88%	67%	72%	18%	51%	100%	35%	28%	14%	0%	56%	49%	2%	91%	4%	7%	0%
% of plans 1s	16%	32%	49%	23%	12%	18%	7%	2%	0%	4%	0%	12%	14%	2%	11%	18%	11%	30%	23%	26%	28%	51%	19%	37%	11%	30%	14%	25%	21%	4%	0%	26%	46%	0%	47%	4%	7%	0%
% of plans 2	0%	5%	5%	11%	23%	4%	2%	0%	0%	2%	0%	16%	4%	0%	0%	82%	5%	23%	21%	2%	26%	37%	47%	35%	7%	21%	86%	11%	7%	11%	0%	30%	4%	2%	44%	0%	0%	0%
Count	9	24	34	25	33	14	6	1	0	4	0	25	12	1	6	104	12	43	37	17	46	71	65	61	14	41	106	26	20	14	0	49	30	2	77	2	4	0

APPENDIX H: ETHICS APPROVAL CERTIFICATE

UNIVERSITY of GUELPH

RESEARCH ETHICS BOARDS
Certification of Ethical Acceptability of Research Involving Human Participants

APPROVAL PERIOD:	July 11, 2022
EXPIRY DATE:	July 10, 2023
REB:	G
REB NUMBER:	22-04-009
TYPE OF REVIEW:	Delegated
PRINCIPAL INVESTIGATOR:	Deacon, Leith (Leith.Deacon@uoguelph.ca)
DEPARTMENT:	School of Environmental Design & Rural Development
SPONSOR(S):	SSHRC, Deans' Tri-Council Scholarship
TITLE OF PROJECT:	Evaluating energy integration in rural Manitoba development plans

CHANGES:

Type	Date
Amendment 1	July 28, 2022

The members of the University of Guelph Research Ethics Board have examined the protocol which describes the participation of the human participants in the above-named research project and considers the procedures, as described by the applicant, to conform to the University's ethical standards and the Tri-Council Policy Statement, 2nd Edition.

The REB requires that researchers:

- Adhere to the protocol as last reviewed and **approved** by the REB.
- Receive approval from the REB for any **modifications** before they can be implemented.
- Report any **change in the source of funding.**
- Report **unexpected events or incidental findings** to the REB as soon as possible with an indication of how these events affect, in the view of the Principal Investigator, the safety of the participants, and the continuation of the protocol.
- Are responsible for **ascertaining and complying with all applicable legal and regulatory requirements** with respect to consent and the protection of privacy of participants in the jurisdiction of the research project.

The Principal Investigator must:

- Ensure that the ethical guidelines and approvals of facilities or institutions involved in the research are obtained and filed with the REB prior to the initiation of any research protocols.
- Submit an **Annual Renewal** to the REB upon completion of the project. If the research is a multi-year project, a status report must be submitted annually prior to the expiry date. Failure to submit an annual status report will lead to your study being suspended and potentially terminated.

The approval for this protocol terminates on the **EXPIRY DATE**, or the term of your appointment or employment at the University of Guelph whichever comes first.

Signature: Date: July 28, 2022

Dave Guyadeen
Co-Chair, Research Ethics Board-General

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