Fostering Community Engagement through Knowledge Mobilization in Renewable Energy Cooperatives - A Case Study of Canmore, Alberta

by

Sara Nekounamghadirli

A thesis submitted in partial fulfillment of the requirements for the degree of

Master of Arts

in

Community Engagement

School of Public Health

University of Alberta

Abstract

Renewable energy cooperatives can be critical resources in promoting sustainable energy transitions and developing alternates to conventional energy systems. Gaining experience and learning from those cooperatives innovating practices on the frontlines can support emerging energy communities, and may encourage greater participation amongst a broader public. Understanding the dynamic of knowledge mobilization within these cooperatives is critical for encouraging such engagement, and can be a useful means of supporting more comprehensive and community integrated forms of energy transition. This subject is particularly important in Alberta, the third-largest electricity producer in Canada, where a small number of cooperative energy projects are taking shape, but in a context in which experience and research is limited. While some research has investigated the challenges of developing cooperatives, there is a significant gap in understanding how knowledge mobilization shapes the institutional structure of these cooperatives and what factors affect processes of knowledge mobilization. This research explores knowledge mobilization dynamics in Bow Valley Green Energy Cooperative in Canmore, Alberta. In this study, a case study approach was taken incorporating data from in-depth interviews with key informants and field visits. From these datasets, results highlight the role of strategies, routines and shared interests in collaborating and learning from similar organizations. Regulatory frameworks and intermediary organizations were identified as contextual factors influencing knowledge mobilization. Addressing power dynamics is also essential, advocating for a federated approach and policy changes to enhance the effectiveness of knowledge mobilization processes.

Keywords: Energy Transition; Community Engagement; Community energy; Renewable Energy Cooperatives; Knowledge Mobilization.

Preface

Some of the research conducted for this thesis forms part of an international research collaboration, led by Professor John Parkins at the University of Alberta, with Professor Robert Marchand being the lead collaborator at the University of Sheffield. The data analysis and findings in Chapter Three and concluding analysis in Chapter Five are my original work. Additionally, the literature review in Chapter One and pieces of work including my suggestions for the community in Chapter Four are also products of my own efforts. .

Dedication

This research is dedicated to individuals who are trying to create positive change in their lives and their communities, no matter how small. In the words of my favorite poet Rumi, "You are not a drop in the ocean. You are the entire ocean in a drop." Similarly, Indigenous communities perceive nature not as a separate entity but an integral part of their existence. Learning from an Indigenous perspective involves recognizing the profound connection between communities and the environment. Embracing this connection encourages a more holistic and sustainable approach to community well-being, steering us toward positive transformations that honor the interdependence between humans and nature. Unlocking our potential requires deep self-exploration, embracing creativity, and fulfilling our unique purpose. The key is to believe in ourselves, our social responsibility, and acknowledge our impact. Engaging actively in making a difference is crucial for fostering positive transformation.

Acknowledgements

During this academic journey, I am overwhelmed with appreciation for the many people who have played critical roles in the direction of my thesis. My heartfelt gratitude goes to my excellent professors, whose constant support, advice, and insight have helped shape the depth and path of my study. Special thanks to my academic supervisor Dr. Kevin E. Jones; your consistent support has created the foundation for my academic endeavors. I'm deeply grateful for the valuable insights and constructive comments you made to improve this research. I extend my sincere gratitude to Dr. John Parkins; I am truly appreciative of the time and dedication you generously provided; the research meetings were insightful, and the discussions contributed significantly to my learning. I also want to express my thanks to Dr. Mary Beckie, your expertise and commitment to fostering academic growth has been instrumental. Warm gratitude is also offered to the research participants, whose vital contributions have enriched this thesis.

A particular thanks goes to my mother, whose unending love and encouragement have been a source of strength for me. To my husband Reza, your love and understanding have been the driving force behind this journey, making each step more meaningful for me. Your support has always made me more confident. And to my little one Roshana, your joyous presence has been a beacon of inspiration during this chapter of my life.

I would also like to express my gratitude to the MACE cohorts for their collaborative spirit and insightful discussions during our meetings. Engaging with MACE peers has been enriching, providing me with diverse perspectives.

Table of Contents

Tables

Figures

List of Abbreviations

Co-op. Cooperative

RE Cooperatives. Renewable Energy Cooperatives

BVGEC. Bow Valley Green Energy Cooperative

KM. Knowledge Mobilization

Glossary

Key Term	Definition
Community energy (CE)	Community energy (CE) encompasses a diverse range of energy-related initiatives aimed at fostering active citizenship and addressing social challenges. It is characterized by sustainability, democracy, decentralization, grassroots-driven efforts, cooperation, and localization. While CE projects vary in their priorities and practices, they commonly involve citizen participation in energy decision-making processes. Some emphasize community ownership, while others focus on project outcomes and community benefits (Hewitt et al., 2019; Seyfang et al., 2013; Becker and Kunze, 2014; Szulecki, 2018; Walker & Devine-Wright's, 2008).
Renewable energy cooperatives	Renewable energy cooperatives are community-based social initiatives focused on sustainable energy development. They can promote democracy, decarbonization, and decentralization at the local level. By engaging in bottom-up strategies, they can contribute to climate justice and represent key social innovations in community energy (Rosewarne, 2022).
Micogrid	A microgrid is a localized energy system established by energy cooperatives, enabling members to generate, store, and distribute renewable energy within their network. It operates independently from the main grid if needed and facilitates direct selling of surplus energy between neighbors, fostering competition and potentially reducing prices.
Peer-to-peer (P2P) trading	Peer-to-peer (P2P) trading refers to the direct exchange of goods or services between individuals or entities without the involvement of intermediaries. In the context of microgrid systems, P2P trading allows local energy providers (prosumers) to sell their surplus electricity directly to their neighbours, or within their community, bypassing traditional utility companies. This enables prosumers to become active participants in the energy market, setting prices for their electricity and potentially increasing their earnings.
Small-scale generation	Small-scale generation refers to the production of electricity from renewable or alternative energy sources on a small scale, typically for supplying electric energy to the grid or within a localized community. In the context described, the Small Scale Generation Regulation allows individuals to connect and operate generating units that meet specific criteria, including size limitations and using renewable or alternative energy sources (Small-scale generation decisions, n.d.)
Micro-generation	Micro-generation refers to the generation of electricity from renewable or alternative energy sources on a small scale, typically for meeting the energy needs of individual households or small businesses. In Alberta, Canada, under the Micro-generation Regulation, individuals can produce their own electricity using renewable sources such as solar or wind power (Micro-generation, n.d.).

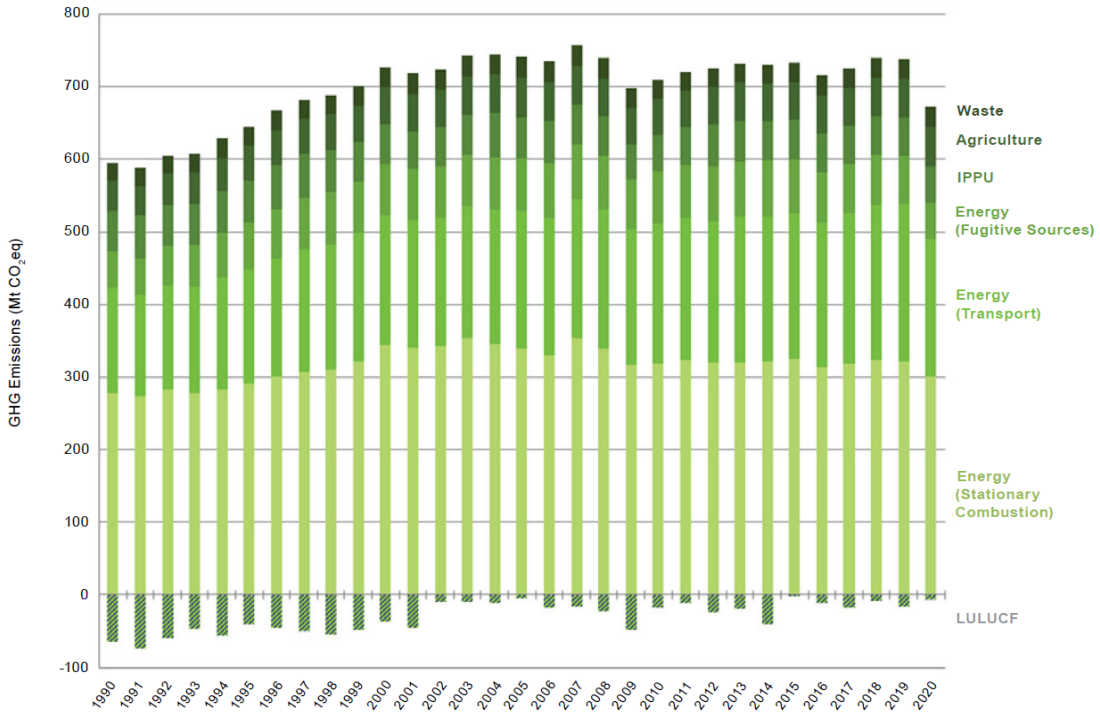
Chapter One: Introduction

Central to the ability of community energy projects, and renewable energy cooperatives in particular, to cement themselves as robust alternates to conventional energy provision are issues of knowledge mobilization. Establishing clear understandings of how knowledge is acquired and shared among diverse stakeholders and engaged participants can assist in sustaining what are currently fledgling enterprises, while also offering opportunities for further projects to establish themselves in the Province. Knowledge mobilization, as Chilvers and Longhurst (2016) argues, offers the potential for making uncertain transitions more robust. When it comes to knowledge sharing, it is crucial to take into account various aspects of the relationships and network structures involved and how they may impact the transfer of knowledge (Reagans & McEvily, 2003). Before studying the mechanisms of knowledge mobilization among renewable energy cooperatives in energy transition, this chapter includes a review of the problem of climate change especially in Canada, and the role of RE cooperatives as a community energy strategy to advance engagement in energy transition.

To-date, much emphasis has been placed on the need to reduce global warming by decarbonization and decreasing emissions of harmful greenhouse gases (GHGs). Particular attention has been paid to the conventional energy sector as a leading source of GHGs (Bruckner et al., 2014). According to Environment and Climate Change Canada (2022a), the Canadian energy sector, including stationary combustion, transport and fugitive sources accounts for 80% of Canada's total GHG emissions (Fig. 1).

Figure 1

Trends in Canadian GHG emissions by sectors (Environment and Climate Change Canada, 2022a).

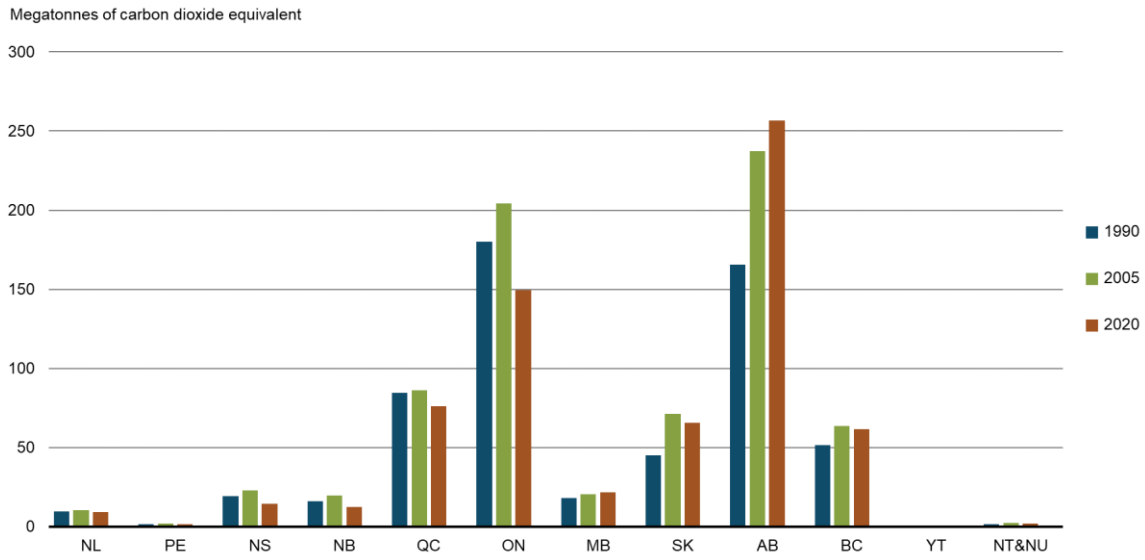


Note. LULUCF stands for Land Use, Land-Use change and Forestry, IPPU stands for Industrial Processes and Product Use.

Together Alberta, Ontario, Quebec, Saskatchewan and British Columbia are the top five emitters and together they released 91% of Canada's national total GHG emissions (as shown in Fig. 2).

Figure 2

Greenhouse gas emissions by province and territory, Canada, 1990, 2005 and 2020 (Environment and Climate Change Canada, 2022b)



Sustainable energy transitions are seen as fundamental to bringing climate actions more in line with sustainable development and to avoid climate catastrophe (Seyfang and Smith, 2007). Some benefits of bottom-up innovations in energy transition may be related to providing opportunities to develop new ideas, practicing new systems of provision, enabling citizens to have green alternatives and achieving sustainable reforms for the community (even on small scale) which would lead to more sustainable development encompassing environmental, economic, and social improvements (Seyfang and Smith, 2007).

Providing the means of transition to clean and renewable energy sources is at the heart of energy sustainability goals and global warming mitigation at the global scale (Hansen et al., 2019). Therefore, a systematic effort of people, companies, and governments is necessary to align with a low-carbon economy by reducing carbon emissions. In this regard, Article 11,

Section two of the Paris Agreement also emphasizes local communities and local governments as central to the decarbonization process and necessary for coming to terms with the challenges ahead to mitigate global warming and move toward energy transition (Pechancová et al., 2022). The local community serves as an appropriate setting for fostering energy transitions, and encompasses the empowerment of citizens as important economic, social, and political actors in this process. Municipalities, owning areas suitable for renewable projects, can also play leadership roles in innovating ways to decentralize energy generation. Meantime, citizen engagement (either through project shares or partnerships with local authorities) in these projects fosters a sense of ownership and can lead to spillover effects, creating new value propositions and local job opportunities (Pechancová et al., 2022). In this context, value proposition refers to the unique benefits or advantages that a renewable energy (RE) project offers to local communities, citizens, and stakeholders.

In order to achieve a comprehensive and fair energy transition that addresses energy democracy (Wahlund & Palm, 2022) and engages active citizens instead of passive ones, new social approaches are needed. These approaches involve strategies and initiatives that prioritize community involvement, inclusivity, and collaboration, and which emphasize innovation as a shared process nurtured within local contexts and relationships (Jones et al., 2019; Jimenez, 2022).

As a pathway toward active citizenship, community energy (CE) is defined as a broad spectrum of energy-related initiatives, rather than a specific class of projects (Creamer et al., 2018). Hewitt et al. (2019) define Community Energy (CE) as a social innovation that leads to social practices and citizen participation in the process of dealing with social challenges. It is commonly characterized as sustainable, democratic, decentralized, grassroots-driven,

cooperative and local (Hewitt et al., 2019). Yet, within this broad definition, different priorities and practices are emphasized in the scholarly literature on the subject. Many CE projects may, therefore, only partially and selectively address the aforementioned characteristics. For instance, scholars such as (Seyfang et al., 2013; Becker and Kunze, 2014; Szulecki, 2018) emphasize the importance of community ownership, whereas others categorize community energy according to the project's outcomes and development process. This includes factors such as the extent of benefits provided to the community hosting the project, as well as the nature and degree of community participation in the design and implementation phases (Walker & Devine-Wright's, 2008). CE is multifaceted, and acknowledging its diverse manifestations requires research to work through this complex, emergent, and incomplete phenomenon (Hewitt et al., 2019).

Community energy projects are promoted internationally, however it is fair to say that the bulk of progress has been made with the UK and European Union nations (Hewitt et al., 2019). CE projects have, in these contexts, involved a variety of renewable energies such as solar farms, wind turbines, or small scale hydro-electric. A good example of a contemporary CE project comes from the community of Reading in the United Kingdom. Reading Hydro is a micro hydroelectric scheme, and has been successful, in part, due to community support, with residents investing and volunteering for its construction. Operated by volunteers, the project makes renewable energy tangible and serves as a local focal point with visible turbines and murals on the Turbine House. It not only inspires but also educates the community on sustainability in their immediate surroundings (Waterman, 2022). Ensuring that the benefits of these projects are shared with the local community helps define the true beneficiaries and purpose of the project.

Walker and Devine-Wright's (2008) identified a two-dimensional approach in a diagram to clarify the meaning of community energy. In this diagram, the first dimension is regarding the

“process” which means who the project is doing for and who it is influenced by. The second dimension is the “outcome” which explains how the results of a project are physically and socially distributed. In this context, an "ideal" community project is one entirely driven and carried out by local people, with collective benefits accruing to the local community. It embodies a project that aligns well with both the process and outcome dimensions – it is developed and run by locals (process dimension) and brings tangible benefits to the community (outcome dimension). As an example, the authors place a conventional utility-developed wind farm in the bottom left of this diagram. This represents a project with minimal local involvement, developed by a distant institution, generating energy primarily for the grid, and yielding economic returns for distant shareholders rather than local residents. In this scenario, neither the process nor the outcome is locally centered. As an ideal community energy project they exemplified a case study from the North of England which perfectly illustrates this ideal term. It was a village hall renovation project led by the local committee. This initiative involved installing a ground source heat pump and a small wind turbine, largely carried out by community members. The outcome was a communal asset, a warm and cost-effective community hall, serving as the heart of village life (Walker & Devine-Wright's, 2008).

Meantime, in the process of energy transition, active actors who are not only energy consumers but also energy ‘prosumers’ are needed. Prosumers, as Bauwens et al. (2016) define them, are community members who co-provide energy in local area and offer it to local energy consumers (Bauwens et al., 2016; Pechancová et al., 2022). These entities are characterized by their dual role as both producers and consumers of energy. Specifically, they offer energy services to local citizens (acting as producers) and simultaneously consume energy within the industrial production process (acting as consumers) (Pechancová et al., 2022). Unlike passive

consumers, prosumers play a dynamic role by contributing to the local energy grid and participating in renewable energy projects. Prosumers can produce electricity through Distributed Generation (DG) systems. Distributed Generation involves small-scale, decentralized power generation units, often located close to the point of use. The motivations for becoming prosumers vary. Some may choose to install DGs due to financial considerations, seeking potential cost savings or income generation through energy production. Others may be motivated by environmental concerns, aiming to reduce their carbon footprint. Additionally, the desire for energy independence from traditional power suppliers can be a motivating factor (Denktas et al., 2018).

This transformative concept emphasizes a more decentralized and community-centric approach, where individuals become key actors in shaping a sustainable and collectively-driven energy landscape. According to Pechancová et al. (2022), a local community provides an appropriate space to change from consumer to prosumer. Moving towards energy transition also requires consideration of who owns and implements renewable energy projects (Walker, 2008). To promote active community engagement, renewable energy cooperatives have the potential to be a grassroots sustainable niche in many countries (Fischer et al., 2021).RE cooperatives are emerging as one potentially important innovation in supporting the development of community energy, and are the focus of this study. Renewable energy (RE) cooperatives, serving as front-liners and pioneers in sustainable energy initiatives, play a pivotal role in this process. To promote a more inclusive and democratic approach to energy transition, it is vital to clarify how knowledge is gained and shared among different stakeholders, including those on the frontlines and entrepreneurs who are more generally interested in innovating community energy approaches.

The concept of ‘knowledge mobilization’ refers to the sharing of experiences, and building collaboration within and between RE cooperatives, and is an important source of innovation and strength building within the CE sector. There are some influencers which shape the dynamic of knowledge transfer (in the context of transferring knowledge from projects to project-based organizations). These dimensions cover attributes of the sender and receiver, their relationship, the nature of the knowledge, and the context of the transfer (Zhou et al., 2021). It is, at the most fundamental level, the process through which the knowledge held by an individual or organization is transferred to another individual or organization (Zhao et al., 2015). Here, knowledge transfer is seen as a dual process involving sending and receiving knowledge. The sending process entails the communication of knowledge from a source to a recipient. This can involve various methods such as dissemination through publications, presentations, or digital platforms. On the other hand, the receiving process involves the recipient actively engaging with the communicated knowledge, understanding its relevance, and integrating it into their own context or practice (Zhao et al., 2015). Singley and Anderson (1989, as cited in Zhao et al., 2015), relatedly define knowledge transfer as the application of acquired knowledge in one situation from another, emphasizing the role of context in shaping and influencing the knowledge transfer process. Instantly, according to a study by Zhou et al. (2021) some contextual factors that affect knowledge transfer (from projects to project-based organizations) are organization atmosphere, incentive mechanism, temporary nature of the project and time urgency. In this study, harmonious atmosphere of an organization and effective mechanism of incentives were identified as important factors in knowledge transfer (Zhou et al., 2021).

By leveraging the experiences and insights of front-liners and starters, a comprehensive knowledge-sharing ecosystem can emerge, empowering communities and entrepreneurs to

navigate the challenges of energy transition effectively. This collaborative knowledge mobilization not only strengthens the resilience of RE cooperatives but also contributes to a more informed, interconnected, and collectively-driven energy transition on a broader scale. The ability of cooperatives to withstand and adapt to challenges by KM will be explored in the findings of this research. In this research, I also address the dynamic of knowledge mobilization in a green energy cooperative in Alberta, Canada with a focus on the activities of Bow Valley Green Energy Co-operative, located in Canmore Alberta.

Developing a RE cooperative as a community innovation depends on ensuring the consistency of knowledge mobilization behavior in the community (Xue et al., 2016). There is empirical value in exploring knowledge mobilization behavior among different cooperatives involved in community energy initiatives and the ways these organizations learn from each other to cope with the challenges. The remainder of this Chapter will detail: a) the objectives, goals and questions guiding this research, b) the context of cooperative renewable energy development, focusing specifically on an Alberta case study, c) a literature review and; d) the methodological approach of the project.

1.1 Research Purpose and Objectives

This research delves into the complex dynamics of knowledge mobilization behavior within cooperatives, exploring how these organizations learn collaboratively to navigate challenges. The primary objectives include shedding light on the most important strategies of knowledge mobilization among renewable energy cooperatives in Alberta, probing the role of knowledge mobilization in supporting renewable energy cooperatives amidst different challenges, and identifying influential factors in the knowledge mobilization process. This study

aims to provide a perspective on knowledge mobilization within renewable energy cooperatives, ultimately contributing to a more inclusive and democratic approach to energy transition. It seeks to reveal key impact areas and influential factors regarding knowledge mobilization process among cooperatives, bridging the gap between research and practical application. By offering insights into strategies for an effective knowledge mobilization, the research seeks to empower communities, foster engagement, and contribute to the global shift toward a sustainable, renewable energy future. This effort underscores the pivotal role of knowledge mobilization in shaping community-driven energy initiatives and adds depth to the ongoing discourse on sustainable energy transition. This research takes up this challenge by exploring the following questions:

1. What are the most important strategies of knowledge mobilization among renewable energy cooperatives?
2. What are the factors that influence knowledge mobilization within renewable energy cooperatives?
3. How knowledge mobilization among renewable energy cooperatives supports these organizations?

In the following section, I will explore the contextual landscape of community renewable energy initiatives and RE cooperatives in Alberta.

1.2 Context

1.2.1 Community renewable energy in Alberta

Alberta is the third largest producer of electricity in Canada (NEB, 2019a). Community engagement in the renewable energy transition in this oil-rich province is complicated due to the province's status as the third-largest holder of global oil reserves (Government of Alberta, 2019), primarily consisting of bitumen deposits deemed among the world's dirtiest fuel sources (Efstathiou & Orland, 2018). Fossil fuel extraction is deeply embedded within Alberta's economy, politics, and culture (Adkin et al., 2017), shaping the social acceptance of CE. Conflicts regarding energy projects in this context are intricate, extending beyond individual attitudes and local concerns to encompass broader regional, national, and international contexts that shape people's knowledge, issue representation, and practices (Gismondi & Hanson, 2021). However, Alberta has been involved in the global move towards renewable and decentralised energy particularly community-developed projects. The Province, for example, is actively increasing its utilization of renewable energy sources, marked by the closure of coal-burning power plants (by early 2024) and a 50 percent tax hike on carbon emissions put in place in January 2018. These measures align with Canada's commitment to reduce emissions as part of the global Paris climate agreement. Despite these positive steps, the province is concurrently escalating production from its extensive reserves. Oil sand production in the north of the Province produces a dense fossil fuel requires intensive energy to extract and must be upgraded before it can be shipped to refineries across North America for further processing. As such, a barrel of oil produced derived from the oil sands contributes significantly more carbon dioxide during extraction and processing compared to the North American average, posing a challenge to

Alberta's overall emissions reduction efforts (Efstathiou & Orland, 2018). Yet, despite the impacts of oil sands on climate change, the Province has remained steadfast in its commitment to the sector (Adkin et al., 2017), and despite challenges over the past decade the industry has remained robust. Recently, for example, Suncor Energy Inc., one of the primary producers in the oil sands, unapologetically curtailed a strategic move towards energy transition in a move to increase efficiency and output and to capitalize on current market demand. They announced an anticipated 7% growth in its upstream production for 2024, projecting a range of 770,000-810,000 bbls/d (barrels per day), up from the levels recorded in 2023 (including 430,000 bbls/d oil sands operations) (“Suncor Energy announces, ” 2023).

In contrast with Alberta’s conventional energy industry, renewable energy is often recommended as a technology with minimal carbon emissions and is recognized as a way to sustain an energy-intensive way of life in Canada while simultaneously reducing carbon emissions (Patel et al., 2020). Renewable energy corporations, demonstrating a long term confidence in the sector despite the Province’s deep attachment to fossil fuels, have been proactive in developing alternate energy sources in the Province. As Barrington-Leigh and Ouliaris (2017), the Province has both high energy demands, and offers a high potential for development of renewables, and solar systems in particular. TransAlta Corporation, one of Alberta's leading power generators anticipates a significant shift in its profit sources, with over two-thirds expected to derive from renewable electricity production by 2028. This marks a notable transformation for the company, previously one of the country's major greenhouse gas emitters. TransAlta revealed an updated capital growth plan, outlining a substantial investment of $3.5 billion in clean electricity generating and storage capacity by the end of 2028. This Calgary-based company, already having introduced over 800 megawatts of wind and solar power since

2021, plans to further expand by adding an extra 1,750 megawatts of clean power in the next five years (Stephenson, 2023). At the opposite end of the development scale, local communities and municipalities have also begun to support the creation of renewable energy systems. EPCOR, the City of Edmonton's primary utility provider, recently, for example, completed the installation of a 13.6 megawatt solar installation to support the electricity needs of the company's water treatment facilities. In another instance, the Bissell Centre – a not-for-profit agency supporting citizens move out of poverty -- has begun a collaboration with the Solar Power Investment Cooperative of Edmonton (SPICE). Together, they are installing a 30-kilowatt solar array on the Bissell Thrift Shop's roof. This project aims to cut emissions, reduce costs, and provide local employment through a training program. Financed by local investors, it covers 59% of energy needs and reduces 22.1 metric tons of emissions. Bissell Centre leases the array, becoming its owner in ten years, offsetting costs with reduced utilities. This socially responsible clean-energy project exemplifies neighborhood sustainability (Silvius, 2023).

Considering provincial regulations in energy transition, Alberta's fully deregulated electricity market is unique in Canada, with electricity generators, retailers, and customers able to operate in a competitive marketplace (Hastings-Simon et al., 2018). The deregulated market allows qualified electricity generators to make competitive offers to sell their electricity into the wholesale power pool, while qualified retailers can buy and sell electricity from the same pool. (In a regulated market, government agencies typically control electricity generation, pricing, and distribution, whereas in Alberta's deregulated market, electricity generators and retailers operate competitively, making offers to sell and buy electricity in a marketplace.) This market flexibility means that customers can choose their preferred retailer, and non-utility buyers can enter into procurement contracts with generators, promoting competition and innovation within the

industry. The deregulated market in Alberta has proven successful, with competitive pricing and an increase in renewable energy investment and development, making it a model for other jurisdictions to consider (Hastings-Simon et al., 2018).

It is also worth mentioning that renewable energy development in Alberta has experienced a significant halt following the announcement by the United Conservative Party government in August 2023, declaring an immediate seven-month pause on all new projects related to renewable electricity generation (Anderson, 2023). Initially, government officials cited requests from rural municipalities and the Alberta Utilities Commission as the reason for the pause. However, upon discovering that no such requests had been made, the decision was later rationalized based on concerns regarding reclamation, farmland preservation, and the preservation of what was described as "pristine viewscapes" (Weber, 2023). According to a study by Pembina institute, one aspect considers companies' capacity to undertake projects with willing landowners. Currently, landowners must agree to renewable energy development on their properties. However, unlike renewable energy, oil and gas companies can enforce access to surface land without landowners' consent. While renewable energy firms must adhere to reclamation security stipulations outlined in agreements with landowners, oil and gas companies are subject to provincial regulations lacking security provisions. Moreover, these regulations offer no recourse to landowners if companies cease production without securing wellbores or reclaiming sites. This discrepancy suggests that using reclamation and farmland preservation as a rationale for the moratorium may not be substantiated (Choi, 2024).

1.2.2 Renewable Energy (RE) Cooperatives in Alberta

The cooperative movement in Canada has a rich history dating back to the late nineteenth century, with early developments in dairy and grain cooperatives. This movement expanded

through initiatives like the Desjardins caisses populaires in Quebec and the Antigonish Movement in Nova Scotia, which integrated cooperative businesses with microfinance, adult education, and rural community development. Today, cooperatives are a significant part of Canada's economic landscape, with four in ten Canadians being members of at least one cooperative. These organizations, including large entities like Federated Co-operatives, play a crucial role in providing alternatives to centralized economic systems and responding to challenges such as sustainable development and local control in the face of neoliberal globalization (MacArthur, 2016).

The history of electricity cooperatives in Canada, particularly in Alberta, dates back to the 1940s and 1950s when provincial governments utilized co-ops as alternative service providers. Between 1940 and 1990, the development of electricity cooperatives in Canada was heavily concentrated in Alberta, accounting for 70 percent of new incorporations, along with Quebec at 29.5 percent. In the 1940s, Alberta faced a significant challenge with only a 5 percent electricity connection rate in rural areas, compared to higher rates in other provinces (MacArthur, 2016). The Alberta government's reluctance to build a public power system led to the emergence of electricity cooperatives as alternative service providers. Rural communities, largely left without access to power, took matters into their own hands, forming cooperatives with support from provincial policies such as the Co-operative Marketing Associations Guarantee Act of 1946. These cooperatives involved buy-in shares from rural farmers, with the balance of funds borrowed from banks, often with provincial guarantees. Despite challenges, such as not having franchise areas like investor-owned utilities, the cooperatives succeeded in connecting over 90 percent of Alberta farms to power within a decade. However, the lack of franchise areas contributed to the decline of power distribution cooperatives in subsequent years.

The success of cooperatives in meeting rural electrification needs highlights the importance of political mobilization and supportive public policies. Provincial policies played a crucial role in facilitating the growth of cooperatives, which expanded beyond electricity to include other energy sectors like natural gas. These cooperatives learned from earlier experiences and leveraged policies such as the Rural Gas Act to scale up and secure exclusive franchise areas, making them better resourced compared to electricity cooperatives (MacArthur, 2016).

The development of renewable energy (RE) cooperatives in the electricity sector has undergone significant changes since 1990. These new cooperatives have diversified their functions beyond traditional electricity distribution. They now focus on generating renewable energy, providing networking services, retailing renewable energy products like solar panels, and even forming consumer electricity-purchase cooperatives. Unlike earlier electricity cooperatives, these newer RE cooperatives are less geographically concentrated and do not have guaranteed access to government funds or designated service areas. This shift reflects a broader restructuring of the power sector across Canada, including the opening up of the grid to new private-generation retail opportunities. Additionally, fluctuating power prices and growing community interest in renewable energy sources have spurred the mobilization of these cooperatives (MacArthur, 2016).

So, the landscape of Alberta's renewable energy cooperative sector is evolving. As mentioned there are several contributing factors to this development, such as proactive funding initiatives from the former NDP government, a conducive regulatory environment, and backing from the local provincial cooperative association. The small-scale generation program is also a key driver of community energy initiatives in the province (Leonhardt et al., 2022).

Presently, there are six renewable energy cooperatives in Alberta. Peace Energy Co-op is the first renewable energy cooperative in Western Canada and the second one in Canada (established in 2003). They have led the establishment of Alberta's inaugural cooperatively owned solar farm. They also have conducted the development of British Columbia's first commercial wind facility, Bear Mountain Wind Park, with a capacity of 102 MW. In early 2023, a Seed Investment Round secured $189,000 from the co-op's dedicated members to do some projects. They initially aimed to submit their application to the Alberta Utilities Commission (AUC) in early August (2023). However, an unexpected moratorium on new renewable energy project approvals by the Alberta Government, effective from August three to February 29, 2024, disrupted their plans. Despite this setback, they swiftly adjusted to meet the new interim requirements announced on September 4, 2023. The SABRE Cooperative is a member-owned investment group focusing on renewable energy projects in Southern Alberta. They assess the viability of community-partnered projects, conduct due diligence on their risks and benefits, and foster a community of members and investors to engage in selected initiatives. At the moment, they are doing a feasibility study of three projects in the City of Lethbridge.

Another RE cooperative in Alberta is Alberta Solar Co-op which has been installed to develop community owned renewable energy projects. They have a plan to do a solar PV project (1-2 Megawatt) in Alberta which will feed in to the province pool directly. They believe that it will make the overall grid greener. In 2015, several energy cooperatives collaborated to establish new retail energy prospects in Alberta, forming ACE (Alberta Cooperative Energy). Now, all customers across the province of Alberta have access to cooperative prices through ACE. ACE is a second-tier cooperative comprised of Alberta Co-operative Energy membership holders and existing energy businesses, including Northern Lights Energy and Power, Merit Energy &

Power, and Gas Alberta Energy. These businesses have a history of cooperative ownership and serving thousands of members across Alberta.

Foothills Energy Co-op was established in 2016 with the purpose of accumulating net revenues to finance and promote energy conservation, green energy, and sustainability efforts within its service areas. It is based in Black Diamond, Alberta. This co-op has more than 2000 members and have done some renewable energy projects such as the partial funding of the solar installation at the High River United Church. Bow Valley Green Energy Cooperative is another active co-op in Alberta which is also the case study of this research. Additional details about this cooperative can be found in Chapter 2. Table 1 presents an overview of active renewable energy cooperatives (RE co-ops) operating in Alberta.

Table 1:

Active RE Cooperatives in Alberta

Numbers	Co-op	Website
1	Peace Energy Cooperative	https://peaceenergy.ca/peace-river-energy-project/
2	SABRE Cooperative	https://www.sabrecooperative.com/
3	Alberta Solar Co-op	https://albertasolarcoop.com/
4	Alberta Cooperative Energy (ACE)	https://www.acenergy.ca/story
5	Foothills Energy Co-op	https://www.foothillsenergycoop.ca/index.html
6	Bow Valley Green Energy Cooperative (BVGEC)	Bow Valley Green Energy Cooperative (bvgreenenergy.org)

1.3 Literature Review

The literature review is conducted through a systematic search in overlapping terms of Energy Transition, Community Energy (CE), Renewable Energy (RE) Cooperatives and Knowledge Mobilization. Different studies have been done both internationally and regionally assessing different aspects of community energy projects mostly focusing on local challenges which are different with respect to socio-political landscape of the region. Although there are some studies on cooperatives' benefits and challenges, there remains a gap regarding how knowledge is mobilized among these organizations. Knowledge mobilization is important since it can affect the development of coops as well as the ways they may face their challenges by learning from each other. In the process of knowledge mobilization, the sender transfers usable and required knowledge to the receiver who can appropriately reuse it in the right spot (Davenport & Prusak, 1998 cited in Zhou et al., 2021). According to Grant (1996), knowledge and knowledge transferability have a strategic role in any organization. Exploring the mechanisms of knowledge mobilization in RE cooperatives can benefit the development of community energy projects in energy transition.

1.3.1 Energy transition and community energy

The concept of energy transition is a critical priority that emphasizes a shift from fossil fuels, particularly depleted oil and gas reserves, to sustainable and green energy sources (Homket et al., 2021). Energy transition is underway globally, driven by various factors such as climate change, fluctuations in fossil fuel prices, and the geopolitical and economic challenges associated with ensuring a secure energy supply (Bayulgen, 2020). To actively contribute to this energy transition, Homket et al. (2021) argue that communities must focus on three key aspects: i.community capacity-building transformation; ii. positive community mobilization changes, and

iii. meeting basic community needs through secure and sustainable practices. Challenges to this deliberative framing approach include political resistance, public disinterest, and resource limitations. However, as more entities commit to the Paris Climate Agreement which "includes commitments from all countries to reduce their emissions and work together to adapt to the impacts of climate change, and calls on countries to strengthen their commitments over time" (The Paris Agreement, 2016), resources can be developed to address these challenges (Romsdahl et al. 2018). To successfully achieve energy sustainability goals at the national level, not only technological capability, economic capacity, and political will are necessary but also the participation of the people at the local level who would be impacted by energy transitions is of great importance (Walker et al., 2014; Burke & Stephens, 2017; Komendantova, 2021).

Comprehensive strategies are needed that enable people to thrive and remain resilient as a result of energy transition. Amidst the shift towards sustainable energy practices, it is necessary to focus not only on the technical aspects of renewable energy development, but also on the social and human dimensions of this transformation. (Krumm et al., 2022). The Social Sciences and Humanities (SSH) are crucial since they can develop understanding the factors and policies that influence various actors to adopt sustainable energy behaviors and contribute to necessary system changes. SSH offers valuable insights into empowering consumers for consistent engagement in sustainable energy practices, fostering the adoption of new technologies, and supporting policies and transformations in energy systems (Steg et al., 2021). To attain this, multi-level and multi-sector actions should be integrated, recognizing the intricate interplay of different social domains and engaging diverse stakeholders. By considering the broader societal impacts and involving various players, strategies can be formulated to align with local values, address regional concerns, and promote inclusive development (Grubler et al., 2016; Sovacool

and Geels, 2016). As highlighted by Miller and Richter (2014), the concept of "social planning" for energy transitions would integrate technical and economic analyses with social dimensions in decision making. Meantime, Jenkins et al. (2018) have come up with an ethical framework including energy justice and sociotechnical transitions. They suggest that sustainable energy transition should cover three main principles: availability, accessibility and affordability. In other words, according to Jenkins et al. (2018), any energy alternative should be technically available while at the same time it should be accessed and afforded by all parts of society (including those in remote locations, low-income communities and other marginalized groups) and should not threaten basic needs of local communities.

The growing renewable energy sector can both positively and negatively influence the well-being of local communities (Krupa, 2012). On one hand, renewable energy development is aligned with low-carbon energy and can also support economic development. On the other hand, growing global demand for energy and international strategic policies and approaches may not align with local needs, perceptions, and goals. For example, in Canada bioenergy producers are looking into benefitting from the forests and Indigenous lands (traditional territories) as a primary source of biomass where they can provide the need for bioenergy (Bullock et al., 2020). Although local communities which can be considered remote regions with a lack of capacity and opportunities, can benefit from employment, investments, and infrastructure (Cambero and Sowlati, 2014) Indigenous ecosystems encounter degradation and the environmental, political, and social change happen without considering Indigenous rights (Bullock et al., 2020). In this regard, the basic question would be "Energy transitions for who?". This would highlight the multi-lateral nature of energy transition context where local communities with different capacities, goals, and needs would play a critical role.

One of the key factors that significantly affect people's support is how their needs and demands would be addressed in energy transition projects (Giulio et al., 2016). To have an effective public engagement in energy transition it is vital to know how people are making choices and realizing the benefits/challenges (Wolsink, 2012). According to Butler and Demski (2013), co-learning and enhancing the knowledge of the public in energy transition can be the first step to negotiating the challenges and minimizing the conflicts in decision-making about energy system change. Co-learning in public engagement emphasizes mutual learning through inclusive dialogue, shifting from merely providing knowledge. This will lead to collaborative exchanges among stakeholders for a richer understanding of issues. The traditional approach to public engagement aimed to address perceived public deficits, such as knowledge gaps, by providing information to enable rational decision-making. However, this approach has been criticized for its assumption of information neutrality, bias towards certain knowledge forms, and neglect of values and contextual factors (Wynne, 1998). In contrast, new approaches emphasize mutual interaction between the public and stakeholders, prioritizing principles like knowledge exchange, trust, openness, and transparency over addressing perceived deficiencies (Butler & Demski, 2013).

Community energy plays an important role in actively engaging individuals in the transformative process of energy transition. Community energy can be recognized as energy projects done by, and for, the common good and benefits of a local population. Community actors usually carry out energy projects in different aspects from supplying power to distributing and managing demands (Hoicka and MacArthur, 2018). Walker and Devine-Wright's (2008) identify two important dimensions of defining community energy: these are the process dimension and the outcome dimension. In the process dimension, the authors explain who the

project is doing for and who it is influenced by. In the outcome dimension, they investigate how the results of a project are physically and socially distributed. This two-dimensional approach makes it easier to clarify the meaning of a community energy. In the process dimension, their exploration of local residents' perspectives revealed that increased and direct involvement of the community positively correlates with greater acceptance and support for the project. Furthermore, their findings indicated that such active involvement fosters a positive impact on local residents' overall understanding and endorsement of renewable energy. Regarding outcomes, their study indicates that when the benefits of renewable energy projects are not equitably shared among local residents, these initiatives have the potential to become sources of local division and controversy (Walker & Devine-Wright's, 2008, pp. 497-500).

The goals of community energy projects can differ according to their members' goals and of course external stakeholders such as policymakers and suppliers. Members' logics for joining community energy mostly lay on environmental, economic, and social issues, but how these are understood and prioritized can differ considerably. In developing countries, an important goal can be accessing electricity, and renewables offer more accessible means of achieving this. In wealthier countries, decreasing GHG emissions and overall environmental footprints often provide the motivation for communities (Gjorgievski et al., 2021).

1.3.2 Why Renewable Energy Cooperatives have emerged?

The appearance of the first energy cooperatives goes back to the 19th century with a focus change from specific groups to community benefits including electric and agricultural cooperatives. The first cooperatives were traditionally oriented to specific groups and the interests, such as consumer, worker and banking groups and benefits were not shared by all community members. Contemporary cooperatives are designed to provide crucial services to all

members of a community for example residents in a distinct territory who own it democratically (Mori, 2014). These co-ops are called as community co-ops by Mori (2014), which were not previously identified by this name. Electricity cooperatives were the most important examples at the beginning of electrification. The first electric cooperatives in the world were in Italy (mostly hydro-electric and near alpine areas). In numerous instances these cooperatives played a pivotal role in driving local economic development (Mori, 2014). Comparable narratives of their impact can be observed in countries such as France, Germany, and Spain, where electric cooperatives shared analogous characteristics, such as hydro-power and small-scale operations, and were predominantly situated in similar rural areas. The distinctive feature of these cooperatives lies in their provision of services of general interest to the entire community, directly influencing the community's well-being through mechanisms such as open membership and non-member patronage. This sets them apart from traditional cooperative models, such as worker, consumer, and banking cooperatives, which primarily impact the welfare of a limited segment of society. Renewable energy cooperatives are new version of community cooperatives which are more classified in social structure and more diverse in organizational modules (Mori, 2014).

Successful RE cooperatives lead to good economic, social, and environmental results and are able to improve and develop the social areas of the clean energy transition. From the economic point of view, in spite of some economic values such as saving energy costs for the members, RE cooperatives also lead to sharing the expenses, risks, and liabilities among the members so people can be more engaged in the projects that before were mostly under the control of the government. Additionally, as Tarhan (2015) suggests, cooperatives may also enhance more sustainable development options for local economies by promoting local job opportunities such as direct full-time and part-time employment (both on-site and business

activity as the result of a project). Community-owned projects generally have a remarkable impact on job creation. According to a study by Lants and Tegen (2009) during the construction period, community-owned projects showed a 1.1 to 1.3 times higher impact, and during the operations period, the impact was 1.1 to 2.8 times higher compared to corporate projects. Renewable energy cooperatives are mostly able to assess the market as they are in contact with different stakeholders.

Energy cooperatives also can provide a micro-grid to create a more dynamic market since the stakeholders are usually in the same local area (Denktas et al., 2018). Cooperatives provide a micro-grid by bringing together individuals, businesses, or communities in the same region who are connected to the main grid at a shared point of common coupling. By pooling their resources, members of the cooperative can generate their own renewable energy, store it, and distribute it within the cooperative's network. This creates a self-contained, localized energy system that is able to operate independently from the main electricity grid if necessary.

Micro-grid systems offer direct advantageous for prosumers, eliminating intermediaries and allowing them to directly sell surplus energy to their neighbors. Peer-to-peer (P2P) trading offers local energy providers the opportunity to equitably sell their electricity either within their community or the broader distribution system, transforming prosumers from passive electricity and price takers to active electricity and price makers (Yoo et al., 2017). This establishes a dynamic market framework for local communities, fostering healthy competition and leading to potential decreases in prices. This streamlined approach not only accelerates the amortization of their investment but also positions prosumers to potentially increase their earnings through the more direct and efficient trading model (Denktas et al., 2018).

From a social point of view, RE cooperatives can offer a space to access common goals by strengthening democracy in decision-making, enhance social cohesion among its members, create new linkages within communities (instantly through stakeholder ownership), develop capacity building within communities and foster confidence among community members. From an environmental point of view, RE cooperatives are a good mechanism for supporting the culture of resources conservation and public engagement in energy transition (Tarhan, 2015).

Renewable energy cooperatives, as one community energy strategy, play an important role in a sustainable energy transition at the local level since they can develop democracy through bottom-up engagement strategies. 'Democratisation, decarbonisation and decentralisation' are three sides of a triangle represented by the activities of RE cooperatives and clarifies that climate justice would be pursued as the final goal (Rosewarne, 2022). Lack of community participation and democratic control of existing energy systems in addition to their highly greenhouse emissions highlight the necessity for energy democracy initiatives. Energy democracy is an umbrella term including a range of demands put forth by social movements, critical think tanks, trade unions, and political parties, all advocating for fairer, more democratic, and sustainable energy systems across different contexts. These initiatives not only aim to reorganize existing energy policies but also highlight the intertwining of technological advancements and institutional reforms (Kunze & Becker, 2014). By shedding light on this coevolution, energy democracy projects emphasize the importance of aligning technological innovations with institutional changes to advance the development of more equitable and accessible energy infrastructure. This holistic approach seeks to empower communities and promote inclusive decision-making processes in shaping the future of energy systems (Becker & Naumann, 2017). To tackle the challenge of energy democracy, new initiatives are developing

around the world in the subject of energy democracy (Becker & Naumann, 2017). The emergence of RE cooperatives is reflective of more active climate citizens who are trying to foster transition by decreasing trust on fossil fuels. RE cooperatives are practicing democratisation by managing and taking control of energy production and distribution. Displacing fossil fuels with local-based renewable cooperatives can lead to decarbonisation. Decentralisation in energy technologies, organizational structures and regulations or decision-making (Becker & Naumann, 2017) is the result of this chain due to distributing the benefits of developing community energy projects to the local citizens (Rosewarne, 2022).

A scan of the literature reveals how renewable energy cooperatives have emerged across various regions worldwide. Heras-Saizarbitoria et al. (2018) worked on a project to clarify how renewable energy co-ops have emerged in Spain. They concluded that an important factor that led to the appearance of RE co-ops is public dissatisfaction with the domination of five big electric companies over the energy market and controlling the energy prices in Spain. They caution that energy co-ops still face considerable barriers to development, including monetary, regulatory, and conceptual uncertainties such as lack of confidence to manage RE projects and lack of awareness among different stakeholders (Tarhan, 2015). Spanish energy co-ops, however, are presented as at least having some potential to overcome the monopoly of electric companies, especially on the price of electricity which had become a political issue (Heras-Saizarbitoria et al., 2018).

According to a research by Łakomiak (2022), in Poland electricity price inflation and anxiety about power scarcity have led moves towards renewable energy sources, especially photovoltaic panels. However, this process is slow due to the lack of supportive legal policies. Polish fruit farmers who tackle the expenses of electricity are interested to be a part of energy

cooperatives by installing micro-scale (less than 50 kW) renewable energy. Łakomiak (2022) has explored regulations that are the most effective ones for fruit farmers' engagement. He has concluded that although participating in energy cooperatives isn't always an economic solution, Poland has the potential to develop energy co-ops by engaging fruit farms.

Economic situation (fuel poverty) and political issues (lack of liberalization in energy market) have also played an important role in emerging RE cooperatives. Considering a multi-level approach, Capellán-Pérez et al. (2018) studied how Spanish RE cooperatives have grown up against an economic space and adversary regulations by applying innovative engagement and investment methods. Innovation, according to Joseph Schumpeter who was an Austrian economist (Defourny, 2001, as cited in Huybrechts, 2013, encompasses novel combinations of goods, services, production processes, and organizational forms. So, the concept of 'social innovation' can be categorized into three types: institutional innovation in new product and service development, incremental innovation in utilizing existing goods and services more socially productively, and disruptive innovation in redefining normative terms to address social problems with new solutions. Furthermore, market orientation places a heightened focus on competition, performance, rational cost recovery strategies, and accountability (Huybrechts, 2013). RE cooperatives have shown their significant role in extending innovative ideas at both political and social levels. They have emerged as a response to the deficient liberalization of electricity market and increased levels of fuel poverty. Capellán-Pérez et al. (2018) have emphasized that RE cooperatives are not only a solution in transition but also a comprehensive set of economic practices and have the potential to promote the model nationwide. In 2015, Som Energia initiated the "Generation kWh" project as a response to regulatory changes and the goal of expanding renewable energy capacity. This innovative project enables cooperative members

to invest in "energy-shares," with returns manifested through reductions in energy consumption reflected in their bills, constituting an interest-free loan during the power plants' lifespan. Approximately 3.5 million € has been invested by 3500 cooperative members, leading to the successful operation of the first plant (a 2MW PV plant) since early 2016 (Capellán-Pérez et al., 2018).

1.3.3. Important factors and barriers in developing RE Co-operatives?

It is crucial to consider various factors influencing the development of cooperatives. Cooperative projects can serve as significant pathways for establishing diverse business models in renewable energies. Such diversity further lends itself well towards the aims of enhancing democracy and empowerment in communities (Robby and Dibb, 2019). Reviewing different challenges of top-down, bottom-up, and hybrid ways of developing community energies, Robby and Dibb (2019) have concluded that to have the flexible communities that embrace renewable energies, it is important to consider increasing small-scale adaptation and behavior change among consumers. Achieving this goal needs to engage key stakeholders from the central government to local communities. It is also important for policymakers to know about the role of aggregators since they can help to increase democratization and decentralization and also advance commercial rivalry in community energies (Robby & Dibb, 2019; Bolton & Hannon, 2016). Energy transition entails more active energy citizens who are passionate about their basic energy needs as well as their responsibility for the social, economic and environmental impacts of energy consumption (Yun et al., 2022). Measuring the exact effect of democratization on energy transition depends on many factors and even might be different in Global North and Global South but overall there is a positive relationship between democratization and renewable energy growth especially in developing economies (Clulow & M. Reiner, 2022).

Policies and regulations are also important in developing renewable energy co-ops. Walker (2008) reviewed the experiences related to the concept of "community-owned production and use" in the UK and potential obstacles or motivations in the process of developing the idea. He anticipated that in the following decade, (from 2008) community-owned renewable projects would be increased especially wind turbines in rural areas and other kinds of renewables in both rural and urban areas. Walker (2008: p. 4404) believed that in 2008 the government in the UK (except in Scotland) was not supporting the policy of feed-in tariffs which was important in the growing community-owned renewable projects in other European countries Feed-in tariff (FIT) schemes, common in the EU and the USA, incentivize renewable energy development by setting fixed prices for electricity from various sources. This price-based policy minimizes uncertainty for potential entrepreneurs, encouraging investments in wind power production for grid integration (Mudasser et al., 2013).

It is also critical to consider human factors in growing RE cooperatives. Centgraf (2018) has addressed human factors of engagement in the German energy system and more exactly in RE cooperatives which she believes as pioneers in Energy Transition. At first, she identified some important challenges such as financing, lack of active members, lack of technical support, challenging political situations, and lack of networking activities, etc. in three German RE cooperatives while developing their organization. Then she clarified the benefits of getting involved in energy cooperatives which are mostly focused on the satisfaction of human needs such as feeling of pride about their achievement or feeling of connection among cooperative members.

Another motivation for creating community energy projects is achieving the socioeconomic benefits of developing renewable energy and green energy transitions. According

to Pacheco et al. (2021), firstly it is important to consider the community's point of view in exploring challenges and needs. Second, community engagement and cooperation between community members, local governments, researchers, and enterprises make a comprehensive foundation for the green transition. Pacheco et al. (2021) found that when the community and different stakeholders are involved from the beginning, more support will be given to the transition process. This would lead to choose an appropriate technology, increase awareness and engagement and provide a foundation for community-based management. Third, to design a community-owned energy system for decarbonization, a completely aligned plan is needed which includes all types of technology such as "batteries, electric vehicles, retrofitting of homes, or heat pumps, etc. (Pacheco et al., 2021). Fourth, community ownership in energy projects can lead to quick reacting to community needs which may foster stronger connection between the community and the projects . This can enhance the valuation of projects by citizens and also commitment among community members.

Tarhan (2015) identifies a number of barriers to developing RE cooperatives. This includes a lack of confidence in community members to do RE projects and develop community-owned projects and low awareness among the general public (non-members), governors, investors, and other potential stakeholders. The lack of monetary sources and supporting policies are the other obstacles. Tarhan (2015) further argues that the right amount of trust among community members and previous experiences with community initiatives may affect the growth of RE cooperatives. Research by Huybrechts and Mertens (2014) similarly revealed two primary barriers hindering the development of renewable energy (RE) cooperatives in Europe. Firstly, barriers to entry, encompassing challenges related to accessing capital for RE production and entry into the supply market, were identified. Secondly, cognitive barriers, specifically the

inadequate knowledge and understanding of the cooperative model, were found to be pervasive. This lack of awareness and comprehension was identified among various stakeholders. The data strongly suggest that these barriers contribute to an uneven and challenging development landscape for RE cooperatives. In essence, the insufficient understanding of the cooperative model emerges as a significant impediment to the advancement of these cooperatives.

Receiving support from local governments is another factor in developing RE co-ops. In order to explore the political and socio-economic aspects of development, it is important to ask why some local governments are more engaged in creating policies that help to develop renewable energies. In this regard, Bayulgen (2020) have studied the role of local governments and found out that leaders who have been elected by the people and have enterprising solutions for developing renewable energies are more successful. According to decision-making context analysis, she has also found that in towns increasing the capacity of bureaucracy concerning professional energy experts and energy task forces makes the local governments more proactive in the energy transition. Comparing different towns with different situations, she has also mentioned that there is a positive relationship between educational level and engagement in renewable energies.

To explore how RE cooperatives are developed and what are their barriers in this research, it is also beneficial to study the socio-political landscape of the region. The success of renewable energy co-ops is affected by different factors such as existing level of trust (Trahan, 2015; Walker et al., 2010) and socio-political situation (Hoicka & MacArthur, 2018). A comparative study by Hoicka and MacArthur (2018) on community projects in Canada and New Zealand, provides a useful means of demonstrating how different socio-political landscapes can enable different approaches, despite sharing much in common. Both countries are responsible

for relatively high greenhouse gas emissions, are politically stable, have access to advanced technologies, offer distinguished instances of community energy projects, and are making efforts towards greater Indigenous community engagement. There are some distinctions in ownership structures within the energy distribution sector, with Canada's ownership shared between municipalities and cooperatives, while New Zealand often sees distribution owned by community trusts. Additionally, Canada has actively promoted wind and solar projects through incentives like power purchase agreements, contrasting with New Zealand's slower adoption of similar incentives. Furthermore, Indigenous ownership structures are less common in Canada compared to New Zealand, where Indigenous ownership holds a larger share. In some Canadian provinces, less privatization and more support of renewable energies can be observed whereas in New Zealand more uniform liberalization and trust building is seen (Hoicka & MacArthur, 2018).

It is also beneficial to discuss the governance effect of co-ops. Wagemans et al. (2019) studied the governance role of local renewable energy cooperatives in the Netherlands. They first created a framework according to the interactions between cooperatives and 1) their members, 2) the state and 3) the other cooperatives. As a result, through an online survey and some qualitative interviews, they addressed five important governance roles of energy cooperatives in the process of energy transition: 1) engaging citizens, 2) connecting government to citizens, 3) creating knowledge and expertise, 4) developing accepted change and 5) providing an integrated vision on sustainability. Wagemans et al. (2019) identified some key success factors for energy cooperatives which include having local knowledge and connections, having direct relationships with the state, having openness and trustworthiness, and not having commercial interests leading to more public acceptance. For the first success factor, in order to provide unique knowledge and

connections, cooperatives must first integrate into the local community they serve. Second success factor, maintaining regular, direct communication with municipal or regional governments enables cooperatives to advocate for change and collaborate on sustainability projects. Transparency and honesty as the third success factor are crucial, fostering trust and respect among local citizens. The forth success factor, prioritizing non-commercial interests distinguishes cooperatives from profit-driven initiatives, garnering greater acceptance. Success hinges on mobilizing citizens, government actors, and resources, while addressing subsequent challenges. They also discussed some challenges that cooperatives face in Limburg, such as the ways needed to engage the public, the lack of a dense network grid, and disincentive regulations (Wagemans et al., 2019).

1.3.4 Knowledge Mobilization

Understanding the mechanism of knowledge mobilization among different community-owned cooperatives can foster the development of the same organizations and improve the process of the renewable energy transition. Mechanisms of knowledge transfer are significantly influenced by the dynamics of communication, informal networks, and social cohesion (Reagans & McEvily, 2003). In any organization or community, the effectiveness of sharing knowledge depends not only on formal channels but also on the informal interactions and relationships among its members. Informal networks, comprising personal connections, trust, and shared experiences, often facilitate the flow of information and expertise more efficiently than formal structures alone. Moreover, a strong sense of social cohesion, characterized by mutual trust, shared values, and a collaborative culture, can enhance knowledge mobilization by fostering open communication and collective problem-solving (Reagans & McEvily, 2003).

In order to achieve a more inclusive sustainable transition, mobilizing knowledge from front-liners and entrepreneurs can facilitate the involvement of potential actors of the community and the public. This collaborative knowledge-sharing approach not only enhances the internal capabilities of cooperatives but also acts as a catalyst for building robust networks and partnerships within and beyond the renewable energy sector. By creating a culture of continuous learning and information exchange, these cooperatives can serve as valuable knowledge hubs, empowering their members with the insights needed to adapt to evolving energy landscapes and emerging technologies. Additionally, the mobilization of knowledge from front-liners ensures that practical experiences are integrated into the broader discourse, promoting more informed decision-making and effective strategies for a sustainable energy transition. An appropriate knowledge mobilization strategy becomes the cornerstone for the resilience, innovation, and community-driven success of community-owned cooperatives in navigating the complexities of the renewable energy transition. Clarifying the relations among different actors and the way of learning may also assist to find a participation model (Chilvers & Longhurst, 2016). It also can help policymakers to make decisions that provide a better situation for developing energy innovations.

Involvement in community-owned renewable energy projects can also foster knowledge sharing among community members. This includes diverse areas such as “organisational management and leadership, project management, problem-solving, teamwork, community consultation and engagement, marketing and communication, business development, project finance and fundraising, law”. Additionally, it extends to technical capacity around renewable energy technology and energy efficiency. This involvement can also help utilize potential capabilities associated with capacity building within the communities. (Berka and Creamer,

2018). In a study conducted on 84 community facility and development projects in Scotland, it was found that 65% of the participating groups reported that their committee had acquired new skills as a result of developing a community renewable energy project. This suggests that involvement in CRE initiatives not only contributes to sustainable energy development but also fosters skill development among community members involved in such projects (Gubbins, 2010). Moreover, there is evidence suggesting that most of the learning occurring within projects is driven by project leaders, who dedicate significant time and effort to acquire the necessary knowledge and expertise needed to ensure the project's success (Bere et al., 2016).

Intermediaries, such as local governments or local associations, play an important role in the process of knowledge exploration and can mediate relationships which facilitate knowledge exploitation in innovation networks, facilitate the formation of suitable partnerships and even support the effective distribution and implementation of their outcomes (Caloffi et al., 2015). In the realm of innovation network policies, a better understanding of which organizations can serve as intermediaries and the various roles they can play may assist policymakers in creating more focused interventions. Such knowledge can also benefit potential beneficiaries in establishing more prosperous networks (Caloffi et al., 2015). These intermediaries are also known with other terms such as “knowledge (or technology, or innovation) brokers”, “*bricoleurs*”, “boundary organizations”, “superstructure organizations”, “innovation bridges”, and others (Howells, 2006). These terms have been distinguished by different scholars with two approaches with focus on intermediaries as organizations and intermediation as a process. These two approaches have been led to differences in terminology. According to organization approach “knowledge brokers” has been explained as agents that help innovation by combining existing technologies in new ways (Hargadon, 1998, cited in Howells, 2006). Definition for “bricoleurs”

is agents endeavoring to explore novel applications for emerging technologies beyond their original domain of development (Hargadon, 1998, cited in Howells, 2006). “Boundary organizations” are defined as organizations transfer and co-produce technology (Guston, 1999, cited in Howells, 2006). Accodring to process approach “innovation bridges” means offering knowledge or services that complement those of firms (Czarnitski & Spielkamp, 2000, cited in Howells, 2006).

1.3.5 Engaging communities in RE cooperatives.

Regarding the question of why people don’t get involved in cooperatives, Fischer et al. (2021) believe that, people who are not members of energy cooperatives and haven’t had enough knowledge about co-ops are less interested in participation. They also declared that half of the non-members who have information about “energy cooperatives” are interested in either volunteering or investing in renewable energy projects. Understanding this hesitation and interest dynamic lays the groundwork for addressing barriers to participation. By actively knowledge mobilization including sharing insights and experiences among cooperatives, a collaborative approach can be cultivated. This, will foster a supportive environment that encourages greater participation from those currently on the sidelines.

Learning from similar organizations and making cohesive networks is one level of knowledge mobilization that may help co-ops to develop. Bauwens et al. (2016), address the important factors that increase community engagement in wind power cooperatives in Belgium Denmark, Germany, and the UK. According to the results of this research, the development of RE cooperatives is a multi-dimensional procedure that involves different actors. They believe that one important factor is strengthening cooperatives by making networks and learning from

each other to cope with the challenges in the same situations. This can be associated with how knowledge is mobilized among the co-ops

An important concept that can be discussed in knowledge mobilization and community engagement is how "institutional relatedness" may affect the emergence of local renewable energy cooperatives and also regional policies (Punt et al, 2022). Based on the organizational ecology approach which studies how populations of organizations shape, grow and decline (Hannan & Carroll, 1992), they argue that the legitimacy and the organizational knowledge can be transferred to renewable energy cooperatives from other cooperatives active in the same district but in different fields. According to Aldrich & Fiol (1994), cognitive legitimation here means that new people engaging in RE cooperatives probably use the business model of the pioneers instead of having a new one. They found out that "transposition" which means "the mobilization and adaptation of existing institutions to organize and legitimize a new practice in another field" (Boxenbaum & Battilana, 2005; Powell et al., 2012 as cited in Punt et al., 2022) can help to develop the RE market formation. After analyzing the market formation which considered the role of local technology users, it was identified that the organizational structure of cooperatives was more important than the RE technology to engage users (Punt et al., 2022).

There is also a research by Cao et al. (2022) on how knowledge would be created and mobilized in an industry-university-research energy cooperative in China. They worked on new energy vehicle cooperatives. In their research, they designed a model of creating knowledge and mobilizing it according to the relationship between network structure and knowledge creation and mobilization by using complex network theory and simulation analysis to investigate the progress of knowledge.

Local knowledge also plays a crucial role in developing RE cooperatives because it helps to ensure that the community's unique needs and perspectives are taken into account. Local knowledge is a context-specific understanding deeply connected to community and personal experiences, forming an integral part of local cultural identities (Irwin & Michael, 2007). To accurately explore the role of local knowledge, renewable energy activities within 20 Italian regions were studied by Corsatea (2014). The results show that locally produced knowledge, local researchers, and local public research subsidies associate with increasing innovative activities in the renewable field (Corsatea, 2014). Renewable energy cooperatives formed by local communities primarily concentrate on generating electricity and/or heat for local consumption while addressing local economic, social, and environmental needs. Successful projects owned by these communities have the potential to retain economic benefits within the local economy. This includes direct, indirect, and induced economic effects, encompassing on-site employment, business activity resulting from the project, and changes in wealth and income of community members due to the project. The key advantage of developing RE co-op model according to local needs lies in its enduring impact on personal and community empowerment. Successful RE co-ops foster confidence, interest, and capacity, motivating individuals and communities to take positive actions for sustainable development (Tarhan, 2015).

Research by Bell (2020) in Canada offers further insight into the role of local knowledge in cooperatives. This research sought to better understand how local context may affect procedural justice in nuclear issues, especially in relation to waste siting and storage. This, the author argues, marks an important point of departure for Canadians, whereby nuclear issues internationally have tended towards closed policy systems, often dominated by technical expertise (Wynne, 2011) Analyzing ethnographic observations and interviews in Ontario,

Canada, Bell (2020) clarified that policy-making without considering local knowledge may lead to unintended results that affect procedural justice (the integration of individuals in the decision-making process). She believed that this returns to low engagement due to fear of consequences. She emphasizes that to translate policy to practice in a meaningful way, local knowledge mobilization is vital. She argued that significant knowledge mobilization means considering geographic issues to include all stakeholders, especially marginalized groups, in the process of decision-making at different levels to be sure of a fair engagement. Having clear guidelines that help to translate policy to practice can secure that the local context doesn't make practices that weaken the goals of procedural justice and fairness (Bell, 2020).

To summarize the literature review, the imperative shift towards renewable energy sources, driven by climate change and economic factors, necessitates community engagement in energy transition. To achieve this, a deliberative framing approach focusing on community capacity-building, positive mobilization changes, and meeting basic needs is crucial. In the literature review renewable energy cooperatives have been identified as one of the community energy initiatives to engage individuals and foster cooperative projects. The emergence of RE co-ops is explored as a response to various challenges in the energy sector, including dissatisfaction with conventional energy companies, environmental concerns, and the desire for energy democracy. Additionally, some important factors and barriers have been identified in developing renewable energy cooperatives. It highlights the significance of community engagement, policy support, and human factors in fostering the growth of RE cooperatives. Key challenges include lack of confidence among community members, insufficient awareness, financial constraints, and regulatory barriers. The literature reviews also investigate the role of knowledge mobilization from front-line practitioners to the community. An appropriate

knowledge mobilization strategy can enhance the resilience, innovation, and success of cooperatives. Strategies for knowledge mobilization include learning from similar organizations, creating cohesive networks, and leveraging local expertise to enhance procedural justice in decision-making processes. There is also an emphasis on the significance of intermediaries in mediating communication and supporting knowledge sharing in innovation networks.

Although some studies have been done to investigate the role of local knowledge in cooperatives, still there is a gap in the literature about how the institutional structure of co-ops is shaped by knowledge sharing and how knowledge mobilization is affected by different factors. In this research, I will try to learn from a case study in Canmore to shed light on this aspect of cooperatives' development.

1.5 Methodology

The aim of the investigation presented in this research was to document and analyze the lived experiences of the renewable energy cooperative owners, knowledge mobilisers, community participants, and stakeholders in Alberta for further work in creating support strategies.

In this study, interpretive analysis based on a case study approach has been employed.

1.5.1 Case study

The case study approach can help to achieve a multi-dimensional investigation of a subject in the real world (Crowe et al., 2011). This method offers a unique advantage by allowing for an in-depth exploration and contextual understanding of knowledge mobilization within the specific dynamics of BVGEC. Case study strategy is specifically useful while a phenomenon is explored in its "real-life context" (Yin, 1981). The qualitative richness of the

data enables a comprehensive analysis, contributing not only to academic theory but also offering practical implications and recommendations for other energy cooperatives and stakeholders.

The case study is Bow Valley Green Energy Cooperative (BVGEC). To gather needed information, I was in contact with the founders of this cooperative, community participants, knowledge mobilizers from other cooperatives, and the local government.

BVGEC has pioneered several innovative strategies in cooperative energy development, demonstrating resilience in overcoming the intricate landscape of political, technical, and regulatory challenges specific to their contexts. Meantime, BVGEC's strong commitment to knowledge exchange and collaboration positions it as a great choice for a case study. The cooperative's proactive engagement in cooperative networks, both locally and globally, reflects a dedication to continuous learning and improvement. By actively participating in knowledge-sharing initiatives with various cooperatives and collaborating with local intermediary associations, BVGEC demonstrates a commitment to not only advancing its own practices but also contributing to the collective learning within the cooperative energy sector. These characteristics make BVGEC a valuable case study for understanding effective knowledge mobilization strategies and practices in the context of transforming energy practices.

I employed content analysis to analyze the information that I have acquired through the semi-structured interviews. Content analysis serves the purpose of organizing and extracting meaning from collected data, facilitating the derivation of realistic conclusions. In qualitative content analysis, data are represented through words and themes, enabling the interpretation of results based on the identified patterns and content themes (Bengtsson, 2016). In employing content analysis for the analysis of information gathered through semi-structured interviews in

this research, the process involved a systematic examination of the textual data to identify recurring patterns, themes, and meanings. This method allowed for a comprehensive exploration of the data, finding underlying trends and insights that were not immediately apparent. In this research, I used the data set from a project in which I have already been involved. That project has been headed by Dr. John Parkins in the Faculty of Agricultural, Life & Environmental Sciences, at the University of Alberta.

1.5.2 Data Collection Strategy

Data collection strategies to develop the research included in-depth interviews with key informants, field visits, and observational research and document analysis. My thesis research is drawn from a larger project conducted at the University of Alberta and University of Sheffield entitled: “Mobilizing knowledge for cooperative energy success”.

Most of the interviews were done through online platforms (e.g., Zoom) and took around 60 minutes to complete them. The audio was recorded and transcribed. I also participated in some in-person interviews within a research group. I tried to interview key informants of the cooperatives including the founders of Bow Valley Green Energy Cooperative. According to their relationship, I interviewed some other cooperatives that they were in contact with. This helped me to understand how knowledge is transferred among the cooperatives. This information was also helpful to learn and compare the different experiences of people who are involved in cooperatives in different geographical, political, and social situations. I also tried to interview some community members that were the hosts for renewable community energy projects.

Polkinghorne (1989) cited in Creswell (2018) recommend for a number of 5-25 interviews, so I performed 13 in-depth interviews. Having a good number of interviewees allowed me to gather diverse data to compare and contrast.

The questions for the interview focused on the experiences of people who were involved in renewable energy cooperatives, their motivation for involvement, their challenges and solutions, their strategies for learning and knowledge mobilization, and their probable behavior change.

1.5.3 Ethical Issues

One of the key aspects taken into account for my thesis research was preparing consent and information form for all participants prior to conducting interviews. I have received signed consent forms from all participants. Confidentiality is another principle deemed of great importance in the research project. Confidentiality refers to the ethical principle and practice of safeguarding the privacy and identities of research participants. It involves protecting sensitive information obtained from participants during the research process from unauthorized disclosure or access. This includes ensuring that participants' identities are not revealed or distorted in research reports or publications (Wiles et al., 2007). So, confidentiality will be a crucial consideration in my research, and I am committed to upholding it rigorously. . I also considered respect in the way there is dialogue and towards different perspectives. The aim at the end of the research is contributing to the academic literature in relation to the subject and share knowledge with some stakeholders. It is also worth mentioning that the information will be at the disposition of the University of Alberta[1].

---

[1] An ethics certificate was secured from the University of Alberta Research Ethics Board fort his research project by Professor John Parkins acting as project lead (Pro Number: 00122206).

1.7 Conclusion

This thesis research is trying to explore the dynamic of knowledge mobilization among renewable energy cooperatives as key social innovations and significant actors of community energies. This paper focuses on cooperatives' challenges and needs and the way knowledge mobilization among different stakeholders may lead to more community participation. This study uses semi-structured interviews with key informants as well as observation and field visits. Referring to the data that gathered from a case study in Alberta, this study tries to fill the gap in the literature review on how knowledge mobilization may promote installing energy cooperatives and solving their challenges. Community energy initiatives today are including various strategies and are able to advance pioneering ones in different local communities. In this regard, cooperatives can work as incubators that foster new ideas which can be adopted as the mainstream (Hewitt et al., 2019). Community energy solutions such as cooperatives also seem to be associated with the public good and facilitate inclusive engagement and social capital. Increasing social support can be related to psychological ownership of community-owned projects and the sense of shared identity (Berka & Creamer, 2018). This study also tries to learn how the dynamic of knowledge mobilization may be affected by different factors. In the next chapter, I delve into the history of establishing BVGEC as the case study of this research, the challenges it has faced, its strategies for knowledge mobilization and the way KM may support its development.

1.8 References

Adkin, L. E., Hanson, L. L., Kahane, D., Parkins, J. R., & Patten, S. (2017). Can public engagement democratize environmental policymaking in a resource-dependent state? Comparative case studies from Alberta, Canada. *Environmental Politics, 26*(2), 301-321.

Aldrich, H. E., & Fiol, C. M. (2007). Fools rush in? the institutional context of industry creation. *Entrepreneurship*, 105–127. https://doi.org/10.1007/3-540-48543-0_5

Aurora, S., & Flack, P. (2018). Principles of structural phenomenology. *Acta Structuralica*, *s1*, 151–169. https://doi.org/10.19079/actas.2018.s1.151

Barrington-Leigh, C., & Ouliaris, M. (2017). The renewable energy landscape in Canada: a spatial analysis. *Renewable and Sustainable Energy Reviews, 75*, 809-819.

Bauwens, T., Gotchev, B., & Holstenkamp, L. (2016). What drives the development of Community Energy in Europe? the case of wind power cooperatives. *Energy Research & Social Science*, *13*, 136–147. https://doi.org/10.1016/j.erss.2015.12.016

Bayulgen, O. (2020). Localizing the energy transition: Town-level political and socio-economic drivers of clean energy in the United States. *Energy Research &Amp; Social Science, 62*, 101376. https://doi.org/10.1016/j.erss.2019.101376

Bechtel, R. B., & Churchman, A. (2002). *Handbook of Environmental Psychology*. Wiley.

Bell, M. Z. (2020). Spatialising procedural justice: Fairness and local knowledge mobilisation in nuclear waste siting. *Local Environment*, *26*(1), 165–180. https://doi.org/10.1080/13549839.2020.1867841

Bengtsson, M. (2016). How to plan and perform a qualitative study using content analysis. *NursingPlus Open, 2*, 8–14. https://doi.org/10.1016/j.npls.2016.01.001

Bere, J., Jones, C., Jones, S., & Munday, M. (2016). Energy and development in the periphery: A regional perspective on small hydropower projects. *Environment and Planning C: Politics and Space, 35*(2), 355–375. https://doi.org/10.1177/0263774x16662029

Berka, A. L., & Creamer, E. (2018). Taking stock of the local impacts of community owned Renewable Energy: A Review and Research Agenda. *Renewable and Sustainable Energy Reviews*, *82*, 3400–3419. https://doi.org/10.1016/j.rser.2017.10.050

Bolton, R., & Hannon, M. (2016). Governing Sustainability transitions through business model innovation: Towards a systems understanding. *Research Policy*, *45*(9), 1731–1742. https://doi.org/10.1016/j.respol.2016.05.003

Boxenbaum, E., & Battilana, J. (2005). Importation as innovation: Transposing managerial practices across fields. *Strategic Organization*, *3*(4), 355–383. https://doi.org/10.1177/1476127005058996

Bruckner T., I.A. Bashmakov, Y. Mulugetta, H. Chum, A. de la Vega Navarro, J. Edmonds, A. Faaij, B. Fungtammasan, A. Garg, E. Hertwich, D. Honnery, D. Infild, M. Kainuma, S. Khennas, S. Kim, H. B. Nimir, K. Riahi, N. Strachan, R. Wiser, & X. Zhang. (2014). Energy Systems. *Climate Change 2014: Mitigation of Climate Change* (511-598). Cambridge University Press. Doi: 10.1017/CBO9781107415416.013

Bullock, R.C., Zurba, M., Parkins, J., & Skudra, M. (2020). Open for bioenergy business? Perspectives from Indigenous business leaders on biomass development potential in Canada. *Energy research and social science, 64*, 101446.

Burke, M., & Stephens, J. (2017). Energy democracy: Goals and policy instruments for sociotechnical transitions. *Energy research and social science, 33*, 35-48.

Burke, M., & Stephens, J. (2017). Energy democracy: Goals and policy instruments for sociotechnical transitions. *Energy research and social science, 33*, 35-48.

Butler, C., & Demski, C. (2013). Valuing public engagement with energy system transitions: the importance of what lies beneath. *Carbon Management, 4*, 659 - 662.

Caloffi, A., Rossi, F., & Russo, M. (2015). The emergence of intermediary organizations: A network-based approach to the design of Innovation Policies. *Handbook on Complexity and Public Policy*, 314–331. https://doi.org/10.4337/9781782549529.00027

Cambero, C., & Sowlati, T. (2014). Assessment and optimization of forest biomass supply chains from economic, social and environmental perspectives – A review of literature. *Renewable & Sustainable Energy Reviews, 36*, 62-73.

Cao, X., Li, C., Li, J., & Li, Y. (2022). Modeling and simulation of knowledge creation and diffusion in an industry-university-research cooperative innovation network: a case study of China's new energy vehicles. *Scientometrics, 127*(7), 3935–3957. https://doi.org/10.1007/s11192-022-04416-4

Capellán-Pérez, I., Campos-Celador, Á., & Terés-Zubiaga, J. (2018). Renewable Energy Cooperatives as an instrument towards the energy transition in Spain. *Energy Policy*, *123*, 215–229. https://doi.org/10.1016/j.enpol.2018.08.064

Centgraf, S. (2018). Supporting civic engagement in German Energy Cooperatives – transdisciplinary research based on the reflection of individual needs. *Energy Research & Social Science*, *44*, 112–121. https://doi.org/10.1016/j.erss.2018.05.003

Centgraf, S. (2018). Supporting civic engagement in German Energy Cooperatives – transdisciplinary research based on the reflection of individual needs. *Energy Research & Social Science*, *44*, 112–121. https://doi.org/10.1016/j.erss.2018.05.003

Chilvers, J., & Longhurst, N. (2016). Participation in Transition(s): Reconceiving Public Engagements in Energy Transitions as Co-Produced, Emergent and Diverse. *Journal of Environmental Policy & Planning, 18*, 585 - 607.

Choi, T. (2024, February 16). Alberta ‘unfairly’ targeted renewables in moratorium: Pembina. Sustainable Biz. https://sustainablebiz.ca/alberta-unfairly-targeted-renewables-in-moratorium-pembina

Corsatea, T. D. (2014). Localised knowledge, local policies and regional innovation activity for renewable energy technologies: Evidence from Italy. *Papers in Regional Science*, *95*(3), 443–466. https://doi.org/10.1111/pirs.12136

Creamer, E., Eadson, W., Van Veelen, B., Pinker, A., Tingey, M., Braunholtz-Speight, T., Markantoni, M., Foden, M., & Lacey-Barnacle, M. (2018). Community energy: Entanglements of community, state, and private sector. *Geography Compass*, *12*(7). https://doi.org/10.1111/gec3.12378

Creswell, J. W., & Poth, C. N. (2018). *Qualitative inquiry and research design: Choosing among five approaches*. Sage.

Crowe, S., Cresswell, K.M., Robertson, A., Huby, G., Avery, A.J., & Sheikh, A. (2011). The case study approach. *BMC Medical Research Methodology, 11*, 100 - 100.

Denktas, B., Pekdemir, S., & Soykan, G. (2018). Peer to peer business model approach for Renewable Energy Cooperatives. *2018 7th International Conference on Renewable Energy Research and Applications (ICRERA)*. https://doi.org/10.1109/icrera.2018.8566735

Efstathiou, Jr., J. & Orland, K. (2018, March 26). Alberta, home to one of the world's dirtiest oil sources, wants to be green. *BNN Bloomberg News*. https://www.bnnbloomberg.ca/one-of-world-s-dirtiest-oil-sources-wants-

Environment and Climate Change Canada (2022b) Canadian Environmental Sustainability Indicators: Greenhouse gas emissions. Available at: www.canada.ca/en/environment-climate-change/services/environmental-indicators/greenhouse-gas-emissions.html.

Environment and Climate Change Canada. (2022a). NATIONAL INVENTORY REPORT 1990–2020: GREENHOUSE GAS SOURCES AND SINKS IN CANADA. Available at: https://publications.gc.ca/site/eng/9.506002/publication.html

Fischer, B., Gutsche, G., & Wetzel, H. (2021). Who wants to get involved? Determining citizen willingness to participate in German renewable energy cooperatives. *Energy Research &Amp; Social Science, 76*, 102013. https://doi.org/10.1016/j.erss.2021.102013

Gismondi, M., & Hanson, L. (2021). Provincial polyphasia: Community energy generation and the politics of Sustainability Transition in Alberta, Canada. *A Critical Approach to the*

Social Acceptance of Renewable Energy Infrastructures, 181–198. https://doi.org/10.1007/978-3-030-73699-6_10

Giulio, G.M., Groves, C., Monteiro, M., & Taddei, R. (2016). Communicating through vulnerability: knowledge politics, inclusion and responsiveness in responsible research and innovation. *Journal of Responsible Innovation, 3*, 92-109.

Gjorgievski, V. Z., Cundeva, S., & Georghiou, G. E. (2021). Social Arrangements, technical designs and impacts of Energy Communities: A Review. *Renewable Energy*, *169*, 1138–1156. https://doi.org/10.1016/j.renene.2021.01.078

Government of Alberta. (2019). Oil sands facts and statistics. https://www.alberta.ca/oil-sands-facts- and- statistics.aspx

Grubler, A., Wilson, C., & Nemet, G.F. (2016). Apples, oranges, and consistent comparisons of the temporal dynamics of energy transitions. *Energy research and social science, 22*, 18-25.

Gubbins, N., (2010). The role of community energy schemes in supporting community resilience. *JRF Brief Pap Community Assets*, 1–24.

Hacker, K. (2013). Chapter 1: Principles of Community-Based Participatory Research. *Community-based participatory research.* Thousand Oaks, CA: SageBrian.

Hall, J. R. (2015). Social Futures of Global Climate Change: A structural phenomenology. *American Journal of Cultural Sociology*, *4*(1), 1–45. https://doi.org/10.1057/ajcs.2015.12

Hansen, K., Mathiesen, B., & Skov, I.R. (2019). Full energy system transition towards 100% renewable energy in Germany in 2050. *Renewable & Sustainable Energy Reviews, 102*, 1-13.

Hastings-Simon, S., Kaddoura, S., Klonick, A., Leitch, A., and Porter, M.(2018). Plugging In: Opportunities to Procure Renewable Energy for Non-Utility Companies and Institutions in Alberta. *The Pembina Institute, Rocky Mountain Institute and Calgary Economic Development.* Retrieved from: https://www.pembina.org/reports/plugging-in-2018.pdf

Heras-Saizarbitoria, I., Sáez, L., Allur, E., & Morandeira, J. (2018). The emergence of renewable energy cooperatives in Spain: A review. *Renewable and Sustainable Energy Reviews, 94*, 1036–1043. https://doi.org/10.1016/j.rser.2018.06.049

Hoicka, C. E., & MacArthur, J. L. (2018). From tip to toes: Mapping Community Energy Models in Canada and New Zealand. *Energy Policy*, *121*, 162–174. https://doi.org/10.1016/j.enpol.2018.06.002

Homket, Y., Sutheravut, P., & Nima, S. (2021). Community capacity-building mobilization towards energy transitions in the era of Thailand 4.0: A case study on biomass power plants. *Energies*, *14*(17), 5219. https://doi.org/10.3390/en14175219

Huybrechts, B. (2013). Social Enterprise, Social Innovation and Alternative Economies: Insights from Fair Trade and Renewable Energy. *Alternative Economies and Spaces,* 113–130. https://doi.org/10.14361/transcript.9783839424988.113

Huybrechts, B. & Mertens, S. (2014). The Relevance of the Cooperative Model in the Field of Renewable Energy. *Annals of Public and Cooperative Economics, 85*(2): 193-212. DOI: http://dx.doi.org/10.1111/apce.12038

Irwin, A., & Michael, M. (2007). *Science, Social Theory and Public Knowledge*. McGraw-Hill International (UK) Ltd.

Jenkins, K., Sovacool, B.K., & McCauley, D. (2018). Humanizing sociotechnical transitions through energy justice: an ethical framework for global transformative change. *Energy Policy, 117*, 66-74.

Jimenez, A., Delgado, D., Merino, R., & Argumedo, A. (2022). A decolonial approach to innovation? Building paths towards Buen Vivir. *The Journal of Development Studies, 58*(9), 1633-1650.

Jones, K. E., Granzow, M., & Shields, R. (2019). Urban virtues and the innovative city: An experiment in placing innovation in Edmonton, Canada. *Urban Studies, 56*(4), 705-721.

Komendantova, N. (2021). Transferring awareness into action: A meta-analysis of the behavioral drivers of energy transitions in Germany, Austria, Finland, Morocco, Jordan and Iran. *Energy research and social science, 71*, 101826.

Krumm, A., Süsser, D., & Blechinger, P. (2022). Modelling social aspects of the Energy Transition: What is the current representation of social factors in energy models? *Energy, 239,* 121706. https://doi.org/10.1016/j.energy.2021.121706

Krupa, J. (2012). Blazing a new path forward: A case study on the renewable energy initiatives of the Pic River First Nation. *Environmental development, 3*, 109-122.

Kunze, C., & Becker, S. (2014). *Energy democracy in Europe: A survey and outlook.* Brussels: Rosa Luxemburg Foundation.

Łakomiak, A. (2022). Civic Energy in an Orchard Farm–Prosumer and Energy Cooperative—A New Approach to Electricity Generation. *Energies*, *15*(19), 6918. https://doi.org/10.3390/en15196918

Lantz, E., & Tegen, S. (2009). *Economic Development Impacts of Community Wind Projects: A Review and Empirical Evaluation.* Berkeley: National Renewable Energy Laboratory. http://www.nrel.gov/docs/fy09osti/45555.pdf

Lehtonen, M., & de Carlo, L. (2019). Community energy and the virtues of mistrust and distrust: Lessons from Brighton and Hove Energy Cooperatives. *Ecological Economics, 164,* 106367. https://doi.org/10.1016/j.ecolecon.2019.106367

Leonhardt, R., Noble, B., Poelzer, G., Fitzpatrick, P., Belcher, K., & Holdmann, G. (2022). Advancing Local Energy Transitions: A global review of government instruments supporting community energy. *Energy Research & Social Science*, *83*, 102350. https://doi.org/10.1016/j.erss.2021.102350

Loorbach, D., & Rotmans, J. (2010). The practice of transition management: Examples and lessons from four distinct cases. *Futures*, *42*(3), 237–246. https://doi.org/10.1016/j.futures.2009.11.009

MacArthur, J. L. (2016). *Empowering electricity: Co-operatives, sustainability, and power sector reform in Canada.* UBC Press.

Mertens, D. M. (2020). *Research and evaluation in education and psychology: Integrating diversity with quantitative, qualitative, and mixed methods*. SAGE.

Miller, C., & Richter, J. (2014). Social Planning for Energy Transitions. *Current Sustainable/Renewable Energy Reports*, 1, 77-84.

Mori, P. A. (2014). Community and cooperation: The evolution of cooperatives towards new models of citizens' Democratic participation in public services provision. *Annals of Public and Cooperative Economics*, *85*(3), 327–352. https://doi.org/10.1111/apce.12045

Mudasser, M., Yiridoe, E. K., & Corscadden, K. (2013). Economic feasibility of large community feed-in tariff-eligible wind energy production in Nova Scotia. *Energy Policy, Elsevier, 62*(C), 966-977.

NEB (2019a). Provincial and Territorial Energy Profiles – Alberta. Retrieved from: https://www.cer-rec.gc.ca/en/data-analysis/energy-markets/provincial-territorial-energy-profiles/provincial-territorial-energy-profiles-alberta.html

Pacheco, A., Monteiro, J., Santos, J., Sequeira, C., & Nunes, J. (2022). Energy transition process and community engagement on geographic islands: The case of Culatra Island (Ria Formosa, Portugal). *Renewable Energy, 184*, 700–711. https://doi.org/10.1016/j.renene.2021.11.115

Pacheco, A., Monteiro, J., Santos, J., Sequeira, C., & Nunes, J. (2022). Energy transition process and community engagement on geographic islands: The case of Culatra Island (Ria Formosa, Portugal). *Renewable Energy, 184*, 700–711. https://doi.org/10.1016/j.renene.2021.11.115

Patel, S., Holowach, M., & Anders, S. (2020). *Assessing Barriers to Renewable Energy Development in Alberta : Evidence from a Survey on Wind Energy with Rural Landowners.* Resource Economics and Environmental Sociology.

Pechancová, V., Pavelková, D., & Saha, P. (2022). Community Renewable Energy in the Czech Republic: Value proposition perspective. *Frontiers in Energy Research*, *10*. https://doi.org/10.3389/fenrg.2022.821706

Phadke, R., Manning, C., & Burlager, S. (2015). Making it Personal: Diversity and Deliberation in Climate Adaptation Planning. *Climate Risk Management, 9*, 62-76.

Polkinghorne, D. E. (1989). Phenomenological Research Methods. *Existential-Phenomenological Perspectives in Psychology*, 41–60. https://doi.org/10.1007/978-1-4615-6989-3_3

Powell, W. W., Packalen, K., & Whittington, K. (2012). Organizational and institutional genesis. *The Emergence of Organizations and Markets*. https://doi.org/10.23943/princeton/9780691148670.003.0014

Punt, M. B., Bauwens, T., Frenken, K., & Holstenkamp, L. (2022). Institutional relatedness and the emergence of renewable energy cooperatives in German districts. *Regional Studies*, *56*(4), 548–562. https://doi.org/10.1080/00343404.2021.1890708

Reagans, R., & McEvily, B. (2003). Network structure and knowledge transfer: The effects of cohesion and range. *Administrative Science Quarterly*, *48*(2), 240–267. https://doi.org/10.2307/3556658

Roby, H., & Dibb, S. (2019). Future pathways to mainstreaming community energy. *Energy Policy, 135*, 111020. https://doi.org/10.1016/j.enpol.2019.111020

Romsdahl, R., Blue, G. & Kirilenko, A. (2018). Action on climate change requires deliberative framing at local governance level. *Climatic Change 149*, 277–287. https://doi.org/10.1007/s10584-018-2240-0

Rosewarne, S. (2022). Breaking from the industrial energy generation model fossil fuel complex: Community Renewable Energy Cooperatives. *Contested Energy Futures*, 253–279. https://doi.org/10.1007/978-981-19-0224-6_10

Seyfang, G., & Haxeltine, A. (2012). Growing grassroots innovations: Exploring the role of community-based initiatives in Governing Sustainable Energy Transitions. *Environment and Planning C: Government and Policy*, *30*(3), 381–400. https://doi.org/10.1068/c10222

Shove, E., & Walker, G. (2014). What is energy for? Social Practice and energy demand. *Theory, Culture & Society*, *31*(5), 41–58. https://doi.org/10.1177/0263276414536746

Shove, E., Pantzar, M., & Watson, M. (2012). *The dynamics of Social Practice Everyday Life and how it changes*. SAGE Publ. https://doi.org/10.4135/9781446250655

Silvius, G. (2023, Dec 6). "Bissell Thrift Shop launches solar array". Rat Creek Press. https://ratcreek.org/2023/12/06/bissell-thrift-shop-launches-solar-array/

Sovacool, B., & Geels, F. (2016). Further reflections on the temporality of energy transitions: a response to critics. *Energy research and social science, 22*, 232-237.

Steg, L., Perlaviciute, G., Sovacool, B. K., Bonaiuto, M., Diekmann, A., Filippini, M., Hindriks, F., Bergstad, C. J., Matthies, E., Matti, S., Mulder, M., Nilsson, A., Pahl, S., Roggenkamp, M., Schuitema, G., Stern, P. C., Tavoni, M., Thøgersen, J., & Woerdman, E. (2021). A research agenda to better understand the human dimensions of energy transitions. *Frontiers in Psychology, 12*. https://doi.org/10.3389/fpsyg.2021.672776

Stephenson, A. (2023, Nov 21). "TransAlta going greener: Power generator to spend $3.5B on renewables by end of 2028". CBC News. https://www.cbc.ca/news/canada/calgary/transalta-green-power-electricity-profit-renewables-1.7034936

Suncor Energy announces 2024 corporate guidance. (2023, December 5). Boe Report. https://boereport.com/2023/12/05/suncor-energy-announces-2024-corporate-guidance/

Tarhan, M. D. (2015). Renewable Energy Cooperatives: A review of demonstrated impacts and limitations. *The Journal of Entrepreneurial and Organizational Diversity*, *4*(1), 104–120. https://doi.org/10.5947/jeod.2015.006

Teherani, A., Martimianakis, T., Stenfors-Hayes, T., Wadhwa, A., & Varpio, L. (2015). Choosing a qualitative research approach. *Journal of Graduate Medical Education*, *7*(4), 669–670. https://doi.org/10.4300/jgme-d-15-00414.1

The Paris Agreement, 4 November 2016. https://www.un.org/en/climatechange/paris-agreement

UNEP. 2016. *The Emissions Gap Report 2016*. Nairobi: United Nations Environment Programme.

Wagemans, D., Scholl, C., & Vasseur, V. (2019). Facilitating the energy transition—the governance role of local Renewable Energy Cooperatives. *Energies, 12*(21), 4171. https://doi.org/10.3390/en12214171

Wahlund, M., & Palm, J. (2022). The role of Energy Democracy and energy citizenship for Participatory Energy Transitions: A comprehensive review. *Energy Research & Social Science*, *87*, 102482. https://doi.org/10.1016/j.erss.2021.102482

Walker, G. (2008). What are the barriers and incentives for community-owned means of energy production and use? *Energy Policy*, *36*(12), 4401–4405. https://doi.org/10.1016/j.enpol.2008.09.032

Walker, G., & Devine-Wright, P. (2008). Community renewable energy: What should it mean? *Energy Policy*, *36*(2), 497–500. https://doi.org/10.1016/j.enpol.2007.10.019

Waterman, S. (2022, Sep 5). "*Reading Hydro's Story*". Carbon Copy. https://carboncopy.eco/initiatives/reading-hydro-cbs

Weber, B. (2023, December 25). Alberta's renewable energy pause could become lingering stumble, observers say. Calgary Herald. https://calgaryherald.com/news/politics/alberta-renewable-energy-pause-could-become-lingering-stumble#:~:text=EDMONTON%20%E2%80%94%20It%20was%20just%20supposed,an%20industry%20growing%20beyond%20expectations.

Wiles, R., Crow, G., Heath, S., & Charles, V. (2008). The Management of Confidentiality and Anonymity in Social Research. International Journal of Social Research Methodology, 417-428. DOI: 10.1080/13645570701622231

Williams, S., & Doyon, A. (2019). Justice in energy transitions. *Environmental innovation and societal transitions, 31*, 144-153.

Wolsink, M. (2012). Wind power: Basic challenge concerning social acceptance. *Encyclopedia of Sustainability Science and Technology*, 12218–12254. https://doi.org/10.1007/978-1-4419-0851-3_88

Wynne, B. (1998). May the sheep safely graze? A reflexive view of the expert–lay knowledge divide. *Risk, Environment and Modernity: Towards a New Ecology*, 44–83. https://doi.org/10.4135/9781446221983.n3

Wynne, B. (2011). *Rationality and ritual participation and exclusion in nuclear decision-making.* Earthscan.

Yenneti, K., & Day, R. (2015). Procedural (in) justice in the implementation of solar energy: The case of Charanaka solar park, Gujarat, India. *Energy Policy, 86*, 664-673.

Yin, R. (1981). The case study as a serious research strategy. *Science Communication 3*(1), 97–114.

Yoo, Y.-S., Hwang, T., Kang, S., Newaz, S. H. S., Lee, I.-W., & Choi, J. K. (2017). Peer-to-peer based energy trading system for heterogeneous small-scale ders. *2017 International*

Conference on Information and Communication Technology Convergence (ICTC). https://doi.org/10.1109/ictc.2017.8190789

Zhao, D., Zuo, M. & Deng, X.N. (2015), Examining the factors influencing cross-project knowledge transfer: an empirical study of IT services firms in China, *International Journal of Project Management 33*(2), 325-340, doi: 10.1016/j.ijproman.2014.05.003.

Zhou, Q., Deng, X., Hwang, B.-G., & Yu, M. (2022). System dynamics approach of knowledge transfer from projects to the project-based organization. *International Journal of Managing Projects in Business, 15*(2), 324–349. https://doi.org/10.1108/ijmpb-06-2021-0142

Chapter Two: Bow Valley Green Energy Cooperative, an Introduction

2.1. Founding of the Cooperative

This chapter delves into the case study of Bow Valley Green Energy Cooperative in Canmore, Alberta. The purpose of this chapter is to explore how the cooperative emerged and its journey towards integrating renewable energy production into the community. Drawing on interviews and contextual materials, I provide insights into the formation and development of Bow Valley Green Energy Cooperative. Canmore is recognized for its scenic charm and vibrant lifestyle. To preserve its untouched surroundings and enhance power grid resiliency during crises, the town is prioritizing the integration of renewable energy production (Ehr et al., 2019). Bow Valley Green Energy was conceived of in early 2019 when the Canmore-based Biosphere Institute envisioned a "network of solar panels across our valley" and recruited a group of volunteers to implement it. With funding from Energy Efficiency Alberta's Community Generation Capacity Building Program, the Biosphere Institute initiated a feasibility study to identify suitable locations for a community-owned solar project in the Canmore region. During this process, they also began exploring community-based approaches to finance renewable energy projects. The Biosphere Institute collaborated with local community members and established a steering committee which later evolved into the founding board of directors for Bow Valley Green Energy.

Building upon the information gathered, we try to focus on the analysis of the data to gain deeper insights into the operations and impact of Bow Valley Green Energy Cooperative. In the research project we detail below we spoke to individuals involved in the establishment of the cooperative, and they described it in these terms:

> "So, one of the things we did was reach out to the community and say: hey, we want to do this, but we don't know how to do that. But do you know how to do it?! And we just got together a really talented, amazing group of people…". (Participant Two).

This participant adds:

> "And we were just so lucky that we had this pool of amazing people, who had all of this business, background, financial background, project management, lawyers, all of this come together…"

As this participant mentioned, despite starting with a group of volunteers and no budget, they engaged with professionals in the community. An interesting point is the broad range of skills and experience brought to the cooperative by its members, which significantly contributed to its success. Bow Valley Green Energy has seven member boards. The co-founders are a group of professionals with different backgrounds mostly in energy and environment areas. Some of them were retired professionals who have changed their path from heavy oil, mining and processing towards climate change issues. Interviews with key individuals involved in the cooperative's establishment highlight the collaborative spirit and expertise to drive the initiative forward. They emphasized the importance of networking and knowledge sharing with other organizations involved in similar initiatives, such as OREC (Ottawa Renewable Energy Co-operative) and SES solar co-op. They also sought guidance from ACCA (Alberta Community & Co-operative Association) and received valuable resources, including a guidebook and draft Power Purchase Agreements (PPA). Building strong relationships was a key factor in their success. A Power Purchase Agreement (PPA) is a contractual arrangement where a third-party developer installs and operates an energy system on a customer's premises. In exchange, the customer buys the electricity generated by the system over a set period. This agreement provides the customer with

stable, potentially inexpensive electricity without any initial expenses, while allowing the system owner to benefit from tax incentives and revenue from electricity sales (*Financing Navigator*, n.d.). While often associated with renewable energy, PPAs can also apply to other energy technologies like combined heat and power (CHP).

According to their goal their projects can be any renewable or alternative energy source, including hydro, solar, geothermal or wind. As Participant Two describes (below), Bow Valley chose to start developing the cooperative around solar because they were already familiar with some of the technology capacity and were well suited to get up and running with it more easily. They don't, however, preclude moving into other areas to capture the energy potential of the region:

> "We're starting with solar because it's easy. So, we know how to put it on ribs and we know how to make it work with volunteer capacity to do the basic level of assessments before we need to start paying money to bring in professionals. And we're definitely looking at wind options further down the valley because we have super windy [weather]."

The co-founders displayed a passion for sustainability and a commitment to making a positive impact. Their dedication to environmental responsibility, climate action, and community well-being continues to guide their efforts.

2.2. BVGEC Governance

The founders chose a for-profit structure which enabled them to generate income for the members and investors. Investment with Bow Valley Green Energy Cooperative offers individuals the opportunity to contribute financially to the renewable energy transition in their community. With a minimum investment of $1000, investors purchase shares at $50 each, with an anticipated rate of return at 2.4%. These investments support BVGEC's project portfolio,

ensuring returns from various renewable energy projects. On the other hand, membership, priced at $100 for a lifetime, allows individuals to support BVGEC's operations while gaining various benefits, including influencing the transition to renewable energy, running for a seat on the board of directors, accessing a local investment vehicle, supporting the local economy, and earning voting rights to influence decision-making processes. In their feasibility study as the first phase they decided to choose a small-scale generation way to connect a solar installation to the electricity grid. However, they altered their model to micro-generation by learning from a co-op business model in the UK and adapting it according to the regulations in Alberta. Participant Two discussed:

> "The idea for the power purchase agreement and the micro generation model came from a solar co-op in Brighton (UK).They really helped with that initial shift and shared their financial model with us. This was for the church approach. And it wasn't necessarily relevant because of the regulation difference."

Brighton Energy Cooperative operates within the regulatory framework of the UK, which includes incentives like the Feed-In-Tariff scheme to support renewable energy generation. Their approach may not directly apply to Alberta's regulatory context. Bow Valley Green Energy Cooperative operates within Alberta's regulatory framework, which differs from that of the UK. Alberta does not have a Feed-In-Tariff system, and its energy system has distinct characteristics. BVGEC adapted the concepts and financial model shared by Brighton Energy Cooperative to suit the regulatory environment and energy system in Alberta. This involved modifying the approach to fit local conditions while retaining the core principles of the cooperative model. BVGEC model is:

> "…pretty similar to what the Ottawa renewable co-op, but Ottawa co-op revenue stream is a little bit better because they had the Ontario government at the time they got going with feed in tariffs, which are pretty lucrative on they're selling energy into the grid." (Participant Five).

There is no feed-in tariff in Alberta but still they believed that they could move fast. The reason that BVGEC could move forward faster is the regulatory environment in Alberta where almost anybody can produce and sell energy to anybody without regulatory constraint "particularly behind the meter type of installations that BVGEC have put in" (Participant Five). According to BV business model there isn't any obstacle from the government. Participant Five added: "If we were to produce more than what the microgeneration regulations allowed, we might be into some challenges." Nevertheless, they expressed the potential for government support; Participant Five articulate this sense of hope in the following interview extract:

> "I think the area where government could help is providing incentives to investors, through tax deductibility of their purchasing, or purchasing shares in a co-op. Other coops have TFSA (Tax-Free Saving Account) and RRSP (Registered Retirement Savings Plan) eligibility, the cost of doing that for us is burdensome so that is on our radar screen, but we're not there yet".

According to one of the documents provided, BVGEC was also actively seeking red tape reduction for its Canmore Community Solar initiative, aimed at establishing a community-owned solar energy project in or near Canmore, Alberta. Although they were not successful in changing the regulation, BVGEC made efforts to adapt to the existing regulatory framework and continue their initiatives.The cooperative, in innovating a business and financing model, has had to adapt

and the context created by a local regulatory environment, and this adaptation thus over time has constituted a central area of learning for the organization.

In relation to the initial funding phase, they started with the directors' loans. Three of the board members provided the first money they needed for their first project. They approached their family and friends and raised around $10,000 but still didn't have enough inflow of investment. They believe that banks aren't eager to invest in their projects. Participant One mentioned:

> "I've met with lots of them. The problem with this array here [is that] 20% of that $200,000 is the solar panels, [it is] easy to reclaim with the stuff. So from a security perspective, they don't have a lot and banks don't have a clue how to use a power purchase agreement in the security stock".

Banks are hesitant to invest in their projects because traditional banking institutions struggle to understand how to incorporate power purchase agreements (PPAs) into their security measures. While solar panels are tangible assets, comprising only 20% of the array's value, the real value lies in the long-term PPAs with major corporations. However, banks are unfamiliar with treating PPAs as valuable security instruments, making it difficult for renewable energy projects to secure traditional bank financing. As a result, they are exploring alternative lending institutions more open to considering PPAs as viable security assets. In order to raise money they referred to different non-traditional lending institutions to see if they will work with their PPA (Power Purchase Agreement). Participant One mentioned:

> "I'm basically just meeting all kinds of organizations to try to raise the debt funding or some other form of funding because going to the community and using friend and family we're getting $10,000 but we need hundreds of thousands to meet".

This aligns with the existing literature, indicating that renewable energy cooperatives (RE co-ops) may appear less appealing to financial lenders and investors primarily due to their focus on profit maximization (Huybrechts & Mertens, 2014). Bow Valley, due to the challenge of raising investment, or securing financial loans, are in the contradictory position of receiving interest for expanding projects and developing new partnerships, but without secure financing to exploit those opportunities. Simply, they have many projects but not enough money, as participant One describes, contrasting a growing organization with the inability to staff the cooperative properly:

> "Now, from a business perspective, where we've got so much stuff going on, where we don't have enough economic maturity, to be able to afford staff to help carry the day-to-day operations".

They are predominantly volunteer-run, with retirees dedicating their time and expertise for free. Positions include administrative roles, energy marketing, and office management, with plans to hire an administrator and office manager in the future. Participant Five stated:

> "We're hoping to grow that to a point of passive income stream from energy sales that will allow us at some time in the future to hire administration and office manager that wears multiple hats that actually takes the load off the volunteers."

In an interview with a leader in the Bow Valley Cooperative (participant One), they described finding their "sweet spot", in developing successful projects, and what has subsequently become a strategic focus for the cooperative. This includes the creation of partnerships and power purchasing agreements with building owners with long term commitments to their properties. This happens while they don't have the capital, or choose not to deploy the capital, for developing green energy projects themselves, "but they've got the space, and the demand for electricity that" (Participant One). Bow Valley then operates to install the solar panels and

associated electrical system, and creates a power purchasing agreement with the partner. The payback period for the partner is 15 years and: "after the 15-year period, these projects will start to generate surplus revenues and that will be a source of potentially investment", as described by a further participant (Participant Three). Rocky Mountain Community Energy is a part of Bow Valley Energy Cooperative. They work as energy marketer and sell their utility package including electricity, natural gas, Internet and solar club to the local community members. Within this enterprise they try to support BVGEC activities. It's a new enterprise (less than six months) and they have dozens of customers. Their goal is to have thousands of customers to have a fiscal security. Participant One said:

> "If we can get to a thousand, it provides the economic maturity for this organization to be able to go through the normal variances that occur with project-based operations".

The rationale for developing Rocky Mountain Community Energy lies in its role as a sales agent for energy and sustainability products through Utility Net, a company with multiple energy marketing firms. By growing its customer base, Rocky Mountain Community Energy aims to achieve economic stability, which would enable BVGEC to navigate the fluctuations typical of project-based operations. This approach allows the cooperative to leverage existing infrastructure and resources while expanding its reach and impact in the renewable energy market. BVGEC is also directly connected to the Biosphere Institute and through this institute they can apply to receive some grants to create some of their documents. Participant Two said:

> "We paid a business specialist to create our business plan… The biosphere paid for a lawyer for Bow Valley Green energy, and to have their subscription agreement written and help with financial modeling and working with solar contractors to work through the physical side."

The relationship between BVGEC and the Biosphere Institute has been one of the significant supports during BVGEC's initial stages. The Biosphere Institute provided financial assistance through grants to create essential documents like the business plan and subscription agreement. Additionally, they offered support in legal matters and financial modeling, as well as in coordinating with solar contractors for physical infrastructure development. While the Biosphere Institute continues to offer support for environmental education projects that align with BVGEC's mission, BVGEC is now expected to stand on its own financially. Any future support from the Biosphere Institute will depend on grant availability and project alignment with environmental education objectives.

2.3. BVGEC Projects

The first project was Ralph Conner Memorial United Church with $25,000. In this project, Bow Valley Green Energy Cooperative (BVGE) received support through the United Church of Canada, demonstrating its commitment to support renewable energy initiatives in faith communities. This strategic collaboration is consistent with the overall goal of the United Church to encourage and facilitate the transition to renewable energy sources. Participant Five mentioned: “And both on the Ralph Connor church our first installation, we received a grant through the United Church of Canada that assists churches in moving towards renewables”. In the Ralph Corner project, the cooperative sells 100% of the electricity produced by the solar panels to the church. The innovative side is in the decision-making power given to the congregation later. After purchasing the electricity, the church has the right to determine the optimal use of the electricity produced. It is a dynamic choice - if it wishes, the church can also consume electricity internally for its energy needs, which promotes economy in its premises. Alternatively, the church has the option of selling excess electricity back to the grid for 25 cents

(per kWh). This model not only shows BVGE's commitment to promoting sustainable energy practices, but also empowers local communities, such as churches, to actively participate in energy transition. The cooperative's ability to navigate and benefit from such support opportunities demonstrates its strategic approach to collaborative partnerships and its commitment to promoting the adoption of renewable energy in various settings.

The Second project was I-Place Phase one which was $225,000 investment with a significant progress in financing. (I-Place is a building in Canmore with commercial and residential units.) In this project they received an “energy savings for business grant” from the provincial government. Participant Three explained:

> “Every unit in this building commercial and residential has their own power meter and tastes separately to the utility. So right now electrons just basically go through the separate meter and then can go out to the grid or to the users here in the building, wherever it is demand for electricity.”

Participant One also added: “We sell a 100% of the energy that is produced by the panels to the building and they buy 100%. We sell into a pool, people draw from a pool”. An important part of this project was the acquisition of an energy saving grant for commercial use from the government, which demonstrated BVGE's ability to use state support to support its projects. The unique design of I-Place Phase 1, where each unit, be it commercial or residential, has its own power meter, is a testament to BVGE's commitment to individual energy solutions. This approach ensures that the generated electrons are directed either to the grid or to meet the specific needs of the building, resulting in an efficient energy distribution system.

They have completed two additional projects since our interviews and have several more projects to develop in the future. The recently agreed BAYMAG Exshaw project is a big step up

for the cooperative, and involves a collaborative effort between the BVGEC, Baymag Inc., and KCP Energy to establish the largest solar array in the Municipal District of Bighorn. This 291 kW photovoltaic system is situated on the rooftop of a process building at Baymag's Exshaw magnesite mining operation. The project aims to produce approximately 300,000 KWH of renewable electricity annually, contributing to a significant reduction of 240 tonnes of carbon dioxide emissions from Alberta's electricity grid each year. In addition to its ongoing initiatives, BVGEC has embarked on another project in collaboration with Temple B'nai Tikvah. On November 8, 2023, this joint effort achieved a significant milestone as solar energy production commenced, marking the completion of BVGEC's fourth solar installation and the first community-owned installation in the City of Calgary. They also have two more projects in Canmore which are in the financing phase.

Figure 3.

BVGEC's first project - Ralph Conner Memorial United Church

Note. The photo is from ***https://www.bvgreenenergy.org/project-one-rcmuc***

2.4. BVGEC Challenges

The challenges faced by the BVGE cooperative, as discussed by the interviewees, are vital considerations in the pursuit of their goals. These challenges encompass various aspects with unique hurdles and highlight the complexities of managing community energy initiatives within a cooperative framework.

One significant challenge for the cooperative was selling their product while also keeping the price low enough to be attractive in a competitive environment. In the process of their development it is important to sell their energy product while ensuring a competitive price point. Participant Five says:

> "You need to be able to sell a product that is competitive with the alternatives that the host pays right now. They're buying from the bank from the grid, the alternative is buying from us, and we have to have a price that it's equivalent or very near to what others are selling for. So some of the challenges there are keeping that price low".

This participant mentions the importance of aligning their product pricing with existing alternatives in the market. This reveals the complex dynamics in determining a price that is not only attractive to potential customers but also economically viable for the cooperative. Achieving this balance requires a comprehensive understanding of the broader market trends, consumer preferences, and cost structures. The need to keep the price low isn't just a matter of affordability for consumers; it involves strategic positioning in a dynamic energy market where various factors influence pricing structures, including grid alternatives and banking options.

In addressing this challenge, as mentioned before in a quotation from Participant Two, the cooperative could benefit significantly from the involvement of individuals with diverse

backgrounds, particularly those in marketing, business, and even professionals from the oil and gas industry. Another participant also added:

> "And one of the interesting things that are coming up is, we've got a number of young professionals that are actually working in the oil and gas industry, and they're looking to gain experience and the knowledge that will allow them at some point in time to transition to the renewable energy field" (Participant Five).

The involvement of professionals from the oil and gas industry brings a unique perspective to the table. These professionals can offer a fresh lens through which the cooperative can analyze and refine its pricing strategies, drawing upon their industry-specific knowledge to position themselves effectively against alternative energy sources.

A second barrier for the cooperative was making their business model more attractive. This challenge is more about engaging individuals who prioritize financial considerations in their investment decisions. In this situation the cooperative must navigate the balance of offering a financial package while promoting the inherent benefits and values of renewable energy. Participant Two said:

> "We need to figure out how to make our model as attractive to the people who just look at the numbers. And if they're not, if they can make 8% over here with these guys by an oil and gas share, or they can make 2.5% over here with those bio and renewable energy".

A third challenge of the co-op was gaining the participation of professional volunteers; an essential aspect of any volunteer run organization, and a challenge which is common in the development of cooperatives. Dependence on the contributions of a committed group of volunteers possessing essential financial, legal, and technical expertise is vital for the co-op's success and impactful initiatives (Walker, 2008).Participant Five said:

> "The third emerging challenge is the capacity of our volunteer base to deliver and getting the right people that have the capabilities, the legal background, the accounting background, the technical background, to move these forward".

According to what this participant mentions, it is important to align volunteers' backgrounds with the specific demands of tasks or projects. The participant goes beyond skill acquisition, recognizing the need for volunteers who can effectively execute initiatives and move them forward, suggesting a deeper requirement for practical application of expertise. So, ensuring diversity in volunteer recruitment is essential for an inclusive team needed in cooperative activities.

A last challenge for the co-op was raising money: The challenge of securing funds for projects which is common for many cooperatives is also highlighted by participants of this research. Participant One stated:

> "if you look at the Ottawa co-op, they've got 60 to 70 million dollars with the assets built developing an ROI (Return on Investment) for them and that gives them the freedom where they can actually build its entire asset from their own internal capital tool and then go to the market because they've done a history of solutions, history of producing a long-term return and the market invests, and then that replenishes the capital pool and then they take on another project. We need to get to that level of maturity".

In a similar vein, participant Five contrasted the situation at Bow Valley with recent capital fund raising by Vancouver co-op: "we've looked at how Vancouver renewable did a recent capital raise for installing solar panels on a winery in the Okanagan Valley." Participants talked about successful practices from Vancouver Renewable and the Ottawa co-op, showcasing the importance of studying capital raise initiatives. By addressing these practices, co-ops can

mobilize knowledge to identify best practices, learn from effective strategies, and potentially adapt successful models to their own fundraising efforts. The Ottawa co-op's use of internal capital tools highlights the significance of developing internal financial mechanisms, reducing reliance on external funding and providing greater financial flexibility. This successful approach enhances confidence in both cooperatives and potential investors, increasing the likelihood of securing financial support for new initiatives. It also encourages cooperatives to establish and leverage their capital pool to have a sustainable cycle for undertaking new projects.

2.5. Strategies of Knowledge Mobilization

Strategies of Knowledge Mobilization encompass a diverse range of approaches employed to effectively share and utilize knowledge across various domains. By exploring these strategies, we gain a deeper understanding of how knowledge flows, disseminates, and ultimately contributes to informed decision-making, innovation, and societal progress. Table 2 (Appendix D) represents participants' strategies to learn from other co-ops and Table 3 (Appendix D) represents Participants' strategies to transfer their knowledge to others.

According to the information provided in Table 2 and Table 3 (Appendix D), areas of knowledge mobilization is as the following: establishing a co-op, raising money, preparing agreements and contracts, permitting needed for projects, dealing with hosts, switching from other areas and financial models.

In conclusion, the case study of Bow Valley Green Energy Cooperative in Canmore, Alberta, offers valuable insights into the evolution of community-driven efforts to integrate renewable energy production. With a diverse founding membership and strategic networking with similar organizations, Bow Valley Green Energy Cooperative showcases the potential for impactful environmental initiatives within local communities. Bow Valley Green Energy

Cooperative operates under a for-profit structure, enabling members and investors to contribute financially to renewable energy projects. Collaboration with the Biosphere Institute during BVGEC's inception was instrumental in laying the groundwork for its success. Volunteer-driven and reliant on retirees' expertise, BVGEC seeks economic stability through strategic partnerships within the community. From navigating a competitive market while keeping prices competitive to attracting investors and volunteers with diverse backgrounds, BVGE faces multifaceted obstacles moving forward. Strategies to address these challenges involve leveraging professionals from various industries, refining business models to attract investors, and ensuring the availability of skilled volunteers. Additionally, the challenge of raising funds highlights the importance of studying successful fundraising initiatives from other cooperatives, emphasizing the need to develop internal financial mechanisms for sustainable project undertakings.

In the next chapter, attention will be directed towards exploring the dynamics of knowledge mobilization within Bow Valley Green Energy Cooperative and how they may be influenced by various factors. This exploration will provide valuable insights into the evolving landscape of KM in community-based renewable energy initiatives and its implications for sustainable development.

2.6. References

Ehr, C., Patterson, E. & Donegan, T. (2019). Rooftop solar in Canmore: A neighbourhood by neighbourhood analysis. https://canmore.ca/documents/planning-building-development/signposts-to-sustainability/3109-rooftop-solar-in-canmore-final-report

Financing Navigator (n.d.). Better Buildings Solution Centre. https://betterbuildingssolutioncenter.energy.gov/financing-navigator/option/power-purchase-agreement#:~:text=A%20PPA%20allows%20the%20customer,from%20the%20sale%20of%20electricity.

Huybrechts, B. & Mertens, S. (2014). The Relevance of the Cooperative Model in the Field of Renewable Energy. *Annals of Public and Cooperative Economics, 85*(2): 193-212. DOI: http://dx.doi.org/10.1111/apce.12038

Chapter Three: The Importance of Knowledge Mobilization in Establishing Community Energy in Alberta: A Case Study of the Bow Valley Renewable Energy Cooperative

3.1. Introduction

Beginning the transformative journey towards a comprehensive and just energy transition, novel approaches, particularly those emphasizing knowledge mobilization, are important for fostering greater engagement and participation. One such approach is the paradigm of Community Energy (CE), a social innovation that embodies a citizen-centric ethos and fosters active participation in addressing societal challenges (Hewitt et al., 2019). Community energy projects encompass a wide array of renewable energy endeavors, from solar farms to wind turbines, united by the common thread of local community ownership. Community energy refers to energy initiatives done by, and for, the collective welfare and advantages of a local population. Community stakeholders are involved in various aspects of energy projects, ranging from power generation to the distribution and management of demands (Hoicka and MacArthur, 2018). These projects not only strive to bolster economic, social, and environmental well-being within the host communities but also offer a gateway to broader global benefits, such as carbon emissions reduction (Walker & Devine, 2008).

Crucially, this energy transition necessitates the emergence of a new breed of active actors who transcend the role of mere energy consumers and evolve into energy 'prosumers.' Prosumers represent community members who not only consume energy but actively participate in its local production and distribution (Bauwens et al., 2016; Pechancová et al., 2022). The local community, in this context, serves as the ideal breeding ground for this transformation, influencing economic, social, and political dimensions. To facilitate this shift, the ownership and implementation of renewable energy projects play pivotal roles (Walker, 2008).

By delving into the realms of social innovation (due to its adaptability in response to crises and opportunities, the active involvement of civil society, the reconfiguration of social

practices and institutions, and the adoption of new working methods), renewable energy cooperatives (RE cooperatives), as one form of community energy, present an opportunity to drive social change, foster energy democracy, and empower communities (Hewitt et al., 2019). These community-driven bottom-up approaches exhibit the power to augment social awareness and instigate behavior change, particularly in the context of climate change (Dall-Orsoletta et al., 2022). Within the framework of community innovation, the continuity of knowledge mobilization behavior within the community plays a pivotal role (Xue et al., 2016). Knowledge sharing, as highlighted by Sun et al. (2019), bridges knowledge gaps among network members, enabling those with rich knowledge resources to diffuse knowledge to those with lower knowledge resources. Such knowledge sharing improves performance and fosters the creation of new knowledge, enhancing capabilities (Asheim et al., 2011; Kong, 2019). The evolving landscape of knowledge mobilization further enhances the prospects for a successful energy transition.

Drawing from insights gained in another industry, the significance of local knowledge to inform strategies within renewable energy cooperatives can be made clear. Bell's research (2020) explores the significance of considering local knowledge and context in policy-making, especially in the context of waste siting for nuclear issues. According to an ethnographic study in Ontario, Canada, it was identified that policy-making without bringing up local knowledge may influence procedural justice in nuclear issues. Procedural justice which means the integration of individuals in the decision-making process is important since it pertains to the fair and equitable integration of individuals particularly in complex and sensitive issues such as nuclear waste siting. Bell (2020) believed that it was the result of low engagement due to fear of consequences. This involves not only sharing knowledge, but also considering geographic nuances to include all

stakeholders, especially marginalized groups, in decision-making processes, ensuring a fair and inclusive approach.

In order to foster collaboration and knowledge exchange at the local level, as one example, Evers et al. (2010) introduce the concept of knowledge hubs, innovative systems at the local level facilitating the production and sharing of knowledge. These hubs are characterized by high connectivity, both internally and externally, and strong networking and knowledge-sharing capabilities. Their functions include generating knowledge, transferring knowledge to places of application, and disseminating knowledge through education and training. The importance of smooth communication flow within organizations, sectors, and industries is emphasized for effective knowledge sharing, a key factor in achieving long-term success and performance improvement (Grigorescu et al., 2021). The type of knowledge that has been transferred in the study by Grigorescu et al., 2021 is explicit, implicit, and tacit knowledge within economic and policy decision-making processes. The problem being addressed is the lack of connectivity and understanding of these mechanisms and functions, which creates barriers to information and knowledge exchange in the market of renewable energies. The proposed solution involves setting up innovation clusters specific to regions and industries, aiming to bridge the network between human resources, information, and knowledge resources. These clusters facilitate the transfer of both explicit and tacit knowledge, encompassing documentation, processes, mechanisms, routines, practices, and norms. Explicit knowledge is characterized as objective, rational, sequential, and digital, while tacit knowledge is subjective, experimental, simultaneous, and analogical (Chini, 2004). Therefore, the knowledge being transferred addresses the need for improved connectivity and understanding within economic and policy decision-making

processes, enhancing information exchange and fostering innovation within regions and industries.

The focus of this paper rests upon the integral role of knowledge mobilization in the context of renewable energy cooperatives, underscoring its potential to enhance community engagement, and promote sustainable development. It explores the multifaceted landscape of knowledge mobilization behavior within the case study of (BVGE Cooperative) and the cooperatives with which it has interacted. Results shed light on the way these organizations learn from one another to tackle the challenges they face. The core objectives of this research are to investigate the role of knowledge mobilization in renewable energy cooperatives as they navigate their challenges, and the factors that may affect knowledge mobilization.

In sum, this research aims to provide a vantage point from which to understand the dynamics of knowledge mobilization among renewable energy cooperatives, ultimately contributing to a more comprehensive and democratic approach to energy transition. The research aims to uncover the key areas where knowledge mobilization is most impactful and the pivotal factors that influence this process. By bridging the gap between research and practice, it offers insights into the strategies that have the potential to empower communities, foster engagement, and accelerate the global shift toward sustainable, renewable energy futures.

3.2. Literature Review

3.2.1. Renewable Energy Cooperatives:

Renewable Energy Cooperatives (RE cooperatives) play an emerging role in driving a sustainable energy transition at the local level, particularly emphasizing democracy, decarbonization, and decentralization (Rosewarne, 2022). They function as alternatives to

conventional energy systems which are criticized for their lack of community participation and democratic control, along with their high greenhouse gas emissions (Becker & Naumann, 2017). Unlike global and corporate energy models, RE cooperatives have potential to localize decision-making, encouraging active engagement and ownership among community members. This distinction sets them apart, fostering a more inclusive and participatory framework for sustainable energy initiatives. Promoting more renewable energy sources, they are able to reduce greenhouse gas emissions.

RE cooperatives are the outcomes of growing public dissatisfaction with large conventional energy companies. They reflect a global shift towards cleaner, more sustainable energy alternatives, driven not only by environmental concerns but also by the desire for greater energy independence, stable energy supply, and lower energy costs (Heras-Saizarbitoria et al., 2018). Europe offers a great deal of experience in the establishment and operation of renewable energy cooperatives. Examples in Spain and Poland illustrate this point. In Spain, the emergence of RE cooperatives was driven by public dissatisfaction with the dominance of five major electric companies over the energy market and their control over energy prices. The potential to overcome this monopoly, particularly with regard to electricity prices, has made RE cooperatives a politically charged issue (Heras-Saizarbitoria et al., 2018). Huybrechts also believe that dissatisfaction is an important factor in emerging RE cooperatives. Cooperatives address transparency concerns by offering locally produced energy, providing citizens with clear insight into its origin. Furthermore, many RE cooperatives, such as EWS in Germany, Middelgrunden in Denmark, Enercoop in France, and Ecopower in Belgium, implement transparent and simplified pricing mechanisms for electricity supply (Huybrechts & Mertens, 2014).

In Poland, electricity price inflation and concerns about power scarcity have led to a slow yet promising shift towards renewable energy, particularly photovoltaic panels. Fruit farmers with available roof areas on their structures such as cold storage facilities and land, have faced the burden of electricity expenses. These farmers are interested in becoming part of energy cooperatives by adopting micro-scale renewable energy solutions (Łakomiak, 2022). This transition has been hindered by a lack of supportive legal policies such as incentives (Łakomiak, 2022). While energy cooperatives might not always provide an economic solution, Poland presents potential for their development through fruit farms, provided that supportive regulations undergo necessary changes (Łakomiak, 2022).

Another factor that can impact the emergence of energy cooperatives returns to the concept of trust and mistrust. The example of Brighton and Hove in the UK demonstrates how ideological and institutional distrust among the community, both in the market and government, spurred the development of bottom-up initiatives, such as community energy projects (Lehtonen and de Carlo, 2019). This sense of distrust led to the survival and independent growth of these organizations without government support (Lehtonen and de Carlo, 2019). Economic conditions, particularly fuel poverty and political factors like the lack of liberalization in the energy market, have also driven the emergence of RE cooperatives (Capellán-Pérez et al., 2018). Some studies indicate that the resistance of the regime presents a significant obstacle to the development of RE cooperatives (Capellán-Pérez et al., 2018). The resistance of existing regimes, particularly national governments and utilities, stems from their persistent commitment to traditional energy sources such as nuclear, gas, and coal, despite the urgency of addressing climate change. This commitment is evident in their reluctance to transition to renewable energy sources, resulting in limited substitution effects and hindering the progress of low-carbon transitions. The failure to

meet climate targets, as highlighted by the International Energy Agency, reflects the entrenched resistance within incumbent regimes to shift away from fossil fuels, impacting the advancement of renewable energy cooperatives (Geels, 2014). This case study (BVGEC) also exists in similar sociopolitical context including government resistance as seen in Alberta, where there is a heavy reliance on the oil and gas industry. Fossil fuel extraction deeply permeates Alberta's economy, politics, and culture, influencing the societal acceptance of Community Energy (CE). Conflicts surrounding energy projects in this context are multifaceted, extending beyond individual attitudes and local concerns to encompass broader regional, national, and international factors that shape public perception, issue representation, and practices. Furthermore, renewable energy development in Alberta has encountered a significant setback following the announcement by the United Conservative Party government in August 2023, imposing an immediate seven-month pause on all new projects associated with renewable electricity generation.

3.2.2. Motivations and Challenges for the development of RE Cooperatives:

Community energy projects offer a pathway to developing diverse business models for renewable energy, furthering the goals of enhancing democracy and empowerment within communities (Robby & Dibb, 2019). Walker (2011) has introduced five kinds of community energies: 1) cooperatives, 2) locally based charities or social enterprises, 3) local energy service companies, 4) local government projects and 5) non-local cooperative ownership. The differences among different forms of community energy lie in the varied social arrangements governing their setup, development, management, and operation. While cooperatives are often highlighted within the realm of community energy, other models exist. For instance, some projects are managed by local charities or social enterprises, while others are run by locally

owned energy service companies (ESCOs). Additionally, some projects see significant involvement from local governments in developing and operating energy infrastructure on behalf of the community. Furthermore, there are projects where ownership is not locally focused but extends to a wider network of shareholders. These diverse models showcase the flexibility and adaptability of community energy initiatives, each tailored to suit the unique needs and contexts of their respective communities (Walker, 2011). Projects like this face various challenges, including issues related to top-down versus bottom-up approaches, stakeholder engagement, and economic considerations (Robby & Dibb, 2019). One crucial factor in establishing flexible, renewable energy-embracing communities is increasing small-scale adaptation and driving behavioral change among consumers. Achieving these goals requires the engagement of key stakeholders at all levels, from central governments to local communities (Robby & Dibb, 2019). For example aggregators as intermediaries have the role to support the development of energy market or local councils as facilitators have the role of supporting instead of leading these projects. This approach offers the advantage of enhancing community participation in decision-making processes, ensuring that communities receive the necessary support and expertise for the effective implementation of projects (Robby & Dibb, 2019). Policymakers should also acknowledge the role of aggregators, which can contribute to democratization, decentralization, and competition in community energy projects (Robby & Dibb, 2019; Bolton & Hannon, 2016). While the impact of democratization on energy transition varies based on several factors, and can differ between developed and developing economies, there is an overall positive relationship between democratization and renewable energy growth, particularly in developing nations (Clulow & M. Reiner, 2022).

Policies and regulations are essential for the development of renewable energy cooperatives. The UK's experience highlights the impact of government policies on community-owned renewable projects (Walker, 2008). While the lack of government support hindered the growth of community-owned renewables in the UK, other European countries experienced growth, particularly in the case of feed-in tariffs (Walker, 2008). Below, in outlining the policy and governance contexts in which CE and RE cooperatives in particular are emerging, we will discuss the particular importance of feed-in-tariffs.

Renewable energy cooperatives (RE co-ops) represent a type of community energy formed by a growing number of individuals and community groups. These cooperatives are established with the aim of offering bottom-up and collective solutions to address both local energy needs and broader global environmental concerns (Tarhan, 2015). Human factors play a crucial role in the development of RE cooperatives (Centgraf, 2018). Factors such as financing, lack of active members, deficient technical support, challenging political situations, and the absence of networking activities can hinder the progress of these organizations (Centgraf, 2018). On the flip side, involvement in energy cooperatives can lead to the satisfaction of human needs, including a sense of pride and connection among cooperative members (Centgraf, 2018).

Tarhan (2015) believes that there are some other barriers to developing RE cooperatives such as a lack of confidence in community members to do RE projects and low awareness among publics (non-members), governors, investors, and other potential stakeholders. The lack of monetary sources and supporting policies are the other obstacles. One instance demonstrating the impact of renewable energy cooperatives is highlighted in a survey conducted by Co-operatives UK. The survey found that members engaged in project development reported a heightened confidence in addressing local issues collectively over time. Specifically, participants noted the

empowering effect of raising funds from within the community rather than relying on external sources, such as large corporations (Willis and Willis, 2012, cited in Tarhan, 2015). Tarhan (2015) also argues that the right amount of trust among community members and previous experiences with community initiatives may affect the growth of RE cooperatives.

3.2.3. Policies and Governance:

In this section, I delve into a literature review focusing on policies and governance frameworks that influence and support community energy initiatives. Leonhardt et al. (2022) reviewed literature on government instruments supporting community energy and cooperatives projects. In their review, they found that the most important government policies in this context include financial supports, feed-in-tariffs, grid services (tools and regulations that govern access to the grid system, as well as laws controlling energy connection, transmission, and distribution) and fiscal incentives (tax deductions or waivers). The effectiveness of governmental tools in promoting community energy relies, in part, on the coordination and complementarity between various levels of government and the diverse instruments available (Leonhardt et al., 2022; Bomberg & McEwen, 2012).

Walker (2008) believed that the establishment of feed-in-tariffs was an important policy innovation in most European countries (excluding Scotland), and supporting the development of community renewable energy projects in these countries. A Feed-in Tariff (FiT) program is a policy mechanism that offers guaranteed prices for a specified duration for electricity generated from renewable energy sources (Couture & Gagnon, 2009). Feed-in tariffs provide stability and predictability for renewable energy investors and help promote the expansion of renewable energy generation. Even though there are some pros and cons regarding FiT programs.

According to Nolden (2013), however Feed-in Tariffs (FiTs) can benefit community-led projects by reducing their need for financial grants, they are unlikely to cause a major shift in the overall policy landscape, which still primarily favors large-scale energy developments. In other words, while FiTs help community initiatives, they don't fundamentally change the broader focus on big energy projects in policy decisions (Bauwens et al., 2016). He also points out that challenges such as initial investments, uncertainties regarding planning outcomes, and grid connection expenses represent significant constraints associated with FITs in the context of community energy initiatives.

In addition to state level interventions, such as feed-in-tariffs, local governments can also play pivotal roles in supporting RE coops get established, and in ensuring they succeed (Bayulgen, 2020). Local governments can significantly support renewable energy development in several ways. Firstly, they can utilize their control over infrastructure to enhance energy efficiency and increase renewable energy generation in municipal operations and buildings, setting an example for the community. Secondly, they can influence public behavior through education campaigns, promoting the benefits of clean energy. Lastly, local governments can enact supportive regulations and policies, such as streamlined permitting processes and financial incentives, to facilitate the adoption of renewable energy technologies (Bayulgen, 2020). It's also important to highlight the significant role that creative leaders within local governments play. Leaders with enterprising solutions for renewable energies, increased bureaucratic capacity in terms of professional energy experts and energy task forces, and a higher level of education at the local level all contribute to more proactive local governments in energy transition (Bayulgen, 2020).

The socio-political context of a region (Hoicka & MacArthur, 2018) and existing levels of trust in organizing renewable projects between local residents and project initiators (Trahan, 2015; Walker et al., 2010) significantly impact the success of renewable energy cooperatives. Comparative studies between Canada and New Zealand, both characterized by high greenhouse gas emissions, politically stable environments, advanced technologies, and instances of community energy projects, show differences in the level of privatization and support for renewable energies (Hoicka & MacArthur, 2018). In this regards, Hoicka & MacArthur (2018), highlight some useful differences in the context of cooperatives between Canada and New Zealand. Primarily these are evident in differences in ownership structures within the energy distribution sector between the two countries. In Canada, a substantial portion of distribution is owned by municipalities (35%) or cooperatives (33%) especially within Ontario, only a small number are owned by private corporations. By contrast, in New Zealand distribution is frequently owned by community trusts (52%). Another notable difference between Canada and New Zealand relates to the incentivizing of wind and solar projects. While many Canadian jurisdictions have actively promoted these renewable sources through power purchase agreements and feed-in tariffs, the New Zealand government has been comparatively slow in adopting similar incentives. Another difference lies in the prevalence of Indigenous ownership. In Canada, Indigenous-owned projects are less common, whereas In New Zealand, Indigenous ownership hold a larger share (Hoicka & MacArthur, 2018).

Addressing the policy and regulatory aspects of RE cooperatives necessitates considering governance. Governance involves the interactions between cooperatives and their members, the state, and other cooperatives (Wagemans et al., 2019). These interactions are pivotal for the energy transition. The governance roles of energy cooperatives include engaging citizens,

connecting government with citizens, creating knowledge and expertise, developing accepted change, and providing an integrated vision of sustainability (Wagemans et al., 2019). Key success factors for energy cooperatives include having local knowledge and connections, maintaining direct relationships with the state, being open and trustworthy, and avoiding commercial interests, which enhances public acceptance. Challenges that cooperatives face include the need to engage the public, the lack of a dense network grid, and disincentive regulations (Wagemans et al., 2019). Lack of a dense grid means that if a cooperative seeks to establish a solar farm, for instance, it would incur costs for connecting the farm to the grid. Given the limited density of the network, such a connection may need to span considerable distances, resulting in higher expenses. Meantime, navigating rules and regulations, including those set by the Consumer & Market Authority and government regulations (laws and policies), poses a significant challenge for cooperatives. Fortunately, the cooperatives collaborate to influence and change these regulations. However, these regulatory challenges divert their attention and resources, hindering their capacity to effectively drive the energy transition (Wagemans et al., 2019).

3.2.4. Knowledge Mobilization:

Knowledge mobilization is a pivotal factor influencing participation in renewable energy cooperatives (RE cooperatives) (Fischer et al., 2021). People's interest in these cooperatives is closely linked to their knowledge about them, with those lacking awareness showing less inclination to participate. Fischer et al. (2021) discovered that individuals with information about energy cooperatives express interest in volunteering or investing in renewable energy projects.

Knowledge in the context of mobilization is classified into two types: tacit and explicit knowledge (Nonaka & Takeuchi, 1995). Tacit knowledge is experiential, while explicit knowledge is documented and accessible through texts and databases (Nonaka & Takeuchi, 1995). Transferring tacit knowledge into explicit knowledge poses a challenge (Evers et al., 2010). Tacit knowledge is primarily derived from practical experiences and actions rather than explicit cognitive understanding: “A person can therefore do more than he or she knows” (Polanyi, 1967 cited in Evers et al., 2010). Face-to-face interactions and observation are deemed the most effective for transferring tacit knowledge and experiences. Local knowledge transfer can be facilitated by regional cooperation, knowledge hubs & clusters (Evers et al., 2010). Knowledge hubs play a role in supporting learning by providing a structured environment for the transfer of knowledge. They can represent a type of network (for example by facilitating events that encourage face-to-face interactions) where individuals or organizations collaborate and share insights leading to effective knowledge transfer. Clusters refer to localized networks of interconnected companies, universities, and associated institutions that emerge from mutual linkages or external influences across various industries. The concept of clusters underscores the organizational dimension of agglomerations, whereas 'hub' denotes the knowledge-sharing and dissemination aspect. Knowledge hubs can be situated within the same geographical areas as knowledge clusters and may be integrated within them. Knowledge hubs consistently serve as pivotal points in networks facilitating the sharing and dissemination of knowledge within and beyond clusters (Evers et al., 2010). In addition to intermediary organizations, there are also some other contextual factors influencing knowledge transfer in organizations. These include the organization's atmosphere (in an organization), incentive mechanisms, the temporary nature of projects, and time urgency. The research emphasizes the significance of a harmonious

organizational atmosphere and effective incentive mechanisms in facilitating knowledge transfer (Zhou et al., 2021).

The principles of tacit and explicit knowledge, as argued in the paragraph above, provide a preface for understanding the complex of knowledge dynamics within RE cooperatives. As we delve deeper into knowledge transfer within RE cooperatives, it is essential to consider additional factors that shape this process. Effective knowledge transfer within RE cooperatives hinges on three components: knowledge characteristics, context, and source or recipient attributes (Szulanski, 1996; Argote et al., 2022). Knowledge characteristics (as discussed earlier), refer to the attributes of the knowledge being transferred, with tacit knowledge being particularly difficult to convey (Szulanski, 1996). Contextual characteristics concern the organizational environment's impact on knowledge transfer (Szulanski, 1996). Source and recipient attributes consider the influence of differences between knowledge providers and recipients (Szulanski, 1996).

To enhance knowledge mobilization within RE cooperatives, learning from similar organizations and fostering networks is crucial (Bauwens et al., 2016). Cooperative development involves various actors, and strengthening cooperatives through shared learning and networking helps address challenges (Bauwens et al., 2016). "Institutional relatedness" significantly affects the emergence of local renewable energy cooperatives and regional policies (Punt et al., 2022). Knowledge and legitimacy can be transferred from cooperatives in different fields but in the same district which promotes the adoption of established business models (Punt et al., 2022). The term “transposition” here means “the mobilization and adaptation of existing institutions to organize and legitimize a new practice in another field” (Boxenbaum & Battilana, 2005; Powell et al., 2012 as cited in Punt et al., 2022) and can help to develop the RE market formation.

Local knowledge is vital in RE cooperatives, ensuring community needs and perspectives are considered (Corsatea, 2014). Studies in Italian regions show that locally produced knowledge, local researchers, and local research subsidies are linked to increased innovation in renewable energy (Corsatea, 2014). According to Bell (2020): "Local knowledge mobilization refers to how knowledge of local geographic context is used to shape decision-making processes". Bell (2020) emphasizes the role of local knowledge in decision-making, especially in nuclear issues in Canada. Policy-making without considering local knowledge can result in unintended consequences and affect procedural justice "from lack of engagement due to fear of repercussions, to a preoccupation with concurrent processes" (Bell, 2020).

In summary, understanding knowledge dynamics within renewable energy cooperatives (RE cooperatives) is crucial for their success. Tacit and explicit knowledge interactions, influenced by face-to-face interactions and organizational contexts, shape participation and effectiveness. Challenges include transferring tacit knowledge and navigating differences between knowledge providers and recipients. Enhancing knowledge mobilization requires learning from similar organizations, leveraging institutional relatedness, and valuing local knowledge. Addressing these issues is essential for fostering effective RE cooperatives and advancing renewable energy initiatives sustainably.

3.2.5. Power dynamics

Understanding power dynamics and their influence on various transition actors is important, extending beyond a sole focus on green innovations like community energy, in which energy cooperatives play a role (Geels, 2014). The democratic potential of public and

stakeholder engagement is heavily influenced by the power dynamics within the political-economic context (Adkin et al., 2017).

Geels (2014) explores how regime actors, particularly incumbent firms and policymakers, exert power to resist fundamental energy system change in the context of climate change and low-carbon transition. Resistance takes a variety of forms: 1) Instrumental Power: Involves using resources like authority, money, media access, personnel, and capabilities in immediate interactions to achieve goals. Regimes typically wield more power than niches in this regard. 2) Discursive Strategies: Involves shaping dominant discourses that not only set agendas but also dictate how issues are discussed. Policymakers and incumbent firms form a powerful discourse coalition in this realm. 3) Material Strategies: Involves leveraging technical capabilities and financial resources to enhance the technical dimension of socio-technical regimes. Technical innovations are often accompanied by promises and discourses to attract attention and resources. 4) Institutional Power: Encompasses broader influence embedded in political cultures, ideology, and governance structures. This form of power operates at the institutional level, shaping the overall context of resistance (Geels, 2014).

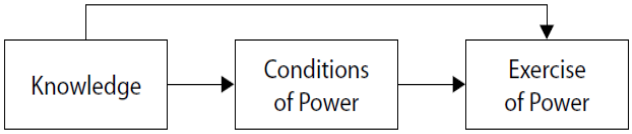
Both incumbent energy companies and energy cooperatives sought to employ their available resources to influence energy policies (Avelino, 2014). According to Avelino & Rotmans (2009), power is defined as the ability to mobilize resources and rests on four conditions: access to resources, strategies for mobilization, skills to apply methods, and the willingness to do so. Knowledge directly influences all of these conditions, acting as a meta-condition for the exercise of power. Creating and transferring knowledge is a kind of exercising power. Therefore, understanding how energy cooperatives mobilize resources, shape discourses,

and navigate institutional power dynamics is vital for comprehensively analyzing the dynamics of energy system change and policy influence.

Energy cooperatives promote citizen mobilization and ownership of diverse resources for decentralized and renewable energy production. The mobilization of both theoretical and practical knowledge serves as a significant power source for cooperatives to drive energy transition. Figure 5 illustrates the relationship between knowledge and power in the context of energy system change. The figure depicts knowledge as a meta-condition (as discussed above) that influences four key aspects of power: access to resources, strategies for mobilization, skills to apply methods, and the willingness to do so. In essence, knowledge serves as a foundational element that underpins the exercise of power by actors within the energy system. Additionally, the figure highlights that creating or communicating knowledge is a form of power exercise in itself. This implies that the dissemination and utilization of knowledge can also be seen as a means of exerting influence and shaping the dynamics of power within the energy transition landscape. Additionally, intermediaries play a crucial role in collecting and disseminating knowledge (Avelino, 2014).

Figure 5

Knowledge and power relations.



Note. From "Power in transition: An interdisciplinary framework to study power in relation to structural change." By F. Avelino, and J. Rotmans, 2009. European Journal of Social Theory 12(4), p. 559 (DOI: 10.1177/1368431009349830). Copyright statement.

Avelino et al (2023) outlines a federated approach (as important factor in power dynamics) in cooperatives, emphasizing the role of intermediary organizations at regional, national, and European levels. These intermediaries, like the German Cooperative and Raiffeisen Foundation (DGRV) and Bündnis Bürgerenergie e.V. in Germany, aid renewable energy cooperatives in political advocacy. They enhance cooperative capacity to challenge powerful industries through activities such as press releases, joint statements on legislative proposals, and political lobbying. Notably, their influence is demonstrated in the EEG amendment 2020, where lobbying efforts by Bündnis Bürgerenergie e.V. and DGRV led to a reduction of the tendering obligation from 750 kW to 500 kW, safeguarding the interests of energy cooperatives (Avelino et al., 2023). The EEG (Erneuerbare-Energien-Gesetz), translated as Renewable Energy Sources Act, is a German legislation aimed at promoting the generation of electricity from renewable energy sources. EEG amendments refer to changes made to the EEG (Renewable Energy Sources Act) in 2012 and 2014. The revisions included reductions in feed-in tariffs and the introduction of an auction model for renewable energy projects (Avelino et al., 2023).

Bauwens et al. (2016) believe that cooperatives overcome power imbalances through coordinated actions that serve both economic and political purposes. These actions involve strategic responses to policy changes and heightened competition in power markets, allowing cooperatives to adapt to evolving regulations while actively influencing them to align with their interests. The creation of federations at national and European levels exemplifies this approach, enabling cooperatives to not only survive but also thrive in challenging environments. The formation of such coordinated actions, similar to addressing a collective-action problem, endures costs influenced by contextual factors, institutional variables, and the various actors involved (Bauwens et al., 2016).

In Alberta, the power dynamics surrounding renewable energy face significant challenges due to the dominance of the oil and gas industry. The province's cultural identity, employment, and politics are heavily influenced by these traditional sectors. Conflicting values emerge as renewable energy actors encounter obstacles, such as corporate competition, difficult government regulatory and approval processes and resistance from private electricity companies. The social representation of renewable energy in Alberta reflects a complicated landscape, including struggles over grid ownership, cultural perceptions, and regulatory authority. Despite these challenges, community energy actors such as some energy cooperatives or Indigenous culture and entrepreneurial organizations (such as, MNA), envision transformative models for community solar generation that could potentially disrupt the centralized energy politics prevailing in the province (Gismondi & Hanson, 2021).

3.2.6. Community Energy in Alberta

Alberta, the third-largest electricity producer in Canada, is embracing renewable and decentralized energy despite its oil-rich history (NEB, 2019a; Gismondi & Hanson, 2021). A previous case study analysis of Bow Valley Green Energy Cooperative in Canmore, Alberta, conducted by Ehr et al. (2019) illustrates the town's commitment to integrating renewable energy for grid resiliency and environmental preservation (Ehr et al., 2019). This transition aligns with low-carbon technologies and emissions reduction priorities at the Federal level as established by the current Liberal Government (Patel et al., 2020). In addition, the Province's fully deregulated electricity market, unique in Canada, fosters competition and innovation by allowing generators and retailers to operate in a competitive marketplace. Consumers are able to choose a preferred retailer, promoting competition, and opening the market up to alternate (Hastings-Simon et al.,

2018). However, different forms of power, as noted in Gismondi and Hanson's study (2021), present challenges and opportunities for community energy actors in Alberta. Notably, that recent imposition of a seven-month moratorium on all new renewable energy by the Province's United Conservative Government, is indicative of longstanding trends towards protecting conventional energy sources, and distrust of renewable energy development (Adkin et al., 2017). Yet, despite this temporary setback, some corporations like TransAlta Corporation are demonstrating confidence in the sector's long-term prospects. TransAlta plans a substantial investment of $3.5 billion in clean electricity generation and storage by 2028, anticipating a shift in the majority of its profits to renewable sources (Stephenson, 2023). Additionally, local initiatives, such as the Bissell Thrift Shop's collaboration with the Solar Power Investment Cooperative of Edmonton, showcase socially responsible projects aiming to reduce emissions, cut costs, and provide local employment (Silvius, 2023).

According to a study by Leonhardt et al. (2022), Alberta's renewable energy cooperative sector is developing. The participants in this study attributed this growth to some factors, including the proactive funding initiatives by the former NDP government, a favorable regulatory landscape, and support from the local provincial cooperative association. They believe that small-scale generation program was an important facilitator of community energy in the province. At the moment there are six active RE cooperatives in Alberta. More explanation about community energy in Alberta can be found in Chapter One of this research. In the context of Alberta's growing commitment to renewable energy, knowledge mobilization plays a pivotal role in fostering community engagement. However, it is worth noting that comprehensive research on this vital subject remains scarce within the Alberta region. In an era where informed communities are central to sustainable energy transitions, there is an increasing need for focused

studies that delve deeper into the mechanisms of knowledge mobilization (strategies and contextual factors) within the province.

Although some studies have been done to investigate the role of local knowledge in cooperatives, there remains a gap in the literature about how the institutional structure of co-ops is shaped by knowledge sharing and how the knowledge is mobilized among different co-ops. In this research, I explored knowledge mobilization strategies in renewable energy cooperatives and the important factors that may affect them, looking at a specific case study in Alberta, Canada.

The aim of this research is to investigate and analyze the experiences of stakeholders within renewable energy cooperatives in Alberta. Specifically, the study focused on cooperative owners, knowledge mobilizers, community participants, and other relevant stakeholders. The main objective was to develop understanding about how knowledge is mobilized among renewable energy cooperatives and what are the important factors that may affect it. In the following section, I will outline the methodology employed in this research before proceeding to discuss the findings.

3.3. Methodology

In my research, presented here, I focus on the Alberta case study of the Bow Valley Green Energy Cooperative. A mixed methodology involving elements of case study and qualitative analysis was used. I employed a combination of data collection methods, including in-depth interviews, field visits, and document analysis to explore how knowledge is mobilized among BVGEC and the other renewable energy cooperatives and what are the most important factors that affect it.

The Bow Valley Green Energy Cooperative (BVGEC) was founded in 2019, and operates as a volunteer-driven, for-profit organization with a strong community focus. BVGEC has successfully completed two projects and currently has a significant expansion of their portfolio in progress. Its funding structure includes loans from board members, support from family and friends, grants, and membership fees. By actively engaging in cooperative networks and local associations, BVGEC showcases a strong commitment to continuous learning and improvement. The cooperative's emphasis on knowledge exchange and collaboration makes it particularly appropriate for this analysis. (More explanation about BVGEC can be found in Chapter One of this research).

In addition, we conducted 13 in-depth semi-structured interviews including: 1) Four participants from BV Green Energy, 2) One participant as a host of their solar project, 3) Two participants from an intermediary organization 4) Five participants from five different cooperatives who were in contact with BV and knowledge was transferred among them, and 5) One participant from the government. These interviews allowed us for the collection of diverse data to facilitate comprehensive analysis. Interviews lasted approximately 60 minutes, and were conducted either in person, or using a virtual communications platform. In the semi-structured interview, the researcher employs a standard set of questions to gather data. However, this method permits the researcher to ask additional if for example a new inquiry emerges during the interview process (Young et al., 2018). So, in some interviews, we expanded the set of questions based on the specific topics discussed during the conversation. All interview sessions were recorded and subsequently transcribed for analysis. Interview questions (Appendix B) revolved around participants' experiences in renewable energy cooperatives (their background, history of starting and etc.), motivations, challenges (their specific challenge and the way they overcome,

their experience in working with government and etc.), knowledge mobilization strategies (their strategies or approaches), and potential behavioral changes resulting from cooperative involvement. Following this, we inquired about their connections with individuals from other organizations and cooperatives, subsequently conducting interviews with these individuals to gain insights into the knowledge exchange processes among them.

Ethical considerations in this research adhered to principles based on Case Study Research. I prepared consent and information form for all participants prior to conducting interviews. Transparency, accountability, and respect for diverse perspectives were ensured throughout the research process. Participants were informed of the research's intentions and results, and their anonymity will be protected.

In this research, an interpretive analysis approach based on a case study methodology is employed. This approach allows for a comprehensive and multi-dimensional exploration of the subject within its real-world context.

This methodology will provide valuable insights into renewable energy cooperatives in Alberta, shedding light on knowledge mobilization strategies, community engagement, and cooperative success. The research aims to contribute to the advancement of the cooperative energy sector and support broader sustainable energy transition efforts.

3.4 Findings

In this section, I present my findings. It highlights the importance of collaborative strategies and shared interests, the influence of contextual factors, and the need to address power imbalances for effective knowledge mobilization within the renewable energy sector.

3.4.1. Knowledge Mobilization Strategies and Routines:

In the following section, I explore the strategies and routines employed by renewable energy cooperatives to connect with and learn from similar organizations with a focus on our first research objective to learn about knowledge mobilization strategies among cooperatives. Drawing from interviews and data analysis, I explore how BVGEC and other cooperatives that were in contact with navigate the intricacies of establishing and operating in their respective fields, particularly in the context of overcoming challenges. Our examination sheds light on the diverse approaches utilized by these cooperatives to foster knowledge mobilization and exchange. From acquiring guidebooks and contracts to studying successful project models, I uncover learning mechanisms that drive collaboration and innovation within the cooperative landscape. Through these strategies, cooperatives not only enhance their own capacities but also contribute to the collective advancement of renewable energy initiatives. Our interviews highlight various learning strategies and routines that contribute to knowledge mobilization within renewable energy cooperatives. For example, there is a focus on learning from other organizations through the acquisition of guidebooks, contracts, and examples of successful projects. One of the participants stated:

> "So we got a guidebook from SES solar co-op in Saskatoon. That was a little bit out of date, but at least provided us a roadmap to how to get going". (Participant Five)

Another participant shared:

> "We'll be passing on whatever we learn to anybody who are already doing that, we're doing webinars for other cooperatives telling them the process". (Participant Seven)

Participant Five mentioned: "We reached out to other coops in particular, the Ottawa, renewable energy co-op in Ottawa". Reaching out to other cooperatives indicates a strong emphasis on

networking and collaboration. This strategy suggests that cooperatives actively seek to build connections within their community. The act of reaching out to other cooperatives implies the existence of a community of practice within the cooperative sector. Knowledge mobilization here extends beyond just internal processes, involving engagement with a broader community for shared learning and support.

Participant Five added:

> "Ottawa provided us with some draft power purchase agreements and some contracts from the basis for us going forward."

These quotes reflect a knowledge sharing mechanism where practical documents are exchanged. It implies a culture of experiential learning within the cooperative sector. The documents received, such as power purchase agreements, serve as the basis for the participant's cooperative to move forward. It also contributes to leveraging existing knowledge and resources to make informed decisions.

By the process of putting knowledge into active use, cooperatives make the knowledge practical and applicable. The extension of practical knowledge from pioneers to others entering the cooperative field is an important aspect of fostering collaboration and shared success. Pioneers, having navigated the challenges and gained valuable insights, play an impressive role in transferring their practical knowledge to aspiring cooperatives. This knowledge transfer includes not only technical expertise but also encompasses practical strategies, lessons learned, and best practices in dealing with challenges. By sharing their experiences, pioneers contribute to the capacity building of emerging cooperatives, providing them with a foundation for informed decision-making, effective problem-solving and sustainable growth. This collaborative approach strengthens the cooperative movement and promotes a supportive environment for new entrants,

fostering a culture of shared learning within the cooperative community. Table 2 and 3 (Appendix D) showcase additional participant quotes underscoring the prevailing culture of knowledge sharing within cooperatives. These excerpts highlight the interconnectedness of cooperatives, illustrating how they actively engage with one another to exchange valuable insights and information

Meantime, these strategies demonstrate how knowledge is embedded within the cooperative's activities and how individuals within the cooperative actively participate in learning and knowledge sharing. The interviewees highlight the importance of collaboration and the sharing of experiences, best practices, and resources among organizations working in different geographic locations. They emphasize the need for knowledge mobilization to support the growth and success of community energy initiatives. Additionally, they discuss the potential for federations or associations of community energy co-ops to facilitate knowledge sharing and cooperation on a larger scale.

These findings align with previous studies which illuminate the leading role of pioneering co-ops (in Spain and Germany) to encourage other organizations by transmitting knowledge of platforms and practices (Heras-Saizarbitoria et al., 2018; Mignon & Rüdinger, 2016). Previous studies also concluded that RE cooperatives in Spain and Germany can deal better with the big challenges if they arrange similar structures and participate in associations and networks. The findings of this research which emphasize the development of cooperatives by sharing knowledge and networking is also aligned with some other studies such as Bauwens et al. research in Europe (2016).

Most of the interviewees highlighted their commitment to advancing renewable energy in the region and supporting the transition to cleaner energy sources. However, there was relatively

less emphasis on fostering democratic processes or actively involving marginalized groups, including indigenous communities, women, and those who are traditionally challenging to reach.

3.4.2. Shared Interests within the Renewable Energy Cooperatives

Our interviews suggest the existence of shared interests within the renewable energy cooperatives. For instance, cooperative members express a collaborative mindset and a willingness to share knowledge with others. Interest of knowledge sharing is evident in their engagement with conferences, webinars, and online forums. This contributes to the development of a collective learning environment within the cooperative, where knowledge is seen as a communal resource rather than something to be hoarded. One of the participants shared:

> "...being a co-op, that's, you know, we're part of being a co-op, is to cooperate and share your knowledge, and it's very easy to get a hold of documentation and things that you can use as templates." (Participant Two)

This quote emphasizes the cooperative spirit of sharing knowledge and the practical aspect of using documentation and templates as part of their practices within the cooperative model.

According to a study by Sun et al. (2019), it is important to address the cooperative culture, network power, and knowledge flow from the sustainable development perspective. Cooperatives are more likely to share knowledge and resources with other cooperatives, and such cooperation enhances the overall knowledge base of the sector where a mutually beneficial situation with complementary advantages and synergies will be attained. Meantime, they believe that information asymmetry, and insufficient knowledge sharing, would directly affect cooperative relationships and performance.

The interviewees in our research mention that community energy organizations typically operate in different geographic locations, which means they are not in direct competition with each other. This lack of direct competition allows for a more collaborative environment where knowledge sharing and learning from one another can take place. Since their projects and target audiences are often specific to their local areas, there is less overlap in terms of competing for the same resources or customers. This geographical diversity creates an opportunity for organizations to freely exchange information, experiences, and best practices without the fear of undermining their own projects or market positions. The focus is on mutual support and cooperation rather than competing for limited resources. By sharing knowledge and lessons learned, these organizations can benefit from the experiences and expertise of others, which contributes to the overall growth and success of the community energy sector. One of the participants stated:

> "Well there's a couple of co-ops geographically distributed in Alberta and … because we worked together we don't step in each of those toes. So like, for example, down in Lethbridge loads of space for goods, all good wind but if somebody from Lethbridge approach does and said, hey we'd like to do project, we would send them to SABRE and vice versa."

Participant 11 also declared:

> "I think having worked in the, you know, sort of corporate business for 15 years. I like the fact I'm more naturally collaborative, in how I like to behave. And one thing about community energy is, it's quite local. So it's not often that we're competing with another Community Energy Organization for a project, or a potential client because they're based in different geographies. But we do share information, you know, face-to-face at

conferences, which, you know, with COVID, etc, we did less of that, but there's lots of Zoom webinars, etc."

This quote highlights the natural inclination toward collaboration in community energy cooperatives, where members often come from diverse backgrounds. These cooperatives foster a collaborative culture, emphasizing their non-competitive nature, facilitated by their localized project focus. Face-to-face conferences and, in the context of COVID-19, digital platforms like Zoom webinars serve as avenues for sharing knowledge and building relationships. Knowledge management in cooperatives encompasses both explicit and tacit knowledge gained through everyday practices and routines, ultimately benefiting their projects and communities.

3.4.3. Contextual factors

The interviews touch upon contextual factors including intermediary organizations and regulatory frameworks that influence knowledge mobilization within renewable energy cooperatives. These contextual factors shape the dynamics of knowledge mobilization. The contextual factors influence the availability and accessibility of knowledge within the cooperative and shape the cooperative's strategies for sharing and mobilizing knowledge:

The Role of Intermediary Organizations (ACCA)

Knowledge brokers play a crucial role in facilitating the exchange of information and collaboration among actors who are not connected, allowing them to pursue shared goals and bridging those gaps in the process. They are essential in converting knowledge and promoting knowledge-sharing activities (Burt, 2007). The interview content in this research reflects the active role of intermediary organizations, such as cooperative associations, in facilitating knowledge sharing, collaboration, and the dissemination of the best practices within the

renewable energy and community energy sectors. These organizations play a crucial role in bridging the gap between individual organizations and fostering a collective learning environment.

From the interview content in our research, it is obvious that ACCA (Alberta Cooperative Association) plays a significant role as an intermediary organization in supporting and mobilizing knowledge among renewable energy cooperatives in Alberta. According to this information, the following are the main activities of ACC as an intermediary organization:

Connection and Networking: ACCA seems to serve as a hub for cooperative organizations in Alberta. It is mentioned in the interviews that they were involved in founding and facilitating initial conversations on how to set up cooperatives. ACCA plays a vital role in knowledge mobilization among renewable energy cooperatives by connecting them with other organizations and providing a platform for sharing experiences and best practices. This indicates that ACCA helps create connections and networks among various cooperative organizations, including those in the renewable energy sector. ACCA also facilitates knowledge sharing among cooperatives by organizing workshops, conferences, training sessions, etc. This knowledge sharing is crucial for newcomers to the cooperative sector, especially in niche areas like renewable energy cooperatives. One of the participants from this organization:

> "we got some funding from the provincial government to do workshops, and really just kind of bringing together like the community groups that didn't have the expertise around the technical side, and then the solar industry that maybe didn't have the connection with the community" (Participant Six).

Collaboration: Another important activity of ACCA is developing collaboration. One of the participants expressed:

> "I presented for the ACCA on what probably green energy is doing and as I mentioned earlier about the … network and that's how we kind of connect with the other organizations and they quite often come to us and I've gone to like Athabasca who are kind of very early doors and kind of given them a bit of a pep talk to like help them, they got stagnant and I was invited to go and talk to them." (Participant Two)

The reference to collaboration between the interviewee and ACCA suggests that there is an ongoing relationship. This collaboration involves joint initiatives, projects, or events aimed at furthering the interests of renewable energy cooperatives. Such collaborations can result in the pooling of knowledge, resources, and expertise. By presenting for ACCA and engaging with the broader network, the participant not only shares insights about green energy but also actively connects with other organizations. The mention of visiting Athabasca and providing support indicates a collaborative effort to assist cooperatives facing challenges. This demonstrates that intermediary organizations play an important role in fostering collaboration, acting as brokers for knowledge exchange and support within the cooperative community.

Support in establishment and adaptability: The interviewees acknowledge that renewable energy cooperatives are not common in Alberta, with only about six of them. ACCA provides resources to help cooperatives navigate the process of establishment and operation. ACCA's involvement in supporting such a unique and specialized sector demonstrates its commitment to assisting cooperatives across different domains. This support is essential for the growth and success of renewable energy cooperatives in the region. One of the participants (Participant Two): "ACCA help found us. They brought how to set up a co-op, how to become a co-op kind of conversations". Another participant mentioned the role of knowledge brokers in their region to achieve the knowledge of finding appropriate experts for their co-op:

> "We had a hell of a time finding an accountant actually had ever done any accounting for coops. And so that was a challenge... I said, [to one of the managers of a local knowledge broker which was ACCA], you need to be setting this stuff up and making it easy for us." (Participant Five)

The participant describes the challenges faced in finding an accountant with experience in cooperative accounting and emphasizes the lack of relevant expertise. By reaching out to a local knowledge broker (ACCA), the participant expects knowledge brokers to help them addressing such challenges. The request for ACCA to set up support mechanisms indicates the need for intermediary organizations to support the process of accessing expertise, making it easier for cooperatives to find the right professionals during their establishment and ongoing operations. ACCA can promote adaptability among cooperatives by providing them with essential resources, knowledge, skills, and support systems. By acting as a facilitator, advocate, and educator, ACCA contributes to the overall resilience and sustainability of cooperatives, enabling them to thrive in dynamic and changing environments.

Regulatory Framework

Another important factor that influences the dynamic of knowledge mobilization is regulatory framework. As highlighted in the literature, the socio-political context of a region is recognized as a crucial factor in the success of RE cooperatives (Hoicka & MacArthur, 2018). During the interviews conducted for this research, it became evident that the regulatory and political framework plays a substantial role in shaping knowledge-sharing dynamics within cooperatives. Here are some key points elaborating on this aspect:

Resource Access and Funding: Regulatory policies and government support can determine the availability of resources and funding for cooperatives. There are some financial supports in community energy, ranging from national and supranational government programs, to smaller-scale support from local and regional authorities. These incentives can facilitate research, training, and collaboration among cooperative members. According to one of the participants:

> "Part of what we did when we received the grant [...] is we created a workbook or kind of a manual on how to set up a co-op and we made that public. It's on our website."(Participant 10)

In this case study, one of the participants mentioned that they received a grant to develop their training ideas. According to the interviews, ACCA as the intermediary organization in this area also had some grants from the provincial government to organize workshops for the community groups who do not have enough technical knowledge about renewable energy resources.

Feed-in tariffs (FiTs), offering financial support are crucial for cooperative development. Based on the interviews in this research it is obvious that cooperatives view Feed-in Tariffs (FiTs) as a critical driver of their success. According to one of the interviewees:

> “We had a lot of contact with the renewable energy coops in Ontario, which had some success, although much limited, which were prescribed and I would hope, because was based on the German feed in tariff models”. (Participant Eight)

Participant Nine also noted:

> “Our counterparty in contract is provincial government. ... And the bank knows we'll get paid. That's the end you need your projects to be bankable. Our contracts are more secure than someone who has a mortgage on their house and has a job that it may lose next year.

> When we started this credit union we're dealing with only would give us a loan if we signed over our houses. The Board of Directors, we refused to do that. We found another credit union that would do it. That's the advantage we had in our first couple of years with those feed in tariffs."

While specific aspects of feed-in-tariff benefits are not explicitly detailed, the participants mention the financial support offered by FiTs, making projects more secure and bankable. The benefits mentioned include the predictability of income, especially when dealing with the provincial government, creating a secure financial environment for cooperatives. However, the information doesn't explicitly elaborate on whether the benefits extend beyond creating a marketplace. Despite the positive aspects of FiTs acknowledged by the participants, it's noteworthy that in our case study one of the interviewees (Participant Two) mentioned that despite not having FiTs in their region, they could continue their activities:

> "So actually the idea for the power purchase agreement came from and the micro generation model came from a solar co-op in Brighton in the UK. I think Brighton Energy Co-op are really great guys to connect with. And they really helped with that initial shift and they shared their financial model with us. This was for the church approach. Yeah. And it wasn't necessarily relevant because of the regulation difference. In Alberta we don't have the feed-in tariff here, and our energy system is quite different to the rest of the world. But we adapted it and I made it work." (Participant Two)

Another participant also mentioned:

> "We had the benefit of the feed in tariff. Alberta doesn't have that right now. But equal power in Belgium never had a feed in tariff. They had a small group of people that raised a little bit of money and did things slowly gone cautiously. And now they're second

> largest in the world. Right. So small, small and local is the advantage here". (Participant Nine)

This observation highlights the innovative capacity of the cooperative, adapting to the absence of Feed-in Tariffs in Alberta. One participant elaborated on their proactive approach, emphasizing how they engaged with the community and collaborated with other organizations, fostering networks, consulting with relevant experts, and mobilizing knowledge to navigate regulatory challenges specific to their region:

> "And how do we do it from a physical perspective, like within the regulations of Alberta… So, one of the things we did was reach out to the community and say, "hey, we want to do this, but we don't know how to do that. But do you know how to do it?! … reaching out to these other organizations, you know, the provinces who've done similar things like OREC and SES-solar and just asking them, hey how did you do this? And you know, will you share some information with me?" (Participant Two)

This proactive strategy showcases their ability to innovate and resilience in the face of regulatory obstacles, demonstrating the cooperative's adeptness at leveraging knowledge mobilization for strategic problem-solving and adaptability.

In the context of regulatory frameworks supporting knowledge transfer activities within cooperatives, this study aligns with prior research, notably Leonhardt et al. (2022). These studies underscore the significance of government funding for activities like feasibility studies and promoting awareness of renewable energy projects by training projects. These studies emphasize that government incentive, such as grants, subsidies, or tax benefits, can foster knowledge-sharing initiatives among cooperatives. However, a notable challenge emerges in the form of insufficient funding for training and skill development in community energy projects (Leonhardt

et al., 2022). The important role of incentive mechanisms as a contextual factor in developing knowledge mobilization also aligns with previous research by Zhou et al. (2021). Additionally, other studies acknowledge the importance of feed-in tariffs (FiTs) for cooperative development by providing financial support. Yet, persistent challenges, including initial investments, planning uncertainties, and grid connection costs, hinder the broader impact of FiTs on energy policy and large-scale projects (Nolden, 2013; Bauwens et al., 2016).

3.4.4. Power dynamics:

Power dynamics are present within the knowledge mobilization processes of renewable energy cooperatives. Energy cooperatives are at the forefront of the push for decentralized and renewable energy sources. The interviews in this research indicate the influence and power of professionals from the oil and gas industry who bring their expertise and contribute to the cooperative's projects. Moreover, the discussions about the potential growth of the cooperative and the establishment of a countrywide association of community energy co-ops suggest the need to address power imbalances and engage in collective decision-making processes. To achieve meaningful social change, collective impact initiatives rely on transformative shifts in power dynamics and community practices as essential elements for their success (Ryan, 2014). The interviews indicate recognition of power dynamics and a desire to create structures that promote equitable knowledge sharing and collaboration. Building on the recognition of power dynamics and the goal to explore knowledge sharing, the subsequent discussion delves into two sub-sections: the federated approach and policy advocacy.

Federated Approach

One of the participants (participant eight) highlights the importance of federated approach and collaborations between cooperatives. He emphasizes the need for collaborative action and the benefits of federations in terms of sharing knowledge, due diligence, and lobbying efforts. The power dynamic here lies in the collective strength and influence that cooperatives gain by coming together and pooling their resources and expertise. This participant also mentions:

> "For me, I say this coops are not only an economic choice, they're really a political choice. It's a political economic choice. I choose to work with a co-op. Not for my own individual self, well, part of my internal self-interest because I want something with partners realization and do it together, we can do it better, and stronger and more fair". (Participant Eight)

This interviewee emphasizes that small-scale initiatives, while valuable, must be federated to have a significant impact. The speaker introduces the concept of a federated approach, drawing parallels between cooperatives and federations, highlighting how they can collaborate and collectively own projects. This observation aligns with findings from Avelino et al. (2023) and Verkade & Höffken (2019), which emphasize the significance of a collaborative and federated approach in fostering cooperative development and navigating regulatory challenges. Furthermore, the interviewee emphasizes that cooperatives are not merely an economic choice but also a political one. They believe in the power of collaboration and cooperative ownership to create stronger, fairer, and more impactful solutions in the transition to sustainable energy sources.

There are also some quotes from the interviewees that show that a reason for founding a cooperative might be creating a vehicle for people who wanted to collectively invest in and

support the energy transition by installing solar PV panels on various rooftops, emphasizing the collaborative approach. In this regard, participant 11 said:

> "Partly, to answer an earlier question, one of the reasons why I got involved in the project and helped set it up was because I have an apartment in an old building where I wanted to put solar PV on the roof, but I don't own the roof. So, we put part of the reason we created Brighton Energy Co-Op was a vehicle for people who wanted to put investment or to support the energy transition but didn't necessarily have a property of their own or tenants, etc., to be able to, you know, they didn't have a property that they could put PV on the roof".

In cooperatives, knowledge mobilization involves sharing and leveraging collective knowledge and expertise for the benefit of the cooperative and its members. The collaborative approach described in the interview, where individuals with different skills and backgrounds came together to set up a community energy organization, reflects a form of knowledge mobilization. They brought their collective expertise and knowledge to address challenges and advance the goals of the cooperative, which aligns with the principles of knowledge mobilization in cooperative settings. This interview also exemplifies how cooperatives can work as an adaptable platform for individuals with diverse circumstances. Beyond providing an opportunity for collective investment in solar PV projects, the cooperative becomes a solution for those who lack property ownership or face tenancy restrictions. It demonstrates the adaptive nature of cooperatives, accommodating a spectrum of individuals and communities in their pursuit of supporting the energy transition. So, cooperative model can become a dynamic tool, not only for those with property but also for individuals seeking alternative pathways to contribute to renewable energy transition.

Policy Advocacy

Energy democracy is about giving communities a say in their energy future. It aims to decentralize power, create alliances among social groups, and shift towards community control of energy production and ownership. This agenda promotes new models for energy systems that prioritize local involvement and equitable access (Burke & Stephens, 2017). In the interviews, there are discussions about the need for policy changes and the challenges faced in influencing government regulations and decisions. While our case study (BVGEC) didn't encounter a similar situation, an example from another cooperative, specifically one of the BVGE's network, sheds light on this issue. Participant nine mentions the challenge of pushing for regulatory changes in Ontario regarding solar generation credits and net metering for housing co-ops. They have been advocating for a modification that allows credits to be applied across multiple meters rather than just one, and they are actively engaged in sharing information and rallying support from other cooperatives to push for this change. This participant said that they created a template letter to be shared with other co-ops and organizations, encouraging them to send the letter to the Minister, expressing their concerns about the current regulation:

> "So we've been pushing hydro Ottawa to ask the Ontario Energy Board and the Minister of Energy to change his regulation. You finally sent a letter several months ago, they got a response last week saying we're considering this with everything else that we have to do. So. No answer. So the last two days I've been Roger Peters and I have put together a template letter that we're asking housing coops, and Rhea, City of Ottawa, City of Toronto, other organizations to send this letter to the Minister saying this is ridiculous, you should be allowing this …".

This participant expresses willingness to share knowledge with other co-ops "…We're sharing everything we can…" highlighting the importance of collaboration and collective action to address issues and bring about change.

These instances highlight the power dynamics involved in policy advocacy. The cooperatives and individuals involved are seeking to influence policy decisions that can have a significant impact on their operations and the broader community energy sector. They are leveraging their knowledge mobilization and networks to advocate for changes that align with their goals and interests. It emphasizes the importance of collaboration, networking, and sharing best practices to advance the collective goals of the community energy sector.

When cooperatives engage in policy advocacy, they frequently encounter intricate power dynamics in navigating bureaucratic processes, gaining government attention, and competing with other interests in the policy arena. A notable example of such dynamics can be observed in the interaction between energy cooperatives and municipalities. One of the interviewees shed light on the complexities involved. The town, representing the municipal authority, expressed its intent to install solar panels on its buildings. While cooperative efforts sought to collaborate with the municipality, they faced certain power dynamics. The cooperative, being a for-profit entity, encountered restrictions and concerns about preferential treatment, indicating a nuanced power dynamic. This participant talked about their conversations with the municipality and said:

> "They want to put their own solar panels on the roofs and they have a plan for that. And as we discussed, if you've got the money to install your own solar panels, you get the benefit much quicker. So you may as well do it yourself, which is what they're doing. We have had conversations and done some pre-feasibility with them, on a couple of the buildings that they are that are lower down the list for them. And it hasn't really gotten

> very far, but I think that's a red tape, got to get all the right people in the room kind of conversation. And it's difficult to make headway, right? Um, so they're aware of who we are. They're aware of what we're doing. But they're not allowed to support us in any way because we're for profit and effectively, they will be showing preferential treatment". (Participant Two)

It is worth mentioning that there might be competition and procurement rules in the city, which likely influence the city's ability to support the cooperative. In some municipalities, especially those with strict regulations around fair competition and procurement, there are rules in place to ensure that businesses, including cooperatives, are treated fairly and that there's no preferential treatment. In this situation, since the cooperative is a for-profit organization, receiving support from the city could be seen as preferential treatment, which might be against the rules. These challenges underline the need for cooperatives to negotiate and advocate for changes in policies that promote equitable collaboration and support their mission of sustainable energy generation.

In exploring how knowledge mobilization contributes to supporting the development of renewable energy cooperatives, participants identified several key factors. During the initial stages of establishing a cooperative, organizations benefited significantly from sharing insights with counterparts in different geographic locations through the exchange of guidebooks, contracts and the best practices. Specifically, they sought guidance on various aspects such as power purchasing agreements (PPAs), community agreements, subscription agreements, and engagement with solar contractors. For instance, they approached similar organizations to learn about PPA structures and community engagement models. As highlighted earlier, one notable instance involved adapting a PPA model from a cooperative in Brighton. Subsequently, they modified this model to better align with the regulatory framework in Alberta, showcasing a

proactive approach to addressing local challenges and regulatory requirements. This exchange of information and adaptation of practices underscored the collaborative learning strategy within the cooperative network, facilitating the dissemination of knowledge and the development of tailored solutions to common challenges. This is especially beneficial in the initiation and management of a cooperative, aligning with findings from Tarhan's study (2015) that highlight the concerns related to the lack of confidence and insufficient knowledge during the startup phase of a cooperative. The adoption of a global knowledge-sharing strategy, as demonstrated in our case study with an organization in Brighton, UK, played a pivotal role in comprehending and adapting the micro-generation model and taking regulatory considerations into account. Additionally, overcoming challenges in finding suitable experts was facilitated by the Alberta Cooperative Association (ACCA), acting as an intermediary organization, fostering knowledge exchange on this front. The collaborative efforts of cooperatives in advocating for regulatory changes in Ontario exemplified another instance where knowledge-sharing initiatives played a supportive role in policy advocacy.

3.5. Conclusion

Renewable energy cooperatives have an important role in sustainable energy transition. Sharing knowledge among these cooperatives improves performance; allowing citizens to actively participate in local energy production. This research provides insights into knowledge mobilization dynamics, addressing challenges and factors influencing knowledge sharing. It contributes to a more democratic and comprehensive approach to the global transition to renewable energy. By exploring the dynamics of knowledge mobilization, I gain insights into the

knowledge-sharing processes within these cooperatives, recognizing the critical roles of strategies and routines, shared interests, contextual factors, and power dynamics.

Based on feedback from those involved in the study, learning strategies and routines within renewable energy cooperatives emphasize knowledge-sharing through the acquisition of guidebooks, collaboration with volunteers and professionals with different backgrounds especially in the oil and gas industry, and a cooperative spirit of knowledge exchange and template usage. These strategies underscore the significance of collaborative learning and knowledge sharing as vital components in advancing community energy initiatives. However, there's room for improvement in fostering democratic processes and actively involving marginalized groups.

Shared interests within these cooperatives promote a culture of knowledge sharing. According to the individuals interviewed in the research, members express a willingness to collaborate and learn from one another, contributing to a collective learning environment. The results of this research identify that cooperatives' non-competitive nature, thanks to their distinct local project focuses, encourages the free exchange of information, experiences, and best practices.

In the context of renewable energy cooperatives, the research subjects highlight that various contextual factors play a vital role in influencing knowledge mobilization. These factors, as indicated by the interviews, include challenges related to regulatory frameworks, finding the right professionals, and coordination with other cooperatives and intermediary organizations. The regulatory framework is significant, particularly in situations where government policies influence resource allocation and grant opportunities, which can either encourage or hinder

knowledge-sharing initiatives. Additionally, feed-in tariff (FiT) programs are noted as vital for cooperative success, although their absence can lead to adaptation challenges.

Intermediary organizations, such as the Alberta Cooperative Association (ACCA), represent another contextual factor capable of influencing knowledge sharing by developing collaboration, and dissemination of best practices among cooperatives. ACCA, in particular, serves as a hub for cooperative organizations, playing a pivotal role in knowledge mobilization through networking, collaboration, and support in establishment and adaptability. According to the research results, intermediary organizations need to tackle the challenges of limited connectivity and understanding of economic, technical, and policy decision-making processes within the sector. Promoting inclusivity and collaboration among different cooperatives is also indispensable. Intermediary organizations such as ACCA can place a stronger emphasis on fostering inclusivity. Promoting inclusivity and collaboration can aid in lobbying efforts for policy changes that benefit all cooperatives, reinforcing the democratic nature of these organizations. Inclusivity also expands the cooperative's network, allowing for more extensive knowledge sharing. Additionally, it fosters a sense of belonging, making members more inclined to actively participate and share their knowledge. In conclusion, while intermediary organizations play a pivotal role in the renewable energy cooperative sector, they can enhance their impact by addressing these challenges and better supporting cooperatives on their journey towards sustainable energy solutions. Understanding and navigating these contextual factors are essential for optimizing knowledge mobilization within renewable energy cooperatives.

Addressing power dynamics is also crucial in understanding the knowledge mobilization processes of renewable energy cooperatives. Professionals from the oil and gas industry bring expertise to cooperative projects. The potential for growth and collaboration on a larger scale

necessitates the recognition of power imbalances and the promotion of equitable decision-making processes. A federated approach among cooperatives emphasizes the benefits of collaborative action and creating federations for sharing knowledge, achieving due diligence, and lobbying efforts. This approach underlines the power of collaboration and cooperative ownership in fostering stronger, fairer, and more impactful solutions. Policy advocacy efforts are marked by power dynamics, as cooperatives seek to influence government regulations and decisions. Collaborative action, networking, and the sharing of best practices are essential in advancing the collective goals of the community energy sector. Complex power dynamics also come into play when cooperatives engage with municipalities, as they navigate bureaucratic processes, government attention, and potential preferential treatment. Renewable energy cooperatives are catalysts for change in the energy sector, involving citizens and local communities in renewable energy production, and challenging traditional utilities. However, the predominance of white, educated, and male members and representatives within these cooperatives reflects existing power imbalances (Avelino et al., 2023). This research findings support this observation by highlighting the prevalence of white, educated, and mostly male founders. This demographic concentration can limit knowledge mobilization, potentially leading to groupthink, reduced community relevance, and barriers to inclusivity and policy advocacy. To enhance knowledge mobilization, cooperatives should prioritize diversifying their membership to access a broader range of expertise and experiences.

In conclusion, the findings highlight the intricate dynamics of knowledge mobilization within renewable energy cooperatives. These cooperatives play a significant role in advancing sustainable energy practices. To further empower these cooperatives and enhance knowledge mobilization, it's essential to address power imbalances, enhance democratic processes, and

actively involve marginalized groups in the renewable energy sector. These endeavors will enhance community engagement and contribute to the collective goals of energy democracy and the transition towards more sustainable energy sources.

3.6. References

Adkin, L. E., Hanson, L. L., Kahane, D., Parkins, J. R., & Patten, S. (2017). Can public engagement democratize environmental policymaking in a resource-dependent state? Comparative case studies from Alberta, Canada. *Environmental Politics, 26*(2), 301-321.

Anderson, D. (2023, Sep 14). *"Alberta's renewables pause is leaving billions of dollars in limbo. Here's what you need to know*". The Narwhal. https://thenarwhal.ca/alberta-moratorium-renewables/

Argote, L., Guo, J., Park, S.-S., & Hahl, O. (2022). The mechanisms and components of knowledge transfer: The virtual special issue on knowledge transfer within organizations. *Organization Science*, *33*(3), 1232–1249. https://doi.org/10.1287/orsc.2022.1590

Asheim, B.T., Boschma, R., & Cooke, P. (2011). Constructing Regional Advantage: Platform Policies Based on Related Variety and Differentiated Knowledge Bases. *Regional Studies, 45*, 893 - 904.

Avelino, F., Hielscher, S., Strumińska-Kutra, M., de Geus, T., Widdel, L., Wittmayer, J., Dańkowska, A., Dembek, A., Fraaije, M., Heidary, J., Iskandarova, M., Rogge, K., Stasik, A., & Crudi, F. (2023). Power to, over and with: Exploring Power Dynamics in Social Innovations in energy transitions across Europe. *Environmental Innovation and Societal Transitions*, *48*, 100758. https://doi.org/10.1016/j.eist.2023.100758

Avelino, F., & Rotmans. J. (2009) Power in transition: An interdisciplinary framework to study power in relation to structural change. *European Journal of Social Theory 12*(4): 543–569.

Barriball, K. L., & While, A. (1994). Collecting data using a semi-structured interview: a discussion paper. *Journal of Advanced Nursing-Institutional Subscription, 19*(2), 328-335.

Bauwens, T., Gotchev, B., & Holstenkamp, L. (2016). What drives the development of Community Energy in Europe? the case of wind power cooperatives. *Energy Research & Social Science*, *13*, 136–147. https://doi.org/10.1016/j.erss.2015.12.016

Bayulgen, O. (2020). Localizing the energy transition: Town-level political and socio-economic drivers of clean energy in the United States. *Energy Research &Amp; Social Science, 62*, 101376. https://doi.org/10.1016/j.erss.2019.101376

Becker, S., & Naumann, M. (2017). Energy democracy: Mapping the debate on Energy Alternatives. *Geography Compass*, *11*(8). https://doi.org/10.1111/gec3.12321

Bell, M. Z. (2020). Spatialising procedural justice: Fairness and local knowledge mobilisation in nuclear waste siting. *Local Environment*, *26*(1), 165–180. https://doi.org/10.1080/13549839.2020.1867841

Bolton, R., & Hannon, M. (2016). Governing Sustainability transitions through business model innovation: Towards a systems understanding. *Research Policy*, *45*(9), 1731–1742. https://doi.org/10.1016/j.respol.2016.05.003

Bomberg, E., & McEwen, N. (2012). Mobilizing Community Energy. *Energy Policy, 51*, 435–444. https://doi.org/10.1016/j.enpol.2012.08.045

Boxenbaum, E., & Battilana, J. (2005). Importation as innovation: Transposing managerial practices across fields. *Strategic Organization*, *3*(4), 355–383. https://doi.org/10.1177/1476127005058996

Burke, M., & Stephens, J. (2017). Energy democracy: Goals and policy instruments for sociotechnical transitions. *Energy research and social science, 33*, 35-48.

Burt, R.S. (2007). Secondhand Brokerage: Evidence On The Importance Of Local Structure For Managers, Bankers, And Analysts. *Academy of Management Journal, 50*, 119-148.

Capellán-Pérez, I., Campos-Celador, Á., & Terés-Zubiaga, J. (2018). Renewable Energy Cooperatives as an instrument towards the energy transition in Spain. *Energy Policy*, *123*, 215–229. https://doi.org/10.1016/j.enpol.2018.08.064

Centgraf, S. (2018). Supporting civic engagement in German Energy Cooperatives – transdisciplinary research based on the reflection of individual needs. *Energy Research & Social Science*, *44*, 112–121. https://doi.org/10.1016/j.erss.2018.05.003

Chilvers, J., & Longhurst, N. (2016). Participation in Transition(s): Reconceiving Public Engagements in Energy Transitions as Co-Produced, Emergent and Diverse. *Journal of Environmental Policy & Planning, 18*, 585 - 607.

Chini, T.C. (2004). *Effective Knowledge Transfer in Multinational Corporations*. Palgrave Macmillan.

Clulow, Z., & Reiner, D. M. (2022). Democracy, economic development and low-carbon energy: When and why does democratization promote energy transition? *Sustainability*, *14*(20), 13213. https://doi.org/10.3390/su142013213

Corsatea, T. D. (2014). Localised knowledge, local policies and regional innovation activity for renewable energy technologies: Evidence from Italy. *Papers in Regional Science*, *95*(3), 443–466. https://doi.org/10.1111/pirs.12136

Couture, T., & Gagnon, Y. (2010). An analysis of feed-in tariff remuneration models: implications for renewable energy investment. *Energy Policy, 39*, 955–965.

Crupi, A., Sarto, N.D., Minin, A.D., Gregori, G.L., Lepore, D., Marinelli, L., & Spigarelli, F. (2020). The digital transformation of SMEs - a new knowledge broker called the digital innovation hub. *J. Knowl. Manag., 24*, 1263-1288.

Dall-Orsoletta, A., Ferreira, P., & Gilson Dranka, G. (2022). Low-carbon technologies and just energy transition: Prospects for electric vehicles. *Energy Conversion and Management: X*, *16*, 100271. https://doi.org/10.1016/j.ecmx.2022.100271

Ehr, C., Patterson, E. & Donegan, T. (2019). Rooftop solar in Canmore: A neighbourhood by neighbourhood analysis. https://canmore.ca/documents/planning-building-development/signposts-to-sustainability/3109-rooftop-solar-in-canmore-final-report

Evers, H., Gerke, S.H., & Menkhoff, T. (2010). Knowledge clusters and knowledge hubs: designing epistemic landscapes for development. *J. Knowl. Manag., 14*, 678-689.

Fischer, B., Gutsche, G., & Wetzel, H. (2021). Who wants to get involved? Determining citizen willingness to participate in German renewable energy cooperatives. *Energy Research &Amp; Social Science, 76*, 102013. https://doi.org/10.1016/j.erss.2021.102013

Geels, F.W. (2014). Regime resistance against low-carbon transitions: introducing politics and power into the multi-level perspective. *Theory, Culture & Society, (31)*5, 21–40. https://doi.org/10.1177/0263276414531627.

Gismondi, M., & Hanson, L. (2021). Provincial polyphasia: Community energy generation and the politics of Sustainability Transition in Alberta, Canada. *A Critical Approach to the Social Acceptance of Renewable Energy Infrastructures,* 181–198. https://doi.org/10.1007/978-3-030-73699-6_10

Goggin, C.L., & Cunningham, R. (2021). Social Connection and Knowledge Brokerage in a State Government Research Network in Australia. *Electronic Journal of Knowledge Management, 19*, 54-75.

Grigorescu, A., Ion, A.E., Lincaru, C., & Pîrciog, S. (2021). Synergy Analysis of Knowledge Transfer for the Energy Sector within the Framework of Sustainable Development of the European Countries. *Energies*, 15(1), 276.

Hansen, K., Mathiesen, B., & Skov, I.R. (2019). Full energy system transition towards 100% renewable energy in Germany in 2050. *Renewable & Sustainable Energy Reviews, 102*, 1-13.

Hastings-Simon, S., Kaddoura, S., Klonick, A., Leitch, A., and Porter, M.(2018). Plugging In: Opportunities to Procure Renewable Energy for Non-Utility Companies and Institutions in Alberta. *The Pembina Institute, Rocky Mountain Institute and Calgary Economic Development.* Retrieved from: https://www.pembina.org/reports/plugging-in-2018.pdf

Heras-Saizarbitoria, I., Sáez, L., Allur, E., & Morandeira, J. (2018). The emergence of renewable energy cooperatives in Spain: A review. *Renewable and Sustainable Energy Reviews, 94*, 1036–1043. https://doi.org/10.1016/j.rser.2018.06.049

Hewitt, R. J., Bradley, N., Baggio Compagnucci, A., Barlagne, C., Ceglarz, A., Cremades, R., McKeen, M., Otto, I. M., & Slee, B. (2019). Social Innovation in Community Energy in Europe: A review of the evidence. *Frontiers in Energy Research*, *7*. https://doi.org/10.3389/fenrg.2019.00031

Hoicka, C. E., & MacArthur, J. L. (2018). From tip to toes: Mapping Community Energy Models in Canada and New Zealand. *Energy Policy*, *121*, 162–174. https://doi.org/10.1016/j.enpol.2018.06.002

Kong, D.Z. (2019). Research on the Impact of Innovative Network Knowledge Flow on Enterprise Innovation Performance—Based on Network Embeddedness Perspective. *Forecast*, 38, 45–51.

Łakomiak, A. (2022). Civic Energy in an Orchard Farm–Prosumer and Energy Cooperative—A New Approach to Electricity Generation. *Energies*, *15*(19), 6918. https://doi.org/10.3390/en15196918

Lehtonen, M., & de Carlo, L. (2019). Community energy and the virtues of mistrust and distrust: Lessons from Brighton and Hove Energy Cooperatives. *Ecological Economics, 164,* 106367. https://doi.org/10.1016/j.ecolecon.2019.106367

Leonhardt, R., Noble, B., Poelzer, G., Fitzpatrick, P., Belcher, K., & Holdmann, G. (2022). Advancing Local Energy Transitions: A global review of government instruments supporting community energy. *Energy Research & Social Science*, *83*, 102350. https://doi.org/10.1016/j.erss.2021.102350

Lewis, G. (2022). The site of the social: A philosophical account of the constitution of social life and change. *Educational Review*, *75*(4), 806–806. https://doi.org/10.1080/00131911.2022.2051343

Mignon, I., & Rüdinger, A. (2016). The impact of systemic factors on the deployment of cooperative projects within renewable electricity production: an international comparison. *Renew Sustain Energy Rev, 65*, 478–88.

NEB (2019a). Provincial and Territorial Energy Profiles – Alberta. Retrieved from: https://www.cer-rec.gc.ca/en/data-analysis/energy-markets/provincial-territorial-energy-profiles/provincial-territorial-energy-profiles-alberta.html

Nolden, C. (2013). Governing Community Energy—feed-in tariffs and the development of community wind energy schemes in the United Kingdom and Germany. *Energy Policy*, *63*, 543–552. https://doi.org/10.1016/j.enpol.2013.08.050

Nonaka, I., and H. Takeuchi. (1995). The Knowledge-Creating Company: How Japanes companies create the dynamics of innovation. New York: Oxford University Press.

Ostrom, A.L., Bitner, M.J., Brown, S.W., Burkhard, K.A., Goul, M., Smith-Daniels, V., Demirkan, H., & Rabinovich, E. (2010). Moving Forward and Making a Difference: Research Priorities for the Science of Service. *Journal of Service Research, 13*, 36 - 4.

Pacheco, A., Monteiro, J., Santos, J., Sequeira, C., & Nunes, J. (2022). Energy transition process and community engagement on geographic islands: The case of Culatra Island (Ria Formosa, Portugal). *Renewable Energy, 184*, 700–711. https://doi.org/10.1016/j.renene.2021.11.115

Patel, S., Holowach, M., & Anders, S. (2020). *Assessing Barriers to Renewable Energy Development in Alberta : Evidence from a Survey on Wind Energy with Rural Landowners.* Resource Economics and Environmental Sociology.

Pechancová, V., Pavelková, D., & Saha, P. (2022). Community Renewable Energy in the Czech Republic: Value proposition perspective. *Frontiers in Energy Research*, *10*. https://doi.org/10.3389/fenrg.2022.821706

Polanyi, M. (1967), *The Tacit Dimension*, Anchor Books, New York, NY

Powell, W. W., Packalen, K., & Whittington, K. (2012). Organizational and institutional genesis. *The Emergence of Organizations and Markets*. https://doi.org/10.23943/princeton/9780691148670.003.0014

Punt, M. B., Bauwens, T., Frenken, K., & Holstenkamp, L. (2022). Institutional relatedness and the emergence of renewable energy cooperatives in German districts. *Regional Studies*, *56*(4), 548–562. https://doi.org/10.1080/00343404.2021.1890708

Roby, H., & Dibb, S. (2019). Future pathways to mainstreaming community energy. *Energy Policy, 135*, 111020. https://doi.org/10.1016/j.enpol.2019.111020

Rosewarne, S. (2022). Breaking from the industrial energy generation model fossil fuel complex: Community Renewable Energy Cooperatives. *Contested Energy Futures*, 253–279. https://doi.org/10.1007/978-981-19-0224-6_10

Ryan, M. J. (2014). Power Dynamics in Collective Impact. *Stanford Social Innovation Review*, *12*(4), A10–A11. https://doi.org/10.48558/N8Y6-E936

Schatzki, Theodore R. (2002): *The site of the social. A philosophical account of the constitution of social life and change.* University Park: Pennsylvania State University Press. https://doi.org/10.1515/9780271023717-005

Seyfang, G., & Smith, A. (2007). Grassroots Innovations for Sustainable Development: Towards a new research and Policy Agenda. *Environmental Politics*, *16*(4), 584–603. https://doi.org/10.1080/09644010701419121

Schatzki, T. R. (2013). *The Timespace of human activity: On performance, society, and history as indeterminate teleological events*. Lanham: Rowan & Littlefield Publishers.

Shove, Elizabeth; Pantzar, Mika (2005): Consumers, Producers and practices: Understanding the invention and reinvention of Nordic walking. *Journal of Consumer Culture 5* (1): 43–64.

Silvius, G. (2023, Dec 6). “Bissell Thrift Shop launches solar array”. Rat Creek Press. https://ratcreek.org/2023/12/06/bissell-thrift-shop-launches-solar-array/

Sovacool, B. K. (2014). What are we doing here? analyzing fifteen years of Energy Scholarship and proposing a social science research agenda. *Energy Research & Social Science*, *1*, 1–29. https://doi.org/10.1016/j.erss.2014.02.003

Stephenson, A. (2023, Nov 21). “TransAlta going greener: Power generator to spend $3.5B on renewables by end of 2028”. CBC News. https://www.cbc.ca/news/canada/calgary/transalta-green-power-electricity-profit-renewables-1.7034936

Sun, Y., Wang, T., & Gu, X. (2019). A Sustainable Development Perspective on Cooperative Culture, Knowledge Flow, and Innovation Network Governance Performance. *Sustainability*, 11, 6126.

Szulanski, G. (1996). Exploring internal stickiness: Impediments to the transfer of best practice within the firm. *Strategic Management Journal*, *17*(S2), 27–43. https://doi.org/10.1002/smj.4250171105

Tarhan, M. D. (2015). Renewable Energy Cooperatives: A review of demonstrated impacts and limitations. *The Journal of Entrepreneurial and Organizational Diversity*, *4*(1), 104–120. https://doi.org/10.5947/jeod.2015.006

Verkade, N., & Höffken, J. (2019). Collective energy practices: A practice-based approach to civic energy communities and the energy system. *Sustainability*, *11*(11), 3230. https://doi.org/10.3390/su11113230

Waardenburg, L., Huysman, M., & Sergeeva, A.V. (2021). In the Land of the Blind, the One-Eyed Man Is King: Knowledge Brokerage in the Age of Learning Algorithms. *Organization Science*, 33(1), 59-82.

Wagemans, D., Scholl, C., & Vasseur, V. (2019). Facilitating the energy transition—the governance role of local Renewable Energy Cooperatives. *Energies, 12*(21), 4171. https://doi.org/10.3390/en12214171

Walker, G. (2008). What are the barriers and incentives for community-owned means of energy production and use? *Energy Policy*, *36*(12), 4401–4405. https://doi.org/10.1016/j.enpol.2008.09.032

Walker, G., & Devine-Wright, P. (2008). Community renewable energy: What should it mean? *Energy Policy*, *36*(2), 497–500. https://doi.org/10.1016/j.enpol.2007.10.019

Walker, G., Devine-Wright, P., Hunter, S., High, H., & Evans, B. (2010). Trust and community: Exploring the meanings, contexts and dynamics of community renewable energy. *Energy Policy 38* (6): 2655–2663.

Williams, R., & Edge, D. (1996). The social shaping of Technology. *Technologies Visions and Realities*, 53–68. https://doi.org/10.1093/oso/9780198774594.003.0004

Willis, R. & Willis, J. (2012). *Co-operative Renewable Energy in the UK: A Guide to This Growing Sector*. Manchester: Co-operatives UK. Doi: http://www.uk.coop/sites/storage/public/downloads/renewableenergy_0_0.pdf

Xue, J., Ding, C.Q., Yuan, J. (2016). The evolutionary game study of knowledge transfer behavior in cooperative crowdsourcing community of innovation. *Advances in Modelling and Analysis A*, *53*(2), 164-175.

Young, J. C., Rose, D. C., Mumby, H. S., Benitez-Capistros, F., Derrick, C. J., Finch, T., ... & Mukherjee, N. (2018). A methodological guide to using and reporting on interviews in conservation science research. *Methods in Ecology and Evolution, 9*(1), 10-19.

Zhou, Q., Deng, X., Hwang, B.-G., & Yu, M. (2022). System dynamics approach of knowledge transfer from projects to the project-based organization. *International Journal of Managing Projects in Business, 15*(2), 324–349. https://doi.org/10.1108/ijmpb-06-2021-0142

Zook, M. (2004). The knowledge brokers: venture capitalists, tacit knowledge and regional development. *International Journal of Urban and Regional Research, 28*, 621-641.

Chapter Four: Power to the People

In this chapter, I aim to extract key insights from my research findings and the existing literature, clarifying the importance of developing RE cooperatives and emphasizing their potential benefits for communities. Central to this exploration is the complex web of knowledge mobilization among these cooperatives, a critical factor of community engagement explored in my research. By providing a summary, I provide community members with a foundational understanding of the advantages offered by renewable energy cooperatives and the pivotal role of knowledge mobilization. This is a resource for community members seeking to initiate a cooperative in their community or trying to collaborate with local cooperatives. Additionally, it highlights the instrumental role of knowledge mobilization in overcoming challenges and propelling community-led initiatives in the renewable energy landscape. In Appendix E, you can find a series of slides designed for both community members and decision-makers, serving as a concise overview of the key findings from this research. These slides offer a comprehensive summary of the study's outcomes, making it accessible and understandable for a diverse audience.

4.1 Why Renewable Energy Cooperatives?

In a world grappling with the urgent need for more sustainable energy solutions, communities are stepping up to seize control of their energy destiny. Let’s see how communities can get engaged in their energy adventure. There are different mechanisms. One important one is developing renewable energy cooperatives. These renewable energy cooperatives, largely driven by local citizens, represent the powerful fusion of people and technology in shaping a cleaner, greener future. Recent studies (Bauwens et al., 2016; Pechancová et al., 2022; Hoicka and

MacArthur, 2018; Rosewarne, 2022; Centgraf, 2018) have demonstrated the transformative potential of renewable energy cooperatives. These cooperative entities are committed to producing their electricity, rewriting the playbook on energy sourcing and consumption. Engaging in renewable energy cooperatives is not merely a sustainable choice; it emerges as a moral imperative grounded in the principles of 'earth care,' 'people care,' and 'fair share'. The intrinsic motivation to do something good for the environment and the community becomes a driving force, aligning personal values with meaningful actions and fostering a sense of ethical responsibility within the realm of renewable energy cooperatives. In embracing these cooperatives, individuals actively participate in a collective commitment to care for the Earth, nurture communities, and ensure a fair distribution of benefits, thus embodying a holistic and ethically driven approach to renewable energy initiatives.

4.1.1 From Local to Global

The beauty of these community-based initiatives is that their impact extends far beyond local borders. By embracing renewable energy, we're actively combating climate change and contributing to the global effort to reduce greenhouse gas emissions. The actions taken by communities today ripple out, influencing the wider world, and creating a healthier planet for future generations.

Figure 4

Butterfly Effect in Energy Transition

Note. A concept photo that shows local choices in renewable energy echo globally, shaping a sustainable future that improves our planet's well-being for generations to come, much like the "Butterfly Effect" - how a small action can cause a big impact. The photo from (https://www.transcontinentaltimes.com/the-butterfly-effect-small-action/).

4.2 Community Benefits

Joining these cooperatives unlocks an array of advantages that extend far beyond the generation of electricity. It's about embracing energy independence, where communities no longer need to rely solely on large utilities for their power needs. Traditional utilities, with their centralized structures, may be prone to monopolistic tendencies and lack responsiveness to local needs. In contrast, local cooperatives empower communities to generate and manage their energy, fostering resilience and reducing dependence on external entities that might exploit their position. Local job creation is another remarkable product of these cooperatives, directly benefiting the community and boosting the regional economy. It's also about significantly lowering energy costs, saving residents and businesses money while simultaneously reducing our carbon footprint, and contributing to the fight against climate change. These initiatives underscore a simple truth: it's a win-win scenario, with the environment and our finances both emerging as victors.

4.3 Tackling the Challenges

While the promise is significant, the path to renewable energy isn't without its share of challenges. Regulations and policy hurdles pose significant barriers, and the need for an inclusive decision-making process that considers all voices is paramount. This is precisely where knowledge-sharing among cooperatives takes center stage.

4.4 Knowledge is Power

The research underscores the incredible power of sharing experiences, ideas, and innovations. When cooperatives come together to exchange their wealth of knowledge, it's like planting seeds of transformation that take root and grow into a thriving forest of change. This knowledge-sharing isn't reserved for industry experts alone; it's a shared experience among community members, a collective endeavor to find answers to local challenges. This study uncovers how knowledge transfers within renewable energy co-ops. These groups are crucial for pushing greener energy. The findings show that to empower these co-ops by knowledge-sharing, we need to tackle power imbalances, enhance democratic processes, and make sure everyone, especially those on the fringes, gets a say in the renewable energy game. This move will boost community involvement and steer us towards a future of sustainable energy for all.

Within the realm of renewable energy cooperatives, knowledge isn't just a resource; it's the very fuel that drives the transformation of communities. It's the collective wisdom, experience, and insights of its members that propel these cooperatives toward cleaner, more sustainable energy solutions.

4.4.1 Empowering Local Communities

The sharing of knowledge within these cooperatives has a profound effect on local empowerment. As members pool their understanding of renewable technologies, funding strategies, and regulatory landscapes, they equip themselves with the tools necessary to navigate the complex world of renewable energy. Members are not just gathering information; they're arming themselves with specific insights into solar panels, wind turbines, and innovative funding approaches. To navigate the complex world of renewable energy, they learn from experienced co-op members, industry guides, and local support networks. What makes it fascinating is that it's not just about knowing; it's about having practical, field-tested knowledge that empowers members to make informed decisions and drive their renewable energy projects forward. When communities dive into renewable projects, they gain the power to control their energy sources, becoming producers instead of just consumers. This empowerment is crucial for developing energy democracy, and it extends into broader economic and policy decision-making. Enhancing community empowerment by taking charge of production and consumption can contribute to broader positive change in the community (Roby & Dibb, 2019).

4.4.2 From Novices to Experts

One of the striking aspects of knowledge-sharing in these cooperatives is the transformation of novices into experts. When community members collaborate to understand the sophistications of solar panel installation, wind turbine maintenance, or energy-efficient building practices, they evolve from mere participants into skilled practitioners. This shift from being consumers to producers of energy underscores the transformative power of shared knowledge.

In this research, it was clear that people from different backgrounds could team up and figure out how to run a renewable energy co-op. They came from different backgrounds but managed to learn from similar organizations and make it work together. One of the participants in this study shared:

> "One of the things we did was reach out to the community and say, hey, we want to do this, but we don't know how to do that. But do you know how to do it?! And we just got together a really talented, amazing group of people, […] who was one of them."

Another participant said:

> "...being a co-op, that's, you know, we're part of being a co-op, is to cooperate and share your knowledge, and it's very easy to get a hold of documentation and things that you can use as templates"

4.4.3 Answering Local Challenges

Every community has its unique energy challenges, whether related to climate conditions, available resources, policies and regulations, and specific local needs. Knowledge-sharing ensures that these challenges are met with effective, locally-relevant solutions. By learning from one another, these cooperatives develop the adaptability to respond to their community's specific requirements.

Instantly, in the interviews of this research, we talked about how rules and policies can affect our solar power projects and how we can overcome the challenges by knowledge sharing with other co-ops and making a federated approach. One of the participants shared a challenge they were facing.

They wanted the government to change a rule about how credits work for solar power in housing co-ops. At that time, you could only use the credits for one meter, but they wanted it to work for multiple meters. To make their point stronger, they created a template letter to be shared with other co-ops and organizations; they also provided them with the information needed, encouraging them to send the letter to the Minister, expressing their concerns about the current regulation. They're working together, spreading the word, and getting support to make this important change happen in their region.

4.4.4 Catalyst for Innovation

Knowledge is the catalyst for innovation within renewable energy cooperatives. The cooperative model fosters an environment where members feel empowered to explore new technologies, experiment with alternative energy sources, and find creative ways to harness their local resources. Through shared knowledge, cooperatives become hotbeds of ingenuity and innovation.

Guess what? Our local cooperative (our case study), faced a tricky challenge – zero Feed-in Tariffs in Alberta. But here's the cool part – they didn't just sit around; they got super innovative! One of our fantastic participants shared their secret: they jumped right into the community, teamed up with other coop organizations, made friends, talked to smart experts, and basically became knowledge-sharing superheroes. This guy said:

> "And how do we do it from a physical perspective, like within the regulations of Alberta… So, one of the things we did was reach out to the community and say, “hey, we want to do this, but we don't know how to do that. But do you know how to do it?! … reaching out to these other organizations, you know, the provinces who've done similar

things like OREC and SES-solar and just asking them, hey how did you do this? And you know, will you share some information with me?”

It is obvious that they didn't just deal with the rules; they did great! This is all about collaborative mindset and finding an innovative solution by knowledge sharing, proving that when the going gets tough, knowledge-sharing is their superpower for solving problems and being super adaptable. It really shows the innovative capacity of cooperatives which makes them more resilient.

Meantime, one challenge to start a co-op is the lack of confidence about things (Tarhan, 2015). But, you know what? This case can also boost confidence in the community. Seeing these co-op tackle local rules with an innovative solution could inspire community members and build up their confidence.

4.4.5 Pathway to Sustainability

The ultimate goal of these cooperatives is sustainability. Knowledge-sharing makes this goal attainable, by providing the insights and strategies needed to ensure the long-term viability of community-driven renewable energy projects. The path to sustainability becomes more assured as collective wisdom informs every step of the journey.

4.5 Key Highlight: Inclusivity Sparks

Unlock the potential for positive change by getting involved in renewable energy projects. Joining these initiatives not only promotes sustainable practices but also fosters inclusivity, creating diverse and empowered communities working towards a shared energy future.

4.6 Get Involved!

From the economic perspective, even though there's the benefit of saving on energy costs, RE cooperatives also mean you and the community get to split the costs, risks, and responsibilities. So now, regular folks can dive into projects that used to be all government-controlled (Tarhan, 2015).

So, what can you do to be part of this transformative movement? Join your local cooperative, become an active participant in meetings, and engage in the critical conversations that drive decisions. Don't hesitate to ask questions, share your insights, and be a part of the knowledge-sharing that's shaping our collective energy future. After all, knowledge isn't limited to textbooks; it thrives when it's cultivated through the shared experiences of friends, neighbors, and community members. This is a journey we're all on together, learning from each other and collaborating to build a brighter, greener future.

If you are living in Alberta look at ACCA website: https://www.acca.coop/
It's a good source packed with events and gatherings that share the real deal from other organizations' journeys. This is perfect for newcomers or cooperatives eager to share out their knowledge and wisdom to others.

There is also a “Community Energy Co-operative Toolkit” prepared by ACCA. They have a guideline to help renewable energy discussions turn into real actions:
https://nadc.ca/media/17701/4-community-energy-co-op-toolkit.pdf

4.7 References:

Bauwens, T., Gotchev, B., & Holstenkamp, L. (2016). What drives the development of Community Energy in Europe? the case of wind power cooperatives. *Energy Research & Social Science*, *13*, 136–147. https://doi.org/10.1016/j.erss.2015.12.016

Centgraf, S. (2018). Supporting civic engagement in German Energy Cooperatives – transdisciplinary research based on the reflection of individual needs. *Energy Research & Social Science*, *44*, 112–121. https://doi.org/10.1016/j.erss.2018.05.003

Hoicka, C. E., & MacArthur, J. L. (2018). From tip to toes: Mapping Community Energy Models in Canada and New Zealand. *Energy Policy*, *121*, 162–174. https://doi.org/10.1016/j.enpol.2018.06.002

Pechancová, V., Pavelková, D., & Saha, P. (2022). Community Renewable Energy in the Czech Republic: Value proposition perspective. *Frontiers in Energy Research*, *10*. https://doi.org/10.3389/fenrg.2022.821706

Roby, H., & Dibb, S. (2019). Future pathways to mainstreaming community energy. *Energy Policy, 135*, 111020. https://doi.org/10.1016/j.enpol.2019.111020

Rosewarne, S. (2022). Breaking from the industrial energy generation model fossil fuel complex: Community Renewable Energy Cooperatives. *Contested Energy Futures*, 253–279. https://doi.org/10.1007/978-981-19-0224-6_10

Tarhan, M. D. (2015). Renewable Energy Cooperatives: A review of demonstrated impacts and limitations. The Journal of Entrepreneurial and Organizational Diversity, 4(1), 104–120. https://doi.org/10.5947/jeod.2015.006

Chapter 5: Summary of the Findings

5.1. Overview of Findings

This research explored knowledge mobilization dynamic of renewable energy cooperatives and specifically the case study of Bow Valley Green Energy Cooperative in Alberta, Canada and 13 participants including key informants participated in this research. The main research objectives were to learn from: 1) the most important strategies of knowledge mobilization among renewable energy cooperatives, 2) important factors that influence knowledge mobilization within renewable energy cooperatives, and 3) the way knowledge mobilization among renewable energy cooperatives supports these organizations. We investigated different strategies of knowledge transfer and important factors that shape and affect knowledge mobilization process. To enable a more comprehensive sustainable transition, leveraging knowledge from those on the frontlines can encourage the engagement of potential community members and the general public. The case study of Bow Valley Green Energy Cooperative emphasizes the significance of collaborative strategies and routines, shared interests and meanings, contextual influences, and the necessity of addressing power imbalances for effective knowledge mobilization within the renewable energy sector.

Knowledge Mobilization involves various strategies to share and use information effectively. Exploring these strategies helps us understand how knowledge contributes to decision-making and innovation. The data of this research show key areas of knowledge mobilization among cooperatives, such as starting cooperatives, fundraising, making agreements, obtaining permits, dealing with hosts, transitioning from other areas, and financial planning (Appendix D, Tables 1 and 2).

The cooperative's strategies and routines on learning from other organizations, demonstrate the embeddedness of knowledge within their activities, emphasizing collaboration, sharing of experiences, best practices, and resources. The interviews underscore the importance of knowledge mobilization for supporting the growth and success of community energy initiatives, while also hinting at the potential for larger-scale cooperation through federations or associations of renewable energy co-ops.

Moving to the interests and meanings, cooperative culture and collaborative mindset foster an environment where knowledge is seen as a communal resource, enhancing the overall knowledge base of the sector. The geographical diversity of renewable energy cooperatives which provide a non-competitive environment promotes mutual support and cooperation, creating a space where knowledge flows more easily for the benefit of other co-ops. The findings suggest that while these cooperatives actively engage in knowledge sharing, there's an opportunity to further emphasize the involvement of marginalized groups (which was absent here) and bring up more democratic processes within their activities.

Contextual factors also influence knowledge mobilization practices. The analysis of interviews in this research shed light on some important contextual factors that affect knowledge mobilization: intermediary organizations and regulatory framework of the region. The role of intermediary organizations, exemplified here by ACCA, plays a crucial part in facilitating knowledge sharing, collaboration, and best practice dissemination. ACCA serves as a hub, fostering connections, networks, and collaborations among various cooperative organizations, developing knowledge sharing for newcomers to niche areas like renewable energy cooperatives. The regulatory framework significantly impacts cooperatives, influencing resource access, funding, and policy advocacy efforts. Feed-in Tariff (FiT) programs also emerge as a driver,

while interviewees mentioned that the absence of FiTs in certain regions prompts cooperatives to adapt and find alternative approaches. The findings underscore the importance of government support, grants, and policies in shaping the knowledge mobilization landscape of renewable energy cooperatives.

Exploring power dynamics, energy cooperatives appear as important actors gathering knowledge from diverse members, including professionals from the oil and gas industry. Power imbalances lead to creating structures that promote equitable knowledge sharing and collective decision-making processes. The federated approach is highlighted, enhancing the collective strength through collaboration and sharing knowledge and resources. Policy advocacy also emerges as a powerful tool for cooperatives to influence regulatory changes, with participants actively engaging in lobbying efforts and creating templates for collective action. The cooperative sector's efforts in policy advocacy reveal power dynamics, particularly in navigating bureaucratic processes and negotiating with municipalities. The research underscores the transformative impact of renewable energy cooperatives, challenging traditional energy systems and potentially shifting power dynamics. However, concerns about demographic composition within these cooperatives highlight the need for diversification to enhance inclusivity in knowledge mobilization by incorporating a broader range of perspectives and experiences. This multifaceted approach to knowledge mobilization, encompassing diverse strategies and addressing power imbalances, positions renewable energy cooperatives as powerful agents driving a sustainable transition and engaging communities in shaping their energy future.

5.2. Key Messages within the Community

The results of this research highlight some important key messages within the community:

5.2.1 Community Empowerment through Collaboration

The results reveal the power of collective action and collaboration within renewable energy cooperatives. Working together is important; community members can empower themselves to drive positive changes in the energy sector in their region.

5.2.2 Power of Knowledge

Knowledge sharing is an important driving force behind successful renewable energy initiatives. It's critical for community members to actively engage in sharing experiences, best practices, and resources to accelerate the transition to sustainable energy.

5.2.3 Navigating Regulatory Challenges

There are some challenges in developing renewable energy cooperatives which are posed by regulatory frameworks. Collaborative efforts and federated approaches by cooperatives in the region can address these challenges. Policy advocacy has a significant role in shaping a supportive regulatory environment for community energy projects.

5.2.4 Adaptability and Resiliency

This research discloses some examples of adaptability and resiliency in facing challenges, such as the absence of Feed-in Tariffs. Renewable energy cooperatives can overcome obstacles by adapting strategies and finding alternative paths toward sustainable energy goals.

5.2.5 Intermediary Organizations

Intermediary organizations have a pivotal role in developing community energy projects in the region. It is important to actively engage with these organizations for support, knowledge mobilization, and networking opportunities. You can become an expert by active engagement.

5.2.6 Shared Norms for Community Benefit

Collaborative mindset is a shared norm in knowledge mobilization within cooperatives. Knowledge is a communal resource that benefits the entire community.

5.3. Future Research Recommendations

Based on the findings of this research, some future research recommendations could contribute to a deeper understanding of renewable energy cooperatives and knowledge mobilization. One of the barriers revealed in this research is the lack of diversity among the community members who are involved in renewable energy cooperatives. An important area of future research can be investigating obstacles and facilitators to inclusive participation within renewable energy cooperatives. One part of this study can be identifying marginalized groups in the region.

To foster community engagement within renewable energy cooperatives, it can be interesting to explore behavior change. This future study can investigate motivations and moral values that prompt individuals to actively participate in renewable energy cooperatives, considering the potential for behavior change as a catalyst for sustainable energy practices. In this research strategies for promoting positive behavior change in communities can also be explored.

Another interesting subject for future research can be analyzing the impact of power dynamics on different aspects of community engagement in energy cooperatives. This research can assess how power imbalances may affect decision-making processes, inclusivity, and the overall effectiveness of cooperatives in achieving their goals.

Cross-sector collaboration studies can be another subject for future studies. This research can investigate opportunities for cross-sector collaboration between renewable energy cooperatives and other community development initiatives, and assess the potential synergies and challenges of such collaborations. By addressing these areas, we can pave the way for more integrated and effective strategies in the realm of renewable energy and community development.

Bibliography

Adkin, L. E., Hanson, L. L., Kahane, D., Parkins, J. R., & Patten, S. (2017). Can public engagement democratize environmental policymaking in a resource-dependent state? Comparative case studies from Alberta, Canada. *Environmental Politics, 26*(2), 301-321.

Aldrich, H. E., & Fiol, C. M. (2007). Fools rush in? the institutional context of industry creation. *Entrepreneurship*, 105–127. https://doi.org/10.1007/3-540-48543-0_5

and power into the multi-level perspective. *Theory, Culture & Society, (31)*5, 21–40. https://doi.org/10.1177/0263276414531627.

Anderson, D. (2023, Sep 14). *"Alberta's renewables pause is leaving billions of dollars in limbo. Here's what you need to know*". The Narwhal. https://thenarwhal.ca/alberta-moratorium-renewables/

Argote, L., Guo, J., Park, S.-S., & Hahl, O. (2022). The mechanisms and components of knowledge transfer: The virtual special issue on knowledge transfer within organizations. *Organization Science*, *33*(3), 1232–1249. https://doi.org/10.1287/orsc.2022.1590

Asheim, B.T., Boschma, R., & Cooke, P. (2011). Constructing Regional Advantage: Platform Policies Based on Related Variety and Differentiated Knowledge Bases. *Regional Studies, 45*, 893 - 904.

Aurora, S., & Flack, P. (2018). Principles of structural phenomenology. *Acta Structuralica*, *s1*, 151–169. https://doi.org/10.19079/actas.2018.s1.151

Avelino, F., & Rotmans. J. (2009) Power in transition: An interdisciplinary framework to study power in relation to structural change. *European Journal of Social Theory 12*(4): 543–569.

Avelino, F., Hielscher, S., Strumińska-Kutra, M., de Geus, T., Widdel, L., Wittmayer, J., Dańkowska, A., Dembek, A., Fraaije, M., Heidary, J., Iskandarova, M., Rogge, K., Stasik, A., & Crudi, F. (2023). Power to, over and with: Exploring Power Dynamics in Social Innovations in energy transitions across Europe. *Environmental Innovation and Societal Transitions*, *48*, 100758. https://doi.org/10.1016/j.eist.2023.100758

Barriball, K. L., & While, A. (1994). Collecting data using a semi-structured interview: a discussion paper. *Journal of Advanced Nursing-Institutional Subscription, 19*(2), 328-335.

Barrington-Leigh, C., & Ouliaris, M. (2017). The renewable energy landscape in Canada: a spatial analysis. *Renewable and Sustainable Energy Reviews, 75*, 809-819.

Bauwens, T., Gotchev, B., & Holstenkamp, L. (2016). What drives the development of Community Energy in Europe? the case of wind power cooperatives. *Energy Research & Social Science*, *13*, 136–147. https://doi.org/10.1016/j.erss.2015.12.016

Bayulgen, O. (2020). Localizing the energy transition: Town-level political and socio-economic drivers of clean energy in the United States. *Energy Research &Amp; Social Science, 62*, 101376. https://doi.org/10.1016/j.erss.2019.101376

Bechtel, R. B., & Churchman, A. (2002). *Handbook of Environmental Psychology*. Wiley.

Becker, S., & Naumann, M. (2017). Energy democracy: Mapping the debate on Energy Alternatives. *Geography Compass*, *11*(8). https://doi.org/10.1111/gec3.12321

Bell, M. Z. (2020). Spatialising procedural justice: Fairness and local knowledge mobilisation in nuclear waste siting. *Local Environment*, *26*(1), 165–180. https://doi.org/10.1080/13549839.2020.1867841

Bengtsson, M. (2016). How to plan and perform a qualitative study using content analysis. *NursingPlus Open, 2*, 8–14. https://doi.org/10.1016/j.npls.2016.01.001

Bere, J., Jones, C., Jones, S., & Munday, M. (2016). Energy and development in the periphery: A regional perspective on small hydropower projects. *Environment and Planning C: Politics and Space, 35*(2), 355–375. https://doi.org/10.1177/0263774x16662029

Berka, A. L., & Creamer, E. (2018). Taking stock of the local impacts of community owned Renewable Energy: A Review and Research Agenda. *Renewable and Sustainable Energy Reviews*, *82*, 3400–3419. https://doi.org/10.1016/j.rser.2017.10.050

Bolton, R., & Hannon, M. (2016). Governing Sustainability transitions through business model innovation: Towards a systems understanding. *Research Policy*, *45*(9), 1731–1742. https://doi.org/10.1016/j.respol.2016.05.003

Bomberg, E., & McEwen, N. (2012). Mobilizing Community Energy. *Energy Policy, 51*, 435–444. https://doi.org/10.1016/j.enpol.2012.08.045

Boxenbaum, E., & Battilana, J. (2005). Importation as innovation: Transposing managerial practices across fields. *Strategic Organization*, *3*(4), 355–383. https://doi.org/10.1177/1476127005058996

Bruckner T., I.A. Bashmakov, Y. Mulugetta, H. Chum, A. de la Vega Navarro, J. Edmonds, A. Faaij, B. Fungtammasan, A. Garg, E. Hertwich, D. Honnery, D. Infild, M. Kainuma, S. Khennas, S. Kim, H. B. Nimir, K. Riahi, N. Strachan, R. Wiser, & X. Zhang. (2014). Energy Systems. *Climate Change 2014: Mitigation of Climate Change* (511-598). Cambridge University Press. Doi: 10.1017/CBO9781107415416.013

Bullock, R.C., Zurba, M., Parkins, J., & Skudra, M. (2020). Open for bioenergy business? Perspectives from Indigenous business leaders on biomass development potential in Canada. *Energy research and social science, 64*, 101446.

Burke, M., & Stephens, J. (2017). Energy democracy: Goals and policy instruments for sociotechnical transitions. *Energy research and social science, 33*, 35-48.

Burt, R.S. (2007). Secondhand Brokerage: Evidence On The Importance Of Local Structure For Managers, Bankers, And Analysts. *Academy of Management Journal, 50*, 119-148.

Butler, C., & Demski, C. (2013). Valuing public engagement with energy system transitions: the importance of what lies beneath. *Carbon Management, 4*, 659 - 662.

Caloffi, A., Rossi, F., & Russo, M. (2015). The emergence of intermediary organizations: A network-based approach to the design of Innovation Policies. *Handbook on Complexity and Public Policy*, 314–331. https://doi.org/10.4337/9781782549529.00027

Cambero, C., & Sowlati, T. (2014). Assessment and optimization of forest biomass supply chains from economic, social and environmental perspectives – A review of literature. *Renewable & Sustainable Energy Reviews, 36*, 62-73.

Cao, X., Li, C., Li, J., & Li, Y. (2022). Modeling and simulation of knowledge creation and diffusion in an industry-university-research cooperative innovation network: a case study of China's new energy vehicles. *Scientometrics, 127*(7), 3935–3957. https://doi.org/10.1007/s11192-022-04416-4

Capellán-Pérez, I., Campos-Celador, Á., & Terés-Zubiaga, J. (2018). Renewable Energy Cooperatives as an instrument towards the energy transition in Spain. *Energy Policy*, *123*, 215–229. https://doi.org/10.1016/j.enpol.2018.08.064

Centgraf, S. (2018). Supporting civic engagement in German Energy Cooperatives – transdisciplinary research based on the reflection of individual needs. *Energy Research & Social Science*, *44*, 112–121. https://doi.org/10.1016/j.erss.2018.05.003

Chilvers, J., & Longhurst, N. (2016). Participation in Transition(s): Reconceiving Public Engagements in Energy Transitions as Co-Produced, Emergent and Diverse. *Journal of Environmental Policy & Planning, 18*, 585 - 607.

Chini, T.C. (2004). *Effective Knowledge Transfer in Multinational Corporations*. Palgrave Macmillan.

Choi, T. (2024, February 16). Alberta 'unfairly' targeted renewables in moratorium: Pembina. Sustainable Biz. https://sustainablebiz.ca/alberta-unfairly-targeted-renewables-in-moratorium-pembina

Clulow, Z., & Reiner, D. M. (2022). Democracy, economic development and low-carbon energy: When and why does democratization promote energy transition? *Sustainability*, *14*(20), 13213. https://doi.org/10.3390/su142013213

Corsatea, T. D. (2014). Localised knowledge, local policies and regional innovation activity for renewable energy technologies: Evidence from Italy. *Papers in Regional Science*, *95*(3), 443–466. https://doi.org/10.1111/pirs.12136

Couture, T., & Gagnon, Y. (2010). An analysis of feed-in tariff remuneration models: implications for renewable energy investment. *Energy Policy, 39*, 955–965.

Creamer, E., Eadson, W., Van Veelen, B., Pinker, A., Tingey, M., Braunholtz-Speight, T., Markantoni, M., Foden, M., & Lacey-Barnacle, M. (2018). Community energy: Entanglements of community, state, and private sector. *Geography Compass*, *12*(7). https://doi.org/10.1111/gec3.12378

Creswell, J. W., & Poth, C. N. (2018). *Qualitative inquiry and research design: Choosing among five approaches*. Sage.

Crowe, S., Cresswell, K.M., Robertson, A., Huby, G., Avery, A.J., & Sheikh, A. (2011). The case study approach. *BMC Medical Research Methodology, 11*, 100 - 100.

Crupi, A., Sarto, N.D., Minin, A.D., Gregori, G.L., Lepore, D., Marinelli, L., & Spigarelli, F. (2020). The digital transformation of SMEs - a new knowledge broker called the digital innovation hub. *J. Knowl. Manag., 24*, 1263-1288.

Dall-Orsoletta, A., Ferreira, P., & Gilson Dranka, G. (2022). Low-carbon technologies and just energy transition: Prospects for electric vehicles. *Energy Conversion and Management: X*, *16*, 100271. https://doi.org/10.1016/j.ecmx.2022.100271

Denktas, B., Pekdemir, S., & Soykan, G. (2018). Peer to peer business model approach for Renewable Energy Cooperatives. *2018 7th International Conference on Renewable Energy Research and Applications (ICRERA)*. https://doi.org/10.1109/icrera.2018.8566735

Efstathiou, Jr., J. & Orland, K. (2018, March 26). Alberta, home to one of the world's dirtiest oil sources, wants to be green. *BNN Bloomberg News*. https://www.bnnbloomberg.ca/one-of-world-s-dirtiest-oil-sources-wants-

Ehr, C., Patterson, E. & Donegan, T. (2019). Rooftop solar in Canmore: A neighbourhood by neighbourhood analysis. https://canmore.ca/documents/planning-building-development/signposts-to-sustainability/3109-rooftop-solar-in-canmore-final-report

Environment and Climate Change Canada (2022b) Canadian Environmental Sustainability Indicators: Greenhouse gas emissions. Available at: www.canada.ca/en/environment-climate-change/services/environmental-indicators/greenhouse-gas-emissions.html.

Environment and Climate Change Canada. (2022a). NATIONAL INVENTORY REPORT 1990–2020: GREENHOUSE GAS SOURCES AND SINKS IN CANADA. Available at: https://publications.gc.ca/site/eng/9.506002/publication.html

Evers, H., Gerke, S.H., & Menkhoff, T. (2010). Knowledge clusters and knowledge hubs: designing epistemic landscapes for development. *J. Knowl. Manag., 14*, 678-689.

Financing Navigator (n.d.). Better Buildings Solution Centre. https://betterbuildingssolutioncenter.energy.gov/financing-navigator/option/power-purchase-agreement#:~:text=A%20PPA%20allows%20the%20customer,from%20the%20sale%20of%20electricity.

Fischer, B., Gutsche, G., & Wetzel, H. (2021). Who wants to get involved? Determining citizen willingness to participate in German renewable energy cooperatives. *Energy Research &Amp; Social Science, 76*, 102013. https://doi.org/10.1016/j.erss.2021.102013

Geels, F.W. (2014). Regime resistance against low-carbon transitions: introducing politics

Gismondi, M., & Hanson, L. (2021). Provincial polyphasia: Community energy generation and the politics of Sustainability Transition in Alberta, Canada. *A Critical Approach to the Social Acceptance of Renewable Energy Infrastructures,* 181–198. https://doi.org/10.1007/978-3-030-73699-6_10

Giulio, G.M., Groves, C., Monteiro, M., & Taddei, R. (2016). Communicating through vulnerability: knowledge politics, inclusion and responsiveness in responsible research and innovation. *Journal of Responsible Innovation, 3*, 92-109.

Gjorgievski, V. Z., Cundeva, S., & Georghiou, G. E. (2021). Social Arrangements, technical designs and impacts of Energy Communities: A Review. *Renewable Energy*, *169*, 1138–1156. https://doi.org/10.1016/j.renene.2021.01.078

Goggin, C.L., & Cunningham, R. (2021). Social Connection and Knowledge Brokerage in a State Government Research Network in Australia. *Electronic Journal of Knowledge Management, 19*, 54-75.

Government of Alberta. (2019). Oil sands facts and statistics. https://www.alberta.ca/oil-sands-facts- and- statistics.aspx

Grigorescu, A., Ion, A.E., Lincaru, C., & Pîrciog, S. (2021). Synergy Analysis of Knowledge Transfer for the Energy Sector within the Framework of Sustainable Development of the European Countries. *Energies*, 15(1), 276.

Grubler, A., Wilson, C., & Nemet, G.F. (2016). Apples, oranges, and consistent comparisons of the temporal dynamics of energy transitions. *Energy research and social science, 22*, 18-25.

Gubbins, N., (2010). The role of community energy schemes in supporting community resilience. *JRF Brief Pap Community Assets*, 1–24.

Hacker, K. (2013). Chapter 1: Principles of Community-Based Participatory Research. *Community-based participatory research.* Thousand Oaks, CA: SageBrian.

Hall, J. R. (2015). Social Futures of Global Climate Change: A structural phenomenology. *American Journal of Cultural Sociology*, *4*(1), 1–45. https://doi.org/10.1057/ajcs.2015.12

Hansen, K., Mathiesen, B., & Skov, I.R. (2019). Full energy system transition towards 100% renewable energy in Germany in 2050. *Renewable & Sustainable Energy Reviews, 102*, 1-13.

Hastings-Simon, S., Kaddoura, S., Klonick, A., Leitch, A., and Porter, M.(2018). Plugging In: Opportunities to Procure Renewable Energy for Non-Utility Companies and Institutions in Alberta. *The Pembina Institute, Rocky Mountain Institute and Calgary Economic Development.* Retrieved from: https://www.pembina.org/reports/plugging-in-2018.pdf

Heras-Saizarbitoria, I., Sáez, L., Allur, E., & Morandeira, J. (2018). The emergence of renewable energy cooperatives in Spain: A review. *Renewable and Sustainable Energy Reviews, 94*, 1036–1043. https://doi.org/10.1016/j.rser.2018.06.049

Hewitt, R. J., Bradley, N., Baggio Compagnucci, A., Barlagne, C., Ceglarz, A., Cremades, R., McKeen, M., Otto, I. M., & Slee, B. (2019). Social Innovation in Community Energy in Europe: A review of the evidence. *Frontiers in Energy Research*, *7*. https://doi.org/10.3389/fenrg.2019.00031

Hoicka, C. E., & MacArthur, J. L. (2018). From tip to toes: Mapping Community Energy Models in Canada and New Zealand. *Energy Policy*, *121*, 162–174. https://doi.org/10.1016/j.enpol.2018.06.002

Homket, Y., Sutheravut, P., & Nima, S. (2021). Community capacity-building mobilization towards energy transitions in the era of Thailand 4.0: A case study on biomass power plants. *Energies*, *14*(17), 5219. https://doi.org/10.3390/en14175219

Huybrechts, B. & Mertens, S. (2014). The Relevance of the Cooperative Model in the Field of Renewable Energy. *Annals of Public and Cooperative Economics, 85*(2): 193-212. DOI: http://dx.doi.org/10.1111/apce.12038

Huybrechts, B. (2013). Social Enterprise, Social Innovation and Alternative Economies: Insights from Fair Trade and Renewable Energy. *Alternative Economies and Spaces,* 113–130. https://doi.org/10.14361/transcript.9783839424988.113

Irwin, A., & Michael, M. (2007). *Science, Social Theory and Public Knowledge*. McGraw-Hill International (UK) Ltd.

Jenkins, K., Sovacool, B.K., & McCauley, D. (2018). Humanizing sociotechnical transitions through energy justice: an ethical framework for global transformative change. *Energy Policy, 117*, 66-74.

Jimenez, A., Delgado, D., Merino, R., & Argumedo, A. (2022). A decolonial approach to innovation? Building paths towards Buen Vivir. *The Journal of Development Studies, 58*(9), 1633-1650.

Jones, K. E., Granzow, M., & Shields, R. (2019). Urban virtues and the innovative city: An experiment in placing innovation in Edmonton, Canada. *Urban Studies, 56*(4), 705-721.

Komendantova, N. (2021). Transferring awareness into action: A meta-analysis of the behavioral drivers of energy transitions in Germany, Austria, Finland, Morocco, Jordan and Iran. *Energy research and social science, 71*, 101826.

Kong, D.Z. (2019). Research on the Impact of Innovative Network Knowledge Flow on Enterprise Innovation Performance—Based on Network Embeddedness Perspective. *Forecast*, 38, 45–51.

Krumm, A., Süsser, D., & Blechinger, P. (2022). Modelling social aspects of the Energy Transition: What is the current representation of social factors in energy models? *Energy, 239,* 121706. https://doi.org/10.1016/j.energy.2021.121706

Krupa, J. (2012). Blazing a new path forward: A case study on the renewable energy initiatives of the Pic River First Nation. *Environmental development, 3*, 109-122.

Kunze, C., & Becker, S. (2014). *Energy democracy in Europe: A survey and outlook.* Brussels: Rosa Luxemburg Foundation.

Łakomiak, A. (2022). Civic Energy in an Orchard Farm–Prosumer and Energy Cooperative—A New Approach to Electricity Generation. *Energies*, *15*(19), 6918. https://doi.org/10.3390/en15196918

Lantz, E., & Tegen, S. (2009). *Economic Development Impacts of Community Wind Projects: A Review and Empirical Evaluation.* Berkeley: National Renewable Energy Laboratory. http://www.nrel.gov/docs/fy09osti/45555.pdf

Lehtonen, M., & de Carlo, L. (2019). Community energy and the virtues of mistrust and distrust: Lessons from Brighton and Hove Energy Cooperatives. *Ecological Economics, 164,* 106367. https://doi.org/10.1016/j.ecolecon.2019.106367

Leonhardt, R., Noble, B., Poelzer, G., Fitzpatrick, P., Belcher, K., & Holdmann, G. (2022). Advancing Local Energy Transitions: A global review of government instruments supporting community energy. *Energy Research & Social Science*, *83*, 102350. https://doi.org/10.1016/j.erss.2021.102350

Lewis, G. (2022). The site of the social: A philosophical account of the constitution of social life and change. *Educational Review*, *75*(4), 806–806. https://doi.org/10.1080/00131911.2022.2051343

Loorbach, D., & Rotmans, J. (2010). The practice of transition management: Examples and lessons from four distinct cases. *Futures*, *42*(3), 237–246. https://doi.org/10.1016/j.futures.2009.11.009

MacArthur, J. L. (2016). *Empowering electricity: Co-operatives, sustainability, and power sector reform in Canada.* UBC Press.

Mertens, D. M. (2020). *Research and evaluation in education and psychology: Integrating diversity with quantitative, qualitative, and mixed methods*. SAGE.

Mignon, I., & Rüdinger, A. (2016). The impact of systemic factors on the deployment of cooperative projects within renewable electricity production: an international comparison. *Renew Sustain Energy Rev, 65*, 478–88.

Miller, C., & Richter, J. (2014). Social Planning for Energy Transitions. *Current Sustainable/Renewable Energy Reports*, 1, 77-84.

Mori, P. A. (2014). Community and cooperation: The evolution of cooperatives towards new models of citizens' Democratic participation in public services provision. *Annals of Public and Cooperative Economics*, *85*(3), 327–352. https://doi.org/10.1111/apce.12045

Mudasser, M., Yiridoe, E. K., & Corscadden, K. (2013). Economic feasibility of large community feed-in tariff-eligible wind energy production in Nova Scotia. *Energy Policy, Elsevier, 62*(C), 966-977.

NEB (2019a). Provincial and Territorial Energy Profiles – Alberta. Retrieved from: https://www.cer-rec.gc.ca/en/data-analysis/energy-markets/provincial-territorial-energy-profiles/provincial-territorial-energy-profiles-alberta.html

Nolden, C. (2013). Governing Community Energy—feed-in tariffs and the development of community wind energy schemes in the United Kingdom and Germany. *Energy Policy*, *63*, 543–552. https://doi.org/10.1016/j.enpol.2013.08.050

Nonaka, I., and H. Takeuchi. (1995). The Knowledge-Creating Company: How Japanes companies create the dynamics of innovation. New York: Oxford University Press.

Ostrom, A.L., Bitner, M.J., Brown, S.W., Burkhard, K.A., Goul, M., Smith-Daniels, V., Demirkan, H., & Rabinovich, E. (2010). Moving Forward and Making a Difference: Research Priorities for the Science of Service. *Journal of Service Research, 13*, 36 - 4.

Pacheco, A., Monteiro, J., Santos, J., Sequeira, C., & Nunes, J. (2022). Energy transition process and community engagement on geographic islands: The case of Culatra Island (Ria Formosa, Portugal). *Renewable Energy, 184*, 700–711. https://doi.org/10.1016/j.renene.2021.11.115

Patel, S., Holowach, M., & Anders, S. (2020). *Assessing Barriers to Renewable Energy Development in Alberta : Evidence from a Survey on Wind Energy with Rural Landowners.* Resource Economics and Environmental Sociology.

Pechancová, V., Pavelková, D., & Saha, P. (2022). Community Renewable Energy in the Czech Republic: Value proposition perspective. *Frontiers in Energy Research*, *10*. https://doi.org/10.3389/fenrg.2022.821706

Phadke, R., Manning, C., & Burlager, S. (2015). Making it Personal: Diversity and Deliberation in Climate Adaptation Planning. *Climate Risk Management, 9*, 62-76.

Polanyi, M. (1967), *The Tacit Dimension*, Anchor Books, New York, NY

Polkinghorne, D. E. (1989). Phenomenological Research Methods. *Existential-Phenomenological Perspectives in Psychology*, 41–60. https://doi.org/10.1007/978-1-4615-6989-3_3

Powell, W. W., Packalen, K., & Whittington, K. (2012). Organizational and institutional genesis. *The Emergence of Organizations and Markets*. https://doi.org/10.23943/princeton/9780691148670.003.0014

Punt, M. B., Bauwens, T., Frenken, K., & Holstenkamp, L. (2022). Institutional relatedness and the emergence of renewable energy cooperatives in German districts. *Regional Studies*, *56*(4), 548–562. https://doi.org/10.1080/00343404.2021.1890708

Reagans, R., & McEvily, B. (2003). Network structure and knowledge transfer: The effects of cohesion and range. *Administrative Science Quarterly*, *48*(2), 240–267. https://doi.org/10.2307/3556658

Roby, H., & Dibb, S. (2019). Future pathways to mainstreaming community energy. *Energy Policy, 135*, 111020. https://doi.org/10.1016/j.enpol.2019.111020

Romsdahl, R., Blue, G. & Kirilenko, A. (2018). Action on climate change requires deliberative framing at local governance level. *Climatic Change 149*, 277–287. https://doi.org/10.1007/s10584-018-2240-0

Rosewarne, S. (2022). Breaking from the industrial energy generation model fossil fuel complex: Community Renewable Energy Cooperatives. *Contested Energy Futures*, 253–279. https://doi.org/10.1007/978-981-19-0224-6_10

Ryan, M. J. (2014). Power Dynamics in Collective Impact. *Stanford Social Innovation Review*, *12*(4), A10–A11. https://doi.org/10.48558/N8Y6-E936

Schatzki, T. R. (2013). *The Timespace of human activity: On performance, society, and history as indeterminate teleological events*. Lanham: Rowan & Littlefield Publishers.

Schatzki, Theodore R. (2002): *The site of the social. A philosophical account of the constitution of social life and change.* University Park: Pennsylvania State University Press. https://doi.org/10.1515/9780271023717-005

Seyfang, G., & Haxeltine, A. (2012). Growing grassroots innovations: Exploring the role of community-based initiatives in Governing Sustainable Energy Transitions. *Environment and Planning C: Government and Policy*, *30*(3), 381–400. https://doi.org/10.1068/c10222

Seyfang, G., & Smith, A. (2007). Grassroots Innovations for Sustainable Development: Towards a new research and Policy Agenda. *Environmental Politics*, *16*(4), 584–603. https://doi.org/10.1080/09644010701419121

Shove, E., & Walker, G. (2014). What is energy for? Social Practice and energy demand. *Theory, Culture & Society*, *31*(5), 41–58. https://doi.org/10.1177/0263276414536746

Shove, E., Pantzar, M., & Watson, M. (2012). *The dynamics of Social Practice Everyday Life and how it changes*. SAGE Publ. https://doi.org/10.4135/9781446250655

Shove, Elizabeth; Pantzar, Mika (2005): Consumers, Producers and practices: Understanding the invention and reinvention of Nordic walking. *Journal of Consumer Culture 5* (1): 43–64.

Silvius, G. (2023, Dec 6). "Bissell Thrift Shop launches solar array". Rat Creek Press. https://ratcreek.org/2023/12/06/bissell-thrift-shop-launches-solar-array/

Sovacool, B. K. (2014). What are we doing here? analyzing fifteen years of Energy Scholarship and proposing a social science research agenda. *Energy Research & Social Science*, *1*, 1–29. https://doi.org/10.1016/j.erss.2014.02.003

Sovacool, B., & Geels, F. (2016). Further reflections on the temporality of energy transitions: a response to critics. *Energy research and social science, 22*, 232-237.

Steg, L., Perlaviciute, G., Sovacool, B. K., Bonaiuto, M., Diekmann, A., Filippini, M., Hindriks, F., Bergstad, C. J., Matthies, E., Matti, S., Mulder, M., Nilsson, A., Pahl, S., Roggenkamp, M., Schuitema, G., Stern, P. C., Tavoni, M., Thøgersen, J., & Woerdman, E. (2021). A research agenda to better understand the human dimensions of energy transitions. *Frontiers in Psychology, 12*. https://doi.org/10.3389/fpsyg.2021.672776

Stephenson, A. (2023, Nov 21). "TransAlta going greener: Power generator to spend $3.5B on renewables by end of 2028". CBC News. https://www.cbc.ca/news/canada/calgary/transalta-green-power-electricity-profit-renewables-1.7034936

Sun, Y., Wang, T., & Gu, X. (2019). A Sustainable Development Perspective on Cooperative Culture, Knowledge Flow, and Innovation Network Governance Performance. *Sustainability*, 11, 6126.

Suncor Energy announces 2024 corporate guidance. (2023, December 5). Boe Report. https://boereport.com/2023/12/05/suncor-energy-announces-2024-corporate-guidance/

Szulanski, G. (1996). Exploring internal stickiness: Impediments to the transfer of best practice within the firm. *Strategic Management Journal*, *17*(S2), 27–43. https://doi.org/10.1002/smj.4250171105

Tarhan, M. D. (2015). Renewable Energy Cooperatives: A review of demonstrated impacts and limitations. *The Journal of Entrepreneurial and Organizational Diversity*, *4*(1), 104–120. https://doi.org/10.5947/jeod.2015.006

Teherani, A., Martimianakis, T., Stenfors-Hayes, T., Wadhwa, A., & Varpio, L. (2015). Choosing a qualitative research approach. *Journal of Graduate Medical Education*, *7*(4), 669–670. https://doi.org/10.4300/jgme-d-15-00414.1

The Paris Agreement, 4 November 2016. https://www.un.org/en/climatechange/paris-agreement

UNEP. 2016. *The Emissions Gap Report 2016*. Nairobi: United Nations Environment Programme.

Verkade, N., & Höffken, J. (2019). Collective energy practices: A practice-based approach to civic energy communities and the energy system. *Sustainability*, *11*(11), 3230. https://doi.org/10.3390/su11113230

Waardenburg, L., Huysman, M., & Sergeeva, A.V. (2021). In the Land of the Blind, the One-Eyed Man Is King: Knowledge Brokerage in the Age of Learning Algorithms. *Organization Science*, 33(1), 59-82.

Wagemans, D., Scholl, C., & Vasseur, V. (2019). Facilitating the energy transition—the governance role of local Renewable Energy Cooperatives. *Energies, 12*(21), 4171. https://doi.org/10.3390/en12214171

Wahlund, M., & Palm, J. (2022). The role of Energy Democracy and energy citizenship for Participatory Energy Transitions: A comprehensive review. *Energy Research & Social Science*, *87*, 102482. https://doi.org/10.1016/j.erss.2021.102482

Walker, G. (2008). What are the barriers and incentives for community-owned means of energy production and use? *Energy Policy*, *36*(12), 4401–4405. https://doi.org/10.1016/j.enpol.2008.09.032

Walker, G., & Devine-Wright, P. (2008). Community renewable energy: What should it mean? *Energy Policy*, *36*(2), 497–500. https://doi.org/10.1016/j.enpol.2007.10.019

Walker, G., Devine-Wright, P., Hunter, S., High, H., & Evans, B. (2010). Trust and community: Exploring the meanings, contexts and dynamics of community renewable energy. *Energy Policy 38* (6): 2655–2663.

Waterman, S. (2022, Sep 5). "*Reading Hydro's Story*". Carbon Copy. https://carboncopy.eco/initiatives/reading-hydro-cbs

Weber, B. (2023, December 25). Alberta's renewable energy pause could become lingering stumble, observers say. Calgary Herald. https://calgaryherald.com/news/politics/alberta-renewable-energy-pause-could-become-lingering-stumble#:~:text=EDMONTON%20%E2%80%94%20It%20was%20just%20supposed,an%20industry%20growing%20beyond%20expectations.

Wiles, R., Crow, G., Heath, S., & Charles, V. (2008). The Management of Confidentiality and Anonymity in Social Research. International Journal of Social Research Methodology, 417-428. DOI: 10.1080/13645570701622231

Williams, R., & Edge, D. (1996). The social shaping of Technology. *Technologies Visions and Realities*, 53–68. https://doi.org/10.1093/oso/9780198774594.003.0004

Williams, S., & Doyon, A. (2019). Justice in energy transitions. *Environmental innovation and societal transitions, 31*, 144-153.

Willis, R. & Willis, J. (2012). *Co-operative Renewable Energy in the UK: A Guide to This Growing Sector*. Manchester: Co-operatives UK. Doi: http://www.uk.coop/sites/storage/public/downloads/renewableenergy_0_0.pdf

Wolsink, M. (2012). Wind power: Basic challenge concerning social acceptance. *Encyclopedia of Sustainability Science and Technology*, 12218–12254. https://doi.org/10.1007/978-1-4419-0851-3_88

Wynne, B. (1998). May the sheep safely graze? A reflexive view of the expert–lay knowledge divide. *Risk, Environment and Modernity: Towards a New Ecology*, 44–83. https://doi.org/10.4135/9781446221983.n3

Wynne, B. (2011). *Rationality and ritual participation and exclusion in nuclear decision-making.* Earthscan.

Xue, J., Ding, C.Q., Yuan, J. (2016). The evolutionary game study of knowledge transfer behavior in cooperative crowdsourcing community of innovation. *Advances in Modelling and Analysis A*, *53*(2), 164-175.

Yenneti, K., & Day, R. (2015). Procedural (in) justice in the implementation of solar energy: The case of Charanaka solar park, Gujarat, India. *Energy Policy, 86*, 664-673.

Yin, R. (1981). The case study as a serious research strategy. *Science Communication 3*(1), 97–114.

Yoo, Y.-S., Hwang, T., Kang, S., Newaz, S. H. S., Lee, I.-W., & Choi, J. K. (2017). Peer-to-peer based energy trading system for heterogeneous small-scale ders. *2017 International Conference on Information and Communication Technology Convergence (ICTC).* https://doi.org/10.1109/ictc.2017.8190789

Young, J. C., Rose, D. C., Mumby, H. S., Benitez-Capistros, F., Derrick, C. J., Finch, T., ... & Mukherjee, N. (2018). A methodological guide to using and reporting on interviews in conservation science research. *Methods in Ecology and Evolution, 9*(1), 10-19.

Zhao, D., Zuo, M. & Deng, X.N. (2015), Examining the factors influencing cross-project knowledge transfer: an empirical study of IT services firms in China, *International Journal of Project Management 33*(2), 325-340, doi: 10.1016/j.ijproman.2014.05.003.

Zhou, Q., Deng, X., Hwang, B.-G., & Yu, M. (2022). System dynamics approach of knowledge transfer from projects to the project-based organization. *International Journal of Managing Projects in Business, 15*(2), 324–349. https://doi.org/10.1108/ijmpb-06-2021-0142

Zook, M. (2004). The knowledge brokers: venture capitalists, tacit knowledge and regional development. *International Journal of Urban and Regional Research, 28*, 621-641.

Appendices

Appendix A. Recruitment Script

Nekounamghadirli Thesis: Fostering Community Engagement through Knowledge Mobilization in Renewable Energy Cooperatives - A Case Study of Canmore, Alberta

Recruitment Script for Email

Title: Mobilizing knowledge for cooperative energy success

Dear …

Hope you are well.

My name is Sara and I'm a graduate student at the University of Alberta. We are conducting a study with supervision of Dr. John Parkins on the development of renewable energy cooperatives in Alberta. We had a visit from Canmore in October and achieved great information about Bow Valley Green Energy Cooperative by talking to Jodi and some other guys.

We would like to talk with you as well about your experience with these types of cooperatives, with a focus on how cooperatives are learning and evolving in recent years.

I was wondering if you have some time to chat further. If you are available, we can send you more information about the study, including a request for a research interview that might take about 1 hour of your time.

Thank you in advance for your cooperation.

Looking forward to hearing from you.

Sara Nekounam

Appendix B. Interview Guide

Introduction and Background

1. Tell us about your background and experience with cooperative energy?
2. What was your motivation for getting involved?
3. How have you been learning about cooperatives and energy systems? Who are your partners and mentors in developing your approach? Are there cooperative models you are being inspired by?

Challenges and Opportunities

4. Describe some of the challenges you face as an organization? How are you able to overcome them (or not)?
5. What are the specific / unique challenges in establishing energy cooperatives in Alberta?
    a. Probe: why aren't there more co-ops of this type in Alberta?
    b. Is the development of the energy coop impacted by Alberta's deep relationship with conventional energy production? How does this show up in the specific challenges of the cooperative movement?
6. Can you tell me a time (a story) about when you had a specific challenge to overcome and the steps you took to address and overcome this challenge?
    a. Probe: When, how, with what tools or what types of insights?
7. What has been your experience in working with the municipal / provincial governments? Are there any specific ways in which municipal / provincial governments could be more supportive of energy co-ops? What are the barriers to doing so?
    a. Probe: Specific policies, legislation, programs?

Knowledge Sharing and Community Partnership

8. Are there ways in which you have learned from other organizations? Can you describe these times and some specific things that you learned?
9. What about sharing what you have learned? Do you have specific strategies or approaches to sharing information with other individuals/organizations?
10. Do you have a plan to grow your community? How do you engage / learn from the communities you work with? Have you explored how other cooperatives manage relationships with their communities and partners?
11. How has your involvement in energy cooperatives influenced your views on energy consumption? How does involvement in cooperatives influence others?

Conclusions

12. Any other ideas, thoughts, comments you'd like to provide as we end the interview?

Appendix C. Information Letter and Consent Statement

Mobilizing knowledge for cooperative energy success

Principal Investigator:
John Parkins, Professor
515 General Services Bld
University of Alberta
Edmonton, AB, T6G 2H1
jparkins@ualberta.ca
780-492-3610

Co-Investigator:
Clark Banack
Augustana Campus
University of Alberta
Camrose, AB, T4V 2R3
csbanack@ualberta.ca

Co-Investigator:
Sara Nekounamghadirli
School of Public Health
University of Alberta
Edmonton, AB, T6G 1C9
nekounam@ualberta.ca

Background
This study seeks to understand the development of cooperative energy organizations in Alberta. Cooperative energy represents one aspect of renewable energy development that is growing in recent years. These cooperative energy organizations have potential to link energy producers and consumers, and engage Albertans in creating new forms of electricity production that are localized and focused on low-carbon sources, such as wind and solar technologies.

Purpose
This study will develop a fuller understanding of how cooperative organizations form in Alberta, how they learn, develop, and mobilize knowledge to meeting their goals and aspirations. In particular, we are interested in learning about two things: (1) how knowledge is gained and how it enables the cooperatives to meet their goals, and (2) how participation in energy cooperatives might change the energy system in Alberta.

Study Procedures
You are invited to participate in an interview about cooperative energy in Alberta. If you decide to participate, the interview will take place at a convenient time for you, either in person or via a phone or video call. The interview will be a relaxed conversation, about one hour in length. The interview will be recorded, typed up, and reviewed by participants to ensure accuracy. To provide anonymity, all identifying information about participants will be removed when the findings are presented or published.

Benefits
There may not be any direct benefits for participating in this research. However, indirect benefits from your participation may include more awareness of the work of energy cooperatives in Alberta and the way these organizations are connected and how they share information to achieve their goals.

Risks
We do not anticipate any risks associated with participating in this project. Our questions are focused on your involvement in energy cooperatives and your understanding of this sector of the economy. You can skip any questions or topics that you do not want to speak about and can end

the interview at any time. Although participation in the study will be kept anonymous, you may be recognized in the final documents because of your unique experiences and insights.

Voluntary Participation

You are under no obligation to participate in this study, and your participation is entirely voluntary. You can also skip any specific question or topic you do not want to speak to.

Confidentiality & Anonymity

You will be kept anonymous throughout the project. Any information that identifies you, such as your name, will not be shared without your consent. The information you share will be used only for the purposes outlined here. If there is any information that you would not like to share publicly, please let me know. The audio recording and transcription will only be made available to the people listed on the study team above. After the interview transcript is completed, any identifying information will be removed. The anonymized data will be encrypted and stored on secure computers and servers. According to University of Alberta policies, the anonymized responses will be stored for a minimum of 5 years. Other researchers may use this data in future research projects with approval from the Research Ethics Board.

Appendix D: Tables

Table 2.

Participants' strategies to learn from other co-ops

Numbers	Participants' strategies to learn from other co-ops	Participants' quotes
1	Approaching people involved in other coops directly	Participant 5: "We reached out to other coops in particular, the Ottawa, renewable energy co-op in Ottawa."
2	Learning from other coops' guidebooks	Participant 5: "We got a guide book from SES solar co-op in Saskatoon. That was a little bit out of date, but at least provided us a roadmap to how to get going."
3	Learning from other coops' agreements drafts and documents	- Participant 5: "… in Ottawa provided us with some draft power purchase agreements and some contracts from the basis for us going forward." - Participant 2: "You know, the provinces who've done similar things like OREC and SES-solar and just asking them hey how did you do this? And will you share some information with me? And again being a co-op that's, you know, we're part of being a co-op, is to cooperate and share your knowledge and it's very easy to get a hold of documentation and things that you can use as templates." - Participant 2: "So actually the idea for the power purchase agreement came from and the micro generation model came from a solar co-op in Brighton in the UK. I think Brighton Energy Co-op are really great guys to connect with. And they really helped with that initial shift and they shared their financial model with us. This was for the church approach. Yeah. And it wasn't necessarily relevant because of the regulation difference. In Alberta we don't have the feed-in tariff here, and our energy system is quite different to the rest of the world. But we adapted it and I made it work. "
4	Power of social osmosis (Informal interaction)	Participant 5: "We've got a couple individuals that are, by virtue of osmosis, working with us on some of our projects, they're picking up the terminology, some of the technical pieces, some of the knowledge around the permitting that you need to do, and how to deal with your hosts."

5	Conferences	Participant 5: We try to attend the "renewable energy conferences and decentralized energy."
6	Co-op Associations	Participant 5: "They're (Ottawa coop) looking to develop a country-wide Association of Community Energy co-op." Participant 2: "ACCA (Alberta Community & Co-operative Association) help found us. The … brought them in to do the initial how to set up a co-op, how to become a co-op kind of conversations. If we're like besties because we've had that relationship since the very beginning."

Table 3.

Participants' strategies to transfer their knowledge

Number	**Participants' strategies to transfer their knowledge**	**Participants' quotes**
1	Preparing a guidebook (Cookbook)	Participant 5: "one of the grants that we have right now for prospective opportunity in Calgary has us preparing a guide book for Alberta coops which is something I asked from the existing coops that are here three years ago, and that had been in business for five years, and none of them had that." Participant 2: "which they currently are funding for is to create what we're calling a cookbook, we might change the name but the idea is to basically lay out step by step what we did."
2	Direct conversation with people and community	Participant 5: "I had a colleague, who was a couple years behind me in school who's just retired. He runs tech smelting operations in trail BC. And they said, tell me how you made the switch. I'd like to make the switch in retirement and get involved in renewable energy." Participant 1: "I was playing golf with this guy, just repeated the narrative of being a grant plan by some invisible organization to take money out of everybody's pocket And I go The World Economic Forum used a few keywords. so anyway I said to him I said would you give me an opportunity to explain math and science of climate action and he goes no but his buddy when we were hung up on the next golf ball waiting for them out of the way. Say oh go ahead." Participant 2: "So one of the things I did was reach out

		to the community and say, hey, we want to do this, We don't know how to do that. But do you know how to do? And we just got together a really talented, amazing group of people, … who was one of them.”
3	Conferences and talks	Participant 1: “So the ladies, Anglican Diocese Church Alberta group, whatever it is because one of the churches here has been done, they want me to speak on the 22nd to the entire province. Well, I'm gonna be talking about, we did, you know what? That's going to cause 10 of them to go.” Participant 2: “I presented at the solar show last year, I've been asked to present at the social show again this year last year was as a panel this year will just be me. Um I presented for the ACCA on what probably green energy is doing and as I mentioned earlier about the calm gen network and that's how we kind of connect with the other organizations and they quite often come to us and I've gone to like Athabasca who are kind of very early doors and kind of given them a bit of a pep talk to like help them, they got stagnant and I was invited to go and talk to them.” Participant 7: “we'll be passing on whatever we learn to anybody who are already doing that, we're doing webinars for other cooperatives telling them the process”.
4	Monthly meeting with local co-ops	Participant 2: “We are an inspiration to them (Spice and Sabre). We were the first co-op to switch to the Microgen model when we realized that small scale just wasn't financially viable, especially for a new organization. So we made that switch and they've kind of been watching us and following along behind. We always offering them support. They ask us questions all the time. So yeah, we work together. We're part of what's going on as the Common Gen Network. So we're all in communication and we meet monthly to like, have conversations about where we are at what we're doing and how we can help.”

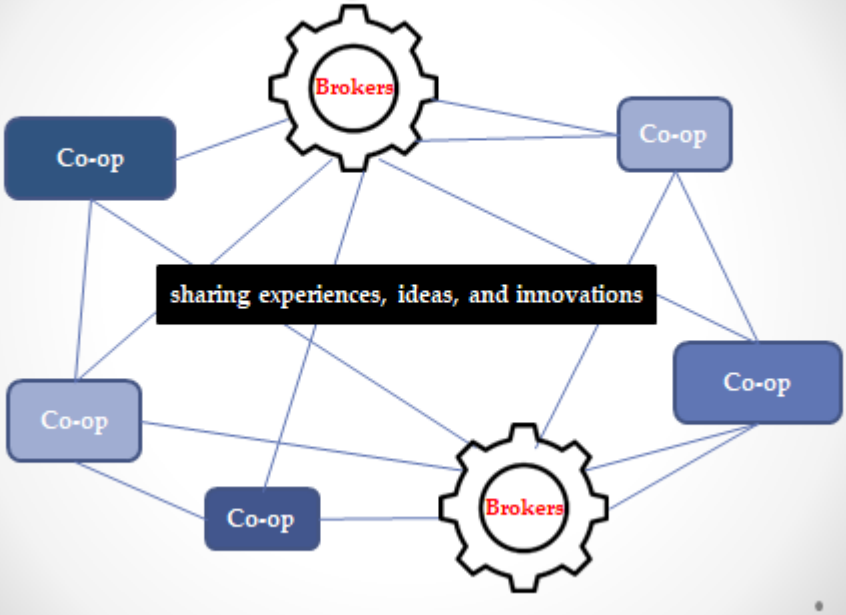
Appendix E: Community Slides

From Local to Global

SMALL ACTIONS
BIG IMPACT

local choices in energy transition echoes globally, shaping a sustainable future for generations to come.

Knowledge Mobilization



From Novices to Experts

People from different backgrounds can team up and figure out how to run a renewable energy co-op. They learn from the pioneering organizations.

Establishing and Developing a Co-op

Learning from pioneers

Policy Advocacy

Influencing government regulations and decisions.

Federated Approach

- Individuals with different skills and backgrounds come together to set up a community energy project.
- They collectively invest in and support renewable energy projects.

Contextual Factors that Affect KM among Co-ops?

Culture of learning and knowledge sharing: guidebooks, contracts, agreements and etc.

Shared norms and meanings : Collaborative mindset

Intermediary Organizations

Knowledge Mobilization

Regulatory Framework

- Connection and Networking.
- Collaboration.
- Support in establishment and adaptability

- resource allocation and grant opportunities.
- Feed-in tariff (FiT) programs.

Get Involved!

Join your local cooperative.
Become an active participant!

If you are living in Alberta look at ACCA website: https://www.acca.coop/