

**Fitting Business Models in Sociotechnical Transitions:  
The Marketing of Utility Energy Efficiency Programs in  
Canada and the US**

by

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## **Abstract**

This thesis explores the relationship between business models and the multi-level perspective on sociotechnical transitions. Through an examination of utility energy efficiency programs in Canada and the US, I use the business model canvas framework to understand how utilities market and deliver these programs. The research questions ask: how do utility business models differ for residential energy efficiency programs, and how do the differences in these business models affect the utilities' role in transitions? Data is collected through semi-structured interviews with program managers and supported by content analysis of marketing materials. The business model canvas blocks of value propositions, customer segments, customer relationships and key partners are used to code and analyze the data. The analysis finds that key partners are a primary differentiator of utility business models and can be categorized into three groups based on relation to the focal firm and industry. A generic key partner canvas is proposed to depict the relationship between value propositions and key partners. This partner canvas can be situated within the multi-level perspective framework to illuminate the relationship between industries, individual firms and customers. Additionally, three segments of utilities are identified, to describe the different roles the utility business model plays in sustainability transitions and the push to achieve net zero emissions by 2050.

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## 1. Introduction

The concept of energy efficiency has been in the public conscious since the 1970s. Initially a conservation campaign to turn off lights and turn down thermostats, the concepts of weatherization, demand side management and efficiency as a resource eventually began to emerge, establishing the programs we know today (Coakley, 2016; Alliance to Save Energy, 2013). The last decade has seen growth and cooperation between utilities and efficiency organizations, policies and initiatives from local and federal governments, and the advent of smart home technology (Coakley, 2016). Despite these changes, much work is still required to meet national and global net zero emissions targets by 2050. The IEA predicts that to meet 2050 targets, the rate of improvement of energy intensity, the percentage decrease in energy supply to unit of GDP, needs to double. This will require investments and policies targeting energy efficiency in addition to measures such as electrification and behavioural change (IEA, 2021). Despite this urgency, an energy efficiency gap, the difference between optimal energy efficiency and actual savings realized (Jaffe & Stavins, 1994), still exists. To increase residential participation in energy efficiency and to ultimately meet 2050 goals, those delivering these programs must understand what prevents customer uptake and design value propositions accordingly.

The utility, as both a producer and distributor of power, and with a direct relationship to the residential customer, must be a part of this change. However, the current utility business model, designed to deliver cheap and reliable power, does not support the goals of energy efficiency programs (Richter, 2012). A business model should “describe the rationale of how an organization creates, delivers, and captures

value” (Osterwalder & Pigneur, 2010, p. 14). Therefore, the utility selling electric power *and* energy efficiency programs must redefine who their customers are and the relationships they will have, the value propositions they demand, and establish a chain of partnerships to deliver said value, in relation to both these products. Only by making these changes to their business models can utilities increase participation in energy efficiency programs and begin to close the efficiency gap by 2050.

When we look at the business model of one utility, we consider the customers it serves, the industry players it works with, the structures and practices it upholds, and the government policies that support and guide it. In reality, this utility is just one in an expansive sociotechnical system in which “the interlinked mix of technologies, infrastructures, organizations, markets, regulations, and user practices together deliver societal functions,” such as the production and consumption of energy (Geels, Sovacool, Schwanen, & Sorrell, 2017, p. 1242). The multi-level perspective (MLP) is a useful framework here, as it models the relationship between technological innovation and the systems and actors needed to diffuse and stabilize it into society (Geels, 2019, p. 187). It uses three levels, the niche, the regime and the landscape, and the interactions between them to explain the process that drives system change.

This research addresses the gap at the intersection of these ideas by examining the strategies used by electric utilities to engage residential customers in energy efficiency and by conceptualizing how business model innovation occurs within sustainability transitions. More specifically, the novel approach of using business model canvas to analyze firm strategy within the sociotechnical transition’s multi-level perspective contributes to the growing interest in the overlap of these two research frameworks.

Specifically, the research questions ask: how do utility business models differ for residential energy efficiency programs, and how do these strategic differences affect the utilities' role in transitions? In answering these questions my intention is to contribute to a growing literature on the role of business models and utilities in sustainability transitions. I also aim to contribute useful and needed information for decision makers and policymakers in utilities, governments and stakeholder industries.

This paper begins with a literature review to outline the three concepts of energy efficiency, business model canvas and the multi-level perspective. Following articulation of the research gap, in section 3 I will present the methodology used, the sample of utilities interviewed, and the categories of results gathered. Results will be discussed in section 4, in which I will summarize the products and services, value propositions, customer segments, customer relationships and key partners of the utilities interviewed. Finally, in section 5 I will discuss the relevance of the results, identify three utility segments, and present a framework to categorize key partners within the business model canvas. In section 6 I will conclude by highlighting the relevance of these findings to theory, industry and future research.

## 2. Literature Review

### Energy Efficiency Programs

While households are not the leading sector of energy consumers in Canada or the US, the knowledge, habits and behaviours surrounding energy use start at home. In the US, residential end-use accounted for 16 percent of energy consumption in 2021, with transportation (37 percent) and industrial (35 percent) sectors consuming the majority (U.S. Energy Information Administration, 2022). In Canada, residential consumers composed 13 percent of Canadian end-use demand in 2019, preceded also by the industrial and transportation sectors at 52 and 23 percent, respectively (Canada Energy Regulator, 2022). While a proportionally small piece of the pie, programs targeting residential energy efficiency can still have a significant impact on national energy use. In Canada alone, residential energy consumption would have increased 57 percent between 1990 and 2017, but instead saw a 6 percent increase due to energy efficiency gains (Natural Resources Canada, 2018). On a global level, countries with well-established energy efficiency appliance standards and labelling programs are realizing an average savings of 15 percent of total electricity generation over the program lifetime (with electricity consumption savings calculated relative to the commencement of programs in those countries) (IEA, 2021).

The power of energy efficiency and its potential savings are of course not unknown and are reflected in utility, industry and government policy and programs. The measure of this potential is reflected in statistics like global energy intensity, a key measure of the global economy's energy efficiency calculated as the ratio between gross energy consumption and GDP (IEA, 2021). With the exception of 2020 and the impact

of the COVID-19 pandemic, energy intensity has improved (i.e., fallen) annually and remains on track for the International Energy Agency's (IEA) Net Zero Emissions by 2050 Scenario over 2020-2030. However, to meet 2050 targets the rate of improvement (the percentage decrease in units of energy per unit of GDP) needs to double, requiring a ramp up of investments and policies targeting energy efficiency in addition to measures such as electrification and behavioural change (IEA, 2021). With economic growth driven primarily by higher populations levels and incomes, we can start to shift behaviour change and consumer spending patterns at home by targeting the residential sector with energy efficiency programs and education.

### *The Energy Efficiency Gap*

The energy efficiency gap is the difference between optimal energy efficiency and actual savings realized (Jaffe & Stavins, 1994). It “arises when a technology that may be profitable for consumers in terms of energy efficiency is available, but consumers do not take advantage of it” (Solà, Ayala, Galarraga, & Escapa, 2020, p. 3). In other words, there are barriers that obstruct consumer adoption of energy efficiency measures, resulting in slower diffusion of technologies and an inability to meet optimal future energy use projections (Hesselink & Chappin, 2018). As an important piece of knowledge to both policymakers and industry players like utilities, numerous researchers have attempted to categorize and define these barriers (Allcott & Greenstone, 2012; Jaffe & Stavins, 1994; Solà, Ayala, Galarraga, & Escapa, 2020; Hesselink & Chappin, 2018; Hirst & Brown, 1990; Gerarden, Newell, & Stavins, 2017; Snape, Boait, & Rylatt, 2015).

Most researchers group these barriers into two categories, market and non-market failures, which can be further subcategorized in up to four: structural, economic,

behaviour and social barriers (Hesselink & Chappin, 2018). Structural barriers include gaps in the market that are non-financial in nature, including the landlord-tenant split incentive issue, a lack of codes or standards and incomplete information. Economic barriers are monetary, including a lack of capital or the inability to calculate the return on investment (ROI) due to incomplete or constantly evolving data (Hesselink & Chappin, 2018). Behavioural barriers limit adoption in ways that affect the decision maker. This includes bounded rationality, when lack of information, understanding and time force the homeowner to satisfice in their purchase decisions. Other behavioural barriers include conflicting priorities, such as when a homeowner chooses to prioritize aesthetic or resale decision factors over efficiency, and risk aversion, such as making a choice based on the avoidance of upfront cost rather than the eventual gain on bill savings (Hesselink & Chappin, 2018). Finally, social barriers can include inherently human concerns such as propensity for comparison, trust and adherence to norms (Hesselink & Chappin, 2018; Jaffe & Stavins, 1994; Solà, Ayala, Galarraga, & Escapa, 2020). The following section will describe value propositions in detail, but it is interesting to note here that these barriers to adoption are not unlike the customer pains a firm must identify within their segments when defining an effective value proposition. For example, the offering of rebates and loans specifically alleviates the pains of economic barriers, while a value proposition of education attempts to limit bounded rationality and reduce pains associated with the decision-making process.

Thus far, the best way identified to address these concerns is via policy that is “designed to promote the purchase and adoption of energy-efficient technologies and include energy standards and codes, financial incentives, feedback information tools,

audits and energy labelling” (Solà, Ayala, Galarraga, & Escapa, 2020, p. 6). It should not go unnoticed, that all these strategies are products or services that utilities provide to residential customers through energy efficiency programming.

### *Energy Efficiency Programs in Canada and the US*

Though many goals and policies are produced by governments, it often falls to the utilities as distributors of power to deliver energy efficiency programs on the residential level, at least in some capacity. In turn, these programs affect investment in other areas of the electricity sector as demand, resource mixes and grid needs evolve (Goldman, et al., 2020). Though not entirely dissimilar, the Canadian and US electric utility industry and energy efficiency program structures differ in a few ways.

#### Canada

The Canadian utility industry has a mix of private/investor, municipal and provincial ownership. In some provinces, one central entity delivers all power to its residents. In others, the provincial utility handles capacity and transmission and smaller municipal utilities or distribution companies purchase from them to service their local customers (Lee & Humphrys, 2014). The major players in electric power transmission are Hydro-Quebec, BC Hydro and Hydro One, holding over 40 percent market share between them. The remaining market share is held by provincial crown corporations, subsidiaries of investor-owned energy firms, municipalities, local distribution companies and rural electrification associations. Over 40 percent of these organizations are in Ontario, followed by 20 percent in Alberta. Other provinces such as Manitoba, New Brunswick and Prince Edward Island hold less than a five percent share of establishments, with one

or a few utilities servicing the whole province (McGrath, 2021; Canada Energy Regulator, 2021).

The Canadian Government has committed to achieving net zero emissions by 2050, which will require the cooperation of utilities, governments and regulators to effectively integrate decarbonization initiatives and technologies (Canadian Electricity Association, 2014). This plan was subsequently strengthened on June 29<sup>th</sup> of 2021, when the *Canadian Net-Zero Emissions Accountability Act* came into law (Government of Canada, 2022). Additionally, Canada is developing a 2035 net zero electricity standard, which establishes that by this year the electricity sector will be emission-free (or offset by other actions) (Environment and Climate Change Canada, 2022). As a result of actions from utilities and provincial/territorial policies, the electricity sector is currently 82 percent non-emitting. The standard has created an urgency to address the remaining 18 percent. This will include actions such as phasing out coal-fired generation by 2030, addressing the lingering reliance on natural gas in some provinces, and exploring other carbon offset programs, policies and regulations. This urgency to implement these changes will only intensify as population and therefore electricity demand, increase (Environment and Climate Change Canada, 2022).

While many provinces and municipalities have developed climate policies and action plans in response, the administration and delivery of residential energy efficiency programs varies across the country. The programs can be administered by both gas and electric utilities, energy efficiency utilities, governments and government agencies (Gaede, Haley, Abboud, & Nasser, 2021). For their part, the federal government has launched several programs in the last year, with the Greener Homes Program specifically

targeting residential homeowners to offer grants and loans to help finance energy efficiency improvements (Gaede, Haley, Abboud, & Nasser, 2021; Natural Resources Canada, 2022). In their annual Energy Efficiency Scorecard, Efficiency Canada determined that British Columbia, Quebec and Nova Scotia have the most effective energy efficiency programming (Haley, Gaede, & Correa, 2019). Their programs “secure energy savings through various strategies such as audits, retrofits, training for building tradespeople, ‘people-centred’ or behavioural efficiency strategies” (Gaede, Haley, Abboud, & Nasser, 2021, p. 32). A key difference maker is that they are developed “under a regulatory framework that recognizes efficiency as an energy-system resource” (p. 32) similar to that of utility infrastructure such as power plants (Gaede, Haley, Abboud, & Nasser, 2021).

Like every aspect of society, the electricity sector has not been untouched by the COVID-19 pandemic. Nationally, energy efficiency program spending has continued to increase, but annual incremental program energy savings has decreased 38 percent since the 2017 peak (Gaede, Haley, Abboud, & Nasser, 2021). Some of this decline can be explained by the added challenge of program delivery during the pandemic, which decreased participation in on-site programs due to lockdowns, supply chain disruptions and contractor shortages. At the same time, while some provinces such as British Columbia were able to pivot and offer virtual programming to meet their targets, not all provinces or utilities could bare this financial burden (Gaede, Haley, Abboud, & Nasser, 2021).

## The United States

According to the US Energy Information Administration's (EIA) electric power sector survey data, almost 3,000 electric utilities were operating in the United States in 2017. Of those, 168 (6 percent) were investor-owned utilities (IOU), 1,958 (65 percent) were publicly owned utilities (POU), and the remainder (29 percent) were co-operatives. While smaller in quantity, IOUs serve 75 percent of utility customers or 110 million households nationally (Lindstrom & Hoff, 2019). IOUs also account for 75 percent of all electric sales in the country, while POUs cover 15 percent, and co-operatives approximately 10 percent (Kushler, Baatz, Nowak, & Witte, 2015). Though IOUs lead by revenue, the American Public Power Association (APPA) reported that 73 percent of POUs offer energy efficiency and/or demand side management (DSM) programs, indicating that they cannot be left out of the conversation. Further, three POUs interviewed for this research were identified as leading municipal utilities in efficiency programs, with percent of revenue spent on programs and annual savings competitive with that of leading IOUs (Kushler, Baatz, Nowak, & Witte, 2015).

A more deregulated market than Canada, there is more reliance in the US on the utility sector to implement energy efficiency programs (Berg, et al., 2020). Similar though, is the share of program delivery by electric and natural gas utilities, independent statewide program administrators and efficiency utilities. The American utility approach also uses a combination of financial incentives, audits, retrofits, behavioural strategies and educational campaigns (Berg, et al., 2020). In a 2020 ACEEE report on energy efficiency, more than 60 percent of the utilities studied had piloted new programs in 2018 (Relf, Cooper, Gold, Goyal, & Waters, 2020). The same study found that many utilities

are spending more than 10 percent of their efficiency funding on low-income programs, often through measures to address the building envelope. Despite their best intentions however, utilities do not have an economic incentive to promote energy efficiency. This has been addressed by state regulators, allowing utilities to recover program costs through on-bill charges, as well as through regulations by state utility commissions setting specific savings targets (Berg, et al., 2020).

Though they continue to engage with utilities, many states are setting their own clean energy goals (Berg, et al., 2020). A Deloitte industry study found that many utilities or their cities/states were announcing decarbonization plans for the next few decades (Deloitte, 2020). Within this research, every US utility interviewed was operating in a state or city that had announced decarbonization goals (upwards of 80 percent reduction by 2050) or had made their own organizational commitment to carbon reduction, electrification and renewables. In an efficiency scorecard where states were ranked by their policy and program efforts over the last year, California, Massachusetts and Vermont were ranked in the top three spots (Berg, et al., 2020). By expenditure alone, California spent nearly double on energy efficiency programming in 2018 than any other state at \$1.3 billion, followed by New York (\$633 million) and Massachusetts (\$577 million) (ACEEE, 2019). Nationwide, 27 states have adopted a utility-sector energy efficiency resource standard. Many have also begun to switch from widget-based programs that install individual products, to deep-savings approaches that provide a comprehensive building retrofit and enable greater energy and financial savings (Berg, et al., 2020).

With growing commitments to net zero in both countries from all levels of government, and a structure that relies primarily on utilities to provide residential programming, fundamental questions remain. Should the responsibility for energy efficiency programs remain with utilities? What will these programs look like once the “low-hanging” fruit of rebates and widget-based upgrades are captured, if not already? As the role of the homeowner shifts from energy consumer to prosumer, does energy efficiency continue to be a utility resource and how can this changing relationship redefine the value proposition for the residential customer?

### **Business Models**

While the business model itself has been present for centuries, it was not until the mid 1990s that the concept of the business model as we know it today was discussed in academic circles (Teece, 2010; Zott, Amit, & Massa, 2011). Since that time, the published mentions of ‘business model’ in peer reviewed academic journals have increased from just over 1200 articles (Zott, Amit, & Massa, 2011) to more than 400,000 (WorldCat via UNB Libraries, 2022). Despite this, there has been very little agreement on its definition (Zott, Amit, & Massa, 2011; Saebi & Foss, 2015; Richardson, 2008; Evans, et al., 2017). Put simply, a business model is “a description of how a firm does business” (p. 136), and how business strategy is implemented both conceptually and architecturally (Richardson, 2008). However, the elements that frame these concepts remain up for debate. In their 2011 literature review, Zott et al. summarize that over the previous decade, the business model has been represented textually, verbally and graphically, and referred to as a statement, a framework, and a pattern, among many others (Zott, Amit, & Massa, 2011). Their analysis provides four themes to define what

business models are: (1) a distinct concept and unit of analysis represented through typologies, (2) helpful for analyzing firm performance, (3) boundary spanning by linking firms and their networks, and (4) both a subject of and vehicle for innovation (Zott, Amit, & Massa, 2011).

Later, Massa and Tucci (2013) conceptualize business models at different levels of abstraction, ranging from narratives and archetypes at their most abstract, to activity systems of the firm and its network as closest to 'reality' (figure 1). In the centre of this range, are graphical frameworks such as the business model canvas. They argue that at this level, these frameworks provide greater descriptive accuracy and formalize the business model down to its essential components. The format allows managers to frame their business goals in a more simplified way, better communicate with external stakeholders, create a sense of legitimacy and potentially guide social action (Massa & Tucci, 2013).

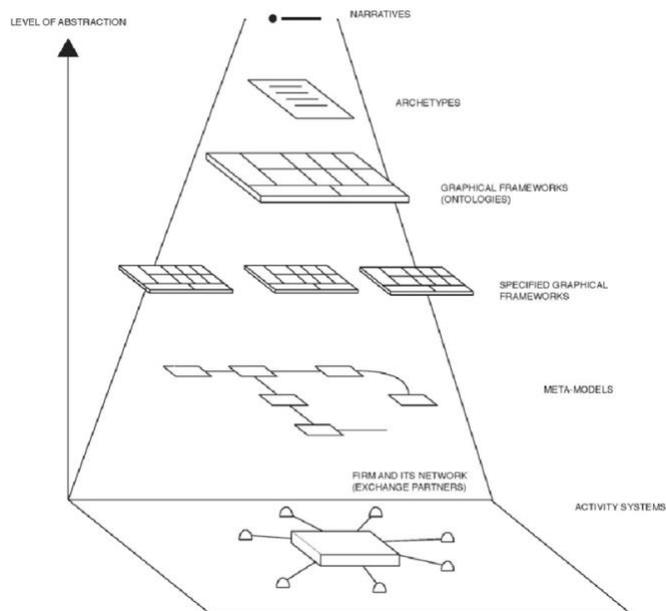


Figure 1: Business Models at Different Levels of Abstraction from 'Reality'

*Note:* From Massa & Tucci (2013), p. 433.

The elements that define a business model vary by researcher, but converge in a few areas (Zott, Amit, & Massa, 2011; Saebi & Foss, 2015). Amit and Zott (2001) list four elements: value creation design, content, structure and governance of transactions. Chesbrough (2007) lists six: value proposition, target market, value chain, revenue mechanism, value network or ecosystem and competitive strategy; and Johnson et al. (2008) list four: customer value proposition, profit formula, key resources and key processes. Finally, the model this research uses, Osterwalder and Pigneur's (2010) business model canvas contains nine blocks: customer segments, value propositions, channels, customer relationships, revenue streams, key resources, key activities, key partnerships and cost structure.

Despite the varied approaches, the idea of value appears in some form in all definitions (Richardson, 2008; Zott, Amit, & Massa, 2011; Evans, et al., 2017). Though more nuanced, a business model is the way in which a firm makes money, and in order to make the sale a business must understand their customers' needs and offer something of value to satisfy them (Teece, 2010). For this research, Osterwalder and Pigneur's definition will be used, that is, "a business model describes the rationale of how an organization creates, delivers, and captures value" (2010, p. 14). This definition and its application to this research will be discussed in more detail below.

Teece (2010) describes the designing of a good business model as an art form. While an effective strategy considers all activities of the firm, an effective business model paints the picture in which the activities reside. Within this, the value proposition considers not only the *how* (delivery channels and partners) and *what* (products and services) of business strategy, but also the *who* (customers). Compared to other strategy

literature, the business model concept specifically emphasizes the role of the customer (Zott, Amit, & Massa, 2011). It is only by understanding customer needs and considering multiple perspectives throughout the value chain that a firm can deliver true value (Teece, 2010). A business model outlines what this value proposition is and describes the system used to create and deliver it to customers (Zott, Amit, & Massa, 2011).

Due to the interconnectedness of these factors, the business model and how it defines and delivers its value proposition and to whom, can be a central part of firm performance and a potential source of competitive advantage (Zott, Amit, & Massa, 2011). As will be seen in this research, firms that address the same customer need and even pursue similar product strategies can do so with very different business models and see varying levels of performance. It is due to this that, “business model design and product market strategy are complements, not substitutes,” (Zott, Amit, & Massa, 2011, p. 1031; Zott & Amit, 2008), the intersection of which is the value proposition.

### **Business Model Canvas**

The business model canvas is a popular graphical representation of a business model (figure 2). Conceptualized by Osterwalder and Pigneur (2010), it provides a template for a firm to organize how it intends to create, deliver and capture value. It includes nine blocks grouped by three areas of business: desirability, including value proposition, customer segments, channels and customer relationships; viability, considering revenue streams and cost structure; and feasibility, comprising key resources, key activities and key partnerships (Strategyzer, 2019). Meant as a practical tool, it can be used in a group setting to encourage creativity and discussion for new businesses, or to assess the viability and organization of existing ones. Its simplicity however, can come at

a cost of depth, as a single framework cannot provide a full picture of all dynamic aspects of a business (Massa & Tucci, 2013). Additional criticism considers the exclusion of the external environment and competition, and the focus on profit making (Coes, 2014). Despite these limitations in practice, the canvas has been used in numerous studies to analyze utilities and energy services, discussed in further detail below. Due to this ease of use and previous application in related literature (Richter, 2012; Specht & Madlener, 2019; Gsodam, Rauter, & Baumgartner, 2015; Reis, Gonçalves, Lopes, & Antunes, 2021), components of business model canvas will be used to answer the questions in this research.

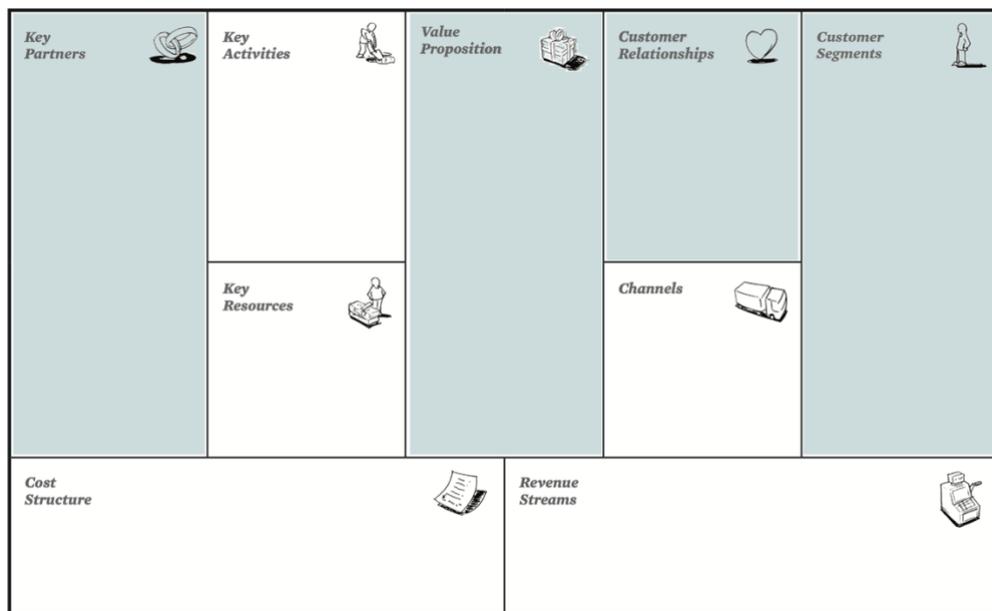


Figure 2: The Business Model Canvas with key blocks labeled  
*Note: From Osterwalder & Pigneur (2010), p. 44.*

This research will narrow in on a few aspects of business model canvas, namely value proposition, customer segments, customer relationships, and key partners. These blocks were chosen because combined, they provide a picture of an organization’s value network. A value network is defined as “a set of roles and interactions in which

organizations engage in both tangible and intangible value exchanges to achieve economic or social good” (Evans, et al., 2017, p. 601). While economic transactions are often the focus of business strategy, relationships among stakeholders can provide a rich picture of a firm’s value proposition and reveal key opportunities for business model innovation (Evans, et al., 2017). Additionally, research on utilities has found that while value propositions, key partners, customer segments and customer relationships can differ significantly between utility business models, underlying cost structures and revenue models remain largely the same (Bryant, Straker, & Wrigley, 2018). Therefore, the following sections describe these select blocks of the business model canvas in detail and provide the framework for which the interviews and analysis will be based.

### *Value Propositions*

Osterwalder and Pigneur (2010) describe the value proposition building block as “the bundle of products and services that create value for a specific customer segment” (p. 22). Similarly, Richardson (2008) explains that “the value proposition generally refers to the reasons a customer will value a firm’s proposed offering” (p. 139). It should involve a mix of elements specific to a segment’s needs, including values such as performance, customization, cost reduction, risk reduction, convenience and usability (Osterwalder & Pigneur, 2010). In generating these values, the business should ask itself: what value do we deliver to the customer? Which of our customer’s problems are we helping to solve? Which customer needs are we satisfying? What bundles of products and services are we offering to each customer segment? (Osterwalder & Pigneur, 2010, p. 23).

In their *Value Proposition Canvas*, Osterwalder and Pigneur detail this further using the concepts of pains and gains. A customer pain is something that annoys or prevents a customer from getting a job done or is the potential risk of a bad outcome. A value proposition then, presents pain relievers that describe how customer pain will be alleviated by a product or service (Osterwalder, Pigneur, Bernarda, & Smith, 2015). A successful value proposition should also focus on gain creators, that is outcomes and benefits of products or services that are expected, desired or a pleasant surprise to customers. Specifically, these characteristics may include functional utility, social gains, positive emotions and cost savings (Osterwalder, Pigneur, Bernarda, & Smith, 2015, p. 33). These definitions were used in this research to understand how the utility defined their energy efficiency program's value proposition. For example, a utility might determine that some customers feel prevented from following through with audit recommendations because they are uninformed about the process of hiring a contractor and choosing a rebate-qualifying product. To address this pain, the utility might design an online marketplace with a list of rebated products, which then connects to a scheduling tool where they can choose an install date with a pre-vetted contractor in their area. In this case, the utility would market the specific value propositions of information, automation and experience to highlight to this customer group how their products and services can alleviate this particular pain.

### *Customer Segments and Relationships*

As is clear in the definitions of gain creator and pain reliever, if a customer does not see a firm's products and services as addressing what matters to them, the value proposition will fall flat. Therefore, to remain relevant and profitable, value proposition

design should be part of a never-ending cycle that includes customer discovery, segmentation and relationship building (Osterwalder & Pigneur, 2010; Osterwalder, Pigneur, Bernarda, & Smith, 2015).

Osterwalder and Pigneur (2010) define customer segments as “different groups of people or organizations an enterprise aims to reach and serve” (p. 20). These groups can highlight common needs and behaviours, such as demand for a specific offer, distribution channel or price point. Depending on the industry, a mass market segment where the business model focuses on one large group of customers with a broad set of needs can be a valid strategy (Osterwalder & Pigneur, 2010). As is found in this research, due to the governmental or community governance of many electric utilities, this mass market strategy is often chosen. However, just because the target market is treated as homogenous does not mean every customer has the same needs. There should still be importance placed on customer discovery and market research. In fact, with a broader base of customers, it may mean more time and energy is needed to determine the most important needs to target and how to deliver them. Understanding any customer segment, broad or narrow, requires the organization to immerse itself in customer knowledge (Osterwalder & Pigneur, 2010, p. 249) and consider the customer perspective in all design processes from business model to final product (Osterwalder & Pigneur, 2010, p. 128).

An effective way to understand how to meet the needs of the customer is to build intentional customer relationships. Not all customer relationships are personal and can often be characterized by a degree of automation. They can also be driven by different motivations, such as acquisition, retention and upselling, or categories including personal

assistance, self-service, communities and co-creation. These categories may co-exist in one segment's relationship with the company, depending on their needs and the products and services being provided (Osterwalder & Pigneur, 2010, pp. 28-29). The better a company understands the environments, routines, concerns and aspirations of their customers, the more intentional and effective they can be in these relationships (Osterwalder & Pigneur, 2010, p. 128). For example, a utility customer that is interested in viewing their energy consumption may prefer a self-serve transaction, where the data is available for them online 24/7. However, the same customer may prefer a more personal experience when they decide to spend money on energy efficiency upgrades. They may even want dedicated personal assistance so they can speak with the same utility contact in every interaction. For a business to intentionally curate their customer relationships, they must have a detailed understanding of who their customers are and design a value proposition that allows their needs to be satisfied.

### *Key Partners*

Key partnerships “describe the network of suppliers and partners that make the business model work” (Osterwalder & Pigneur, 2010, p. 38). Osterwalder and Pigneur (2010) describe four types of partnerships and three motivators for entering them. Partnership types can include strategic alliances between non-competitors, strategic partnerships between competitors, joint ventures to develop new businesses and buyer-supplier relationships to assure reliable supplies. The motivations to create these partnerships can be to achieve economies of scale, to reduce risk or to acquire needed resources and activities (Osterwalder & Pigneur, 2010, pp. 38-39).

Deliberately partnering or co-operating with a diverse group of stakeholders allows a business to not only reinforce their own business model and deliver their value proposition, but can also contribute to long-term, sustainable change in an industry (Evans, et al., 2017). Stakeholder engagement can lead to the positive outcomes of increased trust and innovation, and the development of a value network that contributes to a common economic and social good (Evans, et al., 2017). The utility delivering energy efficiency programming finds itself in a unique position where the goal of the program (conserving energy and switching to clean energy alternatives) is in opposition with the initial strategy of the firm (selling cheap energy). Therefore, to deliver the value proposition as promised, the utility needs to partner with stakeholders that have the knowledge (ex. efficiency organizations, SaaS solution providers), experience (ex. trade allies, industry groups) and resources (ex. governments, retailers, manufacturers) they do not currently possess. As an added benefit, the cooperation of these individual stakeholders helps to establish an organized network in which the consumer can navigate more confidently, therefore increasing the volume of participation and the quality of the customers' experience.

### **Business Models and Utilities**

Outlined by Richter (2012), the traditional utility business model encompasses one or more processes in the electricity value chain, moving from generation, transmission and distribution, to retail and consumption. In Business Model Canvas terms, the product is the generation and/or supply of energy to the end-consumer, namely households, communities, businesses and other organizations (Bryant, Straker, & Wrigley, 2018). This model features a one-sided relationship with the customer, where

interaction involves only the transfer of energy from the utility to the customer (Richter, 2012). The value proposition in this traditional model is to be a low-cost, reliable supplier of power and revenue is generated through the charging of rates (Bryant, Straker, & Wrigley, 2018).

While this model has been profitable for decades, the transition to renewables and a net zero world presents new challenges and expectations for utilities. As major stakeholders in the transformation, utilities must adapt in order to remain competitive and comply with global carbon-reduction goals and relevant national policies (Richter, 2012). Beyond this, consumers expectations of and participation in energy generation and consumption are changing (Tayal, 2017) and in order to keep up, utilities must reassess their business models (Gsodam, Rauter, & Baumgartner, 2015; Tayal, 2017).

There is significant research on utility business models for transition to renewables, (Bryant, Straker, & Wrigley, 2018; Specht & Madlener, 2019; Richter, 2012; Gsodam, Rauter, & Baumgartner, 2015; Altunay, Bergek, & Palm, 2021) and non-utility business models for delivering energy efficiency services such as Energy Service Companies (ESCOs), demand response, financing programs and energy communities (Hamwi, Lizarralde, & Legardeur, 2021; Okkonen & Suhonen, 2010; Bianco, Sonvilla, Reed, & Prado, 2022; Mahapatra, et al., 2013; Funkhouser, Blackburn, Magee, & Rai, 2015; Reis, Gonçalves, Lopes, & Antunes, 2021). However, there is limited research on the business models of utilities delivering energy efficiency services, in addition to the traditional generation and selling of power. Of the studies that have examined this area, it has been found that while some utilities are attempting to integrate energy efficiency solutions into their business models, many are in their infancy and need more time and

effort to develop (Gsodam, Rauter, & Baumgartner, 2015). This can be due to a number of interconnected factors, namely the reliance of utility strategy on policy and profits. While policymakers in the last decade have begun to mandate utility participation in the net zero transition, investment in supply-side assets such as power plants remain more profitable than investments in demand-side efficiency programs (Molina & Kushler, 2015; Lehr, 2013; King, et al., 2007). This explains in part why there is more research and industry interest in utility business models adopting renewables, rather than efficiency programs.

An additional reason for this gap is that innovation within a utility may prove to be a unique business model challenge. Despite the evidence on the value of research, development and innovation, utilities face barriers that a new firm would not face (Costello, 2016). Often inertia to innovation occurs from the inability for managers to see the value of a new business model (Zott, Amit, & Massa, 2011). This is seen especially in utilities where the current business model continues to be profitable (Gsodam, Rauter, & Baumgartner, 2015). The phenomenon is only amplified by the longstanding and government-regulated business model and structure of utilities that results in minimal resources being allocated to R&D and business model innovation (Gsodam, Rauter, & Baumgartner, 2015). As well, the funding process can be so complex that the process is never started even if management is on board (Tayal, 2017). Costello (2016) quantified this problem to find that utilities spent 0.1 percent of their revenues on innovation, the lowest among all industries and a far cry from the 3.3 percent average across all industries. Despite these numbers, there is a lot at stake for utilities that can successfully innovate their business model. While keeping the model relevant and profitable is an

ongoing challenge, the payoff can be significant (Teece, 2010). Due to their position in industry, innovation in the utility sector can “benefit the advancing public policy objectives, namely, safety, reliability, energy security, higher energy efficiency, affordable energy services, and a cleaner environment” (Costello, 2016, p. 20). If innovation can overcome these bureaucratic barriers, utilities can have a far greater impact than simply boosting their bottom line.

### **Sociotechnical Transitions**

Worldwide shifts in production, distribution, consumption, and conservation of energy implicate nearly every individual, business and industry and the practices, structures, policies and conventions that hold them together. In discussing the low-carbon transition, Geels et al. (2017) take the perspective of a sociotechnical system. Aptly named after the interaction between technology and society, it is described as “the interlinked mix of technologies, infrastructures, organizations, markets, regulations, and user practices that together deliver societal functions” (Geels, Sovacool, Schwanen, & Sorrell, 2017, p. 1242). To alter the system and transition to another, as will be necessary to address the increasingly catastrophic environmental issues we are facing, we must consider the reinforcing societal functions of the current system (Geels & Schot, 2010). Geels (2019) lists these functions as including consumer practices, public policies, business models, markets, and infrastructures. He argues that not only must we adopt new technology, but must also invest in establishing new infrastructures and markets, and developing and adjusting social preferences and user practices (Geels, Sovacool, Schwanen, & Sorrell, 2017).

In their book, Geels & Schot (2010) summarize sociotechnical transitions in five characteristics. First, transitions are co-evolutionary, requiring multiple simultaneous changes such as the development and application of technological innovations. Technology, no matter how revolutionary, must be used and integrated into society for any impact to occur. Second, transitions involve a multitude of actors and the interaction between them. In this research, while the actors of focus are utilities, we will find that other stakeholders from governments and contractors to schools and retailers are necessary for effective program delivery. Next, “transitions are radical shifts,” (Geels & Schot, 2010, p. 11) but the journey towards a new system can be a long and arduous one. Finally, while this research and most of that on energy efficiency focus on small and specific areas of change, transitions themselves are macroscopic. A net zero world will be visibly different from the one we live in today.

### *The Multi-level Perspective*

Among the many approaches to conceptualize sociotechnical transitions is the abstract analytical framework of the multi-level perspective (MLP). It focuses on “transitions in systems (ex. energy), which provide societal functions or end-use services” (Geels F. W., 2019, p. 187). As depicted in the figure below, it uses three levels, the niche, the regime and the landscape, and the interactions between them to explain the process that drives system change. It emphasizes how “transitions come about through the alignment of processes within and between these three levels” (Geels, Sovacool, Schwanen, & Sorrell, 2017, p. 1242).

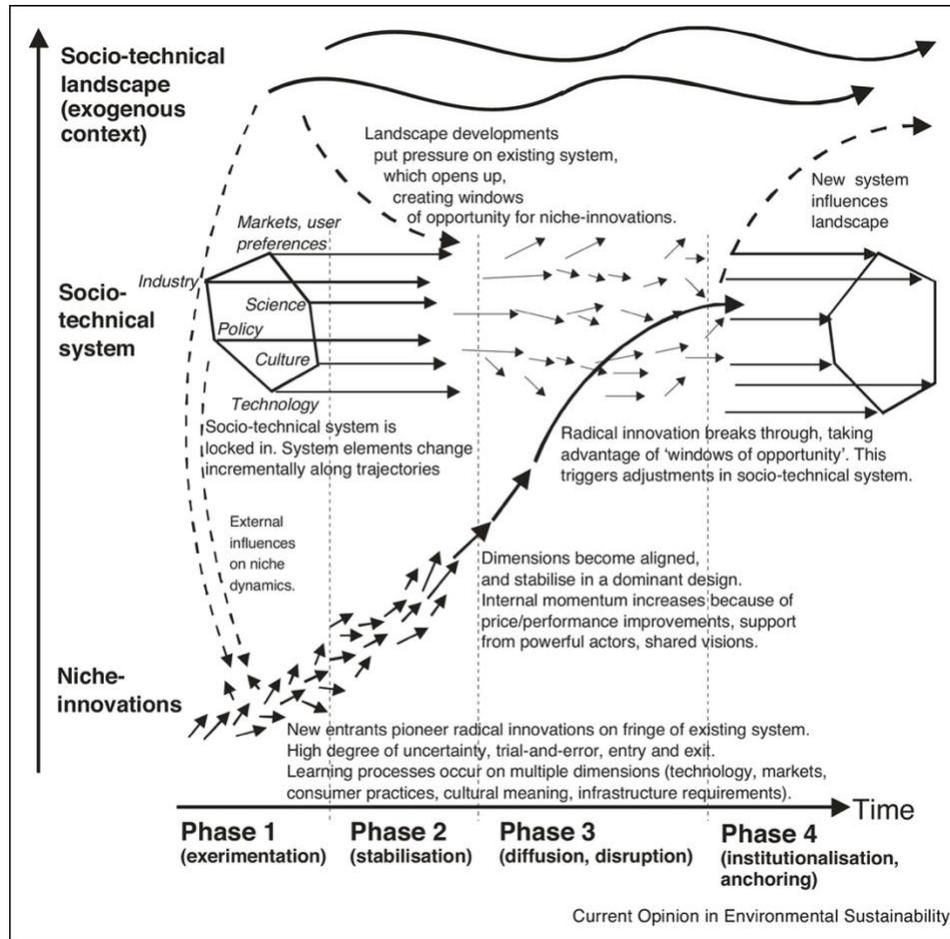


Figure 3: The Multi-level Perspective on Sociotechnical Transitions

Note: From Geels, (2019), p. 191.

At the lowest level are niche innovations. While different from the existing system, they attempt to “move from invention and innovation to viable market introduction” (Sovacool & Hess, 2017, p. 709) by gaining “a foothold in particular geographical areas or market niches, or with the help of targeted policy support” (Geels, Sovacool, Schwanen, & Sorrell, 2017, p. 1242). The next level is the regime, the incumbent sociotechnical system. It contains cognitive, regulative, and normative institutions (Sovacool & Hess, 2017) that are “stabilized by lock-in mechanisms” (Geels, Sovacool, Schwanen, & Sorrell, 2017, p. 1242). As niche innovations gain traction and adoption, “incremental improvements [occur] along path-dependent trajectories” into the

regime (Geels, Sovacool, Schwanen, & Sorrell, 2017, p. 1242). Finally, topping the model is the landscape level. This level is influenced by trends or shocks (ex. ideological change, major environmental disruption, economic crisis) that can create pressures that destabilize the regime and create windows of opportunity for innovations at the niche level to breakthrough (Sovacool & Hess, 2017; Geels, Sovacool, Schwanen, & Sorrell, 2017).

The conceptualization of these three levels is accompanied by the passing of time in four phases: experimentation, stabilization, diffusion and disruption, and institutionalization and anchoring. The first phase occurs when radical niche innovations experiment with trial and error, until in the second phase, they manage to gain traction in a market niche (Geels, 2019). Between these phases, societal and business support grows, with independent actors using strategies such as bottom-up learning processes, stakeholder engagement, and polycentric governance (Geels, Sovacool, Schwanen, & Sorrell, 2017, p. 1243) With this influx of resources, phase three begins with diffusion into mainstream markets. A combination of above landscape changes opening windows of opportunity and strategies such as economies of scale and support from powerful actors help to destabilize the regime and increase adoption. Finally, the fourth phase sees a replacement of the old system, with new innovations becoming institutionalized. To truly enter the regime level, deep and broad learning and networks must be established (Sovacool & Hess, 2017). These changes are “anchored in regulatory programmes, user habits, views of normality, professional standards, and technical capabilities” (Geels, 2019, p. 191). Together, the “mutually reinforcing processes” of niche innovation momentum, weakening existing systems and growing landscape pressures from above

align to create windows of opportunity and ultimately successful sociotechnical transition (Geels, Sovacool, Schwanen, & Sorrell, 2017).

The MLP is championed for its ability to simplify and organize a large and complex concept. The emphasis on dependencies and the interactions of niche, regime and landscape levels helps to provide explanation for the idiosyncrasies of significant structural transformations (Sovacool & Hess, 2017; Smith, Voß, & Grin, 2010). There is some criticism however, that the model oversimplifies these relationships. For example, the line between niche and regime is not as clear in practice. The path of a niche innovation is not necessarily direct from stabilization to regime disruption, but rather undergoes several iterations and reactions between the niche and system levels before anchoring. Similarly, a niche innovation may anchor at the regime level without transforming it at all (Smith, Voß, & Grin, 2010). An additional critique is the geography of transitions and the presumption that the regime reflects societal functions at a national level (Smith, Voß, & Grin, 2010). We can see how this could present a challenge when discussing utilities operating at a municipal level, but influenced by state/provincial, regional and national policy. While the tendency is to presume the regime operates at a national scale, the local environment such as the age of housing stock, population density, existing energy delivery infrastructure and prevailing public opinion about sustainability, will vary greatly between cities and have a significant impact on the stabilization and diffusion of niche innovations.

#### *The MLP, Business Models and Utilities*

While technological innovation is an important part of transitions, it is only half the equation, and non-technical innovation will be necessary to truly change societal

patterns of production and consumption (Bidmon & Knab, 2018). Some researchers suggest that an option for causing this shift is the business model (Bidmon & Knab, 2018; Wainstein & Bumpus, 2016), while others argue the business model reinforces an existing regime (Sarasini & Linder, 2017; Wainstein & Bumpus, 2016).

The concept of business model innovation describes how the business model has the potential to disrupt entire industries (Magretta, 2002). They can be used to introduce new technologies, connect actors and articulate the balance between production and consumption (Bidmon & Knab, 2018). When used strategically and effectively, the business model itself can be a source of innovation and provide a competitive advantage, become the expected standard or norm of an industry and ultimately integrate into the regime (Wainstein & Bumpus, 2016). Alternatively, the business model can be considered a source of inertia. Just as business model innovation can facilitate adoption into the regime, the same mechanisms can be argued to hold an incumbent business model stable. The actions of a business model are not dependent on and exclusive to the single organization, but embedded in shared structures and knowledge of many players and markets (Sarasini & Linder, 2017). When incumbent organizations benefit from the existing business models within the current regime more than a new one, lock-in occurs to maintain this balance (Wainstein & Bumpus, 2016).

Sarasini and Linder (2017) integrated the business model into transitions theory by postulating that when used innovatively, the business model is “situated within and beyond niches” (p. 26). They describe how entrepreneurs must experiment to determine the legitimacy of their innovation, overcoming adoption barriers by working within different sectors or attempting to reform existing structures through political action and

lobbying (Sarasini & Linder, 2017). Geels (2019) describes a similar phenomenon of radical niches emerging “at the periphery of existing systems” (p. 189) via the activities of entrepreneurs and start-ups. This process is not unlike the four stages he outlined (Geels, 2019), with experimentation in phase one and the use of strategies like stakeholder engagement to gain niche adoption and move through phases two into three.

To further solidify the business model as a dweller within niche innovations, Sarasini and Linder (2017) highlight the three subprocesses of a niche: building social networks, learning processes and articulation of expectations and visions. This research, however rudimentary, cannot help but see alignment of these functions with building blocks of the business model canvas. Social networks are built through relationships with key partners and customers, learning occurs within these same relationships and the interconnected blocks of key resources and activities, and the determination of customer segments. The value proposition can be used to articulate the expectations and visions of the consumer the firm intends to meet. In this way, the business model can be seen again as both a force for and a driver of innovation. While many of these arguments fitting business models into the MLP and the greater sociotechnical transitions context seem to align, and its contribution to systemic change seems confirmed (Bidmon & Knab, 2018), there still remains little focus on the firm in transition theory with “the role of business model innovation in wider transformative processes unclear” (Sarasini & Linder, 2017, p. 16).

In their paper, Bidmon and Knab (2018) summarize the role of business models in transitions theory with three potential roles. The first is the business model as part of the regime, reinforcing industry recipes. Existing business models help to stabilize the rules

and structures actors follow, and in turn the system at the individual, organization, industry and global level are reinforced. They argue that it is not only business leaders that reinforce the regime logic, but the interests and behaviors of other regime actors such as consumers and public authorities who benefit from the norm as well. The situation described is not unlike that which many large or well-established utilities may find themselves in. Managers leading a traditional utility business model may be unable or unwilling to adopt a new sustainability business model, one that fundamentally opposes the stable and self-benefiting regime in which they currently operate. This inertia is particularly evident for large players in commodities such as coal and gas that have reaped the benefits of being large and powerful under the current regime for so long (Geels, 2019). Wainstein and Bumpus (2016) posit a similar connection, describing the historical utility business model as on a “carbon lock-in trajectory” (p. 573), asking whether the inability to reconfigure is tied to costly underutilized centralized assets, or if this adaption will be affected by the modernization of the electricity market.

The second role business models could hold within the MLP is that of an intermediary between niche and regime (Bidmon & Knab, 2018). As discussed above, the three subprocesses of a niche, that is articulation of expectations, learning processes and the building of social networks, align significantly with the role of a business model. In considering the low carbon transition and the role of the utility, their relationships with external parties such as governments and customers are critical in articulating and delivering value. By carefully selecting and managing their network, the utility can act as a boundary spanner and enable shifts that bring innovations to the regime level (Wainstein & Bumpus, 2016).

The final role is one of non-technical niche innovation. Bidmon and Knab (2018) argue that “novel business models emerge at a higher level of stability than technological innovation and directly build up a substantial part of the new regime” (Bidmon & Knab, 2018, p. 910). In this case, the business model (1) redefines how value is captured, (2) helps to provide the window for the innovation to break through, and (3) the structure within the regime needed to adopt and stabilize it. For example, Wainstein and Bumpus (2016) describe how new models in distributed and renewable energy are destabilizing the traditional centralized utility business model. While these changes are reducing customer costs and eroding wholesale prices, they are also opening the window for new ways of selling and consuming energy and shifting the traditional relationship and cost expectations between utilities and their stakeholders.

### **Research Gap**

The literature review brings together several important ideas. First, the statistics on energy efficiency programs show that while not the largest consumer of energy by sector, targeting residential energy use has the potential to impact energy consumption beyond the home, and influence the habits and behaviours of the society at large. While this is generally understood, what is not known are the best ways to lower the barriers to participation in these programs to minimize the energy efficiency gap. Second, while business models of utilities and other efficiency-related organizations have been a common topic of research, the business models for offering both electric power and energy efficiency programs have been overlooked. Finally, utilities are key actors in sustainability transitions, as both resistors of and intermediaries for innovation into the regime, and/or as a source of business model innovation.

This research addresses the gap at the intersection of business model innovation and sociotechnical transitions. By examining the strategies used by electric utilities to engage residential customers in energy efficiency, I conceptualize how business model innovation occurs within sustainability transitions. Additionally, the novel approach of using business model canvas to analyze firm strategy within the MLP contributes to the growing interest in the overlap of these two research frameworks.

### **3. Methodology**

The research objective was determined based on the gap identified in the literature, with the intention of contributing useful and needed information to decision makers and policymakers in utilities and related organizations. The research questions ask how the business models of electric utilities delivering residential energy efficiency programs differ, and how do these strategic differences affect the utilities' role in transitions.

A qualitative methodology is used to answer these questions. The purpose of this approach is in “achieving meaning and understanding of how and why questions in relation to the phenomena under investigation” (p. 67), and while it may use prior theory as a support, it seeks instead to determine the reality of a specific situation rather than test what is already known (Carson, Gilmore, Perry, & Gronhaug, 2001). It is also useful for “in-depth understanding of phenomena in the marketing domain, in managerial and consumer contexts” (p. 68) and to capture the complexity of organizational decision making (Carson, Gilmore, Perry, & Gronhaug, 2001). This method suits the objectives of this research well, as the business model canvas and the multi-level perspective are useful tools in which to frame the results, but the specific experience of energy efficiency programs within electric utilities is a specific situation not yet well understood. Additionally, the topic of energy efficiency programming falls neatly at the intersection of marketing and consumer contexts.

## **Data Collection**

### *Secondary Research*

The qualitative research study was designed to understand the strategy used by electric utilities to design and deliver energy efficiency programs by electric utilities. To provide a conceptual framework, article searches for business models were conducted, with a focus on business model canvas. Research and definitions of the specific canvas blocks of value proposition, customer segments, customer relationships and key partners were collected to further frame the interview questions. Then, to develop an understanding of the broader context within which these utilities and programs operate, article searches on sociotechnical transitions and the multi-level perspective were completed. Finally, to conclude the literature review, article searches for the intersections of these areas were added to determine what gaps had been filled and how. These included business models and utilities, multi-level perspective and business models, and multi-level perspective and utilities.

Prior to the interviews, public documents, marketing materials and website content published by the electric utilities interviewed were collected to provide background information on their business models and energy efficiency program structures. This search was conducted after interviews as well, to account for the time gap between the interviews and writing of this paper. For example, some interviewees had indicated that they could not speak about programs in development stages at the time, but follow-up searches found these programs were now public and could be included in the analysis.

### *Primary Research*

Primary research was collected in the form of semi-structured interviews. This method was chosen because it allowed for a formal outline to ensure objective content was collected, but also natural conversation, best for collecting qualitative content (Walle, 2015; Carson, Gilmore, Perry, & Gronhaug, 2001). Due to the outwardly casual tone, interviewees were put at ease and more open to sharing their perspectives on more subjective questions.

To start, a list of 120 electric utilities and energy efficiency organizations in Canada and the US was compiled. Organizations were included only if they had existing residential energy efficiency programs to ensure that responses to the interview questions were available and relevant. From the list, contact information was found for 60 managers, and an interview invitation was sent through email. Over 35 responses were received, and 17 interviews were conducted. Ultimately the interviews from 15 different organizations were used. One interview was excluded because it was a local distribution company of a system operator which conducted programming within the same jurisdiction, and this interview was used instead. Additionally, one was a gas utility, whose efficiency programming, though interesting, was outside the scope of this research.

An attempt at a stratified random sample was made by segmenting the list by country, size and ownership type and aiming for equal distribution between these categories (Walle, 2015). Ultimately, of those interviewed, eight were Canadian, of which six were government-owned (crown) and one investor-owned. Seven US organizations were interviewed, including five publicly owned utilities (POUs) and one

co-operative. Additionally, two firms interviewed were non-profit energy efficiency utilities (NP in the table below), whose missions were to provide energy efficiency programming but did not sell electricity. One of these non-profits was a subsidiary of a publicly traded electric power company. While investor-owned utilities (IOUs) in the US were invited to interview, no responses were received.

The organizations were also sorted by size according to number of customers served. Seven were classified as small, with less than 100,000 customers; five were medium, with between 100,000 and 1 million customers; and three were large, with over 1 million customers. These size distinctions were made based on industry standards and in consultation with a local utility.

<b>Country</b>	<b>Ownership</b>				<b>Size</b>			<b>Total</b>
	<i>Govt</i>	<i>Private</i>	<i>Co-op</i>	<i>NP</i>	<i>S</i>	<i>M</i>	<i>L</i>	
Canada	6	1	N/A	1	2	4	2	<b>8</b>
US	5	0	1	1	5	1	1	<b>7</b>
<b>Total</b>	<b><i>11</i></b>	<b><i>1</i></b>	<b><i>1</i></b>	<b><i>2</i></b>	<b><i>7</i></b>	<b><i>5</i></b>	<b><i>3</i></b>	

Table 1: Interviewed Utilities by Size and Ownership Type

Note: Government owned includes crown corporations, publicly owned (POUs) and municipal utilities. Private ownership includes publicly traded and privately owned companies and subsidiaries.

Interviews were conducted between June and October 2021 via Microsoft Teams and ran about one hour each. Each interview was recorded to produce a transcript and collect relevant data in detail. A semi-structured interview script was followed, and in most cases was shared in advance with the contact to provide time to gather relevant information. Most interviews were conducted with marketing and program managers. In some interviews, these roles were as specific as manager of residential efficiency programming, or as broad as general manager. Depending on organization size and interviewee expertise, one to three employees attended each interview to provide a full

picture of the utility's energy efficiency activities. The interview results were aggregated to keep the identity of individual utilities anonymous. It is also for this reason that more detailed location information is not included (for example, in Canada many provinces have only a few utilities which could be easily identified). While the interviews were conducted to support more than one research result, the relevant questions for this research fell into seven categories: vision and priorities, programs, marketing, market research, program delivery and implementation, challenges and solutions, and funding.

### **Data Analysis**

Upon completion of the interviews, a content analysis was conducted to extrapolate the appropriate information. The interview recordings were first converted into text to produce a transcript and edited for accuracy and clarity. Next, the inductive method was chosen to determine appropriate coding categories to reflect the data collected and the characteristics of interest from the research questions (Gur & Kumar, 2016). The code was written against the data to identify the value propositions, customer relationships and key partners of each utility (Carson, Gilmore, Perry, & Gronhaug, 2001). For the value propositions, all descriptions relating to potential value, gain creators and pain relievers were pulled from transcripts and recorded as short phrases in a table. Then, single adjectives to describe these statements were tagged to create a list of value propositions. This list was compiled for all interviews and common or comparable terms were merged. A similar process was used for key partners and customer relationships. Categories were not developed for the customer segments block because the managers interviewed either did not have information on this marketing strategy, or they chose to target the mass market. This will be discussed further in the customer

segment section of the results. The final step in data analysis was to compare and contrast the themes identified between utilities, and form common groups. Commonalities between and across research questions were considered. The utilities were sorted by the number and variety of key partners, and then cross analyzed with the value proposition and customer relationship categories to identify patterns and form groupings (Carson, Gilmore, Perry, & Gronhaug, 2001).

<b>Products &amp; Services</b>	<b>Value Propositions</b>	<b>Customer Relationships</b>	<b>Key Partners</b>
1. Home Audit & Report 2. Education 3. Market Facilitation 4. Financial Assistance 5. Targeted Programs 6. Appliance-Related Programs	1. Information 2. Price 3. Customization 4. Convenience 5. Usability 6. Experience 7. Trust & Reliability 8. Automation 9. Comfort 10. Absorption of Risk 11. Security	1. Self-Service 2. Automated Services 3. Personal Assistance 4. Communities 5. Co-Creation 6. Dedicated Personal Assistance	1. Government 2. Trade Allies 3. Other Utilities 4. Local Community 5. Retailers 6. Efficiency Organizations 7. Schools 8. SaaS Service Providers 9. Industry Groups 10. EE Products Supply Chain 11. Housing

Table 2: Coded Categories by Business Model Canvas Block

This method of content analysis can be criticized for the oversimplification of text into word counts, but in the same vein is valued for its usefulness. Unlike the deductive method which uses existing literature and frameworks to form code prior to data collection, the method used is beneficial for studies which do not have substantive literature and allows for categories to be created based on the data collected (Gur & Kumar, 2016). This method has proved effective, given that the intersection of electric utilities and business models remains a growing research topic. For example, though

business model canvas has been used to analyze utilities in previous literature (Bryant, Straker, & Wrigley, 2018), a standard list of frequent value propositions does not exist.

## 4. Results

The following section will describe the analyzed results of the coded categories listed in table 2. Each subsection will begin with a review of the business model canvas block's definition, followed by a graphical breakdown of its coded categories (where applicable), and then a summary of what each category includes with anecdotes and examples from the interviews. For reference and simplicity, each block and its categories will follow the same order as is seen in table 2, with the addition of customer segments following value propositions.

### Products and Services

Part of the value proposition definition is consideration of the firm's bundle of products and services, and so the results will begin by examining the energy efficiency programming each utility supports (Osterwalder & Pigneur, 2010). Programs were categorized into six groups based on the service they provided, in some cases named after the value they promised. These groups include home audit and report, education, market facilitation, financial assistance, targeted programs and appliance-related programming. Figure 4 displays the frequency of these programs amongst the 15 utilities interviewed, and a short description of each follow.

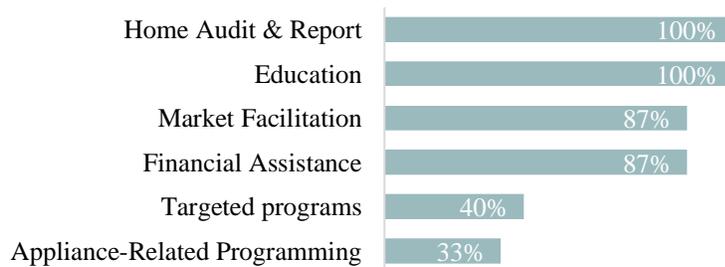


Figure 4: Energy Efficiency Products & Services

### *Home Audit and Report*

According to the Government of Canada, which recently added home audits as part of their Canada Greener Homes initiative, an energy audit has three outcomes:

- Determines where, when and how energy is being used;
- Gives you information you can use to improve efficiency, and reduce your energy costs and greenhouse gas emissions; and
- Can verify the effectiveness of the energy-efficiency projects you implement (Government of Canada, 2018; Government of Canada, 2022).

When using this definition and broadening the scope to include both online and onsite audits, all utilities interviewed were confirmed to have home audits and reports as part of their programming bundle. Most Canadian utilities used the NRCan and EnerGuide resources available through the aforementioned Greener Homes initiative to deliver these programs. This enabled some customers to access grants and rebates at both federal and provincial levels. For US utilities, some used efficiency organizations that supplied an end-to-end auditing service, while others retained auditors in-house or contracted third parties themselves. Additionally, two utilities offered this service to only qualifying low-income customers and not the mass market.

### *Education*

All utilities interviewed had education as part of their program repertoire. Many stated that education in the form of unbiased information was the primary goal and value of the organization or department. Education was delivered through a variety of methods. Most utilities had a page on their website dedicated to educational or learning resources. Targeted for the mass market, these came in the form of blog posts, videos, lists and

interactive webpages (such as a home with clickable features in each room). Some educational content was also targeted, providing information useful to specific groups such as home buyers, renters, people building or renovating a home, and families and children. Often this education was not new or different but framed in a way relevant to the needs of the group. For example, a page targeted to home buyers may list important questions to ask your realtor about energy efficient appliances during a house tour, and a similar list would be listed on the renovator's page as questions to ask your contractor. Education was also delivered through marketing campaigns on social media, booths at local fairs and tradeshow, and in-school programs or curriculum.

#### *Market Facilitation*

A hotly contested program, market facilitation was still delivered in some capacity by 87 percent of utilities. For this purpose, market facilitation was defined as programming that attempted to assist homeowners in navigating the energy efficiency market. This did not necessarily include full automation or end-to-end involvement, but the simplification of the value chain from audit to install. Many utilities said it was not their role to manipulate market conditions and felt strongly that if they provided too much direction, such as highlighting specific contractors, appliance brands and retailers, or provided these products and services themselves, it would overstep their role. That being said, the majority provided this service to some extent with services such as a marketplace to compare and learn about energy efficiency products (only two had option to purchase), a vetted list of contractors and auditors (that included all in the area, or the option for any business to apply), and partnerships both upstream and downstream to lower the cost of efficiency products at the point of purchase.

### *Financial Assistance*

Financial assistance was defined as any program that aided homeowners with the cost of energy efficiency changes. Given cost tends to be a universal barrier to residential energy efficiency, unsurprisingly 87 percent of utilities interviewed had such a program. Of those, 73 percent offered product rebates (ex. upstream on retail products, retroactively through their website, coupons or promotions in-store) and 47 percent offered more comprehensive financing such as modified PACE and loan programs.

### *Targeted Programs*

Targeted programs were defined as any program designed for and offered to a specific group of customers. In some cases, this was the same as the mass program, but with additional benefits or features tailored to the targeted group. For example, an energy audit offered for free or with an automatic loan to a pre-qualified group, where the mass market program charged a fee. Of utilities interviewed, 40 percent offered such a program, and it was generally targeted to low income and First Nations groups.

### *Appliance-Related Programs*

Different from facilitation of product purchases, appliance-related programming included other features such as the rental or recycling of large appliances. Examples of programs include the rental of water heaters and lease-to-own electric thermal storage (ETS) systems (20 percent), and safe recycling of large appliances such as refrigerators or deep freezers (13 percent). Of utilities interviewed, 33 percent offered such a program.

## Value Propositions

Osterwalder and Pigneur’s (2010) value proposition definition states that products and services must “create value for a specific customer segment” (p. 22). While there are unending sources of value any one customer may derive from a product or service, the specific phrasing the utilities used to position and market their products and services was collected. In total, 11 distinct value propositions were identified. The figure below shows the frequency of mention amongst the 15 utilities.

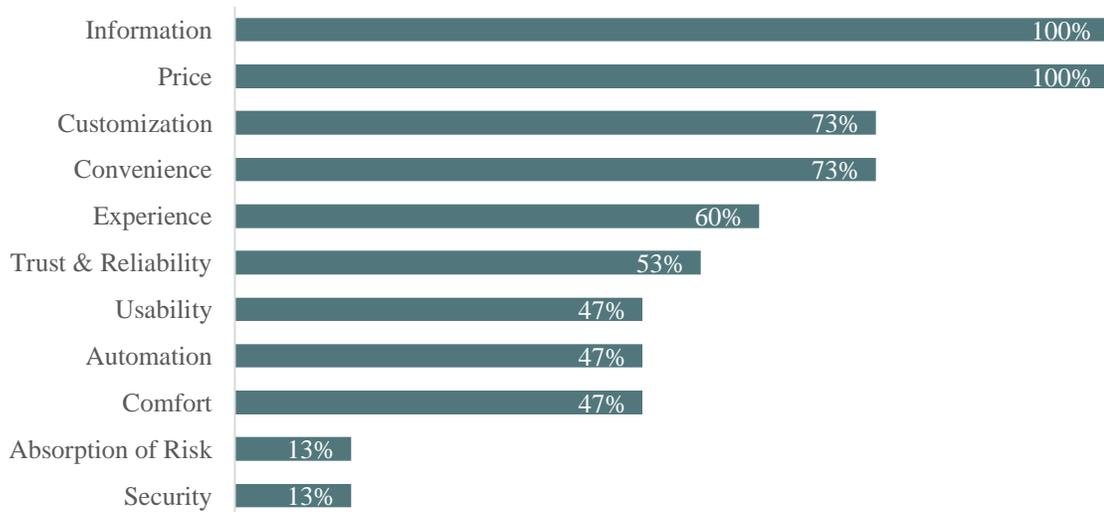


Figure 5: Value Propositions

### *Information*

Information was a value communicated by 100 percent of the utilities. Nearly every utility stated that the communication of clear and unbiased knowledge was a primary goal of their programming. Regardless of whether a customer participated in programming, reduced or electrified their energy consumption, it was most important that a customer obtain and understand all the facts. This result is unsurprising given that all utilities had education within their product bundle.

### *Price*

Similarly, price was communicated as a value proposition by 100 percent of utilities. Again, this was not a surprise given that most utilities interviewed stated that cost was a significant barrier to program participation and offered rebate or financing-related services. This value was communicated as a gain when phrased as “free install,” “complementary service” and “no cost,” but also as a pain reliever in situations such as bill reduction or rebates on expensive appliances.

### *Customization*

Customization was an explicit value proposition of 73 percent of utilities. Terms flagged in this category included custom advice, customized report or recommendations, personal consumption, home scorecard, specific needs and solutions to fit home and budget. Customization could also include choosing how a customer wished to see their data, with options such as in kWh, greenhouse gas and carbon emissions, or comparable analogies like carbon footprint converted to distance driven by car. Most of these propositions were delivered through services such as home energy audits or products like web portals or mobile applications.

### *Convenience*

Convenience was defined by the marketed accessibility of products and services. This included self-serve data portals and calculators (web and mobile applications), online audits to be completed at the customer’s own pace, constantly updated data from meters, and 24/7 on-call advisors. This could also include the removal of unnecessary steps like products pre-approved for rebates or home audits with same-day install of small appliances (lightbulbs, showerheads, etc.). This value was often phrased as a pain

reliever, intended to make customer buy-in easier by removing barriers that made participation inconvenient or unnecessarily complicated. Convenience was marketed as a value proposition by 73 percent of utilities.

### *Experience*

The value proposition of experience was communicated by 60 percent of utilities. In this case, this value was delivered through a human touch in services such as in-home audits, 1-on-1 energy coaching, assigned or personal consultants, and access to a utility employee or energy expert/advisor anytime by phone. This category was included because a significant number of interviewees indicated that maintaining the human experience (over a virtual one) was something they felt their customers preferred. It also allowed for the delivery of personalized service and stronger customer relationships for some utilities.

### *Trust and Reliability*

Trust and reliability were marketed as a value proposition by 53 percent of utilities. While most interviewees stated that they believed their program participation was due in part to trusting customer relationships, the utilities included here explicitly used this branding to describe and bolster the benefits of their programs. Terms such as reputation, accurate, fair and qualified were considered, as well as phrases like “you can count on us” and “together we can...”.

### *Usability*

Usability was defined as the efficient, effective, and easy use of utilities’ efficiency products, most often in the form of technology. Here, terms to describe the

interface of a program as easy, intuitive and interactive were tracked. Many utilities worked with Software as a Service (SaaS) firms to design and deliver these products, a partnership that will be discussed in the following section. Of those interviewed, 47 percent indicated usability as a value proposition.

### *Automation*

Automation was a unique benefit marketed by 47 percent of utilities. Tied to programs related to market facilitation, automation included the streamlining of the audit to install process with steps occurring without need for or prior to customer initiation. For example, this included contractor or product lists that are “pre-approved” for rebate or the merging of processes in the value chain such as reducing product prices upstream, offering scheduling of installers immediately following product purchase, aggregating contractor pricing, and providing on-bill or instant rebates. Utilities that did not offer automation may also provide these services to some extent, but each process was separate and required customer initiation.

### *Comfort*

Comfort is a utility value proposition historically associated with electrification. However, given that the benefits of improvement of the thermal envelope in home retrofits and the upgrade of more efficient heating or cooling appliances, the same benefit can be reaped from energy efficiency programs as well. Only 47 percent of utilities specifically mentioned comfort in their programming, often related to the management of temperature. One utility stated that they had just begun a social media campaign about comfort, testing the benefit against the promotion of other propositions like price or the environment.

### *Absorption of Risk*

Absorption of risk involves utility actions and programs that help to lower or remove the apprehension customers face regarding significant investments. Only 13 percent of utilities highlighted this feature as a value proposition. They did so by relieving risk associated with ownership, offering large appliance rentals that include warranty and maintenance. Risk associated with cost was also distributed, for example, by offering community buy-downs of products like solar panels where price decreased per customer if more community members signed up.

### *Security*

The final value proposition identified was security. Only 13 percent of utilities identified this feature in their marketing. They did so by highlighting the improved safety benefits of bright outdoor lighting, the ability to control smart devices away from home, and the security of personal data used in online dashboards and applications.

### **Customer Segments**

In a typical business model, customer segments are grouped by common needs, behaviours or attributes (Osterwalder & Pigneur, 2010). Although it would be hard to argue that a group as large as all residential electric ratepayers is homogenous, the utilities interviewed stated across the board that they avoided segmentation. They argued that as a public good, required by all and often government regulated they could not ethically target or offer service to one customer and exclude another. Instead, they opted to provide an “open toolbox,” as one manager put it, to provide their customers with a variety of options and allow them to decide what they need. Of course, different groups within this customer base could be identified, such as low-income customers who need

greater financial assistance with retrofits, or renters who can make behavioural changes but not purchasing decisions. To manoeuvre this ethical dilemma, utilities provided information, products and services that could benefit a variety of needs and marketed these across all channels for any customer to access. Some utilities used website pages to segment this information, asking the user to identify whether they were a renter, homeowner, condo-dweller, etc., before providing further information, while others included all services on one page for the user to filter and discern situational relevance for themselves.

The exception to this strategy was utilities who offered programs specifically to low income and First Nations customers. Interestingly, while 40 percent offered targeted programs such as home energy audits and direct installs to these groups, two utilities (13 percent) delivered these services to these groups alone, providing the remaining customers with information only. Whether this was an intentional strategic decision or a cost and resource saving one was not disclosed.

### **Customer Relationships**

Once the utility has defined who their customers are, even if this is simply the mass market, the next question was regarding the customer relationship. Due to the bundle of products and services offered, utilities often had more than one type of relationship with the same customer segment. In speaking with utility managers, it was clear that there was a strong tie between the delivery of value and the establishment of customer relationships, with many stating that customer interaction was one of the most important program characteristics. That said, to organize the responses the original six categories defined on the business model canvas were used: personal assistance,

dedicated personal assistance, self-service, automated services, communities and co-creation (Osterwalder & Pigneur, 2010).

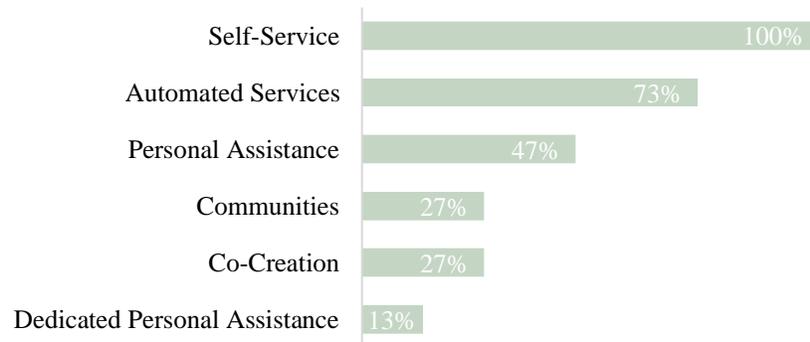


Figure 6: Customer Relationships

### *Self-Service*

A self-service relationship involves no direct human contact between the firm and the customer, and instead provides the means for customers to help themselves (Osterwalder & Pigneur, 2010). All utilities (100 percent) fostered this type of relationship. This is unsurprising as most firms also offered online calculators and educational tools such as videos, contractor lists and product comparisons, providing the minimum resources a customer may need to make a decision on their own. It should also be noted here that no utilities interviewed had only this type of relationship, all felt they needed to do more than the bare minimum to provide value to their customers.

### *Automated Services*

This relationship is defined as a combination of self-service and automation. While still initiated by the customer and contactless, there is personalization in the information offered (Osterwalder & Pigneur, 2010). For example, online portals that show the customer their home's specific consumption patterns, or a platform that is integrated with the home audit or rebate processes so that all recommendations and offers

provided are specific to the user. Given the close ties of this relationship to the value propositions of customization and automation, 80 percent of utilities fostered this type of relationship.

### *Personal Assistance*

Based on human interaction, this relationship gives the homeowner access to a customer representative at any point during the decision-making process (Osterwalder & Pigneur, 2010). In our context, this included utilities that offered a help line available for energy efficiency or home audit related questions. This category excluded utilities that offered in-person audits but contracted these roles out, as the relationship built was not with the utility itself. In total, 47 percent of utilities developed a personal assistance relationship with their customers.

### *Communities*

Common in industries such as online retail, a community relationship in which the firm facilitates communication and knowledge exchange between users, is less common in the utility space. Of those interviewed, 27 percent described this relationship with their customers. One utility used an app designed for community communication, where they encouraged neighbours to ask questions about one another's home audits and experience with efficiency products. Others had advisory committees of community members that planned and coordinated events such as a community buy-down of solar panels, and another nominated community experts in First Nations communities to encourage a discussion about the community-specific energy efficiency challenges they faced.

### *Co-Creation*

Also promoted by 27 percent of utilities was a co-creation relationship. Here, the firms had moved beyond the one-sided buying and selling power relationship, and instead promoted one of mutual experience. For these utilities, this looked like customer committee input on new programs and policies, selling back of residentially generated power, and in one instance the request to manually reduce peak consumption without access to demand response technology.

### *Dedicated Personal Assistance*

The final and least common type of relationship identified was dedicated personal assistance (13 percent). Some utilities took the personal assistance relationship one step further and assigned individual representatives to a customer with the intention of building more than a one-time communication. The few utilities that developed this relationship offered this via the retrofit program when complicated measures required or would benefit a project manager or 1:1 energy coaching.

### **Key Partners**

To deliver their promised value proposition, it is likely that a utility will have to work with multiple actors in their value chain. However, the types of actors required depends on the program being delivered, the market they are operating in and the type of utility providing the programming. Like value propositions, key players were identified in the interviews and marketing materials of the utilities in question, and a list of 11 key partners were coded. These were further categorized into the three groups described next: traditional partners, new players, and non-energy industries. The figure below displays the distribution of partnership type amongst the utilities interviewed.

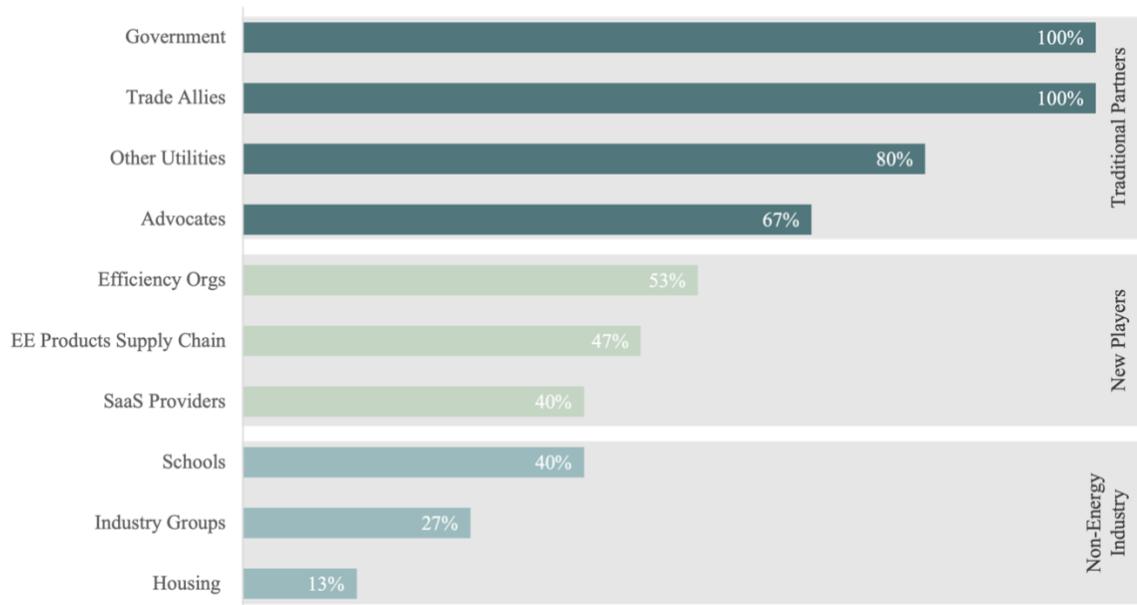


Figure 7: Key Partners

### *Traditional Partners*

Traditional partners were identified as a group of actors who have historically had partnerships or working relationships with electric utilities. They are also generally focused on, or at least emerged in large part in the energy industry. All utilities partner in some capacity with this group, 100 percent with government and trade allies, 80 percent with other utilities, and 67 with advocates and advisors.

### Government

Government, at all levels in both countries, has some involvement with energy efficiency. At the federal level this is seen in policies and mandates (or in the case of Canada, initiatives like Greener Homes). Provincially, many Canadian utilities operate or are owned at this level, and at the state level, US utilities often report to state commissions. Additionally, given the large portion of POUs in this research, many are owned or regulated by municipal government as well.

### Trade Allies

Trade allies are defined as “individuals who act as a resource in educating customers on energy solutions and provide them with information on energy conservation incentive programs from utilities and public agencies alike” (The Canadian Institute for Energy Training (CIET), n.d.). Natural Resources Canada (NRCan) defines service organizations in a similar manner, as those who work with homeowners and other stakeholders to assess home energy performance and savings (Government of Canada, 2021). Roles in this group include contractors, electricians, energy auditors, and heating systems installers, among many others. Occasionally utilities will hire these individuals on staff, but for smaller organizations it is more effective to work with existing companies or groups or retain as needed from departments or agencies such as NRCan. All utilities interviewed stated that they worked with trade allies or service organizations to some extent.

### Other Utilities

Most interviewees (80 percent) stated that they worked with other utilities in some capacity. For some, this was partnering with those in the same state or province to deliver one program or consistent guidelines across programs. Also included were distributing utilities who share energy efficiency programs with their integrated supplier. Unlike other industries where organizations providing the same service are competitors, utilities have the unique situation of having pre-determined service boundaries, so they do not need to compete over customers, which has the potential to make cooperation easier.

### Advocates and Advisors

The final player included in this traditional group of partners is advocates. In this context, this includes groups and boards in the utility's local area that work within the energy space or towards progressing energy efficiency goals and mandates. While not necessarily a key partner for all utilities, those included in this research were primarily government or consumer-owned and so involvement of community players was common for delivery of programs and decision making. For example, one POU had an advisory board composed of local technical experts who helped develop both policy and programs. This same utility had committees nominated through the board on specific topics such as sustainability and electric vehicles.

### *New Players*

The second group of partners that emerged were new players. These organizations, similar to those of the traditional partners group, work to progress energy efficiency goals or sell energy efficient products and services. Interviews found that 73 percent of utilities had relationships with at least one player in this group, with 53 percent partnering with energy efficiency organizations or utilities, 47 percent with up and downstream firms in the energy efficient product supply chain, and 40 percent with SaaS solution providers.

### Efficiency Organizations and Utilities

The first state to create a state-wide energy efficiency utility (EEU), Vermont defines an EEU as an organization that offers services that help consumers invest in energy efficiency measures that will save them money (State of Vermont, n.d.). The Northwest Energy Efficiency Alliance (NEEA) describes how they work to “increase

[consumer] adoption of energy-efficient products, services and practices” (Northwest Energy Efficiency Alliance, n.d.). Similarly, their counterpart in the mid-Atlantic region states that they “deploy education, strategic outreach, and policy innovation to expand the market for energy efficiency” (Energy Efficiency Alliance, n.d.). While these organizations and alliances provide programming directly to consumers, this group also includes organizations such as Efficiency Canada, who work under the pillars of research, communications and engagement to understand and educate the public on the policy systems affecting the energy efficiency sector (Efficiency Canada, n.d.). Just over half of the utilities interviewed had partnerships with such organizations, often to provide specialized expertise for program delivery. Some of those interviewed would be considered in this group themselves, and others worked with their respective local or state/provincial entity.

#### Energy Efficiency Product Supply Chain

Just under 50 percent of utilities had partnerships with firms in the energy efficient products supply chain. This included downstream retailers and sellers, as well as upstream distributors and manufacturers. These relationships were often oriented around reducing the cost to the consumer by rebating or subsidizing the cost of products at the retail level or helping to manage the supply and demand of products available for distribution.

#### SaaS Solution Providers

SaaS solutions were utilized by 40 percent of utilities interviewed. These services generally consisted of the development of an online marketplace or efficient product viewing tool, as well as profiles and portals online or in mobile applications for

homeowners to view and analyze their energy consumption. The goal of these platforms was generally to deliver information through a user-friendly interface with actual purchase linking away to local retailers, but a few utilities had point-of-sale (POS) built into their platform. As discussed previously, whether to include POS on a utility platform was a highly debated topic amongst interviewees, with many landing on the side of minimizing economic influence.

### *Non-Energy Industries*

The third and final group of partners identified were non-energy industries. The parties in this group do not directly work within the energy sector but would be considered stakeholders in the future of energy efficiency. This group includes schools (40 percent), industry groups (27 percent) and firms in the housing industry (13 percent).

### Schools

Just under half (40 percent) of utilities mentioned working with local schools as part of their energy efficiency programming. These programs ranged from single day classroom visits, full packages of curriculum to ongoing contests, activities and events. For example, one utility described an annual contest with local elementary schools where children are asked to draw what energy efficiency means to them and the winning artwork is used in a calendar sent to ratepayers. Another utility prioritized this programming by partnering with regional education non-profits to develop a comprehensive curriculum on energy and conservation aimed at school-age children and offer it free to download online. Unsurprisingly, the interviewees who spoke of their school partnerships described it as some of the most rewarding work they do, but also educational for the utility itself – learning about how future homeowners and ratepayers

understand energy efficiency and envision how their perspectives and habits will shape the future of energy use.

### Industry Groups

Industry groups were identified by 27 percent of utilities. Partnerships in this case were with specific industry and trade associations. While some individuals in this group could fall into the trade allies category, generally utilities who mentioned industry groups in this case referred to those that were not directly related to the energy industry, but could be a potential stakeholder and benefit from the energy efficiency industry. Some utilities recruited companies or trade associations specializing in installing insulation or flooring for example and provided training on the requirements or regulations needed to certify the home's building envelope as energy efficient and qualify the homeowner for rebates or other benefits. Oftentimes these programs worked to generate an aggregated rate that could be provided to homeowners looking for such a service, or the utility would rebate the contractor directly so they could present a discounted quote upfront. These partnerships benefit the utility with a pre-approved list of tradespeople and a more streamlined rebate process for the customer, while also helping the contractor open business to the energy efficiency industry and gain exposure to all homeowners in the utility's jurisdiction.

### Housing Industry

Firms in the housing industry are the final and least mentioned category identified in this research with 13 percent of utilities referencing this kind of partner. Here, partners were defined as firms and individuals working within the housing industry such as builders, developers and realtors. While these groups could do their jobs without energy

efficiency knowledge, it benefits both groups to work together in some capacity and share information. For example, this partnership could be used to determine the proportions of energy efficient homes currently in the market or those about to be built, or for understanding the energy-related concerns of home buyers and other energy efficiency related trends. One such utility offered a residential new construction program which provided rebates and benefits to both the builder and homeowner for building all electric homes and making certain sustainable choices. Although more utilities had new construction programs that rebated the homeowner, few leveraged partnerships with the housing industry to streamline this process.

## **5. Discussion**

To reiterate, this thesis explores the relationship between business models and the multi-level perspective. The first research question to explore was how utility business models differed in the design and delivery of their residential energy efficiency programs. To answer this question, the differences in value proposition, customer relationships and key partners among electric utilities were compared and grouped. From this analysis emerged three distinct utility segments: Niche Dwellers, Regime Reinforcers, and Transition Facilitators. The second research question was regarding how the differences in these models affected the utilities' role in transitions. This will be addressed in the application section for each segment, with an explanation for how the relationships between these characteristics result in business models that provide different functions within the multi-level perspective. Finally, this section will conclude with the proposal of a generic key partner canvas, and a broader discussion fitting key partners and business models within the multi-level perspective.

### **Key Partner Segments**

Taking a firm perspective, the centre of the diagram represents the utility's value proposition. It includes the mix of energy efficiency products and services and the key characteristics of these offerings that the firm markets to the consumer. The innermost ring encompasses the traditional players, including governments, other utilities, advocates and advisors, and trade allies. This group is closest to the centre because these partners operate within the same market and work to advance similar agendas. Utilities have a strong historical relationship with these players and delivery of their value proposition is interconnected, if not entirely dependent on, their resources. The next circle includes new

players, such as the retailers and manufacturers in the efficiency product supply chain, SaaS solution providers, and efficiency organizations. These players also work to advance the same energy goals, but do not have the historical working relationship with utilities that characterizes the first ring. It is not a far leap to see how these players can help to deliver the utility's value propositions, but it requires the utility to move outside its traditional structure and business model and make these connections. Non-energy players that include schools, industry groups and the housing industry establish the final and outermost ring. These partners are the most removed from the utility's everyday activities and energy efficiency is not their priority. Partnerships with these players, though unconventional, can help the utility to deliver unique and innovative value propositions.

### **Segment 1: The Niche Dwellers**

At first glance, the first group appeared to be the least innovative in the delivery of energy efficiency programs, as their business model and strategy surrounding partner relationships was not dissimilar from that of a traditional utility. However, significant effort was made to develop close ties with customers and a large bundle of products and services was used to deliver a variety of value propositions.

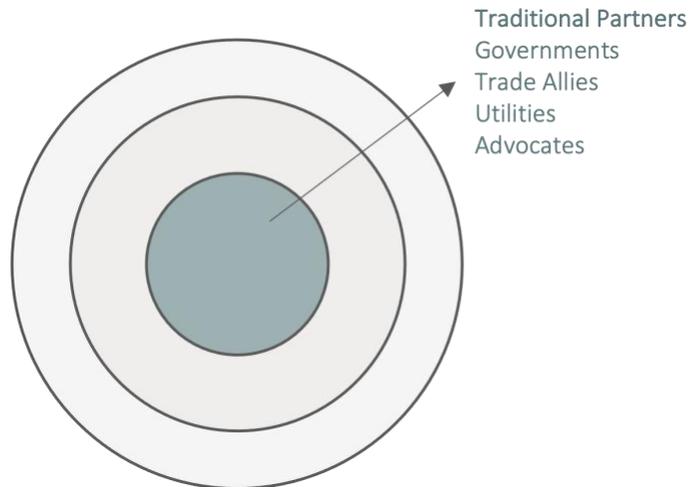


Figure 8: Key Partner Map for Niche Dwellers

This group was composed of primarily Canadian crown-owned utilities and one co-op, but varied in size (7000 customers to 5 million) and type (vertically integrated, transmitter and retailer). Additionally, every category of products and services identified was offered by at least half the utilities in this group. Notably, this is above the total average for targeted and appliance-related programs, which were offered by 40 and 33 percent of all utilities, respectively. This indicates that by offering both mass market and niche products and services, they are delivering more variety than the average utility interviewed.

In terms of value propositions, these utilities were more likely to focus on removing social and economic pains, opting to highlight benefits such as price, experience, and trust and reliability, over more structural barriers such as customization or automation. There was some consideration of behavioural barriers, with value propositions targeting comfort, risk and security, but often these were delivered through a trusting relationship rather than a specific product.

Turning to customer relationships, all utilities in this group offered self-service and automated interactions in the form of calculators, educational tools and web portals. The propensity for relationships characterized by personal assistance and co-creation was more significant for this segment than others, with many offering access to customer support lines and programs designed with feedback from customer pilots and focus groups. These utilities prided themselves on their relationship with their customers and used this connection to inform their decisions regarding value propositions and partnerships more than any other segment. For example, one utility in this group did not have the resources or technology to institute time of use rates, so instead asked their customers via social media to reduce their energy consumption at certain times of day. There was no benefit or reward for customer compliance, other than the idea that they were contributing to the energy efficiency of their community. This tactic was successful because they had developed a strong community-minded, co-creating relationship with their customers.

Finally, the key partners identified by this segment were primarily traditional (government, trade allies), with only two utilities working with new players and one with non-energy industries. When prompted for an explanation to these limited partnerships, these utilities generally stated that their role in energy efficiency was to build a trusting relationship with customers by providing accurate and reliable information, and to avoid risk and market manipulation.

#### *Application to the Multi-level Perspective*

The strategies and business model characteristics these utilities implemented could be described as niche or grassroots. They provided comparable products and

services to larger, more innovative counterparts, but did so at a local level by building relationships with customers over industry players and focused on value propositions that reduced social and behavioural barriers to participation rather than structural, market-related ones. In this way, the customer-focused business model was able to achieve a kind of nontechnical niche innovation which could stabilize on a local level because the strategies used were specific to their community of customers. However, the avoidance of boundary spanning with key partners in the regime limits the potential for the model to open windows of opportunity and diffuse into the regime on a national or global level is not likely or sustainable. To continue the previous example, while simply asking customers to turn off their lights or wash clothes at certain times of day for the benefit of the community's energy use worked within this segment locally, this strategy would be unlikely to succeed with a larger, national audience without added compensation.

## **Segment 2: The Regime Reinforcers**

The second segment identified was characterized by utilities that provided a variety of products and services, delivered many different value propositions, worked with a slightly greater number and variation of partners, and offered many different customer touchpoints. In other words, this group was average, with utilities delivering a little bit of everything but focusing on nothing.

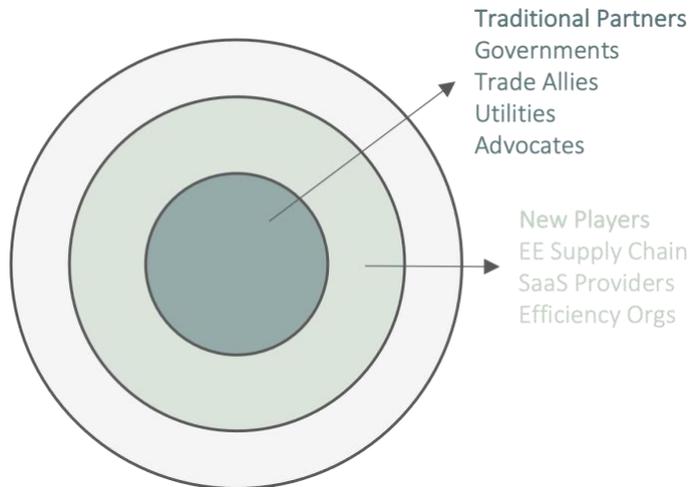


Figure 9: Key Partner Map for Regime Reinforcers

This group was an even mix of Canadian and US utilities, mostly small and municipal with a couple larger vertically integrated firms. Product-wise, their bundle was smaller than the first group, delivering only to mass market with no targeted or appliance programming. This is the only group that did not have low-income programming within the product mix, further emphasizing the strategy to serve the mass market with broad appeal.

Accordingly, marketing focused on the value propositions of convenience and usability to reduce behavioural barriers, and information and customization to address structural ones. As with all utilities interviewed, price featured in all communications of value. Due to the various sizes of this segment, delivery of values such as customization were more accessible to those with greater monetary and technological resources. A key differentiator between these utilities and the previous group is that most managers were not opposed to market manipulation tactics. For example, they would consider the adoption of online marketplaces or automated processes that gave some partners (contractors, retailers, auditors) preferential treatment, activities which the first segment

fundamentally opposed. However, due to the bureaucratic structure of these utilities (80 percent crown or POU), there was minimal flexibility in reframing the value proposition or in differentiating energy efficiency services from energy delivery ones in the business model.

In general, customer relationships were not a strategic priority to these utilities. Some described the existing ratepayer segmentation as sufficient, and others delivered to such a broad or large area that personalization was simply not feasible. This was reflected in the categorization of customer relationships, which saw upwards of 80 percent of these utilities connecting through automated and self-services. Some of these utilities fostered community relationships, such as an advisory committee for the purpose of collecting feedback for annual reporting, but co-creation and the expression of customers' energy efficiency goals did not overpower the need to comply with organizational metrics and mandates.

Finally, this group of utilities partnered to some extent with players from every category. At least half the utilities worked with each traditional partner, and some had relationships with new players and non-energy industries as well. In most instances these relationships could be characterized as convenient or obligatory, rather than out of a desire for innovation and cooperation. For example, of those utilities that worked with efficiency organizations the partnership was mandated by the province or state, or efficient product supply chain participation was necessary due to the remoteness of customers or used to gain a financial foothold in the sector themselves. In other words, these relationships, though greater in quantity and variety than the first group, were not made in a strategic effort to form cross-industry alliances or influence market conditions.

These utilities were also not first-movers in these partnerships, preferring to see the results of more innovation-minded utilities before reaching out themselves.

#### *Application to the Multi-level Perspective*

In marketing terms, this segment's strategy could be described as a "spray and pray" method, supported by variety in products, value propositions, key players and customer touchpoints. Energy efficiency programming did not have a cohesive or intentional strategy, or not one that was differentiated from traditional utility activities. This resulted in managers doing as much as they could and dipping their toes in every opportunity but lacking the resources to bring the activities together. The traditional utility business model was embedded in the existing regime and reinforced by dominant industry logic about how a utility should operate. Therefore, while managers spoke of the need for innovation and change, the existing structure and bureaucracy within which they operated limited the ability to follow through. For example, one utility in this group stated that the metrics set for the number of houses participating in their retrofit program was a hard maximum, and regardless of how eager other homeowners were to implement efficiency upgrades, it wasn't within their budget or priorities to expand the program. Unlike the previous group whose innovation remained at the niche level, this group of utilities did not encourage business model innovation, but rather reinforced the incumbent model supported by the existing regime.

#### **Segment 3: The Transition Facilitators**

The third group had the most external focus among the three. Similar to segment two, these utilities offered a diverse product mix, touched a number of value propositions, and worked with all key partner groups. However, the partnerships established by this

group were more strategic and intentional, allowing for integration between and among players, and a clear set of expectations for customers.

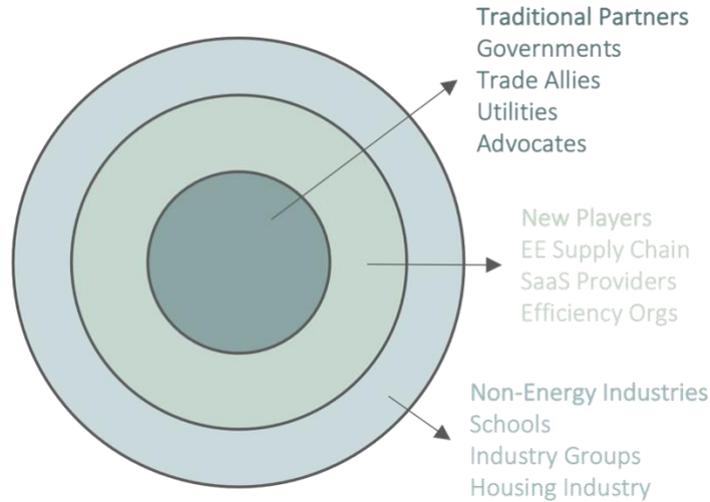


Figure 10: Key Partner Map for the Transition Facilitators

Operating primarily in the US, this group consisted of a combination of publicly owned municipal utilities and non-profit energy efficiency utilities. They also varied in size from less than 100,000 customers to over 1.5 million. While the full product mix was offered by at least one utility, most were focused on mass market programs over niche ones, particularly education and market facilitation.

The value propositions of these utilities touched on all four barriers, but centred primarily on structural, social, and economic issues such as customization, convenience, experience and automation. All these utilities delivered robust, online portals and facilitated the market through online stores and/or automated contractor networks.

While these utilities had developed trusting relationships with their customers, there was a strong focus on automation and self-services. This is likely due to the amount of investment these firms had put into technology to provide these services, but also that

most were dealing with upwards of 500,000 customers. That said, a portion of this group did foster relationships via personal and dedicated assistance depending on the customers' level of need and used community apps to foster connections between customers.

The primary characterization for this group was the way in which they chose and utilized key partners. All but one utility had a relationship with every actor identified within the traditional partners and new players groups. Most also worked with non-energy industries such as schools, industry groups and housing. The focus on these latter partnerships, as well as the involvement with SaaS providers and in up and downstream supply chains is what differentiates this group from the rest. Not only did these utilities develop a diverse set of partnerships, but they integrated and developed them together. For example, they might work with a SaaS provider to develop a marketplace in which they can guarantee rebates and delivery times because they have agreements with manufacturers and retailers to do so. Further, the relationships with trade allies and other industry groups means that when a customer purchases a product on their marketplace, they can immediately schedule an install date. Alternatively, the full product cost is billed to the contractor who then incorporates the rebate into their quote, later subsidized by the utility. These partnerships enabled the utility to deliver on its robust and innovative value propositions.

#### *Application to the Multi-level Perspective*

As described in the example above, the primary differentiator of this third group of utilities is the strategic use of key partners to facilitate the market and reduce structural barriers to adoption through the delivery of convenience, customization and automation.

Overwhelmingly, managers in this group described their role in the transition as for the purpose of creating favourable and efficient conditions for customers to participate in energy efficiency programs and aid in the global shift towards net zero. While the other groups mentioned the value of energy efficiency to the climate in some marketing materials, this group walked the talk. This was demonstrated no better than in one utility's mission which stated their purpose as providing reliable and affordable electricity to their customers *and* leading the transition to a clean energy future. The first part, promising the delivery of reliable and affordable power, is the traditional utility value proposition. The addition of committing to being a leader in the transition is what sets the utilities in this group apart from the others. This utility even went the extra step of adding it to their mission statement, further indicating the strategic significance and importance.

The successful diffusion of an innovation like an energy efficiency marketplace into popular use, first requires proof that the technology is viable in society. To enable this diffusion, the utilities in this group were willing and able to alter their business model to market both energy efficiency programs and traditional energy services. By redefining their value proposition and enlarging and diversifying their key partner network, these utilities used their business model as an intermediary between niche and regime. Their diverse set of key partners allowed them to engage and link actors outside the industry (i.e., new players and non-energy industries), thereby spanning boundaries and proving the viability of the technology and increasing the rate of adoption.

## The Key Partner Canvas

These key partner groups can be extrapolated to create a generic key partner canvas. Like the *value proposition canvas* which helps a firm achieve fit between customer profiles and value propositions (Osterwalder, Pigneur, Bernarda, & Smith, 2015), a key partner canvas can be used to map exactly how and through what partners a firm's value propositions can be delivered. The "fit" between a firm's value proposition and its key partners is just as important as the same between the value proposition and its customers. Therefore, the second part of the key partner canvas is the value proposition. When used by a firm, the objective is to identify and group partners by the pains and gains they can help deliver. The purpose of a key partner is to aid the firm in achieving economies of scale, reduce risk and provide additional resources – the canvas can help a firm figure out what relationships can best do this in relation to customer needs/value propositions. Depending on the value demanded, different partners or combinations of partners may be needed to achieve these benefits and deliver the value proposition effectively. A depiction of the canvas is seen in figure 11, followed by a description and examples of the three partner groups applied to other industries.

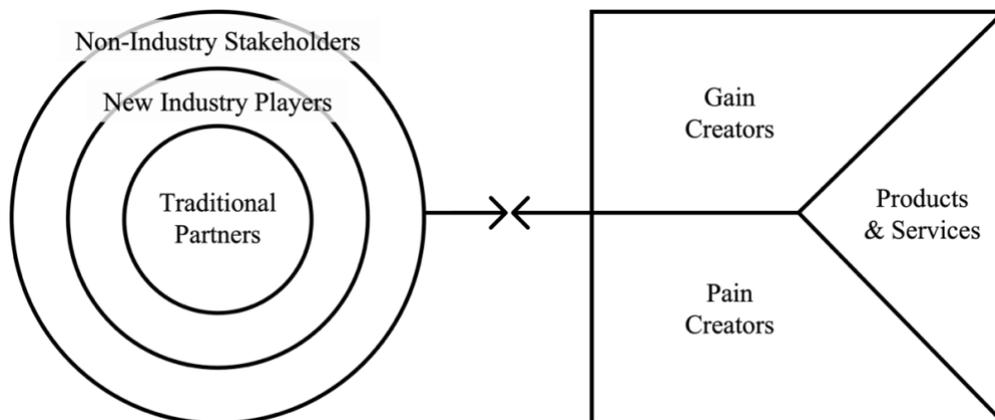


Figure 11: Key Partner Canvas

Note: Based off Osterwalder, et al. (2015)'s *Value Proposition Canvas*

This research found that an effective way to group the relationships between key partners and the focal firm is within three tiers. While built from the perspective of the energy industry, we can consider the generic definitions of these groups as well. First, traditional partners are those with which a firm has built relationships historically, or for which the industry naturally supports a relationship. These partners may or may not be competitors, and while their primary product or service is not necessarily the same as the focal firm, they do have stakes in the same industry. They can also fulfill all three purposes of a key partner, scale, risk reduction and resources. In the case of the energy industry, traditional partners for utilities included governments. To provide a different industry example, a produce supplier is a traditional partner of a grocery store chain. Grocery stores have always needed suppliers to source fruits and vegetables, and the supplier relies on the retail food industry for most of their revenue.

The second ring of key partners are new industry players. As the name suggests, this group of partners are in the same industry as our focal firm but are relatively new. These firms may be more innovative than the focal firm, delivering a unique product or service, or delivering it via a new business model. This partnership can provide economies of scale or resources in a new way, but the novel relationship means reduction of risk is not guaranteed. For utilities this group included SaaS solution providers; relatively new to the industry, they deliver a new product in the form of energy management software through a new subscription and cloud-based business model. A non-energy example is a running shoe manufacturer partnering with a data company that produces a smart gadget for the shoe to collect information on running pace, distance, etc.

This company delivers an innovative product and is equally invested in the athletic wearables industry.

The final group of partners and the most distant from the focal firm's inner circle are non-industry stakeholders. These partners are not within the focal firm's industry and may not be even firms themselves, but they are invested somehow in the successful delivery of the firm's value proposition. These partners can provide additional resources, as well as reduce risk by exposing the firm to a broader group of stakeholders and span boundaries between industries. For utilities, one of these partners are schools. While schools themselves are not involved in the energy industry, this partnership allowed utilities to communicate with and educate students, who given their future on this planet are invested in the successful delivery of energy efficiency programs. The same type of partnership can be seen between a consumer skincare brand and social media influencers. Influencers, as individuals, are not in the same industry as a brand selling skincare. But this relationship allows the skincare brand to be exposed to a much wider consumer base, and the influencer is invested in the value proposition insofar as it delivers its promised benefit and builds trust with their followers.

Additionally, a firm's key partners, while identified within the business model canvas, are also free-thinking actors within the regime of the MLP, influenced themselves by the external environment and niche innovation. Bidmon and Knab (2018) produced an annotated version of the MLP to depict how business models can act as intermediaries between niche and regime. I built on this model by adding business model canvas as a framework for the red business model triangles depicted, and highlighted the relationship between key partners and the value proposition (figure 12).

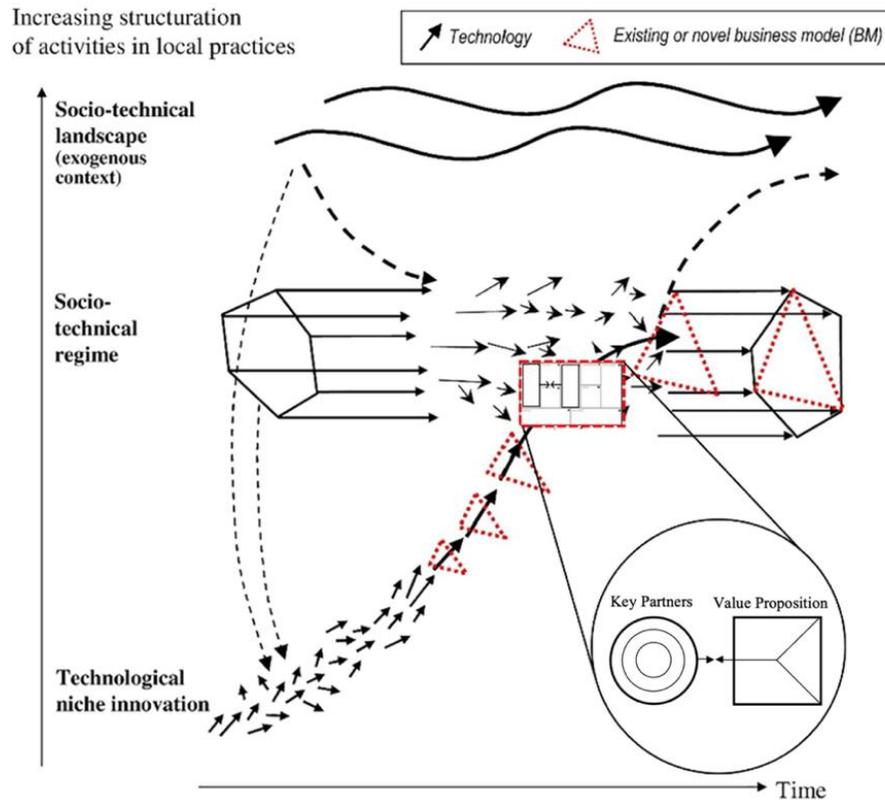


Figure 12: Fitting a Key Partner Canvas into the Multi-level Perspective

*Note:* Adapted from Bidmon and Knab (2018), p.910

The three partner groups identified are all actors in the regime, independently delivering their own value propositions via their own business models, or are individuals reinforcing existing culture and user preferences. Utilities that use key partnerships strategically, by expanding beyond the traditional and partnering with new and external actors, are building new links between markets, industries, technology, etc. These partnerships help to span boundaries, creating new opportunities for innovation and shifting the structure of the regime that typically keeps it stable and reinforced. However, the relationship between key partners and value propositions is just as important as the types of partners themselves. The idea is not that firms who partner with a large quantity and variety of actors will be more profitable or likely to increase adoption in the regime,

but instead they must work with the right combination of partners to deliver the value propositions identified in their business model. Individuals' user preferences are just as much a part of the regime as markets and industry. Partnerships will be most effective when both sides of the canvas are considered. We know that customer segments and relationships can help to inform a firm's value proposition (value proposition canvas), but in turn these value propositions can be used to determine who their key partners should be (key partner canvas). We can then envision the regime as a network of interconnected business models and individuals, informing and reinforcing each other.

## 6. Conclusion

The purpose of this research was to fill the knowledge gap at the intersection of utility energy efficiency programs, business models and sociotechnical transitions. While it is understood that utilities and residential customers play important social and technical roles in transitions, it is not known how utilities engage participation in energy efficiency programs to this end. Additionally, while some research has identified the business model as a useful tool to analyze a firm's role in transitions, the application of business model canvas has not been given much attention in this space. To this end, the research sought to answer the questions: how do the business models of electric utilities delivering residential energy efficiency programs differ, and how do these strategic differences affect the utilities' role in transitions?

First, the research found that key partners were a critical block of a utility's business model and played an important role in delivering the value proposition. The partners could be separated into three groups, (traditional, new, and non-energy actors) based on the type and extent of relationship with the utility sector, and the priority of energy consumption or efficiency to their purpose. The relationship between these partnership levels and the value proposition was considered, and a generic key partner canvas was proposed.

Next, the groups of partners lent themselves to developing three segments of utilities. This conclusion answered the first research question, by describing how the value propositions, customer segments, customer relationships and key partners of the three utility business models differed. Then, to address the second question, these differences were considered within the multi-level perspective. It was found that one

model (niche dwellers) exhibited non-technical niche innovation with their customer relationships, and another (regime reinforcers) worked within the regime to reinforce existing industry recipes. Only the third model, transition facilitators, utilized its key partners to span the boundary between niche and regime, influencing the opening of windows of opportunity and enabling the diffusion of energy efficiency programs and related technology.

### **Contribution to Theory**

This research contributes to the growing areas of theory that considers the role of the business model in sustainability transitions. It also adds the application of business model canvas, and an understanding of how different blocks of the canvas relate to components in the regime and niche levels of the multi-level perspective (i.e., key partners as actors within the regime). The specific analysis of utility business models that deliver energy efficiency programs and electric power simultaneously is also very new to transitions research (Eroglu, 2021). Given the importance of utilities in the transition, more attention should be given to this concept. Also useful to business model research is the proposal of a key partner canvas. Like that of the value proposition canvas, it connects the identification of value propositions with delivery through key partners and suggests the objective of a fit between the two. While some consideration has been given to the importance of supporting industries and partnerships in the transition (Cameron, Waaler, Tunland, & Nøst, 2019; Maby C. M., 2019; Mourik & Bouwknecht), this research adds a generic partner canvas applicable outside the energy industry.

## **Contribution to Industry**

Similar to the practicality of the value proposition canvas to firms in mapping the desirability of their product and service offerings, the key partner canvas has the potential to help firms better understand the feasibility of delivering their product or service. It also provides a framework for categorizing different types of partners, akin to the categories outlined in the customer relationship canvas block, for example. In addition to the emphasis on the importance of key partners in delivering energy efficiency programs, the specific categorization of partners and value propositions can be useful to utility decision makers. For example, if a utility's management intends to deliver programming through market facilitation, this framework outlines the types of partners and value propositions needed to see success. This same argument can be used for policymakers or other key partners identified, to understand a utility's strategy and their role within in.

## **Future Research**

In light of the importance of key partners in the utility's role in transitions, future research might consider the role of these key partners from the perspective of their business models. This research positions all key partners as actors within the regime, but it could be argued that a number of these industries, especially the new players, are in fact situated at the niche level either as emerging technological innovations or non-technical business model innovations. Additionally, this research focused specifically on four blocks of the business model canvas. Future research could build out each block of the canvas and create a more comprehensive understanding of the utility delivering energy efficiency programs. While research regarding business model innovation, the multi-level perspective and the electric utility are a newly growing topic of research (Maby, 2019;

Maby & Gwilliam, 2022), this research highlights the opportunities for expansion in this area.

## Bibliography

- ACEEE. (2019). *Leading U.S. states based on energy efficiency program score 2018*.  
n.a.: Statista.
- Allcott, H., & Greenstone, M. (2012). Is there an energy efficiency gap? *Journal of Economic perspectives*, 26(1), 3-28.
- Alliance to Save Energy. (2013). *The History of Energy Efficiency*. Alliance to Save Energy.
- Altunay, M., Bergek, A., & Palm, A. (2021, October 29). Solar business model adoption by energy incumbents: the importance of strategic fit. *Environmental Innovation and Societal Transitions*, 40, 501-520.
- Amit, R., & Zott, C. (2001). Value Creation in E-Business. *Strategic Management Journal*, 22, 493-520.
- Berg, W., Vaidyanathan, S., Jennings, B., Cooper, E., Perry, C., DiMascio, M., & Singletary, J. (2020). *The 2020 State Energy Efficiency Scorecard*. Washington, DC: ACEEE.
- Bianco, V., Sonvilla, P. M., Reed, P. G., & Prado, A. V. (2022, January 24). Business models for supporting energy renovation in residential buildings. The case of the on-bill programs. *Energy Reports*, 8, 2496–2507.
- Bidmon, C. M., & Knab, S. F. (2018). The three roles of business models in societal transitions: New linkages between business model and transition research. *Journal of Cleaner Production*, 178, 903-916.

- Bryant, S. T., Straker, K., & Wrigley, C. (2018, May 30). The typologies of power: Energy utility business models in an increasingly renewable sector. *Journal of Cleaner Production*, *195*, 1032-1046.
- Cameron, D., Waaler, A., Tunland, K. S., & Nøst, E. (2019). Using the Industry Collaboration Canvas in the Mid-Term Review. Experience in applying the framework in the oil and gas industry. *2019 University-Industry Interaction Conference*. Helsinki.
- Canada Energy Regulator. (2021, May 19). *Introduction to electricity use*. Retrieved from Canada Energy Regulator: <https://www.cer-rec.gc.ca/en/data-analysis/energy-commodities/electricity/report/canadian-residential-electricity-bill/index.html>
- Canada Energy Regulator. (2022). *Canada's Energy Future 2021: Energy Supply and Demand Projections to 2050*. Ottawa, ON: Government of Canada.
- Canadian Electricity Association. (2014). *Vision 2050 - The Future of Canada's Electricity System*. Canadian Electricity Association.
- Carson, D., Gilmore, A., Perry, C., & Gronhaug, K. (2001). *Qualitative Marketing Research*. SAGE Publications Limited.
- Chesbrough, H. (2007). Business model innovation: it's not just about technology anymore. *Strategy & Leadership*, *35*(6), 12-17.
- Coakley, S. (2016, June 8). *Reflecting on the History of Energy Efficiency, While Looking to the Future*. Retrieved July 2022, from Northeast Energy Efficiency

Partnerships: <https://neep.org/blog/reflecting-history-energy-efficiency-while-looking-future>

Coes, D. (2014). *Critically Assessing the Strengths and Weaknesses of the Business Model Canvas*. [Master Thesis Business Administration], University of Twente.

Costello, K. W. (2016, June 24). R&D and public utilities. *The Electricity Journal*, 29, 19-26.

Deloitte. (2020). *2021 power and utilities industry outlook*. Deloitte.

Efficiency Canada. (n.d.). *Who is Efficiency Canada?* Retrieved from Efficiency Canada: <https://www.energycanada.org/about-us/>

Energy Efficiency Alliance. (n.d.). *About the EEA*. Retrieved from EEA: <https://energyefficiencyalliance.org/who-we-are/>

Environment and Climate Change Canada. (2022). *A Clean Electricity Standard in support of a net-zero electricity sector*. Gatineau, QC : Government of Canada.

Eroglu, T. (2021). Renewing business models in the energy supply sector: the role of dynamic capabilities and ambidexterity. *Master Thesis*.

Evans, S., Vladimirova, D., Holgado, M., Fossen, K. V., Yang, M., Silva, E. A., & Barlow, C. Y. (2017). Business Model Innovation for Sustainability: Towards a Unified Perspective for Creation of Sustainable Business Models. *Business Strategy and the Environment*, 26(5), 597-608.

Funkhouser, E., Blackburn, G., Magee, C., & Rai, V. (2015, August 7). Business model innovations for deploying distributed generation: The emerging landscape of community solar in the U.S. *Energy Research & Social Science*, 10, 90–101.

- Gaede, J., Haley, B., Abboud, M., & Nasser, M. (2021). *The 2021 Provincial Energy Efficiency Scorecard*. Carleton University. Ottawa, ON: Efficiency Canada.
- Geels, F. W. (2019). Socio-technical transitions to sustainability: a review of criticisms and elaborations of the Multi-Level Perspective. *Current Opinion in Environmental Sustainability*(39), 187-201.
- Geels, F. W., Sovacool, B. K., Schwanen, T., & Sorrell, S. (2017, September 22). Sociotechnical transitions for deep decarbonization: Accelerating innovation is as important as climate policy. *Science*, 357(6357), pp. 1242-1244.
- Geels, F., & Schot, J. (2010). Part I The Dynamics of Transitions A: Socio-Technical Perspective. In J. Grin, J. Rotmans, & J. Schot, *Transitions to Sustainable Development: New Directions in the Study of Long Term Transformative Change* (pp. 9-102). Taylor & Francis Group.
- Gerarden, T. D., Newell, R. G., & Stavins, R. N. (2017, December). Assessing the Energy-Efficiency Gap. *Journal of Economic Literature*, 55(4), 1486-1525.
- Goldman, C. A., Murphy, S., Hoffman, I., Frick, N. M., Leventis, G., & Schwartz, L. (2020, February 15). What does the future hold for utility electricity efficiency programs? *The Electricity Journal*, 33.
- Government of Canada. (2018, 02 08). *Conducting an energy audit*. Retrieved from Natural Resources Canada: <https://www.nrcan.gc.ca/energy/efficiency/energy-efficiency-industry/energy-management-industry/conducting-energy-audit/20401>
- Government of Canada. (2021, 04 06). *Learn about licensed service organizations*. Retrieved from Natural Resources Canada: <https://www.nrcan.gc.ca/energy->

efficiency/homes/professional-opportunities/learn-about-licensed-service-organizations/16629

Government of Canada. (2022, 06 21). *Canada Greener Homes Initiative*. Retrieved from Natural Resources Canada: <https://www.nrcan.gc.ca/energy-efficiency/homes/canada-greener-homes-grant/23441>

Government of Canada. (2022, March 15). Canada launches consultations on a Clean Electricity Standard to achieve a net-zero emissions grid by 2035. *News release*. Gatineau, Quebec, Canada.

Government of Canada. (2022, May 19). *Net-Zero Emissions by 2050*. Retrieved from Government of Canada: <https://www.canada.ca/en/services/environment/weather/climatechange/climate-plan/net-zero-emissions-2050.html>

Gsodam, P., Rauter, R., & Baumgartner, R. J. (2015). The renewable energy debate: how Austrian electric utilities are changing their business models. *Energy, Sustainability and Society*, 5(28).

Gur, A., & Kumar, M. (2016, September 8). A systematic approach to conducting review studies: An assessment of content analysis in 25 years of IB research. *Journal of World Business*, 53, 280-289.

Haley, B., Gaede, J., & Correa, C. (2019). *The 2019 Provincial Energy Efficiency Scorecard*. Ottawa: Efficiency Canada.

- Hamwi, M., Lizarralde, I., & Legardeur. (2021, October 7). Demand response business model canvas: A tool for flexibility creation in the electricity markets. *Journal of Cleaner Production*, 282.
- Hesselink, L. X., & Chappin, E. J. (2018, September 29). Adoption of energy efficient technologies by households – Barriers, policies and agent-based modelling studies. *Renewable and Sustainable Energy Reviews*(99), 29-41.
- Hirst, E., & Brown, M. (1990). Closing the efficiency gap: barriers to the efficient use of energy. *Resources, Conservation and Recycling*, 3(4), 267-281.
- IEA. (2021). *Energy Efficiency 2021*. Energy Efficiency Division (EEfD). International Energy Agency.
- Jaffe, A. B., & Stavins, R. N. (1994). The energy-efficiency gap: What does it mean? *Energy Policy*, 22(10), 804-810.
- Johnson, M. W., Christensen, C. M., & Kagermann, H. (2008, December). Reinventing Your Business Model. *Harvard Business Review*, 50-59.
- King, M., Liere, K. V., Meehan, G., George, G. R., Olson, W. P., & Nieto, A. D. (2007). *Making a Business of Energy Efficiency: Sustainable Business Models for Utilities*. NERA Economic Consulting . Washington, D.C.: Edison Electric Institute.
- Kushler, M., Baatz, B., Nowak, S., & Witte, P. (2015). *Municipal utility energy efficiency: Successful examples around the nation*. American Council for an Energy-Efficient Economy.

- Lee, P.-c., & Humphrys, E. (2014, July 17). *Electric Utilities*. Retrieved from The Canadian Encyclopedia:  
<https://www.thecanadianencyclopedia.ca/en/article/electric-utilities>
- Lehr, R. L. (2013, October). New Utility Business Models: Utility and Regulatory Models for the Modern Era. *The Electricity Journal*, 26(8), 35-53.
- Lindstrom, A., & Hoff, S. (2019, August 15). *Today in Energy*. Retrieved from EIA:  
<https://www.eia.gov/todayinenergy/detail.php?id=40913>
- Maby, C. M. (2019). Enabling the integration of energy improvements into mainstream home repair, maintenance and improvement practice in the UK. *PhD Thesis*.
- Maby, C., & Gwilliam, J. (2022). Integrating energy efficiency into private home repair, maintenance and improvement practice in England and Wales. *Building Research & Information*, 50(4), 424-437.
- Magretta, J. (2002, May). Why Business Models Matter. *Harvard Business Review*, 80(5), 86-92.
- Mahapatra, K., Gustavsson, L., Haavik, T., Aabrekk, S., Svendsen, S., Vanhoutteghem, L., . . . Ala-Juusela, M. (2013, February 8). Business models for full service energy renovation of single-family houses in Nordic countries. *Applied Energy*, 112, 1558–1565.
- Massa, L., & Tucci, C. L. (2013). Business model innovation. *The Oxford Handbook of Innovation Management*, 20(18), 420-441.
- McGrath, S. (2021). *Electric Power Transmission in Canada*. IBISWorld.

- Molina, M., & Kushler, M. (2015). *Policies Matter: Creating a Foundation for an Energy-Efficient Utility of the Future*. ACEEE. Washington, DC: American Council for an Energy-Efficient Economy.
- Mourik, R., & Bouwknecht, R. (n.d.). Mind your business: entrepreneurs, their dynamic capabilities, context and new business models for energy efficiency services. *ECEEE Summer Study Proceedings*. European Council for an Energy-Efficient Economy (ECEEE).
- Natural Resources Canada. (2018). *Energy Use in the Residential Sector*. Retrieved from Natural Resources Canada:  
<https://oee.nrcan.gc.ca/publications/statistics/trends/2017/residential.cfm#L1>
- Natural Resources Canada. (2022, June 8). *All about the Canada Greener Homes Initiative*. Retrieved from Government of Canada:  
<https://www.nrcan.gc.ca/energy-efficiency/homes/canada-greener-homes-grant/start-your-energy-efficient-retrofits/all-about-the-canada-greener-homes-initiative/23476>
- Northwest Energy Efficiency Alliance. (n.d.). *About NEEA*. Retrieved from NEEA:  
<https://neea.org/about-neea>
- Okkonen, L., & Suhonen, N. (2010, February 23). Business models of heat entrepreneurship in Finland. *Energy Policy*, 38, 3443–3452.
- Osterwalder, A., & Pigneur, Y. (2010). *Business Model Generation : A Handbook for Visionaries, Game Changers, and Challengers*. (T. Clark, Ed.) John Wiley & Sons, Inc.

- Osterwalder, A., Pigneur, Y., Bernarda, G., & Smith, A. (2015). *Value proposition design: How to create products and services customers want*. New Jersey: John Wiley & Sons, Inc.
- Reis, I. F., Gonçalves, I., Lopes, M. A., & Antunes, C. H. (2021, April 7). Business models for energy communities: A review of key issues and trends. *Renewable and Sustainable Energy Reviews, 144*.
- Relf, G., Cooper, E., Gold, R., Goyal, A., & Waters, C. (2020). *2020 Utility Energy Efficiency Scorecard*. Washington, DC: ACEEE.
- Richardson, J. (2008, October 14). The business model: an integrative framework for strategy execution. *Strategic Change, 17*(5-6), 133-144.
- Richter, M. (2012, March 20). Utilities' business models for renewable energy: A review. *Renewable and Sustainable Energy Reviews, 16*, 2483–2493.
- Saebi, T., & Foss, N. J. (2015, December 25). Business models for open innovation: Matching heterogeneous open innovation strategies with business model dimensions. *European Management Journal, 33*, 201-213.
- Sarasini, S., & Linder, M. (2017, October 12). Integrating a business model perspective into transition theory: The example of new mobility services. *Environmental Innovation and Societal Transitions, 27*, 16-31.
- Smith, A., Voß, J.-P., & Grin, J. (2010, February 23). Innovation studies and sustainability transitions: The allure of the multi-level perspective and its challenges. *Research Policy, 39*, 435–448.

- SMUD. (2022). *Strategic Direction*. Retrieved July 2022, from SMUD:  
<https://www.smud.org/en/Corporate/About-us/Company-Information/Strategic-Direction>
- Snape, J., Boait, P., & Rylatt, R. (2015, May 22). Will domestic consumers take up the renewable heat incentive? An analysis of the barriers to heat pump adoption using agent-based modelling. *Energy Policy*, 85, 32–38.
- Solà, M. d., Ayala, A. d., Galarraga, I., & Escapa, M. (2020, December 16). Promoting energy efficiency at household level: a literature review. *Energy Efficiency*, 14(6).
- Sovacool, B. K., & Hess, D. J. (2017). Ordering theories: Typologies and conceptual frameworks for sociotechnical change. *Social Studies of Science*, 47(5), 703–750.
- Specht, J. M., & Madlener, R. (2019, October 15). Energy Supplier 2.0: A conceptual business model for energy suppliers aggregating flexible distributed assets and policy issues raised. *Energy Policy*, 135.
- State of Vermont. (n.d.). *Energy Efficiency Utilities*. Retrieved from Department of Public Service: [https://publicservice.vermont.gov/energy\\_efficiency](https://publicservice.vermont.gov/energy_efficiency)
- Strategyzer. (2019). *Building Blocks of Business Model Canvas*. Retrieved from Strategyzer: <https://www.strategyzer.com/business-model-canvas/building-blocks>
- Tayal, D. (2017, March 27). Leveraging innovation for electricity utilities. *The Electricity Journal*, 30, 23-29.
- Teece, D. J. (2010, April). Business Models, Business Strategy and Innovation. *Long Range Planning*, 43(2-3), 172-194.

- The Canadian Institute for Energy Training (CIET). (n.d.). *Highlighting Trade Allies & Contractors / Jobs, Training & Hot Topics*. Retrieved from CIET Canada:  
<https://cietcanada.com/news/highlighting-trade-allies-contractors/>
- U.S. Energy Information Administration. (2022, June 10). *U.S. energy facts explained*. Retrieved July 2022, from eia: <https://www.eia.gov/energyexplained/us-energy-facts/>
- Wainstein, M. E., & Bumpus, A. G. (2016, March 2). Business models as drivers of the low carbon power system transition: a multi-level perspective. *Journal of Cleaner Production*, 126, 572e585.
- Walle, A. H. (2015). *Qualitative Research in Business: A Practical Overview*. Cambridge Scholars Publishing.
- WorldCat via UNB Libraries. (2022). *Search for 'Business Models'*. Retrieved July 2022, from UNB Libraries:  
[https://unb.on.worldcat.org/search?queryString=business%20models&scope=&changedFacet=language&clusterResults=true&groupVariantRecords=false&subformat=Artchap%3A%3Aartchap\\_artcl&content=peerReviewed&content=fullText&year=1990..2022&language=Eng](https://unb.on.worldcat.org/search?queryString=business%20models&scope=&changedFacet=language&clusterResults=true&groupVariantRecords=false&subformat=Artchap%3A%3Aartchap_artcl&content=peerReviewed&content=fullText&year=1990..2022&language=Eng)
- York, D., Witte, P., Nowak, S., & Kushler, M. (2012). *Three Decades and Counting: A Historical Review and Current Assessment of Electric Utility Energy Efficiency Activity in the States*. Washington, D.C.: American Council for an Energy Efficient Economy (ACEEE).

Zott, C., & Amit, R. (2008). The Fit Between Product Market Strategy and Business Model: Implications for Firm Performance. *Strategic Management Journal*, 29, 1-26.

Zott, C., Amit, R., & Massa, L. (2011, July). The Business Model: Recent Developments and Future Research. *Journal of Management*, 37(4), 1019-1042.

# **Curriculum Vitae**

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