Climate Mitigation from a Renter-Centered Perspective:

A Case Study of Boulder's SmartRegs Program

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Abstract

My thesis is a renter-centered analysis of the City of Boulder's SmartRegs rental energy efficiency standards, as a policymaking process that purports to address both climate and housing issues simultaneously, rather than one at the expense of the other. This focus on renters starts from the premise that housing and climate justice should be about the people most impacted. My preliminary findings indicate that, despite nearly all rental units meeting the SmartRegs' basic energy efficiency requirements, SmartRegs did not result in improved tenant comfort and lower utility bills, as promised by the City of Boulder. I argue that SmartRegs was predominantly a carbon-focused policy to reduce emissions in rental buildings, rather than a renter-centered policy that improved housing quality issues or affordability for renters. I recommend that cities like Toronto learn from Boulder and proactively include renters in policymaking processes and protect them against unaffordable housing and local climate impacts.

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Chapter One: Introduction

A housing crisis plagues many cities across North America, particularly with the lack of affordability, repair issues in aging rental housing stocks, and weak rights for renters. The climate crisis is also intensifying, with individual cities declaring a climate emergency to accelerate local climate action (Intergovernmental Panel on Climate Change (IPCC), 2022). From a housing rights and climate justice perspective, cities have a responsibility to address these concerns for their most marginalized urban residents. However, in my experience, cities tackle climate and housing issues separately, even when there can be significant overlap like in substandard rental housing. My research project examines a municipal policy from the City of Boulder, Colorado that seeks to address both issues simultaneously, rather than one at the expense of the other. I have also specifically chosen to study this from a unique renter-centered perspective.

Buildings are a significant contributor of carbon emissions in urban areas and make up 21% of global greenhouse gas emissions (Dodman et al., 2022; Hoicka & Das, 2020). Cities are promoting energy efficiency retrofits (i.e. green renovations) as a key climate solution to addressing building emissions in their own municipally-owned building portfolios and existing privately-owned buildings in the community (Hughes et al., 2020; Xu & Chen, 2019). However, city policies that promote retrofits aim to reduce technical and economic barriers for property owners and managers, with minimal consideration of social equity for the residential or commercial tenants that occupy these buildings (Hoicka & Das, 2020; Knuth, 2019). The climate policy agenda to advance retrofits is gaining momentum across various levels of government in

Canada and in the United States, although this is typically geared towards homeowners as the audience.

When scanning the retrofit policy landscape, I found Boulder, Colorado's SmartRegs residential rental energy efficiency program (City of Boulder, 2022f; Petersen & Lalit, 2018). Boulder was the first city in the United States that required energy retrofits for rental properties via the SmartRegs ordinance (Barrett et al., 2011; Petersen & Lalit, 2018; Rocky Mountain Institute, 2022). To this day, it remains one of a very small number of municipalities in the U.S., or indeed in North America, to do so. SmartRegs requires landlords to meet basic energy efficiency requirements in order to rent out their units, which needs to be renewed every four years (City of Boulder, 2019). By the end of 2019, 99% of rental units were compliant with SmartRegs (City of Boulder, 2018a, 2020a). The City of Boulder claimed that this policy has and will benefit renters for three key reasons: units will be more comfortable, units will get efficiency upgrades that renters would not otherwise have access to, and monthly energy bills may go down (City of Boulder, 2018a, p. 2). Boulder further states that SmartRegs inspections and possible upgrades promote housing equity for renters, and that SmartRegs contributes to a "just transition so that beneficial energy efficiency improvements reach all segments of Boulder's community" (ibid, p. 3). Boulder celebrates the SmartRegs program as the "first of its kind" and a "successful foundation" for tens, if not hundreds of cities to follow (ibid, p. 4).

My primary argument is that SmartRegs did not result in the benefits for renters as promised by the City of Boulder, although nearly all rental units have met the SmartRegs' basic energy efficiency requirements. My findings demonstrate that SmartRegs was predominantly a carbon-

focused policy to reduce emissions in rental buildings, rather than a renter-centered policy that improved housing quality issues or affordability for renters. It was and still is possible to deliver on social and economic benefits for renters through policies like SmartRegs, if cities take initiative to measure utility costs savings relative to rent increases for the renters, support renters in addressing other repairs and upgrades necessary in their homes, and ensure homes are comfortable considering worsening local climate impacts. The City of Boulder can improve their own SmartRegs and rental licensing policy to better address the needs of renters who face numerous housing quality issues in their homes that impact their health and well-being. When cities beyond Boulder develop rental energy efficiency standards like SmartRegs in their own communities, renters must be present in the policy development process, implementation, and evaluation of the policies to ensure that the promised benefits occur not just in writing, but in practice.

For context, SmartRegs is one component of the wider City of Boulder rental licensing approval process (City of Boulder, Planning & Development Services, 2021). The general requirements to obtain a rental license include a rental inspection on exterior and interior structure of the property, light, ventilation, occupancy limits, plumbing, mechanical and electrical systems, and fire safety (ibid). The SmartRegs energy efficiency requirements are the newest component of the City of Boulder's existing rental licensing program. This process started in 2009 when the City of Boulder convened a multi-departmental meeting with "the goal of enhancing tenant comfort in Boulder's licensed rental properties" and included participation from community and technical-based working groups (Barrett et al., 2011). The City of Boulder adopted the SmartRegs policy on September 21, 2010 and it went into effect on January 3, 2011 (Arena &

Vijayakumar, 2012; City of Boulder, 2018a). Although the SmartRegs municipal ordinance was originally implemented in 2011, landlords and homeowners associations successfully lobbied for an eight-year window to become fully compliant (Barrett et al., 2011). Further details about SmartRegs policy development, implementation, and evaluation, as well as the relevant other housing and climate policies to the City of Boulder are explored in Chapter Two: Context.

To center renters' perspectives, I utilized a grounded theory approach and human-centred design theory to explore how housing and climate issues play out in the City of Boulder (Doorley et al., 2018; Hay & Cope, 2021). Renters' perspectives and voices needed to be top of mind and continuously prioritized when thinking through the implementation and lived reality for renters in Boulder, although interviews with key informants were also conducted to complement the interviews with renters. Human-centered design theory was particularly useful to enact an iterative approach to prioritize renters throughout the research project, from data collection to analysis. These methods will be explored in greater detail at the end of this chapter. Marxist urban political ecology is also an overarching theoretical framework for my work. This analysis of SmartRegs' is based on a larger critique of market-based solutions that promote "business-as-usual capitalism with climate characteristics" to address the climate crisis (Shi, 2020). For example, some actors like real estate developers and investors promote the profit-generating potential or "green value premium" associated with retrofitted properties, which may price out low-income residents and perpetuate energy poverty (Knuth, 2019). Scholars have similarly argued that urban sustainability policies do not promote social equity (despite identifying objectives do so), but instead were found to privilege and perpetuate environmental neoliberalism (Champagne, 2020). This is important in the City of Boulder, as it has become a

city where investors and developers capitalize on its green and sustainable characteristics for further capital accumulation.

Synopsis of research findings

The City of Boulder claims that SmartRegs delivered three main benefits to renters: more comfortable homes, energy-efficiency improvements that renters could otherwise not access that were paid for by the landlords, and potentially lower utility bills (City of Boulder, 2018a; Petersen & Lalit, 2018). Unfortunately, there is limited evidence that renters experienced these benefits from the SmartRegs policy. I argue that renters were not adequately considered in Boulder's evaluation of the policy nor by other industry stakeholders who conducted evaluations of the technical and financial components of SmartRegs. My preliminary findings indicate that while SmartRegs resulted in energy-related upgrades to 32% of rental properties in Boulder, these upgrades may not have improved tenant comfort, reduced energy bills for the renters, or were perceived as a meaningful upgrade to their home either for housing quality concerns or as a climate solution. To study this, I conducted interviews with individual renters in the City of Boulder and analyzed numerous City of Boulder archival documents, reports that featured SmartRegs as a model for rental energy efficiency standards, and external evaluations from third parties (government and academic evaluators) of the SmartRegs ordinance. Through the interviews, renters provided rich insights on the reality and perception of affordable housing in Boulder.

Although renters were involved in the policy design process of SmartRegs, the findings indicate that they were neglected in the implementation and evaluation efforts. Continued engagement

with renters could have resulted in more accountability to ensure that the promised benefits to renters occurred through the policy. First, the City of Boulder claimed that SmartRegs would make rental properties more comfortable for renters. The findings show that most renters interviewed face or have experienced poor housing quality concerns that negatively impact the liveability of their home, and thus, often impact their health and well-being. I found no evidence that the City of Boulder measured specific metrics that pertain to tenant comfort, such as indoor environmental quality (which could have been done through pre- and post- retrofit surveys to renters) (The Atmospheric Fund, 2018). In contrast, some studies interviewed landlords who implemented upgrades (Arena & Vijayakumar, 2012). This may indicate that the City of Boulder is not doing enough to make rental homes more comfortable through SmartRegs and the rental housing licensing overall. Since landlords lobbied to delay SmartRegs over an eight-year compliance period, Boulder's renters were disadvantaged as many continued to live in inefficient, poor quality rental housing. However, if the measures did create more comfortable rental properties, renters will have only started seeing these benefits at the end of the compliance period as there is evidence that reluctant and negligent landlords in Boulder were unlikely to proactively make repairs. Secondly, the City of Boulder required landlords to invest in energy efficiency-related upgrades and renovations that they may not have done through voluntary measures. I identify power dynamics present when renting from the renters' experiences and insights, which can make it challenging to obtain the upgrades they want and need. In contrast, the City of Boulder was persistent in their quest to achieve near universal compliance of SmartRegs through the common upgrades to meet basic energy efficiency requirements. My findings indicate that renters have not noticed or perceived any benefits from the SmartRegs requirements for rental housing, even if they are aware of the policy. Landlords who had to make

SmartRegs upgrades to their property are communicating to their tenants about the energy efficiency of their home, but again, this does not seem to improve the perception of the policy for the tenants as they continue to experience other housing issues in their rental unit or property. Third, the City of Boulder said SmartRegs might reduce utility bills for some renters, potentially making life more affordable, despite public feedback from renters and landlords that the policy may drive up rent to compensate for the costs of upgrades.

Finally, this is compounded with the understanding that Boulder is experiencing more frequent and severe climate impacts, such as wildfires and flooding. Climate change will and already has disproportionately impacted the most vulnerable residents; as a threat-multiplier, the inequities marginalized populations are facing will only be exacerbated by the climate crisis. This is true for renters as well, who are more likely to be low-income, racialized, or part of an equity-seeking group. Renters are often vulnerable to these climate shocks as they have limited ability to make changes to their home and feel that not enough is being done by local governments to address climate change in an equitable way.

Structure of the thesis

The thesis encompasses five chapters. This introduction provides an overview of the research questions and synopsis of the findings and situates the relevance of the project within the wider literature. My overall argument is that renters must be prioritized in equitable climate and housing policies. From theoretical frameworks to the literature review and throughout my research methods, I emphasize the underlying theme of a renter-centered lens to every aspect of my thesis. This is reiterated throughout the literature review, where I discuss how renters are frequently exploited in capitalist profit-driven rental housing markets, and how this has adverse

effects on their health and well-being. Moreover, climate change is disproportionately impacting marginalized and vulnerable populations, which I argue includes renters. Cities have oriented themselves as important sites of climate action, often with claims that their climate policies have multiple social, economic, and environmental benefits for our communities. However, there is evidence that these policies continue to perpetuate inequality in our communities, rather than reducing poverty, and continue to reinforce capital accumulation in new green industries.

In Chapter Two: Context, I outline the motivations underpinning climate and housing policies in the City of Boulder. It is evident that the City of Boulder is an ideal city for capital accumulation; investors and developers see great potential in Boulder due to its fast-growing high-tech industries, prominence of higher education, and tourism from the Rocky Mountains. Renters are subject to market-driven fluctuations, which makes it challenging for low-income renters to stay in Boulder. I also demonstrate that environmental sustainability has long been a priority for the City of Boulder, at the expense of housing affordability. For example, conservation boundaries (in the context of other housing supply factors like opposition to higher density infill) has contributed to limited housing supply in the city, often to the detriment of renters, racialized and low-income residents. This context allows us to assess why and how SmartRegs, a climate policy embedded into an existing rental housing licensing program, was developed in Boulder. I conclude the chapter by arguing that renters were involved and motivated to support SmartRegs as they were promised more comfortable homes and potentially lower energy bills, all paid for by their own landlords. This is the starting point from which Chapter Three starts to examine whether the City of Boulder delivered on its promises to renters.

In Chapter Three: Findings, I make my primary argument that SmartRegs failed to make homes more comfortable for renters or lower their utility bills. The findings show that housing quality is a key concern raised by renters interviewed. However, only 32% of rental properties required upgrades to achieve SmartRegs compliance, meaning most rental properties did not see any changes in tenant comfort or energy efficiency. Since this was a minimum standard, SmartRegs was unable to influence noticeable elements of renters' homes that perhaps would have been impacted with a higher degree of stringency (e.g., heating and cooling systems, ventilation, windows). For the properties that did undergo renovations from SmartRegs, there is no evidence that the City or contractors measured metrics that would correspond to tenant comfort such as indoor environmental quality or health outcomes. In addition, although the City of Boulder acknowledged that SmartRegs could result in rent increases to make up for the cost of the upgrades, they continued to promote the possibility that the policy could lower utility bills for renters. Lower utility bills could have made life more affordable for renters. Renters can benefit from such a program if the energy cost savings are greater than any rent increases that they might experience. This is a significant caveat, as cities like Boulder are largely driven by the profit-motivated rental housing market and have seen fluctuations of three to ten percent in year-over-year rent increases over the past decade. However, there is no evidence that Boulder measured rent increases, despite claiming that they would track and report on this if the information was available.

Chapter Four: Conclusion allows us to reflect on the work produced and its contribution to renters in Boulder and other cities that may design a minimum energy efficiency standard for existing buildings, as well as to the academic literature. This also includes key policy

recommendations from the findings. To wrap up, the chapter envisions future directions for the research and implications for renters in Boulder.

Research questions

There has also been a significant interest in this kind of policy from other municipalities and jurisdictions including from my own interest as a resident and policy advocate from the City of Toronto. Several industry reports have highlighted SmartRegs as a case study that can be replicated in other cities to meet residential climate targets, such as the Rocky Mountain Institute's "Better Rentals, Better City" report (Petersen & Lalit, 2018). For my thesis project, I had two primary research objectives.

1. Assess the "success" of Boulder, Colorado's SmartRegs program based on outcomes for renters, such as: housing quality (e.g., repairs); affordability (e.g., impacts on rent, displacement); governance and power dynamics (i.e., landlord/tenant relationships); and health and well-being
2. Assess what transferable insights or "lessons" there might be for other cities to implement climate policies related to housing that do not overlook or negatively impact renters

The research questions aimed to assess the "success" of SmartRegs based on outcomes for renters and to consider how these findings could be developed into policy recommendations for other municipalities. I developed these research questions to elaborate on the claims that the City of Boulder made on how SmartRegs would benefit renters, namely around tenant comfort, renter equity, and lower energy bills. Power dynamics and governance was an important topic to analyze, as the literature indicates how important tenant-landlord dynamics can be to the renters' lived experiences of a property and how these dynamics can impact renters' health and well-

being (Chisholm et al., 2020; Marquez et al., 2019). I initially felt it would be unnecessary to evaluate the success of SmartRegs as it pertains to climate action, as the City of Boulder focused their policy evaluation on climate metrics like energy savings and emission reductions. Interviews with renters illuminated that there is a real opportunity to improve SmartRegs and the rental housing licensing overall to address climate change more equitably and improve the quality and affordability of rental housing in Boulder.

These research findings are a solid foundation from which I can advise other cities like the City of Toronto on rental residential energy efficiency and climate-housing intersections. For example, the Toronto's Net Zero Existing Buildings Strategy states "potential harms to avoid" such as "increased energy insecurity for low-income households via higher energy bills" and "Increased risk of "renovictions" that price lower-income households out of affordable housing" (City of Toronto, 2021, p. 21). And yet, there is no mention of consultations with renters or mitigation plans to prevent these potential harms, despite efforts from local stakeholder groups (ACORN Canada, 2019; Centre for Urban Growth and Renewal, 2020). Engagement with the primary "user", or person most impacted, is central to human-centered design.

Theoretical framework

My research is fundamentally grounded in two theoretical frameworks: human-centred design theory and Marxist urban political ecology. Human-centered design theory (HCDT) is at the core of my theoretical and methodological framework (Doorley et al., 2018; Giacomin, 2014; Pitter & Lorinc, 2016; P. B. Wood, 2017). HCDT is "an approach to systems design and development that aims to make interactive systems more usable by focusing on the use of the system and

applying human factors, ergonomics, usability knowledge and techniques" (Giacomin, 2014, p. 608). This approach emphasizes the user experience, involves users throughout entire processes of design and development, and values an iterative process (ibid). Empathy is one of the core principles of human-centered design (Doorley et al., 2018, p. 4). One way to empathize is to immerse yourself in the users' (in my case, renters') experience to better understand their needs and desires. In fact, Giacomin (2014) argues that human-centred design should create intuitive solutions that "often transcends [the needs, desires, and experiences] which the people themselves actually realized" (p. 610). HCDT gives me the confidence to value renters as central to my research on climate-housing intersections. As the primary "user", renters should be valued key stakeholders in housing policies because of their lived experiences and as those most impacted by such policies. The Stanford Design Thinking Bootleg, a practical guide to human-centred design methods, provided a helpful foundation for developing an iterative approach to the coding process using design thinking principles (Doorley et al., 2018). Iteration is necessary to this research because it is easy to deprioritize renters when working through complex climate and housing issues, but I come back repeatedly to renters as the "user". Linking this work to my research methods, I referred to best practices for empathizing with the "user" in the Bootleg when conducting interviews.

I have found limited literature that uses HCDT in the sustainability space. Sultan & Qaed (2020) are a notable example, as they used the d.school Design Thinking Bootleg in a study where students connected the United Nations sustainable development goals to social innovation. The authors found that "the un-linear process of design thinking phases (empathy, define, ideate, prototype and test)" was necessary to consider different aspects of user needs, instead of only

working on solutions that addressed one specific need (p. 3). Sultan & Qaed (2020) demonstrate the value of HCDT to prototype technologies, solutions, or government policies, with the users' demands and aspirations, and test the outcome against the users' expectations. Human-centred design, even if this is not the exact language that they use, is inherent in prominent urban scholars who have shaped my own work. For example, Wood (2017) argues for "seeing human beings as political subjects, always citizens in the making" and that this work is grounded in theories of justice (17). Further, the "right to the city' must include not just workers but all residents, and that the rights of owners should not be prioritized over the rights of inhabitants (ibid). Other scholars speak to the "fluidity of our identities as city-dwellers" and how urban metropolises are grounded on the equal participation and vision of their citizens (Pitter & Lorinc, 2016). These scholars deeply understand the importance of empathizing with individual residents and city-dwellers, and value their participation as part of a political "right to the city".

In addition, my research will also be informed by a Marxist urban political ecology lens. Swyngedouw & Heynen (2003) gives us a working definition of what Marxist urban political ecology perspectives and approaches would consider:

> A just urban socioenvironmental perspective, therefore, always needs to consider the question of who gains and who pays and to ask serious questions about the multiple power relations—and the scalar geometry of these relations—through which deeply unjust socio- environmental conditions are produced and maintained. (p. 901)

I consider this a valuable theoretical framework as it provides an alternative to the current housing system, where many residents do not have good housing under capitalism, and to governments' promoting climate capitalism.

Housing as shelter, in my view and shared by Marxist scholars, refers to the 'use value' of housing (Hammel, 2017, p. 1). However, housing is also a commodity that has an 'exchange value,' which is its worth and investment potential in a housing market for homeowners and landlords (ibid). Housing as shelter versus housing as a commodity is a fundamental contradiction; this perception of housing is critical to inform our analysis of residential housing and climate policies (Desmond & Wilmers, 2019; Fluri et al., 2020; Hammel, 2017). An anti-capitalist view of housing pushes back against neoliberal approaches which promote governments and governance "through and by the market" (Weber, 2002, p. 519).This connects to the 'right to the city' as a collective right, rather than an individual right (Champagne, 2020; D. Harvey, 2015). I am also critical of market-based solutions that promote "business-as-usual capitalism with climate characteristics" to address the climate crisis, particularly if they are continuing to produce and maintain unjust socio-environmental conditions (Shi, 2020; Swyngedouw & Heynen, 2003). Insofar as capitalists will continue to be driven by the same infinite surplus value and profit creating motivations, green capitalism is only greenwashing the existing capitalist system. Löwy (2005) articulates this succinctly: "Would-be green capitalism is nothing but a publicity stunt, a label for the purpose of selling a commodity, or—in the best of cases—a local initiative equivalent to a drop of water on the arid soil of the capitalist desert" (p. 19). Capitalism can and always has commodified elements of nature. The "greening" of new sectors of the economy (e.g. carbon markets, carbon sequestration projects) does not in any way change the nature or course of capitalism as it currently exists (Smith, 2010, p. 19). This climate capitalism is rampant in neoliberal cities. Keil (2020) speaks to how scholars in this field are defying "cityist" understandings to counter the notion that cities will save us from climate chaos;

it is not merely a question about density, but about more nuanced conversations about how density can be aligned with values like accessible public space, racial justice, and environmental sustainability. Broto & Robin (2020) similarly argues how climate change "generates urban injustices" as "affluent urban dwellers can shield themselves from climate risks in protected neighbourhoods" whereas vulnerable residents suffer from climate-related impacts (p. 715). This phenomenon of climate change perpetuating urban injustices is evident in communities like Little Haiti in Miami, where low-income renters are getting priced out as affluent renters, who previously lived closer to the coastline and now experience frequent flooding, encroach into their higher-elevation neighbourhood (Mooney, 2020).

Relevance of the project

SmartRegs has a stated focus on rental residential energy efficiency. With renters' needs and concerns at the heart of my research, I have examined the success of the SmartRegs program as it pertains to housing quality, tenant comfort, and municipal climate and energy goals. I had the impression that this was a policy worth investigating because of its focus on rental residential energy efficiency. The concept of "retrofit poverty," defined as the "inequality of opportunity to improve the energy performance of the home," was newly coined but relates quite closely to climate solutions like SmartRegs that are aimed at improving renter equity in the energy-efficiency and quality of their homes (Willand et al., 2020, p. 14). Since SmartRegs was developed specifically for rental housing, I assumed that this policy would proactively work to maximize benefits and minimize harms to rental occupants, more so than perhaps other residential energy efficiency programs developed for a wider variety of household types (e.g., owner-occupied, state-provided community or social housing) would.

There is also a gap in the academic and geographic literature regarding renter-focused climate policy, which is discussed in more detail in the literature review below. Scholars have recommended that policymakers understand energy efficiency not just as a technology issue and from a technological lens, but also as an energy justice issue with an equity lens, in which socially vulnerable populations are targeted to improve social equity (Hoicka & Das, 2020; Xu & Chen, 2019). My research starts to fill this gap by prioritizing renters in energy efficiency research. Ultimately, this thesis builds the case that renters need to be prioritized for equitable outcomes in urban building-related climate policies. My research adds to this emerging intersection of climate and housing justice by analyzing residential rental energy efficiency programs in a human-centered lens. Lessons learned from Boulder's SmartRegs program can help to inform policymaking and contribute to policy recommendations towards better quality, low-carbon rentals, which I discuss in Chapter Four: Conclusion.

Literature Review

Housing is a physical space that provides the necessities of shelter and allows residents to store belongings (Rogers et al., 2013). As such, it is a universal need felt by all human beings. When I speak of housing as shelter, I refer to the 'use value' of housing. However, housing is also a commodity that has an 'exchange value,' which is its worth and investment potential in a housing market for homeowners and landlords (Hammel, 2017, p. 1). As well, even as a shelter or private residence, housing is entwined in markets and housing-related exchange as it acts as an "important locus of consumption activities" (ibid, p. 2). Renters reside at the intersection of housing as shelter and housing as investment for their landlords, whose different purposes almost

always pull in opposite directions. Specifically, landlords who seek only to maximize the extraction of profit from their investment often do so at the expense of the quality of the shelter for their tenants (Chisholm et al., 2020; Herrmann & Krarti, 2012). I reiterate the fundamental contradiction of *housing as shelter* versus *housing as a commodity*; this perception of housing, and how it differs for renters and landlords, is critical to inform our analysis of residential housing and climate policies.

There is evidence that the landlords prioritizing exchange value over use value has negative impacts on renters. Renters have poorer health outcomes (e.g., chronic health issues, higher cost-related healthcare, health hazards like mold/dampness) than homeowners (Marquez et al., 2019; Pollack et al., 2010). Low and moderate-income tenants frequently experience poor housing quality issues including pest and rodent infestations, mold, and outdated appliances; these concerns sometimes resulted in severe negative health impacts such as poor mental health and sleeping issues (ACORN Canada, 2019). Renters face worse physical health outcomes, but they also face significant mental health and emotional wellbeing impacts. Marquez et al. (2019)'s study found that renters' mental health, sense of hopeless, and anxiety were a result of "unresponsive landlords, inadequate repairs, limitations in ability to move elsewhere because of a disability, inaccessible financial resources, or a combination of these". Young, low-income private renters often experience "residential alienation" in their first experiences of housing precarity (Chisholm et al., 2020; McKee et al., 2020).

Housing instability due to crowding or frequent, multiple moves is also harmful for renters' mental health (Marquez et al., 2019). Home ownership is a "symbol of stability" for many

residents (ibid, p. 5). Unfortunately, the promise of housing stability through home-ownership is out of reach for many renters due to increased home prices in cities like Boulder (Fluri et al., 2020). Marquez et al. (2019) emphasizes that rental housing choice is not a reality for many low-income families and those with disabilities, as they "often must choose between living in substandard, unhealthy housing conditions versus being homeless" (p. 6). Housing affordability is one of the key factors that influence housing choice, as well as poor credit (ibid). Even when renters can afford to choose between several rental properties, renters are unlikely to choose to live in homes with higher costs in order to live in better neighbourhoods (Pollack et al., 2010). Substandard housing can be concentrated in low-income neighbourhoods (relative to other neighbourhoods in a city) (Marquez et al., 2019). Renters may differ in their ability to access well-maintained, affordable rental housing due to historic factors like racial discrimination. Fields and Raymond reminds us racial division (e.g. redlining and steering) has long been present in real estate and 'property' has been used as a key 'technology of racial dispossession' in American cities (2021, p. 1638). For example, Connor et al. (2020) assessed the spatial structure of inequality in Denver, Colorado from 1940-2016, which found consistent neighbourhood inequality despite periods of sprawl, suburbanization, and resurgence of downtown areas. The scholars stated some previously low-income neighbourhoods grew to have higher incomes, relative to other low-income neighbourhoods, when they were the target of urban renewal and transportation projects. Since retrofits and green renovations could be understood and advanced as a form of urban renewal, this is an important finding to connect with climate gentrification literature below.

Poor neighbourhood quality and unhealthy housing conditions, however, do not necessarily indicate lower rental costs. There is evidence that although property values and tax burdens are lower in lower income "poor" residential areas, rents are not (Desmond & Wilmers, 2019). This is attributed to the significant role that individual landlords play in determining the cost of, and thus, affordability of, rental housing (Desmond & Wilmers, 2019). Desmond & Wilmers (2019) demonstrate that landlords can get higher profit margins in poorer neighbourhoods than landlords in more affluent neighbourhoods (p. 1107). Landlords frequently exploited tenants in terms of rent costs (exploitation meaning "over-charged relative to the market value of a property") in poorer neighbourhoods to make up for high turnover risk and thus extract higher profits (p. 1110). Rare, occasional maintenance costs can dampen the returns on their investments, but "the median rental unit studied required no expenses on most major repairs in the last year" (p. 1108, 1119). This speaks to the role that capitalism plays, where landlords find multiple ways of increasing their profit rate from their rental properties, such as overcharging rent due to the perceived risk of operating in distressed neighbourhoods and under-investing in regular maintenance and costly upgrades (Desmond & Wilmers, 2019; Melvin, 2018). In fact, Desmond & Wilmers argue that since individual landlords are already pre-emptively increasing their rent costs in poor neighbourhoods to "adjust for possible risk", tenants would benefit from "policies designed to mitigate that risk and lower housing costs" such as rent stabilization and rent control which many jurisdictions (including the City of Boulder[1]) lack (Desmond & Wilmers, 2019, p. 1121).

[1] More context about the lack of rent control is discussed in Chapter 2: Context. Specifically, the state of Colorado prohibits cities like Boulder to enact rent control policies.

Rent is the primary metric in which rental housing is defined and understood, but utility payments and miscellaneous additional costs do impact the affordability of homes as well. Gross rent combines the cost of rent and typical additional costs like utility bills (Daniel et al., 2020; Melvin, 2018; U.S. Census Bureau, 2000). To meet basic human needs, households must have proper heating and cooling, as well as access to information through phone and internet services which require electricity (Hernández & Bird, 2010). Hernández & Bird (2010) found that lower-income households experience a disproportionate "energy burden" spending "10 percent or more of their income on energy expenses", while middle- and upper-income households spent less than 5 percent of their incomes (p. 7). Renters, especially private renters, may live in substandard housing that does not adequately shield them from temperature extremes in the summer and winter (Daniel et al., 2020, p. 3). Some renters may increase their energy usage to heat and cool their homes, if they can afford to do so, or choose to go without. Inadequate heating and cooling of their homes is detrimental to tenant comfort, which can severely impact renter households' health and quality of life (ibid).

Climate change has already and will continue to worsen extreme temperatures in cities (Dodman et al., 2022; Keith et al., 2019). Climate change will disproportionately impact the most economically and socially marginalized individuals with varying drivers of inequality such as gender, class, race, age, sexuality, and level of ability (Dodman et al., 2022). Broto & Robin (2020) exclaim that climate change "generates urban injustices" as "affluent urban dwellers can shield themselves from climate risks in protected neighbourhoods" and the more vulnerable must suffer from climate-related impacts, such as "high temperatures, river flooding, droughts, water scarcity, wild fires, and windstorms" (p. 715). Unfortunately, despite the evidence that these

populations will face the worst negative impacts of climate catastrophe, their concerns are rarely considered in planning for climate adaptation and preventative climate mitigation strategies (ibid). For example, this is a pressing concern that climate mitigation measures at various scales (local, state, national) will both increase the price and reduce the availability of fossil fuels without ensuring an affordable alternative for low-income populations; this could be potentially devastating and result in prolonging living in poverty for many people (McLaughlin, 2020).

The 2016 Paris Agreement, under the United Nations Framework on Climate Change, demonstrated a renewed global consensus to tackle climate change (Dodman et al., 2022; United Nations, 2015; Willand et al., 2020). The Paris Agreement commits countries to rapid greenhouse gas emission reductions "on the basis of equity" and "in the context of sustainable development and to eradicate poverty" (United Nations, 2015, p. 4). Equity is central to the Paris Agreement, but there is also a heavy emphasis on "accelerating, encouraging, and enabling [technological] innovation as a critical component of international climate action (ibid, p. 14). Willand et al. (2020) identifies two key challenges in the Paris Agreement's transition towards a low-carbon future: "the need for a speedy and large-scale adoption of technological innovations, and the moral imperative to protect vulnerable population groups" (p. 15). Similarly, more cities are applying an "equity lens" into their climate work or at least mentioning social equity as an element of their climate plans. Champagne points to the federal government's four pillars model for urban sustainability in the Integrated Community Sustainability Plans (ICSP): "economic health, social equity, cultural vitality and environmental responsibility" as the starting point for many Canadian municipalities post-2006 adopting a more holistic approach to climate policies and programs (2020, p. 762).

However, geographers like Sarah Knuth and Erik Swyngedouw are critical of climate solutions that continue to perpetuate capitalism. Swyngedouw (2013) argues for the need to politicize the climate crisis - away from a neoliberal approach of climate management towards a radical transformation of our socio-political present and future. He argues that "techno-managerial eco-consensus" crystallized around CO2 (carbon) as the 'thing' we must focus our climate efforts on (p. 4). Swyngedouw (2013) refers to carbon pricing as akin to Marx' concept of commodity fetishism, whereas carbon as a commodity is the penultimate solution for neoliberal regimes (ibid). A fixation on carbon is a neoliberal approach that creates new markets and maintains elites' desires for infinite capitalistic accumulation (ibid). Similarly, Knuth (2019) points out how energy efficiency and rapid renewable energy deployments are all expanding frontiers of green capitalism, which have adverse effects on neighbourhoods by contributing to a green value premium and resulting in the gentrification of neighbourhoods. I come back to Knuth's analysis, particularly of retrofitting as an ineffective decarbonization strategy, below.

To connect urban housing and climate issues, climate urbanism is a key concept for my work. Urbanization has been intrinsically linked to the capitalist desire to produce surplus value in global cities; this is still consistent with new trends of urban revitalization through smart, resilient, and/or sustainable cities (Derickson, 2018; D. Harvey, 2015). Urban neoliberalization can be understood in a Marxist way as a state strategy for capital accumulation within cities, particularly as market-based solutions are prioritized in government agendas, which can negatively affect environmental sustainability and social cohesion. Long & Rice define "climate urbanism" as "a policy orientation that (1) promotes cities as the most viable and appropriate

sites of climate action and (2) prioritises efforts to protect the physical and digital infrastructures of urban economies from the hazards associated with climate change" (2019, p. 992). Rather than a previous policy orientation of sustainable urbanism, climate urbanism has a more central focus on carbon as the central object of policy concern (Long & Rice, 2019). Broto & Robin (2020) agree that "cities focused on carbon control… maintain the reproduction of capitalist economies" (p. 715). They propose a climate urbanism that "exposes the production of further inequalities associated with urban responses to climate change" to develop alternatives to the capitalist system (ibid). However, it is unclear to what extent climate urbanism is exposing these inequalities. There is evidence that urban sustainability efforts in Canadian cities have undermined social equity by sidelining marginalized groups in favour of a green professional class (Champagne, 2020). Champagne stresses that cities' climate policies equate sustainability with "greater density, walkability, and green technology" which can result in gentrification if not considered with a deeper equity lens on how it impacts local residents (p. 764). The policy analysis further revealed a heavy emphasis on the greening of the economy, where cities are promoting the 'greening' through "partnerships with businesses or sustainable entrepreneurship programmes" (p. 770).

"Dense, green" cities are often envisioned as a sustainability solution, such as through natural ecosystems acting as carbon sinks and for climate adaptation purposes (Angelo & Wachsmuth, 2020; Parish, 2020). However, scholars identify growing instances of eco-gentrification, where increased investment through a green value premium for "sustainable" real estate (with increased rent prices) can result in low-carbon neighbourhoods being less accessible to low-income populations (Bouzarovski et al., 2018; Knuth, 2019; Quastel, 2009; Rice et al., 2020). Climate

gentrification is similar but has slight differences, as it refers to a phenomenon where climate change and its impacts shifts investment of certain areas from high to low climate risks; this disinvestment from certain neighbourhoods into new neighbourhoods (e.g. areas that have high flood risk versus neighbourhoods where there is limited flood risk) can displace residents and transform communities (Bouzarovski et al., 2018; Long & Rice, 2019). Climate urbanism can indirectly contribute to housing precarity and additional stress on the housing market, as it can "exacerbate pre-existing dynamics of gentrification and displacement, notably through low-carbon interventions and green infrastructure projects (Broto & Robin, 2020, p. 716). As climate change is often considered a threat-multiplier, eco-gentrification and climate gentrification are likely to exacerbate existing social inequalities for the most marginalized residents (Anguelovski, Connolly, & Brand, 2018; Anguelovski, Connolly, Masip, et al., 2018).

Recent evidence indicates the impact of energy efficiency policies in many countries have resulted in avoided or reduced greenhouse gas (namely carbon) emissions (Intergovernmental Panel on Climate Change (IPCC), 2022). Factors like low uptake in energy renovations in existing buildings and the shallow depth of retrofits have decreased the full potential of emission reductions possible from these measures (p. 39). Energy efficiency initiatives are predominantly studied through a climate lens; there is extensive literature on residential energy efficiency retrofits that look at carbon emission reductions, energy savings, and cost saving potential for property owners (Hoicka & Das, 2020; Hughes et al., 2020; MacAskill, Sahin, et al., 2021). Where there are studies on low-income, rental households, the researchers rely on large survey datasets of renters instead of speaking to individual renters and understanding their lived experiences (Reina & Kontokosta, 2017; Shrestha et al., 2019; Xu & Chen, 2019). Renters are

frequently mentioned in the energy efficiency literature when discussing the split-incentive. The split incentive occurs when the tenants pay the utility bills, as there is little incentive for the landlord or property owner to invest in energy saving upgrades (MacAskill, Stewart, et al., 2021; Martinez & Clevenger, 2017). However, if the owner pays, there is a risk of the cost being pushed onto the renters through higher rent payments (Martinez & Clevenger 2017).

However, renters are often overlooked as a key stakeholder in studies that look at energy efficiency in rental housing. Even studies that adopted a "community-based approach to low-income residential energy efficiency" interviewed community stakeholders or "techno-political experts" (e.g. city staff, university faculty, utility representatives, and neighbourhood association leaders), not the renters who are directly impacted by these home retrofits (Crowther et al., 2022; Reames, 2016b). This is consistent with urban regeneration or urban redevelopment literature where residents are often neglected or intentionally excluded from decision-making (Coatham & Jones, 2008; Kipfer & Petrunia, 2009; Pitter & Lorinc, 2016). However, in recent years, the literature on energy efficiency has given more attention to renters and tenants. Notably, Palm et al. (2020) contribute significantly to the under-researched topic of tenant perspectives in energy efficiency renovation projects in Sweden's public housing rental apartments. As do I, the authors consider this a significant oversight given the multifaceted ways that these renovation projects can impact the lives of tenants. Kearns et al. (2000) speaks to the home as the nucleus of their everyday lives and as such, renovations have serious implications of for people's comfort, health, well-being, and prosperity. Kearns' notion of the home is the basis from which Palm et al. (2020) argues why tenants should rightfully have a role in renovation processes. Huber (2015) also points out the uneven power relations regarding access and control of energy systems as cities

and countries transition to a low-carbon future. Although Huber is speaking to how the profits from the energy industry are prioritized over the health and livelihoods of those who live near oil production and refining facilities, this can relate to how the profits of landlords can be prioritized over the health and well-being of tenants who suffer from substandard rental housing quality and/or would benefit from energy upgrades.

Scholars and climate practitioners are increasingly paying attention to energy poverty issues in their energy efficiency work (Canadian Urban Sustainability Practitioners, 2019; Daniel et al., 2020). The Canadian Urban Sustainability Practitioners 2022-07-29 3:33:00 PM identify energy poverty is a key priority for the cities in their network, as it is the "nexus of climate and equity". Willand et al. note there is no singular definition of "energy poverty" but understand it to mean "lack of access to affordable, renewable and reliable essential energy services" (2020, p. 16). Some renters, such as those older than 55 and low-income renters, are facing higher housing cost burdens, which is to say both rent and utility bills (Samarripas & Jarrah, 2021). In contrast to the more commonly used "energy poverty", retrofit poverty speaks less to energy consumption and is more centered around distribution of low-carbon building renovation opportunities (Willand et al., 2020). Retrofit poverty can be defined as the "inequality of opportunity to improve the energy performance of the home" (ibid, p. 14). Retrofit poverty, developed from earlier concepts of energy justice and energy poverty, can be more directly linked to energy efficiency policies and initiatives (Bednar et al., 2017; Carley & Konisky, 2020; Reames, 2016a). Carley & Konisky view energy justice as the idea that "all individuals should have access to energy that is affordable, safe, sustainable, and able to sustain a decent lifestyle, as well as the opportunity to participate in and lead energy decision-making processes with the authority to make change"

(2020, p. 571). The scholars highlight three core tenets of energy justice in the literature: distributional justice, procedural justice, and recognition justice (ibid). This is a highly informative way of understanding energy justice, as each of these tenets can inform energy policy and programs. Distributional justice, the distribution of benefits and burdens across populations, is closely linked to retrofit poverty and energy poverty. Procedural justice speaks to who is included in energy decision-making processes and ensuring fair, equitable, and inclusive procedures. Carley and Konisky (2020) found energy transition processes (e.g., the development of new wind energy farms) are not typically inclusive of communities hosting this new energy infrastructure. However, when their local knowledge was valued and they perceived the planning process as fair, the residents felt that there were more positive impacts and benefits from the infrastructure. Procedural justice is evident in energy efficiency projects as well; there is evidence that tenant engagement is essential to maximize the co-benefits of building repairs and energy retrofits (ACORN Canada, 2019; Centre for Urban Growth and Renewal, 2020; Daniel et al., 2020). Renters can also be embedded into energy efficiency projects through pre- and post-retrofit surveys and interviews to measure tenant comfort and satisfaction, like the one conducted by The Atmospheric Fund across social housing buildings in the Greater Toronto Area (The Atmospheric Fund, 2018). Their study assessed different factors like thermal comfort, drafts and odours, and health outcomes; their findings found that residents perceive spaces differently even when the renovations were consistent across buildings and since there were positive improvements in health and tenant comfort, the renters interviewed were willing to share additional concerns about their unit that remained post-retrofit that they did not express pre-retrofit (ibid, p. 23).

Methodology

This thesis began with a desire to ground the research in the realm of an "ethics of care" where the focus is not solely on outcomes and findings, but as much on how we work and interact with one another (Mountz et al., 2015). Towards that end, I employed human-centred design theory, which is an iterative and progressive process of theory and method that frames the research in terms of community perspective and meeting community needs, from the determination of the research question through the execution of the fieldwork (Doorley et al., 2018; Stratford & Bradshaw, 2021). For the project, this meant that I centred the situation, perspective and needs of renters from determination of the project topic and research design through data collection, recruitment, interviews, data analysis and coding, and writing. Overall, this method was successful in making this gap between how renters were consulted during the policy design and neglected in implementation and evaluation. This research method enabled me to develop outcomes and recommendations that are beneficial for renters and policymakers.

Ethical considerations are paramount when it comes to my research. There are ethics of conducting research with renters, logistics and ethical practices in my own research, and positionality. I conducted this research in the acknowledgement that renters, particularly private renters, are considered a vulnerable group that typically has worse health outcomes and pay a significant proportion of their income towards their homes (Daniel et al., 2020; Pollack et al., 2010). My methodology flowed directly from my goals for this research, which ultimately stem from a desire to see a more sustainable and equitable world. The vision of the world and city that is driving my research is one where everyone feels like they belong, where we work collectively to mitigate and adapt to climate change, and there is adequate affordable housing for everyone.

For this research project, I look to renters who bear to benefit from urban policymaking that is built upon this worldview. While capitalist urbanization and its consequent crises appear well-entrenched in many parts of the world, I remain hopeful and driven to promote health and well-being for all. This is important to note as scholars have argued that urban sustainability policies do not promote social equity (despite hopes or aims to do so), but instead were found to privilege and perpetuate 'environmental neoliberalism' (Champagne, 2020). Although this is a relatively small contribution, this thesis project is intended to be more than just information, but instead as world-building in content, practice, and praxis.

With a human-centered design theory approach, I needed to speak directly to renters to best understand how retrofits and repairs were impacting their homes, quality of life, and well-being. However, these interviews with renters may have had confidentiality issues. For example, interviewees have disclosed personal information about financial situations, health and safety concerns as it relates to their building, personal struggles, etc. The level of detail they provide regarding their building or unit, relationship with landlords and/or property management, as well as other factors may be enough to identify individuals from the interview transcripts. Research participants were extremely forthcoming with their lived experiences regarding rental housing in Boulder, giving me ample information about their rent costs, roommates, family situations, and problems in their unit. While there are power dynamics associated with any interview process, I am mindful of feminist geography approaches to de-center the researcher and utilized various tactics to make interviewees comfortable. Building rapport with the interviewees was essential in getting thoughtful responses, such as honest depictions of the quality of housing they live in. Weiss notes feminist scholars who share this sentiment on valuing kinship and relationship-

building; this is important as research methods, such as interviews, can often dehumanize respondents and interviewees to view them solely as "providers of data" (2004, p. 49).

To speak to the logistics of practicing ethical research, I refer to the Tri-Council Course on Research Ethics (CORE) as the basis of my understanding and the mechanism through which ethics approval was obtained. Catungal and Dowling (2021) identify several key research ethic issues such as voluntarism and informed consent, harm, privacy, confidentiality, deception, data storage, and reporting. Many of these ethical concerns are addressed below. All interviewees were asked to review and sign an informed consent form, attached as Appendix B. In the form, it was noted that participants would not likely face any risks or discomfort but could pass or not answer any questions they did not feel comfortable answering (e.g., questions regarding their home environment). It was also important that I managed the data by storing it in a secure password protected hard drive and ensured anonymity when moving forward with data analysis and writing. The interview transcripts, video and audio transcripts, and names of the research participants were kept confidential. In the informed consent form, the key informants were given a choice to share their name in the report findings. The renter interviewees were not given this choice, as I felt it would not add to the analysis and potentially could even cause issues/harm to expose personally identifying information. My research adhered to an ethics protocol approved by York University Delegated Ethics Review Committee, York University's Ethics Review Board, and conforms to the standards of the Canadian Tri-Council Research Ethics guidelines.

It was also important to consider my positionality as it pertains to this research. I asked myself, how does my own stance as a renter influence the design of the interview questions? How does

my limited knowledge of Boulder influence the recruitment process and analysis of research findings? These are questions I continue to contemplate throughout my thesis; my acknowledgement of personal biases informed my work and allows for critical reflexivity. When I thought about my positionality, I questioned the various factors that add or detract from the privilege I have as a researcher and as an individual. I thought carefully about possible power asymmetries between myself and the interviewees and how to mitigate these dynamics. As someone pursuing my master's degree and conducting research in a location that is not my own, I am well-educated and have access to some institutional resources. Notably, York University's Faculty of Graduate Studies provided me the resources via the Research Cost Fund to give honorariums to the research participants. Again, as I am a relatively young, racialized woman and student, I may or may not be taken as seriously when conducting research in contrast to an older, male, heteronormative, white academic. Neither of the individuals I spoke to as part of the key informant interviews or the renter interviews represented a stereotypical "elite"; yet an "elite" is more to do with those who "hold highly valuable insights into organizations" and the "elite status is embedded into space and time", not necessarily by their titles and positions (W. S. Harvey, 2010). In some ways, I do consider the key informants I interviewed to fit this "elite" definition. The key informants were a staff person in the City of Boulder's Climate Initiatives Department, the Director of Sustainable Communities at Boulder Housing Partners, and two senior staff at the Rocky Mountain Institute clean energy thinktank with expertise in carbon-free buildings. This framing helped me critically analyze the power relationships between researcher and interviewee, which is flipped in this kind of scenario where elites are perceived as having more power (than in typical research interviews where the researcher often has more power and privilege).

Moreover, I felt it was important to maintain boundaries between my academic work and activism. I acknowledge my role as a climate and housing activist in Toronto-based urban social movements and how this could influence my personal biases in interviewing and interpretations. I look to scholar-activists like Pulido and The SIGJ2 Writing Collective to navigate these tensions (Pulido, 2008; The SIGJ2 Writing Collective, 2012). This was occasionally challenging in my interviews, as I would find myself drawn to secondary and follow-up questions about local activism and politics. I considered these biases as I grappled with wanting to support the activism being done by my research participants, without becoming too emotionally invested in the results of Boulder's municipal referendums and council elections. I confess, I couldn't help myself and I bought a Bedrooms are for People shirt. I hope by writing about my personal biases, I can come to a more honest - if never truly objective - view of how I interviewed research participants and analyzed the findings.

I chose to do a case study of Boulder, Colorado because of its promising example of embedding climate considerations into a municipal housing policy: the SmartRegs rental licensing standards that include energy efficiency metrics (Barrett et al., 2011; Petersen & Lalit, 2018) . Adopted in 2011, Boulder was the first city in the United States (and likely North America) that required energy retrofits for rental properties (Barrett et al., 2011). To think more critically about energy efficiency and develop policy implications, I searched for programs I was less familiar with. There are some examples of residential rental energy efficiency policies and programs in Australia or the United Kingdom, which were possible sites to situate my research. Boulder stood out in North America, both in the unique nature of the SmartRegs policy, but also in that it

was geographically closer and felt more possible to visit if in-person fieldwork was allowed. After careful consideration, I feel confident that my research on Boulder's rental energy efficiency program can produce lessons for other cities. While I considered a comparison between Toronto and Boulder, it has come to my attention that this type of research will be applicable and highly valuable to other cities as well. As such, I plan to dive deep into Boulder and its SmartRegs ordinance as a case study and further develop the knowledge transfer component in the research findings and conclusions. This thesis was conducted primarily with renters in the City of Boulder, Colorado, as well as some key informants. The case study method was most "relevant" for research questions that involve an extensive and "in-depth" description of social phenomenon (Yin, 2017). This research was an exploratory case study to center renters in municipal residential energy efficiency programs. A case study approach allowed me to consider changes over the 10-year development and implementation of SmartRegs, analyze different perspectives and discourses around housing quality, affordability, and climate mitigation in Boulder, and connect to broader social and environmental issues.

In many academic disciplines including geography, fieldwork refers to the "field"; this felt particularly prominent when speaking to physical geography colleagues who were much more impacted by the COVID-19 pandemic and the limitations of collecting data. I credit Asher (2019) for helping me rethink the concept of fieldwork through a radical geography lens; she speaks to how "fieldwork" is not going somewhere to collect generalizable data or "a method of knowing something, or the means of taking action for scientific or political ends", but instead it "entails fundamentally interrogating the work done within fields of inquiry, including radical geography, to produce legible and legitimate objects and subjects of knowledge and action"

(2019, p. 123). My field site was in Boulder, Colorado, although the entirety of my research and fieldwork occurred over the internet. It feels surreal to write this, as I was not able to go to Boulder, Colorado during my master's given the current pandemic situation, nor had I ever been to Boulder before starting this degree at York University. Coming into my master's degree, my original research interests and previous professional experience was all rooted in the City of Toronto. I do feel that something was lost, despite my best efforts to immerse myself virtually into the Boulder landscape. In particular, a lack of physical immersion takes away from one of the core principles of human-centered design: empathy. One way to empathize is to immerse yourself in the users' (in my case, renters') experience (Doorley et al., 2018, p. 4). Without being physically present in Boulder, I still feel unable to fully grasp the differences in neighbourhoods and areas of the City of Boulder, which may have rooted my work more geographically to better discuss socio-spatial segregation in the city. Although I have my own experiences as a renter, I must rely on the renters in Boulder to articulate the state of rental housing and climate impacts they experience. Despite this, I strived to feel closer to Boulder using Google Maps (walking through neighbourhoods with Google Street view), the City of Boulder website, a handle of lists ranking Boulder neighbourhoods, daily emails from local Boulder news, etc. With human-centered design, empathy is paramount to developing policies and tools that intuitively meets the needs of the "user" (Giacomin, 2014). I can only hope that my analysis of renters in Boulder can be a starting point to better relate to and empathize with renters when developing rental-focused climate policies.

The pandemic did make virtual interactions more familiar and seemingly normal. There was an element of ease and comfort of online data collection, as the renters interviewed had high digital

literacy. The interviews conducted were on zoom (online video conferencing calls, as well as audio-only calls when requested). This allowed for the renters to gain some personal insights into where I was coming from, as well as often some visual cues for me to consider. Although I asked the interviewees if they had any questions for me before we started, I rarely disclosed much personal information beyond my position as a graduate student (a Master of Arts candidate and researcher) in Toronto, Canada, and the general summary of my research topic. However, interviewees would still occasionally comment on my surroundings as they could see into my own home via the zoom call, such as when Renter 2 commented, "We're kind of more city folk, like I want to live in your condo, your high-rise apartment, but it's a little hard with the kids." All the renters were geographically based in Boulder (confirmed by the zip codes and/or their major intersection they provided). Three out of the four key informants were also in the City of Boulder (one out of the two staff of the Rocky Mountain Institute lives in New York). In total, there were eleven interviews with individual renters and three interviews with four key informants. While this is a relatively small sample size, it was adequate to build out themes regarding climate-housing issues in the City of Boulder and get a snapshot of the quality of housing Boulder's renters are experiencing. I go into further detail regarding data collection later in this chapter.

Recruitment was an extensive part of the fieldwork for this study. The fieldwork comprised of two stages to the recruitment, occurring in a parallel timeline, one for key informants and one for renters. As mentioned above, there were eleven interviews with renters and three interviews with key informants. To obtain these interviews, I had to consider the sampling methods I would utilize for my fieldwork. Researchers must define the sample population to apply a sampling

technique but may do so in whatever way is appropriate to address the research question(s) (Blaikie, 2009). For the purposes of my data collection, the chosen population was all adult (18+) renters (individuals who pay rent for their primary residence) in the City of Boulder, Colorado. The research sample size came about organically, but I set a goal of approximately between ten to fifteen renters. This range was intentionally chosen; I valued the rich insights gathered from the interviews, which may not have been possible or would have been significantly more resource-intensive with a bigger sample. To recruit, I used a single-stage non-probability sampling approach (Blaikie, 2009, p. 176). This consisted of several sampling techniques, such as some convenience sampling, purposive sampling, and snowball sampling. The detailed breakdown of my recruitment process is spelled out below.

My targeted outreach for key informants was relatively successful. I developed a short list of stakeholders to contact for key informant interviews from a literature review and analysis of the key players and stakeholders involved in SmartRegs, as well as climate and/or housing advocacy and activism in the City of Boulder. This recruitment necessitated a very specific purposive sampling approach. The starting point to compile possible key informants came from the individuals and organizations identified in the development of SmartRegs in the academic literature, namely Barrett et al. (2011). The scholars spoke to two City of Boulder staff in the Local Environmental Action Division (LEAD) and with the Building Construction and Code Enforcement Division. In addition, they note a comprehensive list of stakeholders and industry groups impacted by the SmartRegs code adoption and represented in the policy planning and development process:

> Numerous groups are impacted by this specific code adoption: Realtors, bankers, tenants, property management companies, and several others. … Industry groups represented in the SmartRegs planning process included two opposing sides: the homeowner's/property managers, and the renters and progressive non-profit groups. External stakeholders represented in the process included local contractors, builders, architects, designers, local utility staff, energy and construction consultants, residents, local business owners, environmental groups, and community groups. The internal stakeholders included the City Council, the three advisory boards including the Planning Board, the Landmarks Board, the Environmental Advisory Board, and staff. There were several supporters of SmartRegs, primarily a group known as New Era Colorado and secondary groups including: the Boulder Area Housing Authority, Boulder Housing Partners, University of Colorado off-campus student groups, HERS raters, energy consulting firms, the Boulder Area Rental Housing Association, apartment owners, Xcel Energy, PLAN-Boulder County, real-estate brokers, licensed rental housing inspectors, and the community at large (Barrett et al., 2011, p. 198).

This list formed the basis of my initial recruitment for the key informants and to consider the wider recruitment process for renter interviewees (which I go into further detail below). Prospective emails with the subject line: "Request for research interview" were sent to numerous industry groups and stakeholders. Recruitment of key informants was more challenging than expected. Dr. Jennifer Fluri who is the Principal Investigator of the Boulder Affordable Housing Research Initiative pointed me towards the Boulder Housing Coalition, one of the most prominent non-profit housing groups that operate several co-operative housing buildings in the City of Boulder. It is unclear why they did not participate in the initial SmartRegs policy

development process, but as non-profit housing providers, the organization likely had to implement SmartRegs into their own buildings. However, despite several back-and-forth emails, I was unable to schedule a research interview with them due to limited staff capacity. I also faced various challenges in securing and scheduling an interview with local contractors and energy consultants, such as Scott Homes Inspection and ClearResult consulting (formerly Populus).

I had hoped to speak to someone from New Era Colorado, a youth civic engagement organization that had organized the campaign "Renters with Benefits", but I did not hear back from them. It is possible that, as a youth organization, there is likely significant turnover. It is also possible that they did not respond as their campaign was in 2010, and I reached out in 2021 when possibly no one in the organization had any institutional memory of the campaign. The ongoing pandemic may also have limited their capacity to respond. If I was more eager to speak directly to a former New Era Colorado involved in the Renters with Benefits campaign, one of my renter interviewees pointed me towards a personal connection who went on to become a Colorado state senator. Instead, I focused my efforts on recruiting individual renters in Boulder rather than dedicating more time and effort to the recruitment of additional key informants. This again speaks to how to center the current lived experiences of renters and thinking critically about how renters are prioritized in this work. If the study was primarily focused on the voices that represented renters at the onset of SmartRegs policy development, speaking to a current or former New Era Colorado staff person would have been essential. Instead, my focus remained on the issues faced by renters today and whether SmartRegs implementation has successfully improved rentals in Boulder. Ultimately, my four key informants were: City of Boulder employee in the Sustainability department, two energy efficiency experts at the clean-energy

think-tank Rocky Mountain Institute, and a Boulder Housing Authority senior staff member responsible for climate and energy projects in affordable housing. I felt this was a valuable diversity of perspectives to complement the interviews with renters and provide a great depth of understanding to both the development and implementation of SmartRegs and future directions for climate-housing intersections in Boulder.

It was challenging to recruit renters in Boulder to participate in my research study, given my limited contacts in this city and geographic region. However, the recruitment methods employed were successful in achieving the desired number of interviewees, both as renters and key informants. To recruit interview participants, I used both a snowball sampling recruitment approach and a "purposive" or "purposeful" sampling" approach as several of the interview participants came from a local housing advocacy community group. This purposive sampling approach (done by a similar renter-focused study) aims to "gain depth in understanding, not statistical representativeness" (McKee et al., 2020). One could argue that some of my methods resemble a convenience sampling technique where a researcher advertises for people of a certain characteristic to volunteer to participate in a study, without knowing how representative they are of that population (Blaikie, 2009). I would argue that while sharing on social media channels is the modern-day "advertising", I carefully considered ways that my call for research participant posts would reach the target audience: renters in Boulder. My criteria were also broad in terms of not necessarily requiring specific personal characteristics beyond being a renter in the City of Boulder, which all interviewees noted in their written consent form and through their verbal responses. I felt the need to acknowledge the time that interviewees give me through a small token of appreciation, especially if I am attempting to recruit low to middle-class renters who

may value the monetary gift of $10 (via an Amazon gift card or directly through PayPal) for the half-hour to hour of their time.

To make the study more accessible and easily shareable, I created a sign-up google form to collect the names, emails, and zip codes of interested individuals. This helped to also limit the back and forth to inform participants about my research and to coordinate scheduling. While 31 individuals filled out the sign-up google form, only 9 of them ended up participating as an interviewee. Just a note: with the pandemic still looming, I encouraged myself to be patient with those who expressed interest in being a research participant but were unable to because they became sick with COVID-19 or stopped responding for reasons I may never know. I refer to feminist geographers like Mountz et al. (2015) who promote slow and care-driven scholarship which helped me situate my research dissertation in the bigger picture of a global health pandemic and the obstacles it created for both me and for those I was hoping to speak to but whose voices (especially those who are marginalized) are missing from this recruitment and overall findings. For the other two interviewees, I had directly emailed one of the renters based off a "letter to the editor" they had written on a topic regarding climate and housing issues in Boulder (note: I am purposefully being vague about the topic to maintain anonymity for the interviewee). And my first research interview was through a personal connection (snowball sampling), and we corresponded via email.

Social media was the primary method for recruitment, as I used my personal profiles to join Facebook groups (e.g., "CU Boulder Sublet and Roommate Board", "Boulder Creative Housing") and post on Twitter, LinkedIn, and Reddit using relevant hashtags or tagging

organizations in Boulder. One tweet did get some significant traction from Boulderites, including retweets from a local journalist and two community groups. Reddit seemed promising, as I gained five new responses to the google form within 30 minutes of posting to the r/boulder subreddit forum. One of my interviewees was indeed recruited from reddit and did not appear to have any connections to the other interviewees (note: I rarely asked interview participants where they found the study, but sometimes they volunteered that information.) When I reached out to the "Bedrooms are for People" group, they shared my research study in their Slack messaging communications channel.

Some of the housing entities I had originally connected with were less fruitful than anticipated. For example, the Boulder Housing Coalition is a network of co-operative housing in the City of Boulder and was involved in the development of the SmartRegs program. However, they declined to promote the study to their co-op members and did not have the staff capacity to participate as a key informant. While this was initially disappointing, as I wanted some data to consider differences in co-operative living versus the private rental market, I still was able to recruit some renters who live in untraditional housing models. In addition, I had built a positive relationship with feminist political geographer Dr. Fluri at the University of Colorado Boulder who is the lead principal of the Boulder Affordable Housing Research Initiative (and is cited throughout my thesis). While there seemed to be initial enthusiasm and an offer to present to the academic group and promote the study to their network, this did not pan out either due to timing challenges. One of my key informant interviewees, Tim Beal of the Boulder Housing Authority, was similarly enthusiastic about sharing my research study to his network of affordable housing residents. He connected me with the FLOWS (Foundation for Leaders Organizing for Water and

Sustainability) group; we had an initial meeting between 2 of their staff, Tim, and I. However, while they sent out specific targeted emails with the recruitment google form to racialized renters and community leaders, I did not receive any additional responses from any individuals to participate. One possible reason for this was my inability to provide Spanish translation, as it was something I did not consider in the design of my fieldwork and thus did not have the resources to implement.

For the purposes of the study, I was interested in getting a diverse array of renters who could speak to their unique lived experiences and perspectives. For example, since there were recruitment efforts for this project through the Boulder Housing Authority networks, it is possible that some of the renters interviewed live in subsidized housing, but none indicated they did so when asked questions about their home. However, I did not collect demographic information as I felt like it would further deter interviewees from participating in the study. This may be a limitation to my study to further analyze how these experiences differ for renters of different ethnicities, class, and other demographic characteristics. This is particularly important, as I examine further in the findings chapter. While this may have been an oversight, my observations and field notes do capture some demographic information regarding the renters to create a "profile" of the interviewees I spoke to.

Table 1: Demographic characteristics of research participants

Characteristic	**Renter Interviewees**	**Median in the City of Boulder**
Age	Approximately 20 to 40 years old	28.6 years old
Gender	64% male (seven participants) 36% female (four participants)	52.5% male (100 females:105.5 males)
Occupation(s)	Not undergrad students.	Largest industries:

	- Tech sector employees, - Graduate students - Academic (e.g., University of Colorado Boulder) - Urban young professionals	- Educational Services (11,417 people) - Professional, Scientific, & Technical Services (10,348 people) - Health Care & Social Assistance (5,932 people)

The data collection for my dissertation included qualitative primary data sources (semi-structured interviews), as well as secondary and tertiary data to complement the interviews. In the semi-structured interviews, there was a component to it that was more structured and involved yes-no questions that was originally adapted from a questionnaire. The benefit of this format was that interviewees had the opportunity to elaborate further due to the semi-structured nature of the interaction. The data I collected for this dissertation comes from a natural social setting with micro-social phenomena (i.e., individuals as the scale), with the addition of social artefacts (e.g., industry reports featuring SmartRegs, publicly available documents of Boulder City Council and committee meetings).

The purpose of the fieldwork was to collect data to examine if the City of Boulder's SmartRegs program was successful based on renters' lived experience and perspectives. In addition, the data collected needed to create a foundational understanding of lived experiences of Boulder's renters and their insights into climate and housing matters. With the interviews of renters, I set two primary objectives. First, I looked to both interviews with renters and key informants to understand to what extent the renters' concerns from the initial community consultations on the

development of the City of Boulder's SmartRegs ordinance were incorporated and/or compromised. Second, the Interviews with renters would provide insights on other emerging (or additional) concerns pertaining to housing or climate concerns since the program was implemented. The semi-structured format of the interview (see Appendix A for the list of interview questions) allowed the interview participants to develop a sense of comfort and elaborate on the climate and/or housing issues they felt were most prominent in Boulder.

Zoom (video conferencing software) brought pros and cons to the fieldwork. While vaccination rates increased over 2021, there were still significant travel restrictions such as between Canada and the United States. If I had done in-person fieldwork, I would have had to build deeper connections to individuals who could help provide space to conduct interviews and provide a sense of security. It is challenging to feel safe as a young, racialized woman travelling to a new place for fieldwork. In some ways, Zoom (in the confines of my own apartment) was a more comfortable field site to do interviews with renters and key informants. However, I am mindful of the ethics and accessibility concerns that may arise from needing to use technology. Zoom allowed me to record and create a live transcript with relative ease, which also could have helped interviewees with accessibility needs to use the captions/written transcript. Yet, the transcript was occasionally distracting for some of the participants. In addition, ten out of eleven renter interviews occurred over video (one with just audio), which helped to create further rapport. Interviewees were given the option to go off camera given I was recording the sessions, but no one did so other than the interviewee that was audio-only (they noted they did not have a webcam).

The core objective of the coding process was to consider common themes and variations that arose from the interview questions; this was a more holistic approach to qualitative data analysis instead of a narrower method of counting the frequency of a term or general concept. As the interviews all took place over zoom, it was straightforward to get the zoom-created verbatim written transcripts. The transcripts were reviewed and edited for clarity and accuracy as needed; this was a sensitive undertaking as to not misrepresent or heavily revise the content of the interview via a written format. Oliver et al. (2005) argue that the process of transcription is meaningful and can be viewed as "a powerful act of representation"; they suggest that researchers critically examine their own decisions around the transcription process in how this portrays their research participants and the outcomes of their findings. This was important for me to consider, as it was my first time going through an in-depth transcription of lengthy interviews. When reviewing the transcripts, it took intentional effort to revise mostly for accuracy (e.g., words that were inaccurately transcribed by zoom) versus the work of correcting grammar or editing out pauses and repetitive words (as this could provide insights on emotions like hesitancy in some responses). Again, for the purposes of my research, the data analysis needed to be rooted in a renter-centered way. It felt right to represent the renters in their own voices as much as possible.

Following the transcription stage, it took me a substantial amount of time to determine what I should be coding for. There is no clear answer. Coding is an iterative process, and that was reflected in the literature that spoke to methods like grounded theory (Hay & Cope, 2021) to develop coding mechanisms. Weiss provides a helpful analogy of a jigsaw puzzle to sort, integrate, find "meaningful units" or "passages that deal with the same issue" (2004, p. 49).

Weiss also highlights feminist and constructivist critiques of qualitative data analysis, which echoes much of the concerns I felt as a new researcher. To what extent can the investigator(s) sufficiently interpret interviewees' responses to develop more general conclusions and findings? Acknowledging the limitations and possible influences of instigator bias is crucial. It appears that there is no singular reality or correct interpretation of the data, but the researcher must do their best to create their own interpretation that they can stand behind.

From this discussion, I worked to create an initial list of possible codes to go through the interview transcripts and proceed with line-by-line open coding. I used the qualitative coding software NVivo to help make sense of and to organize the data from the eleven interview transcripts with renters and three interview transcripts with key informants. However, there was a significant amount of work before I could start with NVivo, as the software is simply a tool, not doing the coding for the researcher. The start of the coding process occurred in November 2021, where my supervisor and I worked through a whiteboard thematic categorization exercise. This exercise started with my initial thesis research questions and goals for the project, and how these mapped onto the data I had gathered. This process involved an open-ended discussion of associations, relationships, categorization, all iterative, returning constantly to the content and ethical goals of the project. The Stanford Design Thinking Bootleg provided a helpful foundation for developing an iterative approach to the coding process using design thinking principles (Doorley et al., 2018). Sultan & Qaed (2020) have also utilized the bootleg to link sustainability and social innovation; the authors found that "the un-linear process of design thinking phases (empathy, define, ideate, prototype and test)" were valuable to constantly consider different aspects of user needs. This was similar to the basis for thematic coding and examination of my

research data in detail. Utilizing both the practical more unique bootleg framework and the more traditionally academic grounded theory approach helped to meaningfully prioritize the user (i.e., renters) when working through the thinking process initially and throughout the data analysis.

The grounded theory's open coding process was comparable to the whiteboard exercise. I started with my research questions to consider themes around housing quality (repairs), affordability (rent, cost variations in different neighbourhoods), governance and power dynamics (landlord-tenant relationships), and health and well-being of the tenants. In an iterative way and with the central focus on renters, open coding allowed for a bottom-up approach to value the content of the interview transcripts instead of starting with a preconceived notion such as using a codebook. This followed an inductive coding method where I was coding for patterns via each line or paragraph of the interview transcripts. However, it was important to pay attention to how I was phrasing the initial codes I created. A deductive coding method (Hay & Cope, 2021) would speak to a breadth of opinions ("immigration issues") versus values coding to emphasize subjective perspectives "xenophobia"; in the context of my research, I understood this to be the difference between "landlord relationship" versus "landlord issues". Ultimately, with this specific code about landlords, I revised it significantly as there were multiple themes within the initial theme which I dubbed "landlord-tenant-property management" as I felt there were minimal differences in my small sample size regarding individual landlords and larger property management companies. There were also complexities regarding how truly individual some landlords were if they managed several properties. Going back to the specific coding challenge, "landlord-property-tenants" seemed repetitive with the code I had for "repairs" when I was highlighting quotes from the transcripts. With further review, I found there were significant

differences (although there was some overlap) because there is good info about landlord attitudes and their complaints or behavior etc. so I changed it to landlord attitudes.

There were numerous other challenges with creating and revising codes. One specific example was how to code regarding quotes or references to different housing types, neighbourhoods in Boulder, demographics of these neighbourhoods (which may or may not refer to homeowner versus renter differences), so I merged it all into one code. Another one of the original codes was "climate-housing intersection"; however, it was challenging to consider what really fit into that intersection. Instead, it made sense to code out separately for climate codes (climate change discourse or climate impacts) and for housing codes. This is the benefit of using NVivo software which can quickly find the lines from the transcripts that were coded for multiple codes. The following table outlines the codes used for the interview transcripts with the renters. The open codes allow for a broad enough range of topics to garner useful information from the research findings, but not too narrow to prescribe what I was necessarily looking for. There is an iterative nature of coding and data analysis, which then moves into interpretation and discussion. Data analysis can move into interpretation because of the reflexivity of the researcher and by entering a conversation with theory and speculation (MacKian, 2009).

Table 2: List of open coding nodes from the interview transcripts

1. Activism
2. City actions
3. Climate change discourse
4. Climate impacts and extreme weather
5. Complacency & DIY repairs
6. Heat, energy

7. Homeowners vs renters
8. Individual climate responsibility
9. Landlord attitudes
10. Location (home)
11. Neighbourhoods, demographics
12. Rent, affordability
13. Repairs, house issues
14. SmartRegs, energy efficiency
15. Sprawl, density, transportation

This methodology section spoke more to the process of describing the data, observing, identifying key factors, themes, and relationships, rather than proposing meanings, which will be explored in Chapter Three: Findings.

At the end of Chapter One: Introduction, I emphasize the underlying theme of a renter-centered lens to every aspect of my thesis, from theoretical frameworks to the literature review and throughout my research methods. This adds to my overall argument that renters must be prioritized in equitable climate and housing policies. The literature review speaks to how renters are frequently exploited in capitalist profit-driven rental housing markets, and how this has adverse effects on their health and well-being. Marginalized and vulnerable populations, of which I would argue includes renters, are also most disproportionately impacted by worsening climate change and extreme weather. Despite cities' efforts to enact equitable climate policies, there is evidence that these policies continue to perpetuate inequality in our communities, rather than reducing poverty, and reinforce capital accumulation in new green industries.

As a final consideration in this chapter, it is important to add a caveat as to what can and cannot be argued based on the evidence I collected. I did a small number of in-depth interviews, which gave me an informative, qualitative, detailed look at renters' perspectives and experiences. My preliminary findings may differ from other future studies that, for example, collect hundreds of survey responses from renters in Boulder to assess and evaluate the quality of rental housing in Boulder. This study also assumed that since SmartRegs has nearly universal compliance from all rental housing in Boulder, that the interviews would reveal insights from a variety of units that may or may not have gone through energy efficiency upgrades because of this program. Two renters I spoke to can specifically attest to landlords making SmartRegs upgrades. However, given my methodology, it is possible that more of my sample lives in rental homes that had renovations completed for SmartRegs, prior to their tenure that the landlord did not inform them about. The research methodology I used allows for a rich understanding of renters in the City of Boulder and their insights on rental housing and local climate impacts. This semi-structured interview methodology allows for nuanced analysis of the lived experiences in private rental housing, decisions that renters make to improve the liveability of their homes, and power dynamics evident in landlord-tenant relationships. All landlords in Boulder must adhere to SmartRegs regulations and the City of Boulder touts near universal compliance; as such, it is fair to assume that the information gathered in and discussed in the following chapters can a preliminary assessment of the impact SmartRegs has had on renters in Boulder.

Chapter Two: Context

Boulder was one of the first cities in the United States (and likely North America) to introduce mandatory energy retrofits for rental properties starting in 2011 (Barrett et al., 2011; Petersen & Lalit, 2018). This context chapter provides an overview of the City of Boulder to situate this case study in its urban geography. Despite the relatively small size of Boulder, residents in Boulder face growing concerns of housing unaffordability for both affordable homeownership and affordable rental housing (City of Boulder, 2022a; Fluri et al., 2020). It is possible that the lack of affordable housing in Boulder can be connected to the city's environmental conservation actions that limit residential zoning in much of the city (Fluri et al., 2020; E. Vasatka, personal communication, August 2021). Urban growth can either happen outwards (sprawl) or upwards (higher density). It could be argued that environmental sustainability actions have worsened affordable housing issues in Boulder, for example, due to limits on where housing can be built, but this is particularly the case because there are other factors that limit housing supply like opposition to higher density infill. That is why it is surprising to see a rental-focused climate policy coming out of a city like Boulder, when environmental and housing concerns have typically been in conflict. As such, I examine the City of Boulder's climate and housing policies more broadly to better understand how the SmartRegs ordinance fits into the municipal landscape.

Overview: City of Boulder, Colorado

Nestled in the foothills of the Rocky Mountains, the City of Boulder is a small city dominated by the main campus of Colorado's largest university, the University of Colorado Boulder (hereafter "CU Boulder") (Fluri et al., 2020; U.S. Department of Housing and Urban Development, 2018).

Originally the traditional territory of the Ute, Cheyenne, and Arapaho peoples, Boulder was established by European settlers in 1859 (Fluri et al., 2020, p. 4). Boulder[2] has a population of approximately 108,777 residents, a bit less than a third of the total 329,000 who live in Boulder County (Fluri et al., 2020, p. 4; U.S. Census Bureau, 2021). Census data indicates that the population of the City of Boulder is in decline, which the previous mayor Boulder Mayor Sam Weaver attributed to the "aging of the city's population, as well as an expensive housing market" (U.S. Census Bureau, 2021; C. Wood, 2020). As the largest municipality in Boulder County, the City of Boulder is the twelfth largest municipality in Colorado (U.S. Census Bureau, 2021). This is in contrast to its neighbouring metropolitan area Denver[3], the largest city and capital of the state of Colorado, with a population of approximately 715,522 (Britannica, 2022; U.S. Census Bureau, 2022). For context, the population of the state of Colorado is over 5.8 million people (ibid). Located 25 miles[4] northwest of Denver, Boulder is considered a suburb of Denver, although it has its own personality and unique history (Fluri et al., 2020; Sink, 2019). The relationship between Boulder and Denver is growing with a concentrated suburban corridor between the two cities (Britannica, 2022). The state of Colorado provides cities like Boulder and Denver with home-rule jurisdiction, whereas the state constitution allows cities the delegated authority to enact local policies – with the notable exception of a 1981 law that prohibits cities from rent control policies like rent stabilization. (Sargent, 2021, p. 341).The Colorado constitution specifically states: "No county or municipality may enact any ordinance or

[2] For the purposes of this thesis, "Boulder" is meant as the City of Boulder; it will be spelled out as Boulder County if there is a reference to the county at large instead of just the municipality.
[3] Denver is both a county and a city, thus the county of Denver and the city of Denver are the same. This is not the case in Boulder, where the City of Boulder is only one-third of the entire population of Boulder County.
[4] The 25 miles refers to the distance from downtown Boulder to downtown Denver. The approximate distance from southeast Boulder to northwest Denver is a much smaller gap of only 15 miles.

resolution that would control rent on either private residential property or a private residential housing unit" (ibid).

Figure 1: Map of City of Boulder City Limits (City of Boulder, 2022d)

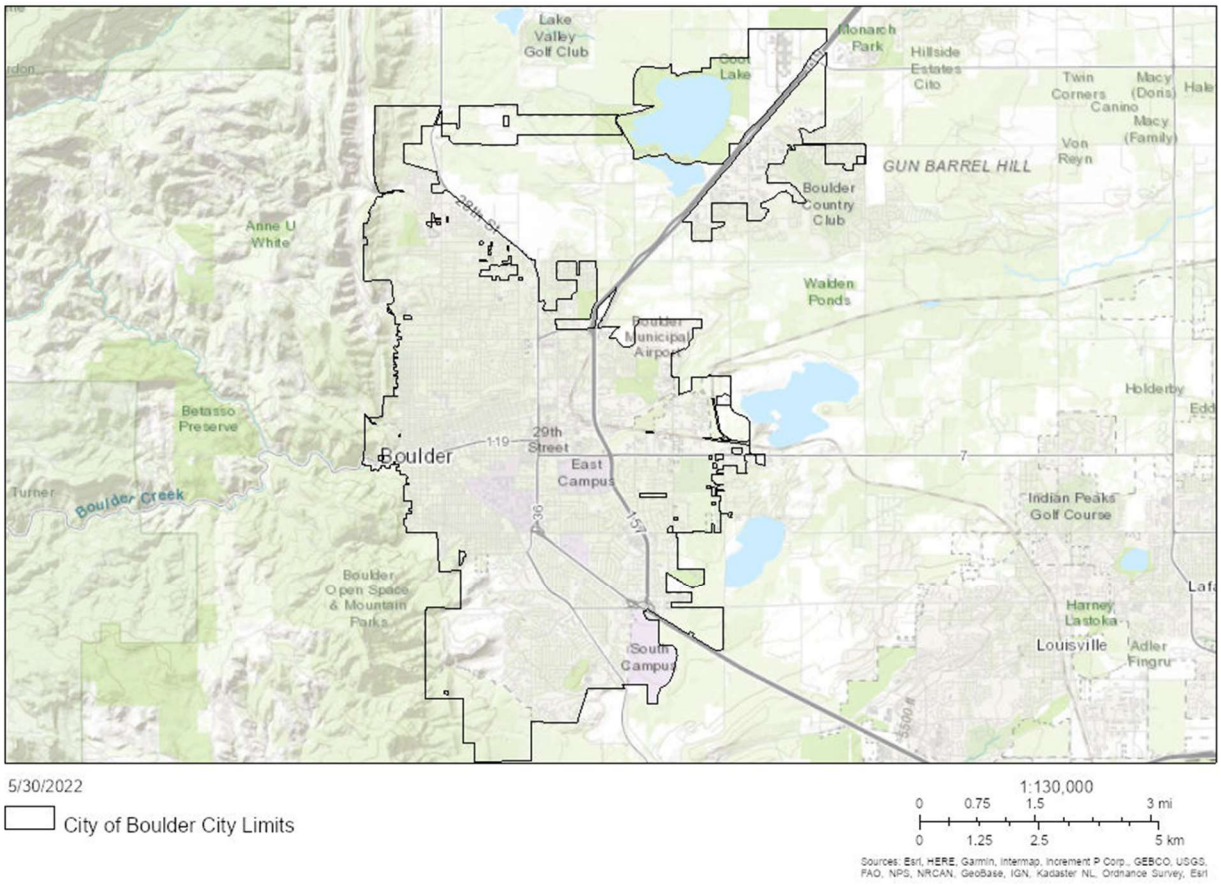
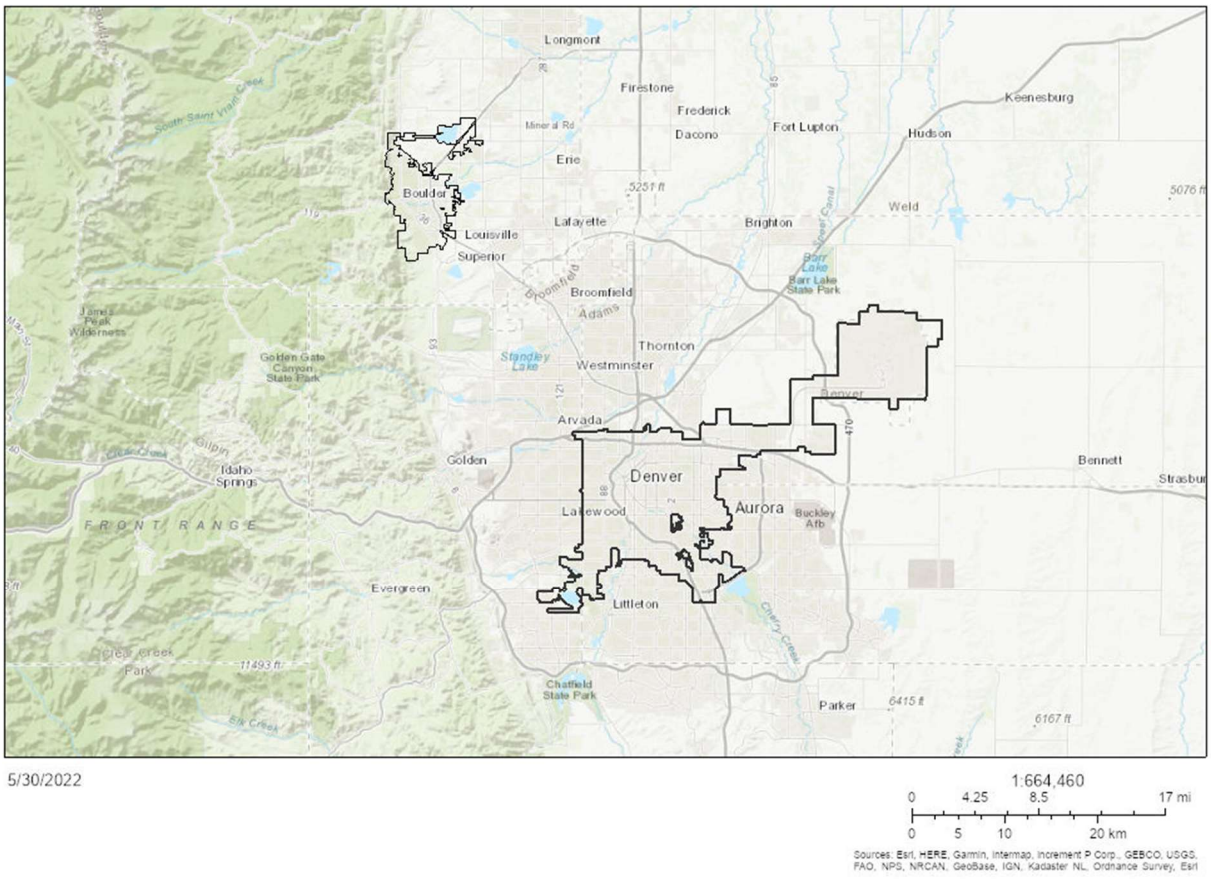


Figure 2: Map of City of Boulder and City of Denver municipal boundaries

(geospatialDENVER, 2019)



Higher education and high-tech industries are the most significant economic sectors in Boulder; in particular, CU Boulder is the largest employer in the city with nearly 10,000 faculty and staff and enrolls over 30,000 students each year (U.S. Department of Housing and Urban Development, 2018, p. 6). In fact, CU Boulder students make up 30 percent of all renters in the City of Boulder (U.S. Department of Housing and Urban Development, 2018). The U.S. Department of Housing and Urban Development (U.S. Department of Housing and Urban Development, 2018) points to "the presence of the university, major research labs, and a highly educated workforce" and the major tourism industry as central to the "emergence of high-tech

industry clusters (p. 2). Fluri et al. (2020) similarly found that the establishment of federal research centers, the expanding CU Boulder campus, and the growing technology sector such as local Google campus in 2017 were key factors contributing to increased housing demand in Boulder. These industries come with the growth of higher-paying jobs, compounded with developers and investors investing in the city, which has added pressure on the existing housing stock, raised both rental costs and home prices, and in high-end real estate development" (Fluri et al., 2020, p. 4). As such, housing access has changed drastically over the past 30 years, "creating a nearly impenetrable market for middle and low-income residents" (ibid).

The median gross rent per household can be defined as the average monthly housing costs for renters which includes rent and the estimated average for utilities (electricity, gas, water, heating fuels). This definition is important as some rentals include utility costs within the rent and some require renters to pay them, thus this gross rent amount should capture both scenarios. In 2019, the median monthly gross rent for the City of Boulder was $1,637 USD ($2,050 CAD) (all amounts hereafter in USD, unless otherwise specified) (U.S. Census Bureau, 2000, 2021). This is slightly higher than what Fluri et al. (2020) found in 2017, where the average monthly rent for a one-bedroom apartment in Boulder was $1596 (p. 4), but this may be the difference between monthly gross rent and monthly rent costs without utilities as the scholars do not specify. I compare this with the median monthly gross rent in Denver where the median gross rent from 2016 to 2020 was $1397 (U.S. Census Bureau, 2022). This contrast points to why Fluri et al. identify "an outmigration of households earning less than $50,000 and an influx of households earning more than $150,000" in the City of Boulder (2020, p. 4). I found evidence that the rent in Boulder has increased significantly from the early 2010s to present-day. In 2013, The U.S.

Department of Housing and Urban Development found that the average rent for apartments was approximately $1100 for Boulder County, but they note "As with home prices, rents are more in the city of Boulder" than Boulder County (U.S. Department of Housing and Urban Development, 2013, p. 9). Due to the 2008 recession, rents "averaged $953" in 2009 and 2010, but the apartment rent increased roughly 4 percent in 2011. The market demand grew from 2012 to 2015 when year-over-year rent increases averaged more than ten percent, but the market has since become "more balanced" with yearly increase of three to four percent (ibid, p. 10).

Boulder's Housing Landscape

Renters make up more than 36% of all households in the United States, which is roughly 44 million households (Samarripas & Jarrah, 2021). In the City of Boulder, the percentage of renters is higher than the national percentage. Boulder's housing stock has slightly more rentals than owner-occupied units (53% of residential properties are rental housing), with a rental vacancy rate of 2.9% as of 2019 (Samarripas & Jarrah, 2021). The City of Boulder calculates that 8.3% of housing units in the city are affordable to low and middle-income households (City of Boulder, 2022a). Given that the majority of Boulder's housing portfolio is rentals, it makes sense that the municipality has developed the SmartRegs residential rental energy efficiency program. Renters, particularly private renters, are considered a vulnerable group that typically has worse health outcomes and pay a significant proportion of their income towards their homes (Daniel et al., 2020; Pollack et al., 2010). The number of renters across the United States has increased significantly in the past decade, with a larger proportion of non-white residents, people 55 or older, and those living above the poverty line living in rental units (Samarripas & Jarrah, 2021). Home ownership is out of reach for 40% of residents in the City of Boulder (Fluri et al., 2020, p.

4). However, access to good quality, affordable rental housing is also limited (ibid). The historic context of urban planning and housing development in Boulder is important to situate the present-day reality for renters. Fluri et al. (2020) points to the 1960's where the City of Boulder utilized direct purchase and conservation easement to acquire and protect open space property surrounding the city (p. 4). This purchase was also noted in the interview with city staff.

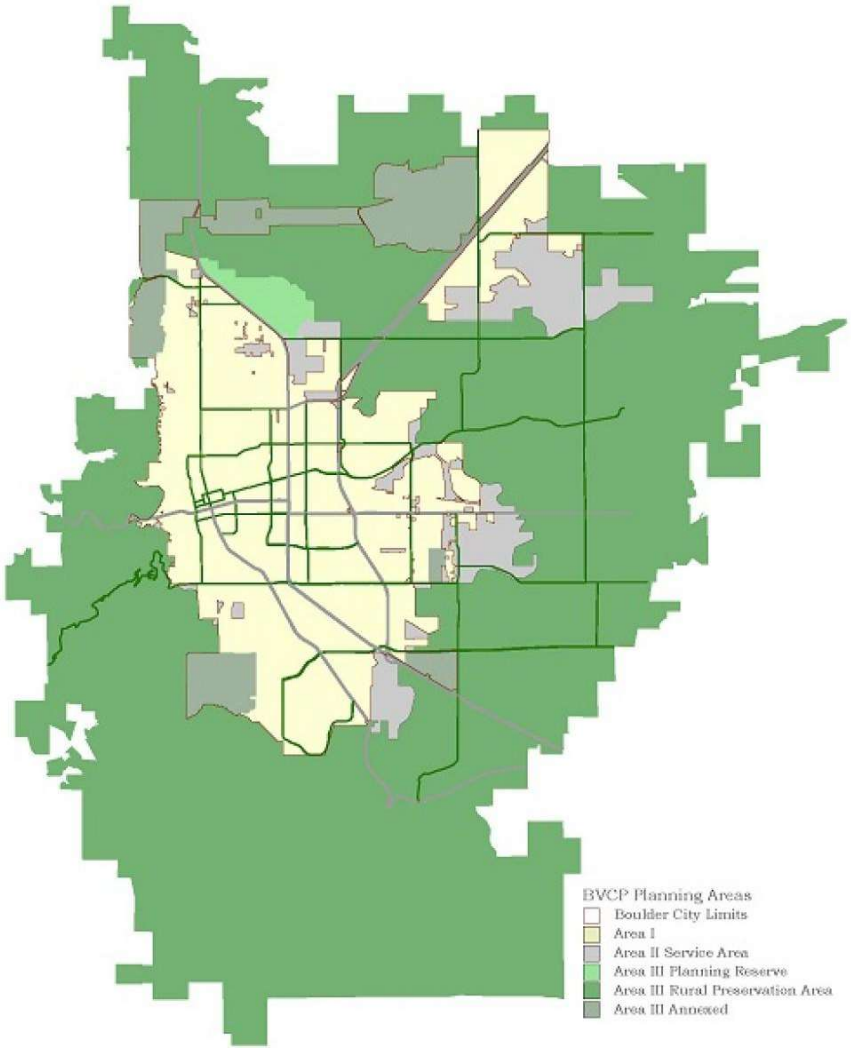
> We have an urban growth boundary around the city because it was a priority in the 60s for Council on the community to preserve a lot of open space, so we didn't get that sprawling effect that most US cities have. That's the suburban, you know, land use planning that the city leaders at that time and [Boulder] leadership just said we don't want to be a sprawling city. So, the unintended consequences of that urban growth boundary, we bought up all this open space, Boulder County and the City of Boulder bought up tens of thousands of acres around the city so it couldn't get developed. So, an unintended consequence of that is that our housing prices just kept rising (E. Vasatka, personal communication, August 2021).

Figure 3 provides a map of the City of Boulder's urban growth boundary, where Area I, II, and III Planning Reserve are meant for urban development and Area III Rural Preservation and Annexed is not. Boulder had positive intent behind the urban growth boundary to limit sprawl and put environmental protections in place. And yet, this policy added to a suite of regulations that residents point to as contributing causes for housing unaffordability due to limited supply in Boulder. The "city's rigid boundaries, building height restrictions, and open space policies" are considered key factors that limit rental housing supply in Boulder (Fluri et al., 2020, p. 5).

In addition, Fluri et al. found that residents perceive a stigmatization of affordable housing in Boulder; this is compounded by the societal norm to live in a "single-family household" over

communal or cooperative housing models that may provide more affordable options (ibid). Despite this, there have been local grassroots activism efforts, like the recent "Bedrooms are for People" campaign that have attempted to change local zoning policies to increase the housing supply (Bedrooms Are for People, 2021).

Figure 3: Map of Boulder Valley Comprehensive Plan indicating the urban growth boundary for the City of Boulder (City of Boulder, 2020b)



Looking at the big picture, there were approximately 46,000 dwelling units of all types in Boulder in 2019; this includes single-family homes, townhomes, condos, cooperatives, and rental

apartments according to the city (City of Boulder, 2022a). More than 60% of all residential land, roughly one-third of all land within Boulder, happens to be zoned exclusively for single-family homes (Castle, 2021). Housing characteristics like single-family or single-detached homes do not provide adequate information regarding whether the property is owner-occupied or rented out. To differentiate between housing categories of rental housing and owner-occupied housing, the City of Boulder had approximately 20,000 licensed rental units at the start of SmartRegs implementation which grew to over 22,000 (Antczak et al., 2016). Presently, the rental stock in Boulder makes up approximately 53% of all residential housing dwelling units (Samarripas & Jarrah, 2021). Other housing units in Boulder are predominantly owned-occupied units (i.e., homeownership), but can also include short-term rental units,[5] housing provided by the University of Colorado Boulder, non-profit or co-operative housing, or manufactured housing communities (City of Boulder, 2022a). Notably, the housing authority Boulder Housing Partners (BHP) builds, owns, and manages 33% of the total inventory of affordable housing in Boulder. Their housing is subsidized by government funding sources like the US Dept. of Housing & Urban Development, a mix of local and state grants, and conventional financing (Boulder Housing Partners, 2022). Some of the housing provided by BHP is at market rate. One of the key informant interviews was with Tim Beal, Director of Sustainable Communities, who was able to shed some light on BHP's role in the housing landscape.

> People joke that affordable housing in Boulder is kind of an oxymoron, but we [Boulder Housing Authority] serve over 3000 people. We have about 1500 units on 40 different

[5] The City of Boulder does in fact have short-term rental regulations, such as for Airbnb units. Landlords can only obtain a short-term rental license for their primary dwelling unit, where they live for at least one-half of the year, and for a maximum of 29 days (City of Boulder, 2022e).

> sites, mostly all multifamily, and most of our units are available at 50% of the area's median income or below (T. Beal, personal communication, August 2021).

It is important to note the difference between "affordable housing" as a definition and rental housing that is considered affordable or unaffordable to renters in Boulder. The City of Boulder defines "affordable housing" as "households spending less than 30% of their income on housing," which is consistent with much of the academic literature. For example, Chan & Adabre (2019) consider it a rule-of-thumb to consider it affordable housing if the rent is no more than 30% of the income of a low-income household (given that the definition of a low-income household varied in the literature review they conducted across eighteen countries). The City of Boulder has set a goal to have "15% of all homes in the city to be permanently affordable for low-, moderate-, and middle-income households" (City of Boulder, 2022a). Boulder currently has 8.3% of rental units qualifying as affordable (approximately 3,600 units) (ibid). The City of Boulder considers households who range from 0% to 60% of the Area Median Income to fit this criterion of 'low-income' (City of Boulder, 2022a). As previously mentioned, the median gross rent for household in Boulder County in $1,637, which is $19,644 annually; the renters' household incomes must exceed $65,480 for that annual rent number to be at or below the 30% threshold. This can be a helpful starting point to understand and compare how this corresponds to the rents that the research participants indicate they are paying (although I did not collect data regarding their income unless they voluntarily disclosed it). Renters may choose to live in what is considered "unaffordable" housing or housing that potentially is beyond their financial means for various reasons (e.g., location, personal choice, low vacancy rental housing rates). There are limits to what this research can comment on in terms of affordability, as the renters were not

asked to disclose their income information. However, there is still richness in the perceptions of renters regarding the affordability of rental housing. To broaden our understanding of affordability as it pertains to rental housing, I look to scholars like Hyde (2018) who argue that affordable housing is too vague of a term and thus does not have a simple definition. Hyde (2018) notes that the term affordable housing "suffers from a degree of indeterminacy in Canadian cities" although this can be said about American cities as well. Perhaps reluctantly, Hyde gives us a general sense that "affordable housing" is not a singular category but more so a range of housing types, these can be social housing either built by private developers, funded by the state, and managed by non-profit or government entities (2018, p. 2). Affordable housing could also be purpose-built rentals with rent stabilization to some degree (either by the company that manages it or through government regulation like rent control). Other market-based units may fall under this notion of affordable housing as well. In housing policy, however, governments look to clearly define "affordability" either through a market-based definition of an average rental unit or based on a renters' ability to pay rent; for example, the percentage of gross family income that goes towards rent has changed from 20% to 25% to 30% as a way to minimize the housing crisis (Sewell, 1994, p. 223).

Our ability to determine a baseline for the state and quality of rental housing when designing and implementing building code regulations for existing homes, retrofits, and energy renovations is restricted by the fact that there is limited evidence that this is a metric that is considered by community and city stakeholders in Boulder. While housing quality is prominent in the academic literature around topics like tenant comfort and well-being and energy efficiency, there is limited evidence that this is a metric that is considered by community and city stakeholders in Boulder.

There is an academic "Public Impact Project on Affordable and Quality Housing" that indicates that "housing is a constant barrier to equity" that is working towards a more systems-level approach to affordable housing; however, there is limited information on their website on what metrics of housing quality they are looking at (University of Colorado Boulder, n.d.). However, from the literature, we understand that quality of housing can have serious impacts on the health and well-being of tenants and thus is an important consideration when looking at the housing landscape (Chisholm et al., 2020; Marquez et al., 2019). With an equity lens, Fluri et al. (2020) provides insight on socio-economic and racial lenses at play in the City of Boulder, particularly as it connects with housing. For example, the City of Boulder has predominantly white residents (79.3%) and then Hispanic or Latino (10.3%), whereas Denver is much more diverse (54.9% white and 29.3% Hispanic or Latino). Local scholars provide a critical look at how whiteness has operated as an essential framework to understand, and perpetuate, Boulder's self-representation as a healthy, socially inclusive, and liberal environment, as well as a site of wealth and wealth generation especially in the housing market (Fluri et al., 2020, p. 1). Whiteness contributes to the "invisibility of non-white and low-income persons in Boulder," which has "material effects on access to housing for people who fall outside of the norm" (ibid). The inaugural City of Boulder Racial Equity Plan also speaks to the role that housing and zoning policies have played in racial inequality and discrimination in Boulder and other American cities (Castle, 2021). This intersection of racial (in)equity, whiteness, and housing in Boulder are emerging in the literature and municipal space. Fluri et al. (2020) specifically points out how racial minority residents of Boulder are overrepresented in affordable housing and that racial discrimination is at play in many elements of daily life in Boulder, from "from traversing public space to education and housing" (p. 5). Renters are a growing population in the United States, assuming also in the City

of Boulder; in particular, more non-white residents, people 55 or older, and those living above the poverty line are living in rental units than in previous years (Samarripas & Jarrah, 2021).This indicates a shift of who the average "renter" may be, for example, if older and middle-income residents are renting for more of their lives and are unable to afford home ownership. The findings go into further detail on these intersections where research participants articulate their perspectives.

Rental housing licensing in Boulder and beyond

In Boulder, SmartRegs affects approximately 23,000 rental housing units as of 2019 (City of Boulder, 2020a). It is important to note that SmartRegs is not a standalone policy. It is embedded within the City of Boulder's wider rental housing licensing approval process. The City of Boulder has long had a housing code, established in 1968, for the minimum standards of maintenance and occupancy of all residential homes to address sub-standard housing units (City of Boulder, Planning & Development Services, 2010). The prevalence of sub-standard or poor-quality rental housing is evident in the City of Boulder, as expressed by Herrmann & Krarti (2012) who conducted two detailed energy audits but state their assumption that "there are thousands of other rental houses out there in similar if not worse conditions" (p. 9). The City of Boulder does indicate that landlords have to ensure rental properties are fit for human habitation, as per the State of Colorado's Warranty of Habitability (City of Boulder Housing and Human Services Department, 2019). The research findings in Chapter Three will elaborate on how individual renters feel about the quality of rental housing in the City of Boulder.

The City of Boulder implemented the original rental license code for long-term rentals in 1973 to address the problem of sub-standard housing units by adopting minimum standards for safety, sanitation, and maintenance of rental properties (ibid, p. 4). The City of Boulder states that feedback from owners, tenants, and private inspectors was the initial push to update the requirements to enhance the effectiveness of the rental licensing program in general, prior to the adoption of SmartRegs (p. 5). However, there is also a reference to the "2007 Supreme Court ruling [that] authorized the Environmental Protection Agency to regulate greenhouse gases as a significant threat to human health" and how building codes can play a role in this kind of regulation (p. 3). It is possible that, although the rental licensing code needed to be updated anyway as the council memorandum notes that building codes are periodically updated, the City of Boulder used this opportunity to advance the goals of the Climate Action Plan by implementing additional energy efficiency components to "coincide with the updates to the Housing Code and Rental License Code" (p. 2). There is reference to a November 18, 2008 Council meeting to identify strategies to reduce emissions and reduce energy use in buildings, which provided the direction to the 2009 and 2010 work plans to address energy efficiency in existing rental housing and existing commercial buildings (p. 1-2).

According to the City of Boulder, the Rental Licensing code is the enforcement mechanism of the Property Maintenance Code and all other requirements under the building code for rented accommodations. Looking through Boulder's Rental Licensing Guidebook, there are four components to the rental inspection (City of Boulder, Planning & Development Services, 2021). The first component "General Requirements" covers exterior and interior structures, light, ventilation, and occupancy limitations. Part two has to do with plumbing facilities and fixtures,

such as toilet rooms and water systems; part three covers mechanical and electrical elements, which include boilers and water heaters, throughout the home. Lastly, part four encompasses fire safety. The general rental inspection touches upon what is covered within SmartRegs and energy efficiency specific components of a home inspection, but at a higher level more designed to meet minimum expectations of health and safety rather than considering factors like energy usage. As mentioned above, for all rental properties in Boulder, owners, managers, and landlords are required to meet basic energy efficiency requirements in order to rent out their units (City of Boulder, 2019). From the SmartRegs inspections data, 50% of rental properties met the initial baseline and 17% were given exemptions for compliance from the City following their initial assessment (Samarripas & Jarrah, 2021). To meet these standards, landlords had to make upgrades to meet the SmartRegs compliance for 32% of rental properties (ibid).

It is worth looking at the broader practice of municipal licensing for rental housing beyond the case study of SmartRegs in Boulder. Samuel et al. (2021) notes that more than half of the 30 largest cities in the United States require rental licensing as a regulatory tool in some form and that this practice is expanding to more cities. It can be helpful to understand the difference between rental registration, which can be done by the landlord, and rental licensing, which usually involves an inspection or steps taken in order to rent out the property (Samarripas & Jarrah, 2021, p. 19). In general, the literature around rental licensing indicates (either through assumptions or findings) that strengthening regulations will result in increased rent and thus have a negative impact on housing affordability. However, the data indicates that increasing the fines on low-quality housing via rental licensing regulations has an ambiguous effect on rents and may have other landlord-tenant impacts such as increased tenant screening (Samuel et al., 2021, p.

145). For example, Minneapolis, Philadelphia, Oakland, Washington, D.C., and Boston are identified as other cities that have approximately 50% or more of rentals in the residential market and have a rental licensing process in place (Petersen & Lalit, 2018). Rental housing licenses also can exist for specific housing types such as rooming houses (Campsie, 2018; Ontario Human Rights Commission, 2013), student housing (Kushner & Phillips, 2018), and short-term rentals or "Airbnb's" (Heath, 2020; Jamasi, 2017).

Boulder's Climate Policies

Climate policy in cities can be broad and encompass a wide array of topics. For the purposes of this research on climate-housing intersections, it is most important to look at climate targets and the built environment's impact on the environment. Buildings, which include residential homes, are a large contributor to carbon emissions in both their energy usage and the lifecycle of embodied carbon (i.e., construction materials) in many cities. On an international scale, buildings are a significant contributor of carbon emissions in urban areas and make up 21% of global greenhouse gas emissions (Hoicka & Das, 2020). In Boulder, this is broken up into more detail with commercial & industrial buildings making up 48% of the city's emissions and residential buildings 18% (City of Boulder, 2022c).

The City of Boulder now has an ambitious net-zero emissions by 2035 target and a carbon-positive by 2040 target[6] (City of Boulder, 2021). A "Climate Emergency" was declared by Boulder City Council in July 2019, which spurred the acceleration of an updated climate action plan with the new targets outlined above. Boulder is visibly self-congratulatory as "an

[6] In contrast, the City of Toronto has set a net-zero emissions by 2040 target (City of Toronto, 2021).

environmental leader" since 1898 (City of Boulder, 2021). The sustainability wins are primarily around environmental conservation issues going back as far as 1898 and waste reduction from the 1970s. Despite the United States not adopting the international Kyoto Protocols, Boulder developed greenhouse gas emissions target in order to align the city with the international standards in the early 2000s (Kinney et al., 2007). In 2006, Boulder developed its first Climate Action Plan that was to be "funded by a tax on the consumption of electricity usage" (City of Boulder, 2021).

There has been an evolution of the City of Boulder's climate priorities over time. The City of Boulder was narrowly focused on significant greenhouse gas emissions reductions in the past, but this has shifted in recent years to prioritize climate adaptation, equity, and climate justice in their updated Climate Action Plan in 2021 (City of Boulder, 2021). This shift occurred from 2016 when a partnership with the University of Colorado Boulder's Just Transition Collective spurred equity principles for a just transition section of Boulder's Climate Commitment plan (ibid, p. 24). City staff continue to emphasize climate justice and equity, noting that "Our climate crisis is intertwined with our racial inequity crisis. If we don't work on both, we will succeed at neither" in a 2020 opinion piece in a local newspaper (p. 26). In the same year the updated Climate Action Plan was adopted, Boulder City Council also unanimously approved the first Racial Equity Plan which includes an appendix outlining how to align climate action with racial equity (p. 42). In particular, the City of Boulder's Racial Equity Plan is critical of how climate policies have had an indirect impact on housing costs and how this affects which residents can afford to live in the City of Boulder: "Anecdotally, Boulder's high design expectations, energy efficiency and climate goals, limited vacant land for development, high proportion of jobs to

homes, and numerous other policies all have an indirect impact on housing costs" (City of Boulder, 2021, p. 42)

Energy efficiency falls under climate mitigation or greenhouse gas emission reduction measures. Boulder's carbon emissions within the city boundary come predominantly from electricity generation (50%) and natural gas use (25%) (City of Boulder, 2022c). The electricity grid in Boulder is split between coal-fired generation (36.7%), renewables (35.7%), and natural gas-fired (25.9%) (U.S. Energy Information Administration, 2022). The breakdown of electricity generation is significant as the state of Colorado's renewable electricity net generation has more than tripled since 2010 (ibid). The city's energy-related climate actions correspond to reducing these drivers of emissions; actions such as reducing energy use, working to generate cleaner electricity, and getting off natural gas are imperative to meet the climate targets that Boulder has set for itself (City of Boulder, 2021). Boulder's updated 2021 Climate Action Plan has new, more holistic elements beyond a narrow focus on greenhouse gas emission reductions, including addressing climate change in an equitable manner, strengthening community climate resilience, and counting the full scope of community emissions (i.e., consumption-based scope 3 emissions) (ibid). The City of Boulder discusses its environmental legacy on reducing waste, protecting land and water, transitioning to clean energy, and supporting alternative mobility options (rather than cars). Boulder emphasizes their achievements in "setting aggressive emissions reduction and renewable energy targets" which are updated as needed to reflect "scientific consensus and urgency" to guide Boulder's climate work (p. 2). The City of Boulder included core equity principles as part of this new Climate Action Plan update (p. 15). This is important to see if and how the SmartRegs policy meets these equity principles: First, "All stakeholders are involved

from the beginning, and culturally appropriate outreach methods are offered, to provide inclusive representation for all programs/policies, from concept to design, through implementation". Second, "The results of all programs/policies have an equitable distribution of benefits and burdens across the community." Third, "Institutional funding allocation corrects for historically advantaged groups and accounts for disadvantaged or historically excluded groups." Finally, "Potential burden that could be imposed on future generations is evaluated to ensure that no such burden is inflicted by the effort." (City of Boulder, 2021, p. 15)

City of Boulder's SmartRegs

Boulder, Colorado has implemented the SmartRegs rental licensing standards that include energy efficiency metrics, which initially appeared to be a promising example of embedding climate considerations into a municipal housing policy (Barrett et al., 2011; Petersen & Lalit, 2018). The City of Boulder claimed that SmartRegs policy would "improve energy efficiency in existing rentals, enhances tenant comfort and supports energy goals and climate commitment" and have the potential to reduce utility bills (City of Boulder, 2010, 2018a; City of Boulder, Planning & Development Services, 2010). The following section provides a detailed breakdown of the components of Boulder's SmartRegs, its policy development, and implementation.

SmartRegs required all rental properties to meet a basic energy efficiency standard by December 31, 2018, or face fines[7] by the City of Boulder. As previously mentioned, SmartRegs is one component of the wider Boulder rental licensing approval process. For all rental properties, Boulder now requires SmartRegs compliance as well as health/safety and mechanical system

[7] The fines for non-compliance increase with each violation ("civil penalty for renting without a license"), the first ranges from $150 - $500, second $300 - $750, and the third $1000 (City of Boulder, 2022f).

standards. In essence, owners, managers, and landlords are required to meet basic energy efficiency requirements to rent out their units[8]. Adopted in 2011, Boulder was one of the first cities in the United States (and likely North America) that required energy retrofits for rental properties (ibid.). Barrett et al. (2011) state that Boulder was the first city in the country that required energy retrofits and energy efficiency requirements for rental properties, although others consider it one of the first cities (Petersen & Lalit, 2018). Barrett et al. (2011) specifically note that this was unique because of the requirement to make upgrades in order to receive a rental license, whereas other cities have enacted policies that only required efficiency upgrades at times of sale or construction (p. 192).

To achieve compliance, rental property owners can go through the performance path (certified Home Energy Rating System HERS) or the prescriptive path checklist (City of Boulder, 2021). The City of Boulder states that 98% of property owners have used the prescriptive path to get SmartRegs compliance, likely since the performance path is designed more for multi-unit apartment complex buildings (ibid). To reach compliance, rental properties must obtain a HERS score of 120 or lower (assessed by a rater accredited by the Residential Energy Services Network (RESNET) or alternatively 100 points through the prescriptive checklist. The checklist is used by a City of Boulder licensed third-party inspector. There are points given for mandatory water conservation (washroom and kitchen appliances), wall insulation, window quality, ceiling insulation, floors, duct leakage, heating and cooling systems, lighting, hot water systems, fans, refrigeration, and solar panels (City of Boulder, 2019). This pertains to renters insofar as the rater or inspector does need to enter the unit to perform an assessment, The inspector can also award

[8] Although renter displacement due to non-compliance is possible, there has not been any evidence that this has occurred yet, especially since the compliance period only went into effect in 2019.

up to three points in this "occupant behaviour" section (more on this later in the discussion on implementation). The City of Boulder also developed the Technically Impractical pathway application process for properties that could not meet basic level of efficiency requirements due to "unforeseen structural or equipment issues and limitations that hinder or complicate full compliance". Only six rental licenses were approved for this pathway in which the property owner could purchase carbon offsets at each license renewal. The City of Boulder also provides complementary support to landlords to access support, financing, and information to make it easier to obtain compliance (City of Boulder, Planning & Development Services, 2021; Nedwick & Ross, 2020).

Renters and the policy development of SmartRegs

Policy development can be a challenging process; there were numerous considerations and stakeholders engaged in the development of SmartRegs. This section focuses on to what extent renters were involved and engaged with the City of Boulder's initial SmartRegs proposal prior to its adoption by City Council. The case study of SmartRegs allows us to consider the degree to which renters or other community stakeholders were influential in shaping this policy.

The process for policy adoption is well-documented (Barrett et al., 2011; Glick et al., 2015; Martinez & Clevenger, 2017). A multi-departmental effort started in the summer of 2009 with "the goal of enhancing tenant comfort in Boulder's licensed rental properties" which included both community and technical-based working groups (Barrett et al., 2011). Although the SmartRegs municipal ordinance was originally implemented in 2011, it had an 8-year

compliance period, given significant pressures from landlords and homeowners associations. The scholars note that compromise is a key factor to adopt requirements like SmartRegs in an "economically driven and adversarial environment" (p. 192). The public consultation process ran over a 14-month timeline due to the additional public hearings and clarifications from Boulder City Council (p. 204). The policy development for SmartRegs was similar to other code adoption processes in the literature (Barrett et al., 2011; Dunn, 2017). Ultimately, SmartRegs remained similar to its original proposal in its contents, but resulted in a lengthier compliance period than originally imagined (Barrett et al., 2011; City of Boulder, 2018b). There is evidence that the Boulder Area Rental Housing Association had a sizeable influence for the timeline (Barrett et al., 2011; Samarripas & Jarrah, 2021).

At the start of the fieldwork for this project, I reached out to some of these authors to gather some of the original data from the policy development phase or shortly thereafter. However, as their research was conducted over a decade ago, they were unable to provide me this information but were helpful in pointing me in the right direction. Glick referred me to the City of Boulder archives and to evaluation reports commissioned by the city, which led me to the quarterly progress updates (City of Boulder, 2018b). The research methods utilized for the purpose of this thesis provide an in-depth understanding of the data collection process, despite not having raw data from previous studies (pre-2011). It is not uncommon to see residential energy efficiency or residential energy conservation ordinance programs get feedback and input from community stakeholders, but rarely are renters considered part of that equation. For example, Reames (2016b)'s "community-based approach to low-income residential energy efficiency" interviewed community stakeholders (e.g. city staff, university faculty, utility representatives, and

neighbourhood association leaders) but appears to have a gap in the study by not interviewing the renters who are directly impacted by these home retrofits. However, since this is a residential energy conservation ordinance for rental properties, the renters were considered and thought of as a stakeholder group to engage with during the community engagement process when developing the policy. According to Barrett et al (2011), there were four steps that included renters in the policy development phase. First, the City of Boulder gathered resident feedback from December to February 2010. Second, there was a Renters Stakeholder Meeting in February 2010. In March 2010, there was a survey on the SmartRegs proposal for owners and renters. Lastly, the City administered a CU Student Renter Survey in April 2010 (Barrett et al., 2011, p. 199).

Although the literature and official documentation of the policy seems to indicate a fair engagement process that equally prioritized renters and landlords, there is evidence that speaks to how this may not have been the case. Much of this comes directly from an article published in 2010 in the Colorado Independent, which is situated during the "March 2010 Survey to Owners and Renters" milestone. The article mentions that "City staffers, however, worried that student renters would not hear about or respond to the survey online, while landlords, who would be more likely to follow local news, would be over-represented" (Volckhausen, 2010). This underrepresentation of renters, specifically student renters, is what caused New Era Colorado to organize a door-knocking campaign. It could be argued that renters would have been less engaged in the policy development of SmartRegs from the original engagement plan from City staff to treat both renters and owners equally. However, the emergence of the campaign may have appeared to improve this potential obstacle, given the earned media and stakeholder voices

represented according to the given the media attention the campaign received and the new stakeholder voices that were heard. There was no expectation for the renters I interviewed during the fieldwork to comment or have any awareness of this Renters with Benefits campaign launched by New Era Colorado. However, it did come up in one of the interviews. Renter 3 reflected that her friends, two who worked at New Era Colorado (one of whom is now a Colorado state senator), one who volunteered, and one who studied building systems at the University of Colorado Boulder, were her "entry into this realm". The City of Boulder made claims throughout the development and implementation of SmartRegs that this policy would have positive impacts for renters, such as the potential to reduce utility bills. In the Community Sustainability Assessments and Impacts section of a City Council information item, the fiscal impact for the cost of SmartRegs energy efficiency upgrades for the rental property owners is justified because there are positive "benefits to the renters who rent the more energy efficient, SmartRegs' compliant properties, which are both more comfortable and may potentially include efficiency upgrades that they would not otherwise have access to and that may reduce their monthly energy bills" (City of Boulder, 2018a, p. 2). SmartRegs was touted as a policy that should help renters by reducing their utility costs, and it makes sense that renters that became aware of this proposal supported its adoption. However, the legislative intent for the ordinance prioritizes the climate-driven motivations behind the policy (City of Boulder, 2010; City of Boulder, Planning & Development Services, 2010). Specifically, 10-2-Legislative Intent states that Boulder City Council found:

> Energy efficiency requirements for housing are necessary because: A) reducing greenhouse gas emissions in existing buildings is imperative to meet the City of Boulder's sustainability goals; B) rental housing represents the largest number of existing housing

> units in the city, and C) efforts to establish incentives for voluntary energy efficiency retrofits in rental housing have proven to be ineffective… "Reducing greenhouse gas emissions [was] established as an important public policy objective and mandated by the City of Boulder due to: 1) the well-documented link between reduction of such emissions and current and projected climate change and 2) the profound public health and safety impacts of such emissions, including but not limited to: increased risk of extreme weather events, increased flood severity, increased risk and intensity of catastrophic wildfire, increased insect invasions causing forest die-offs, and increased risk of drought" (City of Boulder, 2010, pp. 62–63).

I argue that given the climate priorities for the City of Boulder, SmartRegs was predominantly developed for its contribution to greenhouse gas emission reductions, rather than its social benefits which perhaps the city cares more about now in this current context (Barrett et al., 2011; City of Boulder, 2018a).

The City of Boulder's Renters Energy Efficiency Proposal Survey demonstrated that 82% of respondents surveyed were supportive of the initial SmartRegs proposal (Barrett et al., 2011, p. 204). In contrast, the Property Owner Energy Efficiency Proposal Survey found that 75% of property owners disagreed with the energy efficiency requirements for long-term rental properties (ibid). This contrast is significant as it indicates that the City of Boulder was pursuing a policy that renters supported and went against the wishes of the three-quarters of landlords surveyed; this is a clear demonstration of the fundamental contradiction in housing in capitalist societies. During this policy development phase in 2010, a staff person for New Era Colorado, Shad Murib, explained the rationale for their campaign: "The vast majority of young people are

renting and they're paying utilities… we think [SmartRegs] is what they want… This is a fight young people are willing to have with their landlord" (Volckhausen, 2010). He alludes to this as a conflict between young people who are renting and their landlords. An opinion piece from the time also featured a personal perspective of renting in Boulder:

> "As a renter in Boulder, and on a personal note, I have found it was hard enough to get my landlord to bolt my toilet into the floor, so it didn't swivel like an office chair. It took them months to fix a couple of bolts; I can't imagine how long it would take to replace my ancient, drafty windows or lay down a little weather stripping" (Nutting, 2010).

Barrett et al. interviewed renters during this policy development period; the renters they spoke to wanted to see the implementation of SmartRegs and supported its policy development. "Fair, lack of incentive, and equitable" were primary reasons for support that arose from their interviews with tenants. The scholars also identified key themes regarding "general references to income/wealth disparity between owner and tenant" as well as "retribution for past issues of split incentive" (Barrett et al., 2011, p. 196). Although this isn't the language that was used by the scholars (due to it being a relatively new term) or the renters during the 2010 timeframe, the lack of incentive is partly related to as "retrofit poverty" (Willand et al., 2020). In contrast to the more commonly used "energy poverty", retrofit poverty speaks less to energy consumption and is more centered around distribution of low-carbon building renovation opportunities. This distribution of retrofits in a city or area can be linked to renter-occupied units, as there is limited autonomy or ability of renters to pursue and implement repairs and home upgrades like energy efficiency renovations on their own (Marquez et al., 2019; McKee et al., 2020). This policy does not go as far as to give renters the right to make energy efficiency related upgrades, as some

municipalities have done, but it is aimed to improve the distribution of retrofits across the city (Samarripas & Jarrah, 2021). There is the potential of a policy like SmartRegs to help renters to feel more confidence that there will be energy-related home improvements and reduce the perception of powerlessness they may feel by not having the ownership or ability to make those changes on their own.

The survey responses and sentiments expressed in official documents, academic literature, and the media showed clear opposing views between the landlords and renters. The landlords' viewpoints (in some cases, vocal opposition) played into the development and implementation of the ordinance. One of the key arguments that landlords, particularly through the vocal Boulder Area Rental Housing Association, used to oppose the SmartRegs proposal was the threat of increased rent. They claimed that increases in rent would be necessary to "compensate for the increased expenses, making Boulder rentals potentially even more expensive, driving residents elsewhere" (Barrett et al., 2011, p. 204). Barrett et al. note the key themes that arose from interviews with landlords included financial hardships/burden, complex/confusing [processes], and what was perceived to be "invasive government tactics" or "bureaucratic". There were also general references to the "inclusion of associated fees and property upgrades to meet compliance pathways, prescriptive and performance measures" and the "association to general state of affairs with bureaucratic entities; confusion and documentation uncertainties" (2011, p. 196). Ahead of the Boulder Planning Board's first public hearing for the SmartRegs proposal, the local newspaper wrote "Thousands of landlords who rent out homes in Boulder will be forced to invest a combined millions of dollars in upgrades, costs that could be passed on through higher rent, if the city approves new energy-efficiency standards (Urie, 2010). This opposition seemed

to be crafted to spark concern not just for the homeowners but also potentially for the renters. The former executive director of the Boulder Area Rental Housing Association (BAHRA) echoed these sentiments, saying "some landlords would have to raise rent to compensate for the increased expenses, making Boulder rentals potentially even more expensive and driving residents to other areas, even going as far to theorize "Think about increasing the rent for every single person in the city of Boulder" (ibid).

To mitigate this concern, the article also notes that City staffers recommended a hardship provision for an extension if the owner demonstrated an inability to pay for the upgrades and/or the possibility of purchasing carbon offsets. These offsets are meant to buy the landlords more time to meet the requirements; however, there is limited information about how this policy played out. However, the City also fully acknowledged the risk and threat of property owners increasing rent (City of Boulder, 2010). Local reporters raised this issue during the public feedback period. The City did recognize the risk and threat of property owners increasing rent during the policy development of the SmartRegs ordinance. City officials acknowledged the possibility of rent increases from individual landlords, especially as this was a common theme in the public feedback from landlords (City of Boulder, 2010). Local reporters raised this issue "The costs of making the improvements could be passed on to renters because they, not the owners, would see most of the financial benefits of having more energy-efficient homes… To the extent market conditions allow, staff assumes that property owners will try to recover any expenses through rent increases" (Urie, 2010). And yet, City staff publicly pushed back saying "market forces will drive rental costs more than SmartRegs", indicating that this proposal is "achievable and reasonable" and would not impact the majority of homes that would already be

compliant with the proposed energy efficiency baseline (ibid). The City of Boulder was supposed to provide information on "rent increases, if possible" in their annual reports on SmartRegs from 2012 to 2019, but this information either does not exist or was not made available to the public (City of Boulder, 2010, p. 16).

SmartRegs' Implementation and Evaluation

According to the City of Boulder, SmartRegs has been successfully implemented and is now being promoted as a model to other cities. According to the City of Boulder's final SmartRegs Program-to-Date Progress Report last updated December 31, 2018, 97% of rental units have been evaluated through an initial inspection and 96% were either compliant or exempt (City of Boulder, 2018b). Approximately 17% were given exemptions for compliance from the City following their initial assessment, which meant 1% of units were deemed non-compliant at the end of the compliance period (ibid). Out of the 81% compliant units, approximately 50% of rental properties in Boulder met the basic energy efficiency requirements, without any upgrades, on their initial SmartRegs inspection (Samarripas & Jarrah, 2021, p. 25). Landlords only had to make upgrades to meet the SmartRegs compliance for 32% of rental properties (ibid). The most common upgrades done by the landlords were attic, crawlspace, and wall insulation, with an average cost of $3,022 and an average rebate provided of $579 by the city and county (City of Boulder, 2018b). It is possible that the bar was intentionally set low to focus on the worst-performing homes, instead of tackling a larger volume of rental properties.

The implementation of SmartRegs occurred over a much longer period than originally conceptualized. The initial proposal was adopted almost in its entirety, but the timeframe for

adoption and final compliance was extended from four to eight years (Barrett et al., 2011, p. 193). Notably, the implementation of SmartRegs was significantly delayed due to the pushback and opposition particularly from the homeowners BAHRA and thus, increased the compliance period to eight years (initial compliance options considered a four-year compliance period as that is the length of time in which rental licenses must be renewed). I argue that while this concession was made for rental property owners, it came at the detriment to renters. A longer implementation and compliance period results in more time that renters are living in inefficient units, which can be detrimental to their health and well-being. From a climate lens, delay of climate action is a significant problem; there is a compounding impact in reducing emissions quickly. Public policy analysis indicates that there are trade-offs between pushing for more ambitious or potentially controversial policies and the risk it may come with to not have the policies passed and implemented at all (Compton et al., 2019). It is worth considering the probability of Boulder City Council not adopting SmartRegs due to the significant opposition, but it is important to also acknowledge that compromise came at the expense of renters. There is evidence that the City of Boulder did implement some actions to improve the social equity of this policy. For example, renters and residents that live in housing in affordable housing may have benefited from local partnerships, as affordable housing providers were prioritized in inspections assistance and energy efficiency rebates (City of Boulder, 2010; Samarripas & Jarrah, 2021). However, it is still worth noting that energy efficiency and climate goals were identified by the City of Boulder's own Racial Equity Plan to indirectly have harmful impacts on housing affordability (City of Boulder, 2021, p. 42).

While renters were one stakeholder in the policy development process, the implementation and evaluation of the program has almost entirely been from a technical compliance angle (Arena & Vijayakumar, 2012; City of Boulder, 2018a, 2018b; Glick et al., 2015). This is consistent with much of the retrofit literature that focuses on the technical compliance of achieving carbon emission and greenhouse gas reduction targets, or co-benefits of air and indoor environmental quality. Most of the communications regarding SmartRegs since 2011 was targeted to rental owners or managers, such as the Rental Housing Licensing Guide and the SmartRegs Guide to Compliance (City of Boulder, 2019; City of Boulder, Planning & Development Services, 2021). I did want to note one major challenge in the implementation of SmartRegs from this technical angle that has significant climate impacts. Knowledge of energy efficiency has improved over the past decade but the City of Boulder has decided not to increase the stringency of the SmartRegs energy efficiency standards (Petersen & Lalit, 2018). For example, the work that was done targeted the low-hanging fruit such as insulated attics and crawlspaces. At first the City of Boulder was giving points to high efficiency natural gas furnaces but quickly realized that they didn't want to be promoting natural gas appliances (Samarripas & Jarrah, 2021). Natural gas was originally thought to be a bridge fuel to ease the transition to low-carbon heating, but the City of Boulder instead started to promote electrification of heating over the past eight years, during the compliance period. This was a key reflection from city staff that there should have been a clear pre-determined timeline to review and revise SmartRegs requirements on their effectiveness, based on technological changes and shifting municipal climate priorities (ibid).

There is limited information pertinent for renters regarding how SmartRegs would potentially impact their own rental experience and unit. The SmartRegs Guidebook provides practical

information about what renters need to do using an inspection (City of Boulder, 2019). While tenants are allowed to remain in their unit, there is a blower door test where no one can enter or exit during that time and doors and windows must stay shut. Where renters were considered in the implementation was through the scoring of "Occupant Behaviour" as part of the Prescriptive Pathway Checklist (the "Checklist") to assess compliance. As mentioned previously, the Checklist is used by a City of Boulder licensed third-party inspector and they can award up to three points in this "occupant behaviour" section; 100 points are needed for compliance. Even at its maximum, three points is a small contribution to the needed 100 points for compliance. The SmartRegs Guidebook describes the Checklist scoring as "simple", saying "the more points that a home can earn for a measure, the more impact that measure has on its overall carbon emissions" (City of Boulder, 2019, p. 8). The three points are awarded with one point for a "Real Time Energy Monitoring Device" for instant feedback on the unit's rate of electricity consumption, one point for a "programmable thermostat" with a manual on how to regulate energy systems (e.g., heating, cooling, lighting, windows), and one point if the tenant attends an Energy Conservation Class (p. 23). However, this last element seems to be outdated, as the City of Boulder website does not include any information about an Energy Conservation Class but instead has a ten-question Tenant Quiz on energy efficiency (8 correct answers needed to "pass"). However, the current SmartRegs website does however also have a section for tenants. It is primarily focused on energy conservation and how tenant behaviours can help conserve energy and water. The city website also lists the SmartRegs Tenant Quiz which "can help [their] landlord earn one point towards compliance" (City of Boulder, 2022f). None of the renters interviewed, even those familiar with the program, mentioned their participation in the tenant quiz.

A City of Boulder staff report details the immense communication and outreach done to non-compliant property owners ahead of the enforcement deadline (City of Boulder, 2018a).

The most significant implementation concern for renters may be the lack of compliance by some rental property owners, as it could result in their displacement. Potential displacement is possible due to the assumption that owners who make investments into their properties, energy efficiency related or not, will want to recover those costs and even generate a profit; this could be done through an increase in rent costs or selling the properties (Samarripas & Jarrah, 2021). This concern is one of the major potential impacts of SmartRegs for renters and thus is explored in more depth in findings chapter.

Knowledge transfer of SmartRegs

While SmartRegs was developed nearly ten years ago, my scan of other North American cities shows that this specific model has not been taken up by other jurisdictions. This is despite knowledge transfer and capacity building efforts from civil society groups like the Rocky Mountain Institute and the American Council for an Energy-Efficient Economy, although this policy work takes time and there is growing interest from other cities to replicating SmartRegs like policies (Petersen & Lalit, 2018; Samarripas & Jarrah, 2021). The Rocky Mountain Institute states that there are three cities in the United States with existing rental efficiency standards and three more that are in progress (Rocky Mountain Institute, 2022). This claim that the City of Boulder was the first city to develop rental efficiency standards is reiterated by the academic literature (Barrett et al., 2011). The following table was adapted by the organization's "Residential Energy+ Policy Landscape", which also includes additional information on new

construction and commercial buildings as well (Rocky Mountain Institute, 2022). From this data, it is evident that the City of Boulder, Colorado was the first city in the United States to establish rental efficiency standards which passed in 2010. The Rocky Mountain Institute stresses that "The key to a rental efficiency standard is a reduction in the total cost of living for the building occupants. While landlords may pass retrofit costs through to their tenants, tenants will benefit on the whole if energy bill savings are greater than increased rent" (Glassman & Ayyagari, 2021; Samarripas & Jarrah, 2021).

Table 3: Cities with existing or in progress rental efficiency standards (adapted from Rocky Mountain Institute, 2022)

City	**Population (U.S. Census Bureau, 2022)**	**Status (Year passed)**	**Description**
Boulder, CO	108,777	Passed (2010)	Requires landlords to meet a minimum energy efficiency standard to obtain and keep a rental license
Burlington, VT	42,645	Passed (2021)	Applies minimum energy efficiency standards to residential rental properties that use 90,000 BTUs or more per conditioned square foot for space heating purposes
Gainesville, FL	133,611	Passed (2020)	Requires landlords to upgrade efficiency and maintain HVAC equipment
Ann Arbor, MI	121,093	In progress	Starting research on minimum rental efficiency upgrades to obtain and maintain a rental license in the city of Ann Arbor

Columbia, MO	122,659	In progress	The recent Climate Action and Adaptation Plan, approved 2019, contains the action to establish a date by which all registered rentals in Columbia will meet basic energy efficiency standards. They have begun preliminary stakeholder listening sessions with property managers, owners, and tenant advocate groups.
Somerville, MA	81,175	In progress	A plan to establish a rental licensing program based on meeting minimum energy efficiency standards is outlined in the city's climate action plan

Policies like SmartRegs can be developed in various ways, which all fall under the policy umbrella of minimum efficiency standards for rentals or residential energy conservation codes (Herrmann & Krarti, 2012; Petersen & Lalit, 2018). Hermann & Krati (2012) identify Ann Arbor, Michigan as the first city in the United States to adopt an energy conservation ordinance energy with an "energy savings goals for residential buildings of 35% over a five-year time period" (p. 2). Ann Arbor's rental licensing policy from 1985 focuses on basic winterization and weatherization with objectives to reduce high energy costs and ecological harm (Ann Arbor, Michigan - Code of Ordinances, 1987). As the table above indicates, they are working on embedding energy efficiency requirements into their existing policy (Rocky Mountain Institute, 2022). However, Ann Arbour has one sizable stipulation in this code that is not specified in Boulder's code: the rental can be exempt for landlords who pay for all the utility bills (heat) and subsequently does not charge the tenant for heat or increases in energy utility bills. On a more technical note, the replicability of SmartRegs depends in part on the climate zone of the cities that are implementing similar policies. Based on the climate zone designations developed by the

U.S. Department of Energy and used by builders across the country, Boulder is in a "cold climate" area (Baechler et al., 2010). The cold climate designation is important to note because best practices for energy efficiency differ for homes in other climate zone designations[9].

While other American cities have implemented initiatives that address residential rental energy efficiency, Boulder's SmartRegs is unique due to its focus on rentals. For example, Boulder requires the minimum standard be met in all rentals, regardless of size, while other cities like New York City and Washington, D.C. with prescribed energy efficiency performance standards, only have requirements for medium and large multifamily buildings (Samarripas & Jarrah, 2021). This may be because it is easier to work with a smaller number of corporate landlords, rather than individual landlords. Petersen & Lalit (2018) also explore other mechanisms that may achieve similar outcomes like energy efficiency requirements at point-of-sale. The American Council for an Energy-Efficient Economy and the Urban Sustainability Directors Network have built a consortium of interested cities looking to advance residential rental energy efficiency programs with this kind of equity lens in the past two years. In their recent report, Boulder's SmartRegs is the only case study highlighted that utilizes a mandatory regulatory approach; the other cities' initiatives mentioned include rental rehabilitation loan programs, property tax exemptions, and financing mechanisms (Samarripas & Jarrah, 2021). It is critical that building energy efficiency initiatives can scale up, without resulting in negative impacts to affordable housing. This tension has been challenging to navigate, as prescriptive energy performance standards can be costly for affordable housing providers with financial constraints. This is

[9] For example, Toronto is also in a cold climate zone and so the energy efficiency requirements are relatively transferable versus less so in other cities that are in a Hot-Humid, Hot-Dry, Marine, Mixed-Dry, or Mixed-Humid climate zone (Baechler et al., 2010). This is not to say that the climate in Boulder and Toronto are the same.

perhaps why cities like New York City has exempted affordable multi-family residential buildings from their emission caps for now (Nedwick & Ross, 2020).

Chapter Two: Context provides a necessary foundation to assess whether SmartRegs delivered on its claims for renters. The City of Boulder is an ideal city for capital accumulation and is increasingly attractive to investors with growing high-tech industries, prominence of higher education, and tourism rooted in the surrounding natural environment. This has put pressures on the already strained rental housing market. I also demonstrate that environmental sustainability has long been a priority for the City of Boulder, in some ways to the detriment of renters, racialized and low-income residents. The policy development of SmartRegs shows that renters were involved in, and motivated to support, this rental energy efficiency policy as they were promised more comfortable homes and lower energy bills, all paid for by their own landlords. From this point, I analyzed the research findings to assess whether SmartRegs is delivering on its claims to help renters in the ways listed above.

Chapter Three: Findings

Overview

The City of Boulder claims that SmartRegs delivered three main benefits to renters: more comfortable homes, energy-efficiency improvements that renters could otherwise not access that were paid for by the landlords, and potentially lower utility bills (City of Boulder, 2018a; Petersen & Lalit, 2018). Unfortunately, there is limited evidence that renters experienced these benefits from the SmartRegs policy. The findings indicate that while SmartRegs resulted in energy-related upgrades to 32% of rental properties in Boulder, these upgrades did not improve tenant comfort, reduce energy bills for the renters, or were perceived as a meaningful upgrade to their home either for housing quality concerns or as a climate solution. It is possible that some renters experienced improved tenant comfort or had lower energy bills, but there is no data from the City of Boulder that indicates this is the case. As such, I argue that renters were not adequately considered in Boulder's evaluation of the policy nor by other industry stakeholders who conducted evaluations of the technical and financial components of SmartRegs.

To briefly outline the Chapter, I look at the City of Boulder's own evaluation and external evaluations from third parties (government and academic evaluators) of the SmartRegs ordinance and how it pertains to renters. To get renter-centered data, I conducted my own research with individual renters in the City of Boulder on their rental housing experiences and regarding topics of climate-housing intersections. Through these interviews, renters provided rich insights on the reality and perception of affordable housing in Boulder. Renters frequently experience poor rental housing quality in Boulder which speaks to how the City of Boulder is not doing enough to make rental homes more comfortable through SmartRegs and the rental housing licensing

overall. I also identify power dynamics present when renting from the renters' experiences and insights, which can make it challenging to obtain the upgrades they want and need. In contrast, the City of Boulder was persistent in their quest to achieve near universal compliance of SmartRegs through the common upgrades to meet basic energy efficiency requirements. Lastly, I reflect on the climate action opportunities expressed by the renters in Boulder, as they feel increased urgency as they face climate impacts that already harm their health and well-being. Ultimately, the City of Boulder cannot promote the social benefits that occur from climate policies such as SmartRegs if renters do not actually feel the outcomes of these improvements.

Renter-centered Evaluation of SmartRegs

I evaluated the impact of SmartRegs from a renter-centered perspective. Evaluation of public policy is critical to understanding its success (Dunn, 2017). SmartRegs has undergone several evaluations throughout the existence of this policy. According to the City of Boulder's final "SmartRegs Program-to-Date Progress Report" dashboard last updated December 31, 2018, 97% of rental units have been evaluated through an initial inspection and 96% were either compliant or exempt (City of Boulder, 2018b). Approximately 17% were given exemptions for compliance from the City following their initial assessment, which meant 1% of units were deemed non-compliant at the end of the compliance period (ibid). Given that 17% of units are exempt and less than 1% of units are out of compliance, that would mean 81% of units are compliant. Approximately 50% of rental properties in Boulder met the basic energy efficiency requirements, without any upgrades, on their initial SmartRegs inspection (Samarripas & Jarrah, 2021, p. 25). Landlords only had to make upgrades to meet the SmartRegs compliance for 32% of rental properties (ibid). This research project started following the enforcement of SmartRegs. The

fieldwork I conducted happened in 2021, which would assume that most renters interviewed are now living in compliant units. Despite the high rates of compliance of SmartRegs, it is still unclear if the policy actually improved tenant comfort for renters in Boulder.

It is worth noting that there were two studies that acted as more formal evaluations of the SmartRegs program: Arena & Vijayakumar (2012) through the U.S. Department of Energy's Consortium for Advanced Residential Buildings and Glick et al. (2015) through an academic peer-review process. Dunn notes the importance of both monitoring and evaluating a policy. Monitoring asks if the policy resulted in its intended outcome, whereas evaluating answers "of what value is the outcome" (Dunn, 2017, p. 321). The studies mentioned had a different understanding of the 'value' of the policy through more of a climate urbanism framework where emission reductions and energy savings were of primary importance. That is why this thesis research took a unique approach to examining the success of SmartRegs specifically for rental occupants.

Prior to the development of SmartRegs and throughout its implementation, the City of Boulder made several key claims about the benefits of this policy for the renters. It would improve the quality of rental homes. It could reduce utility rates (note the difference between would and could and the caution that municipality made to say that but did not do the work to encourage that benefit to tenants). It would make for healthier living spaces. However, the City of Boulder did not measure this adequately or provide this information publicly. This is evident in the final and most recent City Council item on SmartRegs "Update on SmartRegs Compliance" on September 27, 2018 (City of Boulder, 2018a). The staff report notes economic, environmental,

and social impacts in their community sustainability assessment. The language used by city staff has evolved over the course of the compliance period. For positive social impacts, staff write that inspections and potential upgrades of units can:

> promote a level of housing equity for people who rent. Renters will increasingly experience the benefits of improved efficiency such as lower utility costs and increased comfort. The SmartRegs ordinance contributes to ensuring a just transition, as outlined in the Climate Commitment, so that beneficial energy efficiency improvements reach all segments of Boulder's community (City of Boulder, 2018a, p. 3).

Further, the staff report speaks to improved "renter equity in our community" and that the program helped provide "renters, a sometimes-at-risk population, to have more certainty with variable overhead costs" as property owners had to upgrade to a more efficient, lower cost rental (ibid). Worryingly, the staff report also suggests negative impacts such as "tenants living in these [non-compliant] units could be displaced and need to relocate" if property owners fail to meet compliance by January 2019 (ibid). SmartRegs was supposed to help renters by improving quality of their housing and by lowering utility bills. This is repeated in several documents and by the key informants as a one primary goal of the ordinance (City of Boulder, 2019; Petersen & Lalit, 2018; E. Vasatka, personal communication, August 2021).

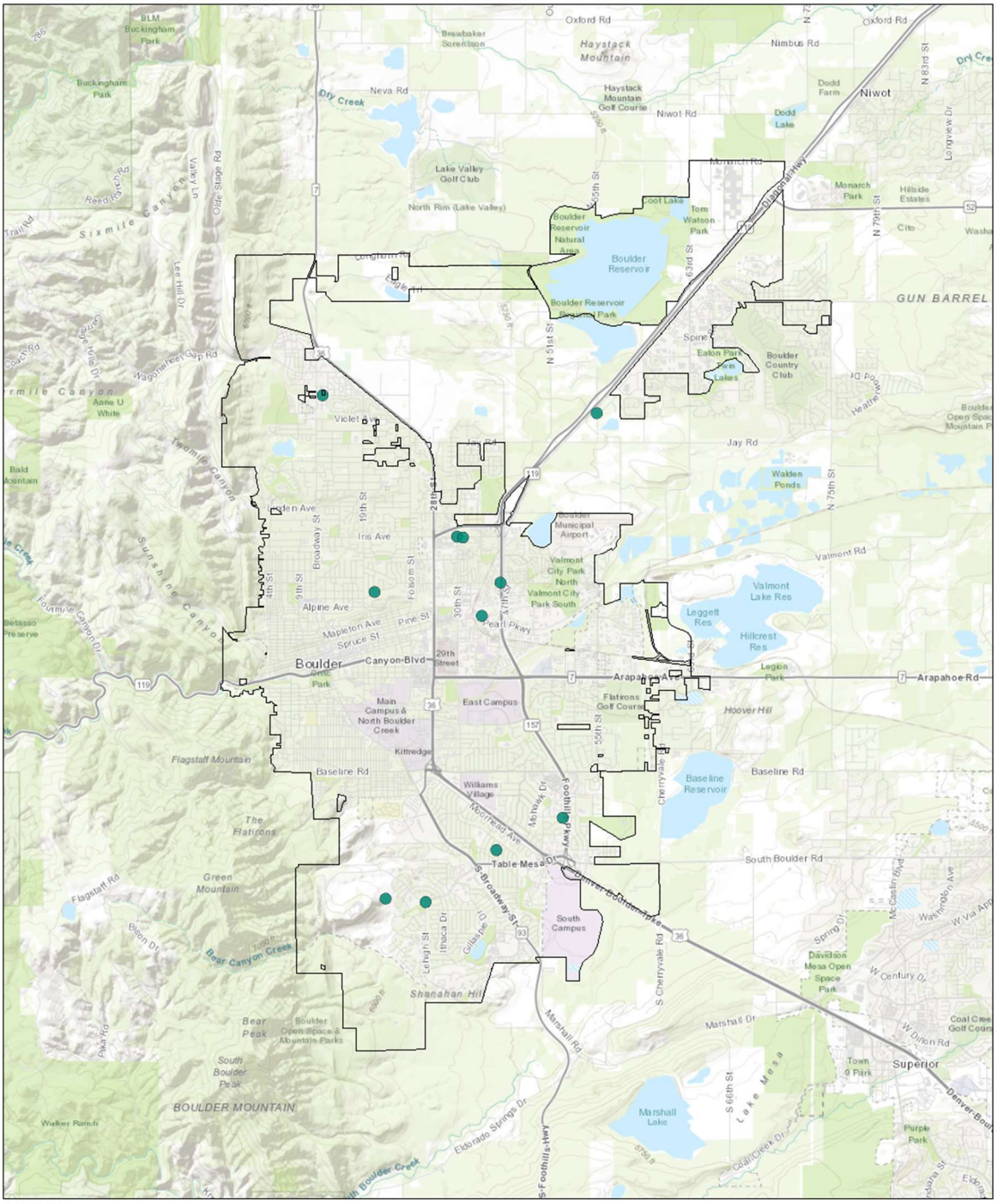
Despite goals to improve the comfort of rental properties and lower energy bills for renters, it is evident that the documents provided by the City of Boulder or expressed in other resources about SmartRegs do not contain sufficient information to examine how SmartRegs impacted renters. Both positive and negative social impacts mentioned in the staff report do not correspond to any metrics or information available in the quarterly dashboard published for the community, the

final one published in December 2018 (City of Boulder, 2018b). Produced by consulting firm CLEAResult, the dashboard tracked the participation (i.e., inspection and compliance), upgrades (common type of upgrades, number of upgrades necessary to ensure compliance), costs, and monetary and energy savings. These dashboards were inadequate in providing information about tenant comfort, and unable to demonstrate that there is better housing equity for renters or lower utility costs for renters. As such, the evaluation of SmartRegs did not adequately capture metrics that considered quality of rental housing and outcomes for renters.

Housing Quality and Tenant Comfort

The interviews conducted with renters in Boulder bring to life the reality of rental housing in the City of Boulder. Geographically, the renters interviewed are well-dispersed throughout the City of Boulder, as shown in Figure 4 below. Their experiences, perspectives, and personal anecdotes about rental housing provide valuable insight to complement quantitative data available about the state of rental housing in Boulder. The quality of rental housing is pertinent to understanding how building code regulations for existing homes, retrofits, and energy renovations may be perceived and implemented. Tenants may be concerned about increased rent payments (i.e. eco-gentrification) or feel resentment against these "green renovations" if they are prioritized over other state of good repair issues (Centre for Urban Growth and Renewal, 2020; Martinez & Clevenger, 2017; Rice et al., 2020).

Figure 4: Map of approximate home locations for renter research participants interviewed



As part of the semi-structured interviews, renters were asked to answer if they faced issues in their home that would disrupt liveability and elaborate on their answer if desired. Ten out of eleven renters interviewed identified with one or more issues in their home from the structured interview questions (see Appendix A for list of interview questions). Thus, despite the small sample size, it does feel significant to consider each of these individuals' lived experiences as indicative of the diversity of rental housing in Boulder.

Table 4: Issues faced by renters in their home from interview data

Issues identified in their home	**Yes**	**No**	**Uncertain**	**% Yes**
Pests	1	9	4	10.00%
Ventilation problems (e.g., condensation, dryness)	6	5	-	54.55%
Bad smells or odours	3	7	-	30.00%
Window drafts	5	4	-	55.56%
General disrepair	7	4	1	63.64%
Too hot in summer	8	3	-	72.73%
Too cold in winter	3	6	1	33.33%
Mould	3	4	-	42.86%
Out of date appliance(s)	7	4	-	63.64%
Flooding	2	2	1	50.00%

This list of issues identified by renters in their home was built from a survey conducted to low-to-moderate income tenants in the City of Toronto by ACORN Canada, a non-profit tenant advocacy network (ACORN Canada, 2019). It felt important to consider what issues may be detrimental to a good quality of life and provide insights on climate and energy efficiency considerations. Due to the semi-structured nature of the interviews, not all interview participants were asked about all the issues in their home. There were a few key changes to this list during

the fieldwork. Some interviewees commented that mould was not a problem in Boulder; I decided to phase out that question and instead ask about flooding for the last four interviews I conducted.

Pests were the least prevalent issue mentioned, but it was also the issue where there were several comments rationalizing that the pests were only a minor problem. Other studies that have asked renters living substandard housing to outline concerns regarding pests and bugs emphasized 'problematic' bugs such as bed bugs and cockroaches (Marquez et al., 2019). As such, it makes sense that these renters did not feel like the bugs they experienced were detrimental to their quality of life. For example, when one renter indicated they did experience pests, they said "We have a lot of bugs, but nothing too bad" (Renter 8). Another renter noted that pests exist in their home in the summer, but that they perceived this to be "normal": "I'll say not really, like we've occasionally had like bugs come in or something, but I think that's normal, especially for like a hot place in the summer." (Renter 6). Renter 5's experience speaks to this as they mentioned how they had mice in a previous unit they lived in this past year, but not this home. It may have been one factor that caused them to move if it was intolerable.

However, it is worth exploring if the lack of affordable housing allows for renters to tolerate perhaps a worse quality of housing than they would if they felt they had more choice in where to choose to live. This idea will be further explored in the section about affordability. A sense of helplessness and precarity has been observed in renters in previous studies (McKee et al. 2019). This is the case with Renter 3 who does not feel like they are particularly "picky" in terms of where they choose to rent but would like to live somewhere "habitable". The literature reflects

that low to moderate income tenants frequently face poor housing quality issues, such as pest and rodent infestations that Renter 3 experienced. This should not be an issue that they tolerate, as these concerns can have significant negative impacts on renters' health (ACORN Canada, 2019; Marquez et al., 2019).

> Renter 3: There isn't really affordable rent in Boulder that's habitable and I don't say that as a very picky person. I spent a year and a half living in a mouse infested cabin like I'm not super picky. But at the same time to pay almost $1,000 for a mouse and rat-infested cabin is like, and with landlord for like, yeah, so we don't really have installation and that like they didn't like that was a non-issue like well if you want to rent it, just realize there's no insulation here, like someone will rent this. Yeah, they know that they don't really need to do anything, and they'll just make a ton of money.

Due to the small sample size, it is challenging to say to what extent the location and neighbourhood impacts housing quality in Boulder. From the interviews, I garnered that the renters interviewed felt generally positive about the location of their home (i.e., their neighbourhood). The literature identifies measures of neighbourhood quality that correspond to housing and health outcomes, such as Pollack et al. (2010)'s metrics of "safe public spaces, access to grocery stores, and a strong social environment" (p. 516). Some renters' responses indicate that they do not feel as if there is a strong social environment. For example, Renter 11 felt that there were neighbourhoods with extreme wealth contrasts. This may indicate that these neighbourhood differences result in tension or that the sense of community may be fractured due to this juxtaposition.

> Renter 11: Boulder is definitely interesting, has a different very interesting neighborhoods where it's a mix of, like, students, and millionaires. Students from CU: grads, undergrads, graduate students, and billionaires type stuff. If you're a homeowner in Boulder, the chances you're not a millionaire is pretty low. Unless you own a home in like housing of affordable housing units.

The age of buildings is a factor when thinking through housing quality and energy efficiency. In Boulder, SmartRegs affects approximately 20,000 rental housing units. Across the United States, more than 24 million of the 34 million rental units were built before 1980 and to the efficiency levels and building standards of that time (Arena & Vijayakumar, 2012). SmartRegs does have compliance exemptions for historic buildings, as well as relatively newly constructed buildings with a certificate of occupancy issued after July 2001 (City of Boulder, 2019). While Renter 1 never explicitly said that the age of their home was a problem, it was the very first introduction to our interview. When asked about their home, Renter 1 said “my home, well my building is pretty old” and commented on how old his home was 9 times/in response to multiple different questions throughout a 40-minute interview. This was reflected in comments such as “older buildings like mine” and “it's definitely an older building, so they do keep it clean and everything but there's some parts of it that are just old”. This interviewee was not previously familiar with the SmartRegs policy; they made that assumption that their home could be exempt based on my introduction of the policy which included language about how nearly all rentals in the City of Boulder are compliant. I stated that the rental properties that are exempt often are due to historic characteristics or renovation issues that would put a significant cost burden onto the landlord (City of Boulder, 2018a). It is unclear if Renter 1 lives in a rental property that is exempt from

SmartRegs, but there is a likelihood that the age of the building indicates poor housing quality and energy efficiency, whether the rental unit is compliant with SmartRegs or not, since the renter commented over and over again on the old age of the property.

> DY: Do you have a sense of if your unit would be compliant?
>
> Renter 1: I know it's old. So, there's a chance that it could be exempt. I don't know for sure.

Poor housing quality can have significant impacts on people's health and well-being in the short and long-term. This is because housing is a social determinant of health and well-being (Marquez et al., 2019; Pollack et al., 2010). Scholars emphasize that renters have poorer health outcomes (e.g., chronic health issues, higher cost-related healthcare, health hazards like mold/dampness) than homeowners (ibid). In fact, evidence in many cities indicates that poor housing quality is experienced more by renters in rental properties than homeowners in owner-occupied housing (Chisholm et al., 2020). The interviews revealed that some of the most significant causes of health concern connected to the home (e.g., black mold) are not as prevalent in a drier climate such as in Boulder. Although there can also be adverse health effects from social factors (e.g., isolation and mental health challenges), this section is primarily looking at the intersection of health issues that connect with climate change.

To start off, extreme heat and overheating is a major concern for renters. This is perhaps one of the areas that can speak most directly between the needs and desires of tenants and what they have or lack in terms of energy or HVAC (heating, ventilation, air conditioning) systems. Overheating in the home affected several renters interviewed, although their responses towards

finding solutions differed. For example, some renters who cannot afford higher energy bills will cut back on heating and cooling (Daniel et al., 2020). Renter 8 acknowledged that some renters in the same rental property would face different levels of heat stress based on what floor their room was on.

> Renter 8: The upstairs definitely is way too hot. One of my roommates who works from home she would come downstairs to work because it gets like suffocatingly warm. And they were using the air conditioner, but the air conditioner was running so much that our utility bill went crazy, so they turned it off and they just like decided to live without it.

There is a need to improve the impact of extreme heat, which can be challenging and potentially devastating for elderly residents and people with existing chronic health conditions (ibid). Scholars have found that both public and private renters are less likely than the average homeowner to have an air conditioner or live in rooms that can be mechanically cooled (Daniel et al., 2020, p. 19). This is reflected in the comments made by Renter 1, where they feel like the cooling system in their home is already insufficient and will continue to be this way. It may be tolerable for them, but that may not be the case for already vulnerable residents and future tenants in this rental property and other older apartments.

> Renter 1: “A lot of older apartments like mine are not equipped to deal with it [the extreme heat]. I don't think the air conditioning is sufficient. I definitely don't think it will be, now it's still bearable or tolerable but at some extent but it won't be… in maybe 10 years or so.”

Some renters admitted that they would want upgrades to their heating and cooling systems, but there was hesitancy to request these upgrades from their landlords. The lack of policy regulations

that protect tenants, such as rent control to mitigate increases in rental costs, allow landlords to raise the rent at their own discretion (Samarripas & Jarrah, 2021). As aforementioned, it is unfortunate that Boulder does not have the ability to implement rent control measures due to state restrictions. This threat of increased rents can result in this hesitancy from renters to ask for renovations, repairs, and housing upgrades. The following quote reflects the importance of the policy recommendation to have protection from rent increases related to energy efficiency improvements (Daniel et al. 2020, p. 22).

> DY: So, if you have a good relationship with your landlord would you ask for that, like implementing AC?
>
> Renter 11: I would love to. Yeah, but I'm also hesitant because I don't… if he says yes, I don't want him to raise the rent.
>
> DY: Right, but you feel like that's a possibility?
>
> Renter 11: Yeah. I think if we asked.

Given the cold-climate zone of Boulder, only one of the interviewees mentioned winter and cold-temperature concerns (“keep the heat in”). It is unsurprising, given the evidence in the literature, that this renter has undertaken their own initiatives to improve the thermal comfort of their home such as through plastic wrapping windows in the winter. Despite the general lack of control renters have over changing energy components of their home, other tenants reported making small, temporary upgrades, like draught proofing, that they did without approvals (Daniel et al., 2020). Although it is not mentioned if the renters have the approvals of their landlords to do this kind of energy-efficiency measure, plastic window shrink-wrap was one recommendation from

SmartRegs inspectors in a case study of another single-family home, which does rely heavily on tenant behaviour (Herrmann & Krarti, 2012, p. 6).

> Renter 8: "Because of how poorly insulated the previous home and then we asked about specifically in our tour. And she mentioned that the windows have been replaced to make it more, to make it more insulated. But we haven't really observed that as an effective way to do it. And I don't know if we will do it in this place, because I don't know how long we'll stay, but in the previous home, two roommates like weather stripped everything to try and make it more energy efficient in the winter, and then keep some heat in. Yeah. There were some things, and I have friends, we haven't done it at our place, but a friend who will plastic-wrap the windows to make the home more energy efficient in the winter, and to keep it warmer. Might be doing that this year."

Power dynamics when renting

While the previous section on housing quality spoke to the specific issues that renters may face in their home or unit, there is overlap in this section of power dynamics. While much of this chapter could be considered in the context of the repair issues themselves, it appears more valuable to consider how the renter deals with the issues (which perhaps may be interchangeable). The findings reveal that renters do have a variety of experiences with their landlords, but ultimately there is a sense that too much onus is put on the landlord to care about the tenant's well-being in their property. This is consistent with the literature that indicates an asymmetrical tenant-landlord relationship (McKee et al., 2020). Barrett et al. (2011) also noted that renters supported the initial SmartRegs proposal due to general wealth and income disparities between renters and owners. Class and income are factors to consider when examining power dynamics. Chisholm et al. (2020) has examined various dimensions of power

as it relates to rental housing quality regulation. The authors found that current forms of regulation are inadequate because the "visible, hidden, and invisible dimensions of power" act in conjunction to render renters ineffective airing and resolving grievances about the quality of their home (Chisholm et al., 2020, p. 139). There is evidence from the literature and in the interview transcripts that renters carefully weigh the pros and cons of getting their landlord or property manager involved in what they perceive as "minor issues". Daniel et al. (2020) found that private rental tenants consistently had requests for improvements refused unless it was necessary to "meet minimum housing standards (e.g. fixing a broken hot-water system)", which was a factor in their poor relationships with their landlords (p. 29). This was the case for the following renters who did not feel comfortable asking their landlords or property management companies for repairs when they are not perceived to be major repairs. There is an element of self-restraint reported by renters as well, who may feel like they must tolerate a lower quality of rental housing (Marquez et al., 2019).

> Renter 1: "It tends to get pretty drafty and windy sometimes. But it's not it's anything that we can't handle."

Other studies have shown that when renters requested repairs to their unit, landlords in private rentals made remedial repairs or continuously neglected issues in their rental properties (Marquez et al., 2019). This phenomenon came up with one of the renters interviewed, who expressed frustration at how little money and effort the landlord put into repairs that the renter had requested.

> DY: Can you tell me more? Like are there repairs that need to be done or no?

> Renter 2: It was, it was done very cheaply, clearly, I know the landlord… He complained a lot and he didn't want to put in the money, and he put in the least amount possible. And it was always a mess, and he did a lot of the work himself with his son and so it was just, yeah so that's really the maintenance or lack thereof has been very, very challenging at times but he'll do it.

When this phenomenon happens with repairs or upgrades that pertain to minimum housing standards, renters may feel discouraged from asking their landlords for other home upgrades such as upgrades related to energy efficiency, heating, and cooling. In fact, Daniel et al. (2020) found that renters perceive landlords' primary motivations as maximizing the profit generated from their properties and that "sustainability-focused upgrades were not seen as smart investment decisions by the landlords" (p. 32).

It is evident that power dynamics and repairs go hand in hand. Renters may also face a degree of insecurity of tenancy if they make complaints against their landlord if repairs or upgrades are not done, or if they face rent increases (McKee et al., 2020). Repair issues can be a primary area of conflict and concern for renters and landlords alike. Based on the literature, it was clear that repairs and maintenance of a rental home relies heavily on the relationship between tenant and landlord (or property management company) such as to ensure rental housing quality assurance (Chisholm et al., 2020).

> Renter 11: "So we have our landlord and then his son is the one that maintains the property. Okay, so I talked to his son, I probably haven't spoken to my actual landlord in years. But it sounds great. We text, mostly almost exclusively when there's an issue that comes up, and he's usually like right on it within like 48 hours."

Some renters expressed satisfaction with the responsiveness of their current landlord because they have had negative experiences in the past. The literature indicates that the lack of landlord responsiveness can make renters feel a loss of control over their home (Marquez et al., 2019).

> Renter 1: “They're pretty responsive. They're not a bad property management company. I have dealt with worse. This company, they respond.”

However, there is a contrast in the response time, desire to maintain the property up to a certain standard, and willingness to meet the needs of the tenants by some landlords, property owners, and managers. This renter requested repairs to their kitchen, but the request was denied by the property management company. Again, this speaks to similar experiences that Daniel et al. (2020) found where private rental tenants consistently had requests for improvements refused unless it was necessary to meet minimum housing standards, although this definition and understanding of what a minimum standard entailed can differ between landlords.

> Renter 3: And the, the wood underneath the in the cupboard underneath the sink was like, kind of destroyed. And the guy [property management company] was like, “Oh yeah, it's just too complicated to fix, we're just not going to fix it.”

Tenants may feel resentment if they are told to make upgrades or changes to their home that “add value” to the property that they are paying for themselves (ibid).

> Renter 9: “The one thing that was weird about this apartment was that there's no light in the living room. There's a little hole in the ceiling for it and when I asked about it, they said yeah you don't get one, but you know if you want to buy one, we’ll install it for you free… and I'm not buying you guys [the property company] a light.”

In some cases, tenants who bring up repair issues have been told by their landlord to pay for the modifications or changes (Chisholm et al., 2020). The literature speaks to this precarity being

more prevalent in renters who are on short-term contracts and may feel they could be subject to a rent increase or asked to leave if they make complaints (McKee et al., 2020).

> Renter 1: “Sometimes it's difficult to get them to pay for repairs that they that they should be paying for. At my last house where I lived for a couple of years, we had to pay for the garage door repair and toilet plumbing repairs, we had been there for a few months, and we had to pay for the plumber.”

These power dynamics may improve with the length of time a renter has lived in a home or unit, but there is not a clear correlation based on the interviews with the research participants. Some renters feel a sense of ownership or “self-reliance” to make these changes to their home. The relationship with an individual landlord versus a less personal relationship in corporately owned housing may account for some of this variation in how renters approach repair issues in their home. The following quote does indicate a sense of ownership over their home; they know “how to take care of the house” and the renter is willing and able to do upgrades as needed. The upgrades the renter does either may not need approvals from their property owner or that they are seen as positive improvements to the home that the tenant is willing to do.

> Renter 10: “So, we haven't asked [in response to question about general disrepair issues], like we don't ask for a lot from him. And then have a lot of self-reliance to take care of things. And in, you know, like, like I clean the gutters, I do that what you know like all the like seasonal things. I know how to take, I've been there so long, I know how to take care of the house. And then we just do upgrades as needed.”

It is worth considering the differences in the perspectives and behaviours of renters when it comes to these “minor” repairs in their home. Some renters feel a sense of ownership or “self-

reliance" to make these changes to their home. The relationship with an individual landlord versus a less personal relationship in corporately owned housing may account for some of this variation in how renters approach repair issues in their home. In addition, other renters, like the one below, may feel like the cost-benefit analysis of doing small repairs on their own is better than 'dealing' with the landlord. That is to say, renters know that the request may involve communicating with the property owner, waiting for their response, potentially getting their request refused, or even if the request is approved, scheduling and following up.

> Renter 4: "I'd say the last house had some things that you know, you know, sliding door wasn't great or like you know the wood was chipping off or, you know, they were just kind of odds and ends like that. This house, I fixed a bunch of stuff when we moved in because I just didn't want, they were like five or $10 repairs and so I didn't really want to put it up like deal with the landlord. Yeah, I just fixed it myself."

The renters I interviewed frequently brought up issues in their home in a way that minimized their importance, despite finding them feeling significant enough to mention during the interview. It is evident that there are many problems that renters find at least unproblematic to live with or not worth the hassle of raising with the landlord, but this does not mean that these repair issues are minor. This speaks to the power dynamics inherent in being a habitant in a rental property, a sense that it is not quite "theirs".

> Renter 7: I think, like living here, like I imagined that if I own this home, like, there's so many projects in this house that would become my responsibility that it's really a disincentive to want to own this place. And all those things that are too small, like for me to worry about, to like, give her [the landlord] grief about them.

But you know, it's just things like the vanity and the bathroom is old and it just doesn't look very nice anymore and it's something I would replace if I owned the place

DY: Right, but when does it become like important enough to?

Renter 7: Not while I'm here.

Some renters spoke to how housing quality issues prevented them from full enjoyment of their rental property and home. The conversation below indicates that some renters must make changes to improve the thermal comfort of their home, but it may not be a fully functional solution. Although it was not evident if the renter raised this concern to the landlord, these repair issues can have a significant toll on renters' quality of life (Chisholm et al., 2020).

Renter 11: Some of the doors, especially our door, just the sliding door to get to a backyard is pretty awful. Like that is slanted a little out of its, its track, and there's actually like a half an inch of just a whole going straight outside, so we just we just like tape that over in the winter we barely go outside into our backyard because we just want to keep that door shut.

DY: If you're close to it and you don't do that... Is it like physically cold near it?

Renter 11: Yes. Yeah, you can just feel gust of wind coming in. Just like Gorilla Glue tape over it, and that keeps it out.

It is unclear how tenure or length of stay impacts the renters interviewed; however, the literature does indicate that it does matter as renters with short-term contracts (e.g., 6-12 months) (Kearns et al., 2000; Moore et al., 2019). Another factor that may impact renters' perceptions of their landlord's actions and housing quality can be their previous experiences. For example, one of the

renters specifically spoke to her personal familiarity of being a landlord previously and how that impacts her rental experience.

> Renter 3: “So there are a few things that are kind of funky you know like I said water damage on the hardwood floor, broken tile, [incomprehensible speech] couple of rooms. A dishwasher that totally needs to be replaced.
>
> The kitchen sink is pretty much destroyed like there's hardly any porcelain left on there.
>
> In the shower, they have like those little soap trays that are kind of built into the wall. That has I think previously been broken into like five or six pieces and somebody just super glued it back together.” …
>
> “None of it's like a deal breaker, but all of its like, you know, years prior, I was a landlord. I was like, Oh my god, I would never do that.

Even though Renter 3 acknowledges and made a positive value judgement (“healthy capitalist mindset”) for landlords to want to make profit on their rental properties, they still felt like landlords should want to have comfortable rental properties for their tenants.

> Renter 3: “When I was a landlord, I want to rent a place that felt comfortable that for me to live in. Not like what's the minimum I can do to get by and what is the most I can charge, I realized that's like a healthy capitalist mindset, but I don't really adopt that. I think that when you take that to the extreme, it feels predatory.”

Connecting these power dynamics back to SmartRegs, some renters are specifically made aware that the landlord did repairs because of SmartRegs to their home and/or unit. Renter 4 has only lived in their home for a few months, thus this conversation with the landlord happened relatively recently (prior to fall 2021 when fieldwork occurred). The following quote illustrates

the conversation that the interviewee had with their landlord regarding upgrades they made to achieve SmartRegs compliance.

DY: And you said like there's been like windows were repaired or like replace like 10 years ago or something?

Renter 4: Yeah, it looks like she did some upgrades in here. And I think she said, 10-15 years ago. So, these all are not the original windows. And I can tell that a lot of like ceiling was done, and the crawl space was upgraded, and it looks like a lot of new installation was put in and things like that.

DY: Do you know why she did those renovations?

Renter 4: SmartRegs.

DY: Okay.

Renter 4: She told me yeah. I think so. They blew all insulation in the exterior walls; you can see the holes in the brick, so I think that was for SmartRegs and then she there's new lighting around the outside of the house I think that's all SmartRegs too.

In fact, this was the second landlord of renter 4 who talked about SmartRegs to their renters. This interviewee below assumed that a policy like SmartRegs would have a financial impact on the landlord but that they did not appear to have a negative opinion of the policy. This is an interesting insight to consider, although there are expenses associated with owning a property, it appears that the interviewee considers this an additional cost to the landlord due to city regulations. If the cost was higher to do renovations, perhaps they are indicating that the landlord would have had a worse opinion of SmartRegs.

Renter 4: My last landlord talked to me about it a little bit, and then this landlord mentioned it, when I was looking at the house.

DY: What did they say?

Renter 4: I don't think… they didn't seem to have a negative opinion of it. I mean, I'm sure it cost them money.

Some renters feel that some landlords who are seen as responsible or up to date on municipal matters would have compliant units. In a study of several Western countries, Chisholm et al. (2020) similarly found that some landlords, like those who pay for water and heating, may be more responsive or attentive to maintenance and repairs only because it will affect them financially.

Renter 6: Based on just like what I know about the place I would assume they are compliant. Because it sounds like they're kind of up on that type of stuff and like with the Xcel Energy they had done that done on their way to just do whatever upgrade, they just did so it seems like that would be something they would be in compliance with, but I don't know for sure.

If some renters assume that their landlords are responsible and likely would have compliant units, there is an unspoken assumption that landlords who are out of compliance are irresponsible in contrast.

DY: Do you have a sense if your unit is compliant?

Renter 7: I don't have any evidence that anyone's checked in on this place and any anytime. Recently, at least not since we know since we came, and, but yeah, I guess my sense is that it probably is just because I don't think she [the landlord] would have insulated the crawl space otherwise. She is like a very much like a rule follower, like she

very much wants to like do the right thing. Yeah. And so, I'd be surprised if it was out of compliance.

The evaluation of SmartRegs does not appear to have any commentary on the reasons for why certain rental property owners continue to have units that were out of compliance, despite the City's frequent communication at the end of the compliance period (City of Boulder 2018).

As mentioned above, there can be a wide range of what is considered acceptable for a minimum standard of housing quality (Daniel et al., 2020). There are differing opinions on what the responsibilities of a landlord or rental property manager should be in terms of keeping up with their unit and ensuring a certain maintenance level. One interviewee spoke to their surprise that landlords would not just make these upgrades on their own in order to have and rent out a comfortable home and unit.

> Renter 3: All of the super simple things you can do to make the home more comfortable and more energy efficient, and they're really simple, very cost-effective things to do. And so, it's dumbfounding to me that other people don't value them or don't care enough about their renters to make them comfortable, right, like I feel like for a lot, I don't know that it's universal but a lot of folks who are renting can't afford to buy. And so, if you just make the assumption that a lot of renters are in a lower economic bracket than a lot of landlords. The fact then that they're having to pay more in utilities, because their landlords are unwilling to invest in smart energy efficiency measures. Once again, just feels really awful. You know, it's like pocketing profits at others expense. And it just, I don't know, it just gives me a yucky feeling like, why wouldn't you put in double pane windows, why wouldn't you blow like recycled jeans or whatever that, you know like,

> environmentally friendly installation is like, why don't you blow that into the crawl space, why don't you patch that huge hole in the siding where the squirrels are getting in like, why, why don't you care. Right. Yeah.

Some renters spoke highly of their landlord, especially when they felt they had shared decision-making for elements of their home. Scholars have also found that "tenants desire for housing repairs or improvements conflicts with landlords' willingness to carry these out" (Chisholm et al., 2020, p. 147). When the reported problems are successfully resolved, renters can feel like there is better balance in the tenant-landlord power dynamic.

> Renter 2: "We have a good relationship and I'm the point person, collecting rents and managing utilities and everything and just manage all that all the work and inform them on what needs to be done and stuff like that. So throughout, over the year, we got closer and closer and so then it came to the point where he was looking for renters I was in the situation, I needed to decide what to do. And because of his trust in me and you know he did check references, he checked people's and employment history and things like a little bit, but a lot of it was based on my word, and so just to give you an idea of like how, like, it's really at that stage now and so we're yeah pretty close, I guess, for landlord-tenant."

Beyond repairs, it is also worth noting the relationship some renters had with their landlords to pursue creative housing opportunities like formal and informal co-operative housing models. Given that one of these renters had lived in their unit for the longest time (from the sample), it makes sense that they have built a positive relationship with their landlord to reside in the same place for several years.

> Renter 10: “And through just going through the process of housing justice advocacy, I have incorporated helped the house incorporate as co-op. And he [the landlord] signs off on it and he's supportive and proud to be able to be someone who can offer affordable housing.”

However, one renter also commented on how their landlord’s main priority is still generating profit. It is an added bonus that the tenants in his rental property have a shared social purpose.

> Renter 2: “Yeah, he wouldn't care who would be here as long as he's getting paid is the bottom line, but he does rest better at night, he said this, and he said he feels better, and he loves the fact that it's that [an intentional community].”

Rental housing for whom? Students, race, and class

Race, class, and gender may also factor into the power dynamics and relationships between landlords, tenants, and other property managers. Affordable housing in Boulder relates to a diverse range of renters (Boulder Housing Partners, 2022; City of Boulder, 2022a). The literature indicates that students make up approximately 30% of renters in the City of Boulder (Barrett et al., 2011; U.S. Department of Housing and Urban Development, 2018). The interviewees frequently referenced renters in Boulder as part of the student population, speaking specifically about the undergraduate student body. This makes sense as most students rent rather than own their own property (Barrett et al., 2011, p. 201). None of the renters I interviewed were undergraduate students (note: despite initial interest from possible research participants who were in their undergraduate studies, these interviews did not pan out due to scheduling conflicts or personal challenges like one individual contracting COVID-19).

> Renter 11: “Boulder is also home to like 35,000 students that come to CU [University of Colorado Boulder]. We’re the biggest university in the state in Boulder. And it's really frustrating for students -- grad students not so much, because we usually will have more income, and like, can afford places like this -- but for undergrads and especially students who come from, you know, less privileged families they are trying to find like affordable housing and you find affordable housing by pairing up with a lot of people, and Boulder won't allow it.”

There are different opinions on whether student renters are concerned about affordable housing, which may make sense as they should not be considered a homogenous group. For example, the following quote shows that some renters in Boulder perceive students at the University of Colorado Boulder to have a certain level of financial privilege.

> Renter 1: “A lot of people, the kind of students who come to Boulder are generally people who can afford it.”

In addition, there was little mention of racialized renters, although some of the interviewees appeared to be visible minorities. Although this topic of whiteness and systemic racial discrimination was under-studied as part of this research project, scholars have theorized on this phenomenon in Boulder. As mentioned in Chapter 2, Fluri et al. emphasizes that “Whiteness operates as an essential framework for understanding Boulder’s self-representation as a healthy, socially inclusive, and liberal environment as well as a site of wealth and wealth generation (particularly in the housing market)” (2020, p. 1). Whiteness contributes to the “invisibility of non-white and low-income persons in Boulder,” which has “material effects on access to housing for people who fall outside of the norm” (ibid, p. 5). Fluri et al. argues that the City of Boulder’s

affordable housing plans fails to address the underlying systemic racism that drives spatial segregation (ibid). One renter spoke to very similar sentiments of how systemic racial discrimination affects renters and the rental market in Boulder.

> Renter 11: "I think that it's just like maybe an unintended systemic issue where it's just too expensive to live here even to rent. It's too expensive. So, in a society where a vast majority of minorities, don't have nearly as much wealth as the white families I think you just end up with clusters of non-white students or residents in small areas where is just affordable housing or affordable. In general, the cost is what drives I think segregation."

Another interviewee noted that they knew several other people who have had negative experiences with rental housing in Boulder. Although it is hard to say what their poor living experiences entailed, it is consistent in the literature that speaks to racial and ethnic disparities when looking at housing instability and hardship. For example, in the U.S., African Americans and Hispanics at all income levels have worse health outcomes which correlates to poor housing quality (Marquez et al., 2019).

> Renter 10: "Every person I've talked to who isn't white passing, you know, [not] hetero-normative white person has had really bad living experiences with housing, like in different ways, and it may not be unique to Boulder, but it hurts that we can't do better, especially [for] our international students."

"Affordable rent and Boulder are an oxymoron"

Cost and affordability are significant concerns for renters in Boulder. Rent is the primary metric in which rental housing is defined and understood, but utility payments and miscellaneous additional costs do impact the affordability of homes as well (Chisholm et al., 2020; Marquez et

al., 2019). Some metrics consider the "gross rent" which combines the cost of rent and typical additional costs like utility bills (Daniel et al., 2020; Melvin, 2018). The City of Boulder envisions "high-performing, safe, well-maintained and attractive buildings and infrastructure that accommodate a diverse set of community needs for working, playing, and living"(City of Boulder, 2022a). However, this vision for the city is not the present-day reality for renters in Boulder based on the findings.

Renters interviewed are well-versed in this lack of affordable housing in Boulder. Some renters, like Renter 3, blame this problem on the landlords.

> Renter 3: "Obviously cost is a huge issue. I think landlords just increase rent because they can. The rents are just insane. Affordable rent and boulder is an oxymoron."

The City of Boulder's explicit goal to create affordability for low- and moderate-income households resonates with many renters interviewed for this project. As one renter said, there is a real need for affordable housing for renters in Boulder who are above the threshold of low-income renters.

> Renter 5: There's just a real lack of anything to support a middle class. So, there's a lot of good options for affordable housing if you make like under $40,000 a year. And if you're wealthy, there's a lot of options too. But there's really not any options for people who are kind of in the middle. So, it's hard to find a place to rent that is not more than 30% of your income. And it's really hard to buy, so you are kind of stuck as a renter for a long time.
>
> DY: Do you feel like that's yeah the reality for a lot of like young people?
>
> Renter 5: You know, that I think the majority of people I know will not be able to buy. Unless they get financial assistance like Boulder's just completely unaffordable nonsense."

The reality is that there is an affordable housing crisis across the United States, Canada, and in many other countries in the Global North (Anacker, 2019). Some renters specifically compared the cost of living and rent in Boulder to other cities in the United States, including some places they have previously lived.

> Renter 1: “It's not that I can't personally afford it. I mean there's a lot of people who, for whom it's much, much harder. I would say the expense of it and how much it increases every year as a little, it feels to me like it's a little out of proportion, as opposed to other cities and towns in the US -- it's definitely on the higher side.”

Some renters referred to historical reasons for the lack of affordable housing and high cost of rent in the City of Boulder.

> Renter 9: “So I think that Boulder has historically not built nearly enough housing. Yeah, and as a result there is housing is extremely expensive for a very small town like boulder like it was more affordable for me to live in a like hot neighborhood in Chicago, than it was for me to live in Boulder.”

Although the renter did not elaborate on this historical analysis of limited housing supply, I note there is and has been unequal access to housing, for example, for racialized renters in the City of Boulder. For example, scholars have identified previous practices of racial discrimination in the real estate market and process of marginalization through access to housing and property in Boulder (Fluri et al., 2020). However, these processes of racial capitalism through housing policies are not unique to Boulder and are also prevalent in other American cities (ibid).

Landlords play a significant role in determining the cost of, and thus, affordability of, rental housing (Desmond & Wilmers, 2019). For example, landlords frequently exploited tenants in terms of rent costs (exploitation meaning "over-charged relative to the market value of a property") in poorer neighbourhoods to make up for high turnover risk and thus extract higher profits (p. 1110). Despite the need for affordable housing in the City of Boulder for low to middle income residents, the findings similarly reveal that the supply of affordable housing is often dictated by the decision-making of individual landlords. The interviewees often point to individual landlords making moral and even generous decisions on behalf of the tenant, even when the capitalist underpinnings of the rental housing system are designed for them to neglect the tenant and the property while increasing profit. This is the case with Renter 5 and their perception of the landlord's motivations:

> Renter 5: "My home. I live in right now I really love because my rent is cheap for Boulder. This house, our landlord bought in like the 60s or 70s and he's just like it's old, he doesn't really believe in raising the rent, like his mortgage is paid and he's just like a nice guy."

Some renters have positive relationships with their landlords, especially if the renter has lived in their rental property for several years, built trust, and subsequently gained a sense of stability in their ability to stay in their home. This is the case with Renter 10 below:

> Renter 10: "And I like the affordability of our home. That's because of two reasons one is our landlord isn't a greedy, terrible person. And two because we've been living as a community house and a co-op for 17 years, so there's that's been able to create a culture of sharing and keeping it affordable."

It is interesting to consider how much the market influences landlord behaviours, in the context of limited rent control and protections for tenants. For example, although Renter 7 notes that their landlord did not intentionally go into the business of managing a rental property, they are likely to raise the rent for their own tenants due to what they see as a standard rent rate in their neighbourhood.

> Renter 7: "I just imagined my landlord who is sort of one of these reluctant landlords who happens to have an extra house because she moved in with her boyfriend husband, now husband. And I assume that when she looks at Zillow next summer and see that has the price went way up and the estimate for the rent went up. She'll probably increase the rent."

It is possible that some landlords do feel empathy for the renters they rent units to. For example, the COVID-19 pandemic meant that many renters across the country struggled to pay rent due to reduced wages or loss of employment (Joint Center for Housing Studies, 2022) Some landlords may have extended their financial privilege to ease the financial burden for some of their tenants. This was the case for a friend of Renter 9; although this seemed to be a tad frustrating for Renter 9 as they did not personally benefit from this reduction in rent.

> Renter 9: "Apparently during the pandemic, one of my friends ended up taking over the lease and I guess they [former landlord] just pre-emptively said Hey like you know COVID is tough, halved rent, without even being asked."

Rental housing in Boulder is in limited supply. This is reiterated by several renters as one of their main housing concerns in the City of Boulder. There is also a lack of affordable rental housing supply in cities across the United States (Anacker, 2019). The following quote from Renter 7,

however, shows that their desire for more rental housing apply is also complemented by their want for walkable, dense, complete communities that prioritize people over cars.

> Renter 7: “So I'm sort of like a radical YIMBY. And I really feel like, well, it's, it's the simple answer is that there's not enough supply of renting which drives up prices. And so, I think that Boulder would be a lot better and more beautiful if we had walkable neighborhoods with dense, denser configurations and we didn't hand over so much space to our cars”

It is unclear to what extent the impact of the COVID-19 pandemic had on the rental housing supply in Boulder. As Renter 6 says in the quote below, there may have been a dip in rent costs from what renters saw, but that this phenomenon was short-lived and that the rent costs have stabilized and started to increase yet again.

> Renter 6: “I'm more just concerned about general housing scarcity and supply and demand in Boulder, which I think it's coming soon… there's some like weird swings during the pandemic…. At some point, apparently rents were going down when I think people were like trying to move out of more city areas, then they apparently rent, and home prices surged the summer and now maybe they're back to being stabilized.”

The fieldwork occurred prior to the 2021 municipal election, which put housing issues at the forefront of key political agendas. Several renters spoke to wider housing issues they felt were prominent in Boulder, such as a local campaign to end rental occupancy limits called “Bedrooms are for People” (Bedrooms Are for People, 2021). Occupancy limits are also part of the City of Boulder’s rental licensing policy (the same policy that includes SmartRegs) (City of Boulder, Planning & Development Services, 2021). For example, the following quote by Renter 5

indicates that the increase in rent costs without a similar increase in wages is negatively impacting low-income renters and may have resulted in increased homelessness for individuals in Boulder.

> Renter 5: "The prices have gone up without wages going up, which just leads to. I mean, which is resulted in like a huge increase in a hole in our homeless population. And I don't think people understand that there's like a direct connection between increases in rent and a homeless population increasing. I think it's definitely a system that really privileges wealthy homeowners, so I'm not sure if people told you about the bedrooms are for people initiative. I think that's an issue."

The "Bedrooms are for People" campaign aimed to change City of Boulder's occupancy limits, which currently limits rental properties to no more than three unrelated renters in one dwelling (Bedrooms Are for People, 2021). Some residents, like Renter 11, saw this as a good solution to increase rental housing supply and improve housing affordability.

> Renter 11: [The biggest housing issue is] Affordability and the zoning laws. Mostly affordability driven by the bad zoning laws" … I think so, because the landlord would still charge the same amount. They're at a competitive market rate. Yeah, but it's more expensive if you have to split that among three people instead of four or five.

Renter 3 was involved in the Bedrooms are for People campaign and spoke to how some people found loopholes to this policy by living with their relatives. It is unclear if he would have done so anyways, but it does indicate that renters are paying attention to policies that regulate their rental properties and how these policies can potentially impact their housing situations.

> Renter 3: The only exception to that [occupancy limit] is that if you live, like I lived with my brother the first couple years I was here, so we counted as one person under that rule.

Renter 7 also spoke to the popularity of the Bedrooms are for People campaign, thanks to a number of endorsements from the Sierra Club, the LGBTQ Alliance, other unnamed community organizations, and even the Boulder local business chamber of commerce.

The landscape of rental housing is essential to understand SmartRegs, particularly when thinking through whether it contributed to the affordable housing problem in the City of Boulder. The lack of supply is compounded by other housing forces such as increased demand for housing with technology companies growing their workforce in Boulder, like the new Google offices in North Boulder. Some renters felt the new Google campus was influencing development in Boulder, as well as a general tech boom that put additional pressures of housing demand in a rental supply-strapped Boulder. This is exemplified in the following quote by Renter 1:

> Renter 1: "It is a college town and enrollment is always increasing. So, I think that has a big part to play in it. I guess landlords are not incentivized to lower the rents or keep them more stable. There's always an increase in demand and there's always students moving in and people moving in and there's recently been more, you know, tech people. I'm a tech person, but more tech people moving into Boulder. And I think that affects it a lot."

The Google offices have resulted in increased development where they are located in the City of Boulder. There is some evidence that these new development areas are not viewed positively by residents in Boulder, as indicated in the following quote by Renter 4. Most of the housing in Boulder is low-rise, as the City of Boulder has a building height restriction[10] of 55 feet in most residential zoning areas (Boulder Land Use Code, 1981).

[10] This building height restriction is at the discretion of City Council development approval. However, given a typical building story is roughly over 15ft, it makes sense that there are not that many buildings above four stories.

> Renter 4: I would say like the big the densest developments going up in Boulder right now are all near where the Google offices are. And those are like four to five storey apartment blocks, and people really hate those. But I would say, even if you built a duplex in a neighborhood next to someone, they probably still be upset about it, so I don't know that there's any winning.

Renter 4 goes on to explain that there are other areas in the City of Boulder that are experiencing new development. Housing and land use policy was historically shaped by Boulder County and the City of Boulder for environmental conservation purposes. As such, the following quote shows that these new development areas are concentrated in underdeveloped areas that are zoned for higher density.

> Renter 4: So, basically, all of the new development that's happened in Boulder in recent times has been all in like one of like three spots… basically it's like around Google. Far North boulder because there's a lot of undeveloped land up there and they zoned it for more dense buildings. I don't know maybe … oh and then like downtown boulder they've done some like tear out old commercial buildings or parking lots of like build new condos and things like that so though, I mean basically there's like three or four areas where everything has been concentrated.

City staff stated "market forces will drive rental costs more than SmartRegs", indicating that this proposal is "achievable and reasonable" and would not impact the majority of homes that would already be compliant with the proposed energy efficiency baseline (Urie, 2010). This may indicate that the City of Boulder knew, and wanted to set the baseline intentionally low, so that it would not impact a significant number of rental properties. And yet, the City did recognize the risk and threat of property owners increasing rent during the policy development of the

SmartRegs ordinance. City officials acknowledged the possibility of rent increases from individual landlords, especially as this was a common theme in the public feedback from landlords (City of Boulder, 2010). Local reporters raised this issue "The costs of making the improvements could be passed on to renters because they, not the owners, would see most of the financial benefits of having more energy-efficient homes… To the extent market conditions allow, staff assumes that property owners will try to recover any expenses through rent increases" (Urie, 2010). This sentiment is also shared by some of the research participants.

> Renter 6: "I'm kind of thinking that like the general housing market trends probably matter a lot more than whatever they're doing with energy efficiency upgrades for right now for this unit at least."

Some renters even went out of their way to show support for SmartRegs or similar energy programs, noting that they felt it would not increase housing and rent costs relative to other problems. There are many reasons for a lack of affordable housing in cities such as Boulder, such as the financialization of housing and lack of rent control that maintains low rental costs (August & Walks, 2018; Hammel, 2017). The sentiment below from Renter 4 makes sense in this context, especially if renters view regulations like SmartRegs as ultimately positive in its attempt to improve housing quality and energy efficiency.

> DY: Do you think like is that a concern for like you and your roommate, like, how much rent is?
>
> Renter 4: For sure. Yeah, affordability is a huge concern, but to be honest with you, I never really thought of it in terms of the energy efficiency stuff, I always thought of it in terms of, you know, lack of housing and Boulder. So, you know, to me, in principle, I'm

> totally fine with it, an energy program, because I think there's other problems that are driving up costs more than that.

However, with additional prompting, Renter 4 articulated the importance of measuring the impact the SmartRegs policy had on affordability in terms of rent and utility bills.

> Renter 4: I think something they could do to enhance it [SmartRegs] maybe is, say like, okay, capture like a year worth of costs before you make the changes, and then capture a year of like utility bills after, because there's no other way to know for sure. Like, like if I lived in this house before my landlord did the SmartRegs stuff, would I be paying more in utility bills? Maybe was the coinciding raise in rent over the past couple years, does that offset it? Like it's really tough. And so, I guess, to answer your question, if I am saving money because the city has implemented SmartRegs and whatnot. I'm either not aware of it or, I don't think about it much.

The City of Boulder was supposed to provide information on "rent increases, if possible" in their annual reports on SmartRegs from 2012 to 2019, but this information either does not exist or was not made available to the public (City of Boulder, 2010, p. 16).

Although City of Boulder did not look at SmartRegs' impact on rents, it does in fact understand that the policy could have severe impacts for tenants once the ordinance is enforced for non-compliant units. Worryingly, the staff report suggests negative impacts such as "tenants living in these [non-compliant] units could be displaced and need to relocate" if property owners fail to meet compliance by January 2019 (City of Boulder, 2018a). The staff report states that there are 2,990 non-compliant rental units, which equates to 1,500 non-compliant rental licenses indicating some property owners own multiple units (ibid). The housing mix of these non-

compliant units are “a mix of residential buildings, including single family dwellings, as well as larger apartment buildings, which have a greater impact on the number of dwelling units which may become unavailable for rent in 2019” (p. 4). Action was said to be initiated on January 2, 2019 to all non-compliant units. Although the displacement of tenants is acknowledged as a potential concern, the City does not provide any information regarding protections for these tenants or information to the tenants on what they should do in this scenario.

Given the housing market and lack of affordable housing in cities like Boulder, it is even more imperative for municipalities to consider protections for renters (such as preventing displacement, not creating new ways to potentially displace them) and evaluate impacts on housing affordability. In a capitalist society where housing has immense exchange value, in which landlords and property owners want to generate as much surplus value and profit from their rental properties, government policies that impact rental housing must put in protections for tenants. For example, landlords may increase rent if they face the potential fines from rental licensing inspections. In addition, owners who make investments into their properties, including energy efficiency upgrades, will want to recover those costs and possibly generate a profit. To increase their profit margin, landlords may either increase in rent costs or sell the properties (Samarripas & Jarrah, 2021). While the interview with city staff emphasize that SmartRegs did not increase rents or cause displacement, the City of Boulder’s own Racial Equity Plan says that energy efficiency and climate goals did have an indirect impact on housing affordability (City of Boulder, 2021). Without clear protections for tenants at the policy design and implementation phases, the potential for displacement of renters exists. This will be further explored with key policy recommendations in the conclusion.

SmartRegs' impact on utility bills for renters

The City of Boulder consistently identifies three reasons why SmartRegs would benefit renters: renters will live in more comfortable homes, renters will get home energy upgrades that are paid for by the landlords, and renters may experience lower energy bills (City of Boulder, 2018a, 2022f; Petersen & Lalit, 2018; Samarripas & Jarrah, 2021). The first two reasons were promised, but the City of Boulder is careful to put a caveat when claiming SmartRegs could result in lower energy bills. This section speaks to the impact SmartRegs may or may not have had on utility bills.

SmartRegs is touted as a key solution to addressing the split-incentive by the City of Boulder (City of Boulder, 2018a; Petersen & Lalit, 2018). As mentioned in the literature review, the split incentive occurs when the tenants pay the utility bills, as there is little incentive for the landlord or property owner to invest in energy saving upgrades (MacAskill, Stewart, et al., 2021; Martinez & Clevenger, 2017). However, if the owner pays, there is a risk of the cost being pushed onto the renters through higher rent payments (Martinez & Clevenger 2017). In Boulder, approximately 53% of residential properties are rentals (Samarripas & Jarrah, 2021). In order to meet climate targets and emission reduction goals, reducing the emissions of rental properties is paramount. The SmartRegs program put that burden on the landlords and rental property owners, as previously implemented voluntary measures were ineffective. However, the City of Boulder, the State of Colorado, and the United States Department of Energy put in significant financial resources throughout the development and implementation of the program (Arena & Vijayakumar, 2012; City of Boulder, 2018a). With SmartRegs, the average cost of upgrades to

reach compliance for the 32% of inefficient non-compliant units was only $3,022 (City of Boulder, 2018b).

One renter spoke about the attic and crawlspace insulation that occurred in their home prior to them occupying the space. Despite limited familiarity of the program, this renter was able to infer that the renovation had been done for the SmartRegs program and started to reflect on how this policy would have impacted their utility bills in a previous unit they had rented.

> DY: And then you said like the attic crawl space is like heavily renovated before you moved in?
>
> Renter 7: It was heavily, heavily insulated.
>
> DY: Do you know like what that was for like why they did that?
>
> Renter 7: Yeah, I think it was related to the regulations for renting, I think there's some, I think there are some renting regulations around insulation and whatnot.
>
> DY: So, it's the SmartRegs program and that's one of the like policies that I'm looking at, yeah, it's the energy efficiency component of the rental housing licensing and you were at least sort of aware of it before this interview.
>
> Renter 7: Yeah, just barely. I'm a little confused by what the, I'd kind of like to know what the bullet points are, because one of the places I moved out of… I guess this is seven eight years ago by now, I don't know if they were in place then or not, but I had, I had some windows that were really bad they would trust over. And I would have utility bills, even though it was like a much smaller place than this, I would have utility bills that were just as bad.

According to one renter, there is some indication that landlords and homeowners understand that energy efficiency and environmentally friendly features can be a selling-point of a house or at least an added component that they consider worth mentioning to prospective tenants. The following renter said that the energy efficiency of their home was less important to them than other factors like overall aesthetic and proximity to work. However, other scholars have found that university students do choose rental units that have better energy efficiency and increased rental costs when efficiency ratings are available in their decision-making process (Melvin, 2018).

> Renter 11: I don't know the correct terminology, but the EPA said that this house is like a highly efficient energy house.
>
> DY: And do you, did you care? Was that when you moved in?
>
> Renter 11: That was just something he [the landlord] said like, at some point. The house was nice and it was close to where we were working, so it was just an added bonus.

This renter went on to say that although they appreciated living in a highly-energy efficient house, they felt that landlords would be motivated by profit and would use this as a selling point to charge more from their tenants. This connects to previous critiques of market-based climate solutions, as we understand that landlords (a form of capitalists) will use all tools at their disposal to generate surplus value (i.e., profit) (Shi, 2020; Smith, 2010). This can include either real energy efficiency upgrades or greenwashed perceptions of improved energy efficiency.

> Renter 11: “I would not be surprised if the rent would be more expensive for more sustainable house solely because it is a sustainable house, despite the fact that is more efficient waste less important saves money. Landlords will know that is a desired aspect of their home and will this charge more [rent].”

However, when asked if renters would pay more to live in a climate-friendly, net-zero emissions home, the responses were mixed. Some renters may feel motivated to make environmentally friendly changes to reduce their carbon footprint. Other studies have found that some renters feel genuinely interested and willing to enact climate actions in their homes (ACORN Canada, 2019; Daniel et al., 2020). However, for example, this willingness can be contingent on renters having access to low- or no-cost energy efficiency upgrades (Samarripas & Jarrah, 2021).

> Renter 8: "Anything we can do to cut into the carbon footprint would be wonderful. As long as it also comes from a place of social justice and acknowledges the fact that like we are in an affordability crisis so passing more costs onto renters, to be more environmentally compliant feels unfair, particularly when those who are living in these environmentally non-compliant homes are those who are least capable paying more to be."

This question of who bears the responsibility for the climate crisis should consider fairness and equity. For example, there is some confusion and slight frustration that tenants and rentals are subject to SmartRegs, but homeowners are not. This is a fair consideration, as the City of Boulder had a program for new buildings and developed SmartRegs to tackle existing buildings, starting with rentals. There is an underlying assumption that homeowners have more of an incentive to make the energy upgrades to their home based on their own occupant comfort, ability to do so, and desire to keep energy costs low.

DY: Would renters like pay more to live in a like climate friendly or like net zero emissions home like, you know, is that something you've considered as like a factor on like where to live?

Renter 3: Yeah, honestly I think rents are so insanely high that I think exact question needs to be flipped yeah I think renters shouldn't be forced to pay more for a comfortable, or in my mind like reasonably cared for home yeah I think that landlords need to be on the hook to do those things like it's a smart investment in the future. And if they see their investment property as like a money maker it's like they should in my mind they should be held to that standard. And I don't think that it should be passed down to the renters.

Regardless, there is a sense that it may be unfair to have this kind of regulation for rental housing and not owner-occupied homes especially as the City of Boulder states that SmartRegs is meant to improve renter equity and fairness in the distribution of energy efficiency upgrades for rental residential properties (City of Boulder, 2021, p. 8). This may indicate biases of the interviewee, who perceives the City of Boulder's actions to typically advantage homeowners and thus disadvantage renters. The following quote by Renter 3 speaks to this notion, as they feel Boulder City Council prioritizes the issues that pertain to homeowners due to the Council composition, as well as the voter constituency base.

Renter 3: That's kind of a theme in town here, where you know you have like a city council[11] that's from largely by wealthy white homeowners who are older, and that's most of the constituency that votes and so, you know, I again I think the fact that homeowners aren't subjected to SmartRegs is telling.

[11]There are nine Boulder City Councillors, including the Mayor, who are elected at-large for a three-year period (City of Boulder, 2022b)

Climate Action, Renters, and Energy Efficiency

My overall understanding of how renters understand and participate in climate actions has changed from when I initially proposed the research project and throughout the fieldwork. It is only after reviewing, coding through, and analyzing the interview transcripts that I have built a deeper understanding on how renters can contribute to climate action and need to be included in and considered a key stakeholder in climate policies that affect rental properties. This is the crux of the thesis, that a renter-centered perspective to climate mitigation is essential to dealing with housing and climate crises simultaneously. And yet, I did not view climate action as a factor that would impact renters as an outcome of SmartRegs. As one of my objectives is to advance human-centered analysis of urban policy, where housing-related policies should have buy-in from renters, climate policy should also consider those most impacted. Since SmartRegs is a municipal policy that straddles the climate-housing intersection, renters need to be considered as an actor and impacted stakeholder even in its climate-related outcomes.

Renters originally supported the SmartRegs proposal due to "retribution for past issues of split incentive" (Barrett et al. 2010). It is helpful to refer to the split-incentive phenomenon here, particularly regarding the impact the split-incentive has on renters. Melvin (2018) found that the underinvestment by landlords on energy efficiency measures may be more significant than previously understood. Boulder appears to agree, which is why this SmartRegs policy puts the financial burden on to the property owners. However, tenants and their behaviour does impact the degree of energy savings following energy efficiency upgrades (ibid). The City of Boulder knows this to some extent, as their SmartRegs website emphasizes the role that tenants play in energy conservation.

> The energy and water bills for your residence are affected by the efficiency of the building and the equipment/appliances inside. SmartRegs requires rental properties to comply with specific efficiency standards. However, the habits of you and any housemates also greatly affect the amount of energy and water used in the residence. (City of Boulder, 2022f)

As renters discuss the motivations that drive their energy efficient behaviours, they generally do not include climate concerns. This is not to say that renters are not concerned about climate change, it is evident that they are, but that this concern is not reflected in their energy consumption decision-making. When renters perform energy efficient behaviours, their motivations are largely cost-driven. For example, some renters do take seriously their personal impact on utility bills through energy conservation. The following renter expressed a dislike of air conditioners from a cost perspective.

> Renter 11: “I don't feel like buying an air conditioner because it's just too expensive, and the house does actually a really, really good job at staying cool. Yeah, I have like a ceiling fan that's really big and at night when the temperature drops we like open all the windows, turn the fan on high and it sucks in like all the cold air, and then in the morning we shut it off, close the blinds, all the windows, and it's usually can stay pretty comfortable in the house for the whole day, unless it's like 90s mid 90s and higher. On those days by, like, two o'clock pm. It's just unbearable in the house.
>
> DY: Do you know other people who've bought an air conditioner?
>
> Renter 11: Yeah. But I also know plenty of people who are just suck it up. So, like it's not humid, it's not gross, but it's just hot.

Another renter expressed similar sentiments in keeping the temperature low, even going as far as encouraging their whole household to lower temperatures. However, one study found that tenants who did request heating and cooling upgrades were motivated by better thermal comfort, rather than climate action or energy efficiency (Daniel et al., 2020, p. 29).

> [DY asks question regarding home being too cold in the winter]
>
> Renter 11: No, no, but I mean it is cold in the house but that's like our choosing .. the thermostat like we don't usually write raised more than like 68. The thermostat like we don't usually raise it more than like 68[F] in the winter.
>
> DY: Is that like a group consensus to save on energy?
>
> Renter 11: Oh, yeah. I think I've just convinced the others. I mean, it's, it's not unbearable and you can always just put on more layers or something. Yeah, it does save us money. And that's even like backed up by the EPA like if you keep your house at 68. At night, you save like a couple hundred each year.
>
> DY: But if you weren't there… do you feel like your roommates would change that?
>
> Renter 11: Probably would turn it up, and then try and put that at 70[F] and I just would put it back down to 60.

Although some renters did not know much (if anything at all) about their energy systems, some renters are quite familiar with energy systems and referenced technologies that were originally unfamiliar to me, such as a swamp cooler[12].

[12] A swamp cooler is another term for a traditional evaporative cooler which cools outdoor air by evaporating water into the air through water saturated pads. This method of cooling is a more natural and energy-efficient way of cooling in low-humidity areas versus window air conditioners or central air conditioners (Sun et al., 2021).

Renter 4: This house has AC. I don't like to use it. I just hate AC as a concept in general, but we used it a couple times and it kept the house you know cool during the middle of the summer, or the hottest [incomprehensible due to noise in background].

DY: What do you hate about AC?

Renter 4: I think in this climate, a swamp cooler is a lot more efficient.

You can't use a swamp cooler like in the southeast but there's people I see how I mean I'm looking out my window right now at a house with a swamp cooler and the roof, and that keeps your house, as far as I've talked to a lot of people keeps us just as cool at a fraction of the cost and a fraction of the climate impacts as far as I understand it.

DY: I will look into this.

Renter 4: Yeah, we have those here. I know you need a very low humidity environment, so they're very common in Colorado.

Another component of the "Occupant behaviour" score for SmartRegs includes programmable thermostats for renters' use. "Smart" or programmable thermostats are common measures (low-cost, easy) provided to rental or affordable housing units (Samarripas & Jarrah, 2021). It is interesting here that this renter enjoyed the smart thermostat in a previous unit, but something is preventing them from asking their property management. It is worth noting that this individual lives in a corporate-owned housing complex, which may result in different experiences as a renter than when communicating with an individual landlord.

Renter 9: The only thing that I can say is that my old apartment before I moved had a nest thermostat and the new one is one of the more manual thermostats, so I used to be able to like have a Google Home by my bed and I could literally just say like, you know, when I

get to bed Hey Google like turn down the temperature to 68 or something because I like sleeping cold. I don't have that, so I assume that was like some units got that upgrade.

DY: You said you had the Nest thermostat like, I guess that was like an energy efficiency upgrade? Were tenants consulted about it?

Renter 9: No, when I moved in that was already there. The new one doesn't have it. I haven't asked about like upgrading it, but I probably could.

DY: Interesting, do you feel like if you asked for it could you could get one?

Renter 9: I feel like they would say no.

Climate impacts and extreme weather

Renters had varied perspectives on the intersection between climate change and housing issues in Boulder. Common themes included wildfires, extreme weather, and density and sprawl. Wildfires were mentioned by renters as a serious climate and health concern; this includes smoke and air quality concerns. The impact of increasing stresses such as increasing heat and drought, as well as climate shocks like floods, fire, air quality impacts were mentioned by the City of Boulder's recent climate action update (City of Boulder, 2021).

DY: What do you think are the main issues like regarding climate change in Boulder, like topics around climate?

Renter 5: I think the fires are the biggest and not even for me. I'm allergic to smoke so it's not even the fires danger here, it's the smoke from California, or Oregon or Washington. So that's been really bad… we've been blessed that we haven't had a bunch of fires, at least not yet they all happened in October last year so there's still a really good chance.

DY: Oh, I didn't I didn't know people could be allergic to smoke.

> Renter 5: Yeah, like classic allergies. Just like nose running things like that. So, I have been like thinking about whether or not that means I need to leave, but the fires have been a big issue here for a long time. Like I remember even like the four-mile Canyon fire happened in like 2009 or 2010 or something like before I moved out here and it's still just a lot of burned area of the canyon, which technically is in Boulder proper.

Renters in Boulder seem acutely aware of smoke and poor air quality coming from wildfires in surrounding areas. One renter noted that they stayed inside to mitigate these potential health impacts from the smoke, but that it felt inadequate because the smoke would travel inside their homes. This connects to literature that states renters lack adequate cooling systems and ventilation, which would prevent them from having to open windows in high temperatures (Daniel et al., 2020).

> Renter 8: Even if it's not like super close, like I know the air quality is an issue. Yeah, there are times when we're just trapped inside and if you don't have air conditioning, I mean you're just inhaling smoke in your house, like yeah, we'd stay indoors, but it's like what good is that, if we have the windows open because it's 90 degrees outside.

The following quote is a tad surreal as fires have caused significant distress for and displacement of residents in the surrounding suburban neighbourhoods of Boulder at the end of 2021 and in early 2022; the impact of this will be touched upon in Chapter Four: Discussion. In addition, it is notable that renters feel that local climate impacts and weather patterns have changed over the past few years.

> Renter 1: “There's been a lot more wildfires in the state of Colorado recently. There was one during the summer that was burning 5 to 10 miles from Boulder, just pretty close and I know that a lot of homes were affected in those towns, but not in Boulder itself. And

> Boulder has a lot of restrictions about where you can build things and how much you can build, and you know how tall buildings can be. So, this topic spans, I think we'll be more exposed to things like that… I've only lived in Boulder for four years, but weather patterns have changed significantly."

Some renters are concerned about wildfires as a serious climate threat that has impacted nearby homes and residents and could impact their own lives in the future as well. For example, one renter works in environmental planning and feels like there is more that could be done for wildfire management. This is work that the City of Boulder is considering as Boulder will work to "foster community resilience through carbon enhanced ecosystems" and "create a closed loop system that reduces fire risk in our community" (City of Boulder, 2021, p. 18). However, these are considered within the scope of climate resilience and adaptation efforts and seen as separate from the work that is being done that affects rental properties, and thus, renters.

> Renter 8: But even for a climate change perspective in terms of climate events that we're not prepared for, wildfire is a big issue in Boulder, just because I mean in 2013 wildfire almost across the mountain range and down into town in 2020 last year, there was a fire that came within 20 miles of town. We were in our old location in South Boulder, and we could sit on our porch and look. All the mountains are on the west, and you could see the flames from the ridge line, like 20 miles away. So that was crazy. And, and the smoke is terrible. Also, I work as an environmental planner, and I care about wildfire management so I think there are lots and lots of like very scientifically backed measures that we can do to reduce the risk of wildfire and also reduce the risk of putting people in harm's way.

Although infrequently mentioned, there were also other concerns regarding other extreme weather events like windstorms (mentioned once) and flooding (mentioned three times). Flooding is a climate impact that potentially has significant implications for renters in Boulder. There is an ongoing concern about the severe flooding Boulder faced in 2013, as indicated by the interviewees. The following quote also provides an insight that extreme climate shocks "100-year flood" are becoming more frequent.

> Renter 5: 2013 there was a terrible flood. And people say it was 100-year flood but, I mean, you know freak things are happening all the time now so there is a lot of the city that is in a flood zone, so I say that's a big one. Just the heat, in general, is another factor. And also, I mean, crazy, we had some crazy blizzards last year to which you know they cause your pipes to freeze if you don't know what to do or you've gone home.

The 2013 flood seems to an issue of public debate currently, as one renter spoke to differences of opinion on how certain land will be used to improve flood controls in the city. The interviewee also continued to connect this local flood to climate impacts such as hurricanes and flooding experienced in other parts of the United States.

> Renter 6: That actually reminded me, you said something about like biggest climate issues for builders one thing that did come in mind was extreme precipitation and flooding. And I think that is something that we probably are already seeing at low levels of warming and increase in is the strongest precipitation events and that's one of the more straightforward climate impacts. Because it's basically just a function of warmer air can hold more water, and when you're going to have a type of storm that's just going to bring the entire atmosphere, just how much water you could potentially have, is how much rain, you're going to get. So, like Boulder had really severe flooding in 2013 and you've

probably heard about like to CU South Annexation issue, and like I honestly really can't wrap my head around it because both sides say that they're better for flood control, which obviously one is wrong and one is right, which one is which. But yeah, I think flooding is a huge issue here and as we saw like in the northeast US recently. Like that was, the heavy precipitation from the remnants of the hurricane was actually more damaging than the hurricane itself in the south, which is pretty crazy.

Renter 7 also expressed anxiety about the potentially devastating impacts of major climate catastrophes or natural disasters. There is a need to better communicate to renters about ways to manage climate stress and health concerns as it relates to issues like smoke and air quality.

Renter 7: The smoke is horrible here. It's just, it's really nasty, and it's not as bad as Salt Lake City, but I mean we have a lot of days where it's way over 100.

DY: You shouldn't have to compare cities. If it's bad, it's bad.

Renter 7: And so, you know, like I normally look forward to July and August and September. But if it's if the AQI [air quality index] is going to go up to 100 every day for three months then, like, no thanks you know that's it's pretty brutal… so I think like, you know, then the 2013 flood isn't so far away, that people have forgotten about I mean that was a major climate catastrophe that happened here. And so, I feel like we all kind of have some sort of you know PTSD when we read about it happening in Germany or New Jersey, or wherever it happens. And we're all worried about it, having more events like that.

Renters reported several actions they are taking to adapt to local climate impacts such as overheating. This was quite surprising as a research finding to realize that many renters and

residents are already feeling the need to find coping mechanisms to deal with extreme heat. For example, one renter expressed several methods they utilize to deal with prolonged overheating that potentially contradict each other like staying indoors or swimming outside and going into the mountains. They also noted that some people just 'get used to' the heat; as mentioned above, this is not a solution for many vulnerable renters like the elderly and those with chronic health conditions (Daniel et al., 2020).

> Renter 5: Yeah, I mean it stays cool in my house, though that's the thing you just don't really go outside. I think some people just like, you get used to it. You can go swimming in the creek. And you can also there's a lot of opportunities to just get 1000 feet higher.

Another renter had similar coping mechanisms, namely, to go into the mountains surrounding the City of Boulder. This was a much more serious case where the renter felt like this was a necessity for them to escape the overheating in their rental property several times a year, and yet were not willing to communicate to their landlord about this need for a better cooling system.

> Renter 11: I don't think that they [the landlord] have no idea that like we've actually had to leave the house a couple times each summer [to] like get away from the heat. I've never actually like told him about that. I just haven't, like there's no reason not to. But that's the thing, I have the ability to cope with it. I have the resources to go into the mountains. I have camping stuff to like go into the wilderness and get away. But if I didn't have that, I would probably have brought it up at this point.

There is evidence that renters are already experiencing local climate impacts and changing behaviours to adapt to these impacts. It is harder to comment on to what extent are renters concerned about climate change in Boulder, as the interview questions were not meant to provide

an in-depth understanding of the climate literacy of renters. However, renters do understand climate-housing intersections. The findings indicate better responses from interviewees when asking how potentially climate change would impact their lives and homes from specific questions about housing in Boulder or about climate change in general, rather than directly asking renters to think about the intersection of climate and housing issues.

SmartRegs did not deliver on its claims to help renters

The City of Boulder believed renters were paying the cost of inefficient buildings, without being able to have the agency to change their home's energy systems, and thus improved distributional justice in this way. The City of Boulder adopted SmartRegs to accelerate upgrades, building improvements, and renovations for low-quality, poorly maintained, private rental buildings and units (City of Boulder, 2018a). However, there is substantial evidence that this kind of policy could have helped renters even more if there were more intentional design and evaluation choices that prioritized renters along the way. Recognition is due to the City of Boulder for taking on this type of policy that put the retrofit onus on landlords, ahead of many other cities that have similar policy infrastructure in place to do so. The political will to enact such a policy, despite the opposition that was clearly laid out by the landlords, is impressive and gives us perspective on the obstacles we face when trying to create fairer, more energy-efficient rental housing. This section outlines my findings on the multiple ways that SmartRegs did not deliver on its claims to help renters: namely to make homes more comfortable and to lower energy bills

Renters did not experience the benefit of more comfortable rental properties, due to lengthy compliance period. The success of public policy can be contingent on the pace of change

(Compton et al., 2019). In this case, the lengthy compliance period for the SmartRegs was supposedly helpful for landlords and property management companies, but detrimental to renters. The implementation of SmartRegs occurred over a much longer period than originally conceptualized; the initial proposal was adopted almost in its entirety, but the timeframe for adoption and final compliance was extended (Barrett et al., 2011, p. 193). Notably, the implementation of SmartRegs was significantly delayed due to the pushback and opposition particularly from the homeowners BAHRA and thus, increased the compliance period to eight years (initial compliance options considered a four-year compliance period as that is the length of time in which rental licenses must be renewed). I argue that while this concession was made for rental property owners, it came at the detriment to renters. A longer implementation and compliance period results in more time that renters are living in inefficient units, which can be detrimental to their health and well-being. From a climate lens, delay of climate action is a significant problem; there is a compounding impact in reducing emissions quickly. Public policy analysis indicates that there are trade-offs between pushing for more ambitious or potentially controversial policies and the risk it may come with to not have the policies passed and implemented at all (Compton et al., 2019). Compton et al. (2019) considers this the fine line between the "reach" or scope of ambition of public policy practitioners and the "grasp" or the ability to overcome pushback and inertia. It is worth considering the probability of Boulder City Council not adopting SmartRegs due to the significant opposition, but it is important to also acknowledge that compromise came at the expense of renters. The lengthy compliance period and flexible approach (the two prescriptive and performance pathways) was heralded by industry stakeholders as a good practice when supporting affordable rental housing properties' compliance with an energy standard, as it could "preserve community and housing affordability"

(Samarripas & Jarrah, 2021, p. 26). The City of Boulder also must consider if property owners are genuinely utilizing this lengthy compliance period to make energy-related upgrades, or if they are simply procrastinating. Thanks to federal Department of Energy spending, the City of Boulder was able to offer free or incentivized energy efficiency upgrades through their EnergySmart program, as well as technical assistance throughout the compliance period (ibid). It may be true that some of the non-compliant properties remained affordable out of neglect if the owners chose not to meet SmartRegs requirements until the end of the eight-year compliance period at the end of December 2018. Unfortunately, this comes at the expense of renters who are living in less efficient rental units. The renters also do not benefit from potentially reduced utility bills over that time (that is, if they do benefit from the savings of reduced energy consumption and improved energy efficiency without increases to their rent).

Renters were neglected in evaluation metrics for SmartRegs, which could have demonstrated if renters experienced improved tenant comfort in their homes or had lower energy bills. There were two studies that acted as more formal evaluations of the SmartRegs program: Arena & Vijayakumar (2012) and Glick et al. (2015). Arena & Vijayakumar (2012) conducted this evaluation through the U.S. Department of Energy's Consortium for Advanced Residential Buildings. Their methodology involved building energy audits, assessments of completed SmartRegs compliance inspections by third-party inspectors, and interviews with property owners that focused on barriers to compliance. Glick et al. (2015) built upon a previous study two of the authors were involved in, Barrett et al. (2011), that focused on policy development of SmartRegs. These studies utilized the City of Boulder's primary objective for emission reductions and energy savings in the city's residential rental buildings. This goes back to the

concept of climate urbanism where the primary metric for climate policy and initiatives is carbon and greenhouse gas emissions. From both of these studies to the City of Boulder's own assessments, the evaluation of SmartRegs did not adequately capture metrics that looked at if tenant comfort improved or if renters experienced the benefit of lower energy bills (Arena & Vijayakumar, 2012; City of Boulder, 2018b; Glick et al., 2015). If this information exists, it was not communicated in their publicly accessible SmartRegs progress dashboards nor in the City Council information reports (City of Boulder, 2018a, 2018b). Renters, like Renter 4 below, may have been interested in this information to guarantee that there were no indirect increases to their rent costs. However, there is an acknowledgement that this data could be hard to measure.

> "I would love to know, the year that they had all the upgrades done, and then see what rent was the next year but there's so many variables in this market that it's hard to tell. It's like property taxes are increasing land valuations are increasing. you know, there's all these things and so it's things and so it's like, even if someone raised their rent because they had to pay off upgrades, they could they, you would never know for sure what it's attributed to" (Renter 4).

Lower utility bills could have made life more affordable for renters. Renters can benefit from such a program if the energy cost savings are greater than any rent increases that they might experience (Glassman & Ayyagari, 2021). This is a significant caveat, as cities like Boulder are largely driven by the profit-motivated rental housing market and have seen fluctuations of three to ten percent in year-over-year rent increases over the past decade. However, there is no evidence that Boulder measured rent increases, despite claiming that they would track and report on this if the information was available. Notably, City of Boulder staff deny the impact SmartRegs has had on increased rent costs in Boulder's rental housing stock, pointing to market

forces as the driving force behind upticks in rent costs, despite climate and energy efficiency goals identified as having an indirect impact on housing affordability as per the Racial Equity Plan. I note that the City of Boulder continued to claim that SmartRegs should not impact the majority of homes that would already be compliant with the proposed energy efficiency baseline, and thus landlords would have no reason to raise rent costs if they did not have to pay for any renovations. However, while 32% of properties did require upgrades to meet SmartRegs requirements, the city did not measure if there was a change in rent costs in these homes. This is despite concerns that this could occur from renters and landlords during the initial consultation process.

Cities that point to market forces driving up rent are excusing themselves of their contribution and thus responsibility to worsening housing unaffordability responsibility. I connect this to eco-gentrification, as discussed in the literature review. If cities are promoting themselves as "climate-friendly", they are indirectly encouraging this kind of investment, and thus increased investment into sustainable communities can have direct and indirect impacts on displacing residents and renters. I reiterate that City of Boulder knew from the outset that there were concerns about the policy's potential to increase rent costs but neglected these concerns from both renters and the landlords.

Renters did not notice improved housing quality, nor experience improve comfort, from the most common upgrades required to achieve SmartRegs compliance (such as attic and crawlspace insulation), especially in comparison to other home upgrades that renters would have preferred (such as occupant-controlled thermostats, window replacements, newer and likely more energy-

efficient kitchen appliances). This is important as almost all renters interviewed identified issues in their home that would disrupt liveability. This is concerning as it can have significant impacts on people's health and well-being in the short and long-term. As part of the rental housing licensing, there should be more collaboration between housing and climate departments to consider necessary upgrades to address tenant comfort, health, and liveability at the same time as doing these inspections and renovations. It could be argued that the minimum baseline for energy efficiency is too low. From a health and well-being perspective, SmartRegs or other rental housing regulations are not sufficiently addressing health concerns like protections against wildfires, smoke, and overheating. Regarding cost savings and affordability, tenants are not seeing the benefits even if they are paying the utility bills. The dashboards have the data to track energy savings from the program, as that is a key performance indicator for the City of Boulder's evaluation of SmartRegs. However, the social objectives of improving housing quality, increasing renter equity, and possibly reducing costs for renters was emphasized and celebrated as "successful" according to the City of Boulder's final staff report on SmartRegs in 2018. It is insufficient to say successful implementation of the program, with 96% of all rental units in compliance, is enough to make these claims about positive impacts to renters without better metrics, tracking, and publicly sharing this information if it exists. Despite the high compliance rate, there is no indication from the City of Boulder to raise these minimum standards for rental properties. Based on the interview with city staff, there is an intentional decision to not raise the standards or change the program as it is operational and functional. Further, one of the key reasons stated for not improving the requirements is the financial burden it would put on the landlords, as shown in this quote below:

> I think if we were to upgrade this program, it wouldn't be cost effective for the city, or for the landlords, because it would be the big-ticket items[13] that are really expensive, and they wouldn't get the savings back (E. Vasatka, personal communication, August 2021).

Instead, according to the City of Boulder's climate update 2021, there will be additional programs that have more of an equity lens that deal with similar energy justice concerns. For example, one of the new energy systems objectives is to "eliminate operational carbon from [Boulder's] existing building stock" to meet a target that all of Boulder's "existing building stock will promote health and wellbeing of occupants and have zero operational emissions by 2040" (City of Boulder, 2021, p. 16). As this is still a high-level climate action plan, Boulder has not yet developed detailed programs to implement these objectives and meet the set net-zero target. It is unclear who will be paying for the costs of future climate policies, for example, if the City of Boulder is unwilling to make landlords pay more to improve the energy efficiency of their rental properties. While there are references to energy poverty and goals for marginalized communities/populations, this neglects the reality that many of these low-income residents and renters are still unable to afford making home upgrades or lack the agency to do so to address energy poverty issues.

The findings indicate that improved public awareness of the program for renters could result in positive impacts such as through more accountability. Through analysis of the research findings, there appeared to be a difference between direct or indirect outcomes (positive or negative) for renters and the "impact" of SmartRegs. It seems a bit cliché to reference the adage "If a tree falls

[13] Big ticket items could include window replacements or heating, ventilation, air conditioning ("HVAC") appliance replacements or additions. These items were further clarified in the interview, as well as inferred based on the literature on energy efficiency measures.

in a forest and no one is around to hear it, does it make a sound?" but it begs the questions: If SmartRegs is meant to improve rental housing, but the renters do not know about the program, does it impact renters? To start off, public awareness among renters regarding the SmartRegs ordinance is inconsistent. Notably, even when renters are aware of the existence of SmartRegs or are made familiar with the premise of the policy, renters are often surprised that their unit is likely compliant. Renters directly and indirectly stated that they do not expect their unit to be compliant to a minimum energy efficiency baseline because of the issues they observed in their rental home. There was one interaction with a research participant where we confirmed that their home is indeed SmartRegs compliant using the City of Boulder's map and database. The notion that their home could be compliant was "hilarious", indicating their surprise and possible confusion given overheating issues, poor ventilation, and age of the home.

> DY: [sent SmartRegs map to interviewee via zoom chat]
>
> Renter 8: Our house is compliant apparently. That's hilarious…Yeah, if you'd asked me if our house was smart regs compliant, and I knew nothing about it. I would have said, no.
>
> DY: I mean, you don't feel like it could be right?
>
> Renter 8: No. Because it, I mean it's extremely hot, it's really weird and drafty and, and it's also 100 years old.

The City of Boulder's SmartRegs map web page was specifically developed to help prospective renters better understand the impact of SmartRegs and be used as a resource to consider energy efficiency in their renting decisions (Samarripas & Jarrah, 2021). Although the map is mentioned as a resource that the City of Boulder developed, it was not perceived to be that helpful for renters based on the interview had with the city staffer.

> We created a map, because what we wanted to do is help tenants understand that they can pick and choose and you want to pick a property that's compliant with SmartRegs or not yet. And that only had so much influence, because it's a landlord's rental market. (E. Vasatka, personal communication, August 2021)

Some renters found out about SmartRegs from their networks and social circles. This may indicate that there is some self-selection bias for interviewees to sign up to be research participants when these are issues that they are familiar with or care about.

> Renter 8: I think I heard of it because I know someone who's on the Green Building Guild of Colorado, but like she's mentioned it in passing, and I didn't really know that it actually applies to rentals or that there's this program.

Although none of the interviews were undertaken with renters who were directly involved in the original advocacy around the SmartRegs program, one research participant felt as if she had an insider's glimpse and was more in the know due to their social circle.

> Renter 3: Yeah, a couple of my friends study building systems engineering at CU [University of Colorado Boulder] and are involved in the renewable energy and energy efficiency fields so I feel like I've got kind of an insider's glimpse. I didn't study those things but just talking with them over the years like when SmartRegs was coming up and starting and so on. And so, I do feel [familiar with the SmartRegs program] like through what they've shared with me.

The impact of increased public awareness relates back to the topics explored earlier in the chapter. To address power dynamics, public awareness of SmartRegs could make renters feel more ownership about the contribution of such policies to improve housing quality and address

climate change instead of feeling powerless in their rental homes. For climate action, renters can access more tools (e.g., SmartRegs tenant quiz) to care more about their energy efficiency use and thus their own role in the collective climate movement if they understand the impact they can have on energy efficiency. To improve rental housing quality, SmartRegs and rental housing licensing in general can give tenants a clear avenue to demand more stringent measures or improvements to their quality of housing instead of assuming that they must settle for low quality rental housing in Boulder. Renters may feel more positively impacted by energy efficiency solutions that claim to help them if the data was publicly available. SmartRegs should not just claim to potentially reduce utility bills for renters, but the City of Boulder could measure and display that information and take a more proactive approach to seeing if the costs of the upgrades were passed down onto the renters. Cost and affordability are significant concerns for renters in Boulder. Rent is the primary metric in which affordable housing is defined and understood, but utility payments and miscellaneous additional costs do impact the affordability of homes as well (i.e., gross rent and metrics measuring energy poverty). The pressures of the rental housing landscape are real; it is not to say that all policies should be aimed to single-handedly solve the affordable housing problem in a city. However, renters would benefit from policies that not only consider their objectives and needs at the outset of policy development but also follow through on monitoring, evaluating, and revising policies over time to ensure that the original objectives are being met.

Although SmartRegs could have improved the quality of rental housing in Boulder, it should have done so in a way that protected tenants and preserved affordable housing and communities. The findings show that housing quality is a concern raised by renters interviewed, and thus can

be considered a need of the renters in Boulder. This is attributed to concepts like retrofit poverty, even if that wasn't the term used to describe SmartRegs by the city or local stakeholders (Barrett et al., 2011; City of Boulder, 2018a). The ability for renters to live in more energy-efficient homes and units did improve because of this policy. However, since this was a minimum standard, SmartRegs was unable to influence noticeable elements of renters' homes that perhaps would have been impacted with a higher degree of stringency (e.g., heating and cooling systems, ventilation, windows, etc.). The findings also show that renters want to limit the stress caused by their housing situation, as it can have serious effects on their health and well-being. The stress caused could be due to a variety of reasons, such as cost, negative experiences with landlord/roommates, precarity in tenure, health and well-being, repairs, etc. These issues in their home do matter, but there is something to be said about which issues and to what extent the issues cause harm to the renters. Renters do seem to react differently to issues in their home, some could view repair issues or neglected maintenance as "minor", whereas others may not be able to tolerate and either attempt to fix it themselves or raise the concern with their landlord, property management company, etc. In addition, SmartRegs neither evaluated the metrics that would be most important for renters to benefit from the policy, nor did it try to promote this policy to renters during the implementation process. SmartRegs was not adequately designed to benefit renters from the outset nor implemented in a way that would protect them, despite claims that it would help renters by making their homes more comfortable and lowering energy bills.

Chapter Four: Conclusion

In this concluding chapter, I attempt to bring my findings into conversation with related issues in Boulder and in other cities. Following a summary of the research findings and analysis produced in the discussion above, I turn to some climate and housing issues that have occurred in the City of Boulder since the fieldwork that may have implications on the findings explored throughout the thesis. I also consider the existing knowledge transfer efforts by the City of Boulder and energy efficiency stakeholders to advance the SmartRegs policy model in other cities. Finally, I draw on what I have identified as weaknesses in the development and implementation of SmartRegs to advocate for the incorporation of elements [be specific here] to advance rental residential energy efficiency policies from a renter-centered perspective for similar policy development in other cities.

This critique of the SmartRegs program from a renter-centered perspective was developed over the course of a year. That said, this thesis is not meant to be merely a critique, but a resource that provides insights into why renters are not benefitting from SmartRegs. A clearer understanding of what the embodied experience and lived reality of renters in Boulder can tell us about the state of rental housing and intersections with climate change. The findings shape the key policy recommendations for municipalities and policymakers in the conclusion to consider a renter-centered perspective on rental energy efficiency standards.

Climate crisis and housing issues in Boulder since the fieldwork

Between October 2021, when I completed my fieldwork, and Spring 2022, when I wrote up the findings, there have been a few significant factors that influence the trajectory of this work in the City of Boulder. First, the Bedrooms for People campaign that was mentioned by research

participants failed at the referendum in the October municipal election. The resistance to local zoning changes and occupancy limits reflects an unwillingness to some degree to work towards grassroots visions for increasing local rental housing supply. Since renters in the City of Boulder cannot fight for rent control as it is outside of municipal jurisdiction, renters must look to other tactics to improve housing affordability like through improvements to occupancy limits. Although there is growing momentum from local residents and renters to advocate for affordable rental housing, I argue that this orientation towards homeownership and single-family homes has long deterred these changes in the City of Boulder, particularly for racialized and low-income renters (Fluri et al., 2020). Although the failed result of this campaign was a disappointment for many residents and renters, likely including some of my research participants, it is also unsurprising given the context of rental housing in Boulder more broadly.

Secondly, on December 31, 2021, neighbouring suburbs of Boulder were devasted by the Marshall fire. This has resulted in the City of Boulder relaxing some of the rental housing licensing regulations, which includes SmartRegs, in order to rapidly house those who lost their homes to the fire. This is in some ways a frustrating development, as it feels counter-intuitive to mitigating local climate impacts. The City notice said this relaxation of regulations is meant to mitigate the damaging effects of the Marshall Fire, Middle Fork Fire and hurricane-force winds that occurred on Dec. 30, 2021 (City of Boulder, 2022g). In addition, there is some recent evidence that points to increase home and rent prices as a result of the Marshall Fire (Castle, 2022). One renter experienced a 22% increase ($535 more per month) in her monthly rent from the year before; real estate firms found a 4.4% increase in rent costs in 2022 for Boulder County, which is more than double what occurred in the same time frame in 2021 (ibid).

Contribution and Future Research

This thesis contributes to the academic literature on rental residential energy efficiency, particularly as it prioritizes renters at every step of the research project. Renters stand to benefit from the policy adoption of residential energy efficiency requirements for rental housing that would upgrade their homes and improve their health outcomes. This research project outlines the opportunity that exists at this climate-housing intersection, rental residential energy efficiency, that can get us towards more equitable, low-carbon cities for all. I argue that rental residential energy efficiency policies can be designed and implemented in a way that maximizes benefits to renters. Similar policies are already being implemented in cities across North America (see Table 3), but there is still an opportunity to develop, improve, and better implement such policies from a renter-centered perspective. To do so, I will continue the knowledge transfer of my research findings in traditional academic formats (e.g., conference presentations) and disseminate this work in more publicly accessible formats such as opinion pieces, blog posts, and on social media.

There is more to learn about how to achieve climate-friendly rental housing while maximizing benefits and reducing harms to renters. Future research should be done to ensure alignment with local renters' priorities. The City of Boulder could choose to improve the stringency of this SmartRegs policy, with renters' needs and desires at the core of the policy, if they feel this is the best route to make rental properties more comfortable for renters. They could also do an analysis of rent increases for rental properties that required renovations and upgrades to achieve SmartRegs compliance, in comparison to rental properties that did not. From there, the City will either have evidence that utility bills decreased, which should be shared with the tenants, as well

as average year-over-year rent increases for rental properties in the city. Using the Rocky Mountain Institute's methodology, the City of Boulder can assess if tenants saw greater energy savings via the utility bills they pay versus any increases in rent (Glassman & Ayyagari, 2021). Future research could also focus on the impact of SmartRegs on the student population, which makes up 30% of renters in the City of Boulder, as I was unable to speak to their experiences and insights. In addition, other cities are starting to implement similar policies like Burlington, Vermont, and it may be valuable to see how my findings align with the policy development, implementation, and evaluation of their program. There is more work to be done to connect this work with a greater analysis of how it correlates to socio-economic factors like race, income, and gender. I also see value in researching whether a policy like SmartRegs would produce more guaranteed energy cost savings through reduced utility bills if there were limits to rent increases such as through rent control policies in other jurisdictions.

Policy recommendations for other cities

Lessons learned from Boulder can help to inform policymaking in cities like Toronto, where I reside, enriched by prioritizing renters' perspectives and needs. In this final part of the thesis, I provide key policy recommendations for other cities to implement similar climate policies and programs that do not overlook or negatively impact renters. The City of Boulder has shown recent interest in integrating equity and climate justice into its climate actions in their updated 2021 Climate Action Plan and in alignment with the city's first Racial Equity Plan. As such, the City of Boulder developed core equity principles for their climate work which speak to distributional justice, procedural justice, and recognition justice elements (City of Boulder, 2021, p. 15). This is important as new climate policies could better maximize benefits to renters and

minimize harm based on distributional and procedural justice. The trajectory of the City of Boulder is quite promising, as there is real potential for cities to orient themselves in the climate urbanism framework and direct their attention and resources towards climate justice-oriented work. It is evident that a narrow focus on emission reductions was not sufficient and the new climate update does showcase how Boulder will move towards more equity focused climate actions (City of Boulder, 2021). There is a desire to not just utilize the climate urbanism framework with carbon as the main policy objective, but to again broaden the city's objectives towards more of a sustainable urbanism orientation. I refer to The American Council for Energy Efficient Economy's work with cities to advance residential rental energy efficiency policies that align with affordable housing advocates "3P goals", which originated from a grassroots housing coalition in California: "Protecting tenants' right to fair, affordable, healthy, safe, and environmentally sustainable housing. Preserving communities and housing as affordable for low-income residents. And producing housing that is both affordable for low-income households and environmentally sustainable" (Samarripas & Jarrah, 2021). This is a more pro-active approach than to simply rely on an overall measurement of how energy savings will be greater than possible rent increases.

From the findings, it is evidence how important it is to frame programs to speak to personal housing challenges, collective climate responsibility, and wider climate resilience. The following policy recommendations for affordable, climate-friendly rental housing are rooted in my renter-centered research findings. First, cities[14] should develop a plan to simultaneously improve the

[14] While my recommendations are for cities, they may likely also pertain to states and provinces. For example, if the cities lack the ability to implement such policies for rental properties or if the states are involved in funding municipal programs like was the case in Boulder.

quality of rental housing in their communities, alongside climate plans that look to reduce emissions and conduct energy retrofits in the existing rental housing stock. Renters deserve to live in healthy, good quality rental housing that protects them from worsening climate impacts and extreme weather. Improvements to existing rental housing licensing infrastructure can be a good starting point for cities who already have such a policy. Cities must acknowledge the power imbalance between renters and landlords that may prevent them from effectively voicing their concerns about their homes and rental properties. When energy efficiency upgrades are being proposed or mandated in rental buildings, this is a key opportunity to speak directly to the renters impacted by these renovations and assess if there are pressing needs and concerns to their unit that can also be resolved during this process. To make such a plan, cities can encourage more collaboration between municipal housing and climate departments to consider necessary upgrades to address tenant comfort, health, and liveability at the same time as doing these inspections and renovations.

Second, cities should ensure that renters are valued not only in municipal housing policy and programs, but also climate actions that impact residential rental buildings. Cities can treat renters and their lived experiences as valuable forms of knowledge, alongside technical experts on topics like building science and financing. In addition, cities should engage renters from marginalized groups, such as low-income renters, younger renters (which may include students) and racialized renters in consultations. Their diverse viewpoints and perspectives should be valued distinctly, rather than assuming all renters are a homogenous entity (which can perpetuate the invisibility of racialized and low-income renters in predominantly white geographies). Consultation with renters should not just be limited to the policy development process, but also throughout the

implementation and evaluation, so that cities remain accountable to the renters who city policies claim to benefit.

Third, cities can conduct comprehensive evaluations of municipal climate and housing policies and programs, that include key performance indicators, targets, and metrics that speak to the needs and aspirations of renters. For example, the City of Boulder acknowledged that despite SmartRegs' potential to reduce energy bills, there was widespread concern amongst landlords and renters that rent could increase as an indirect result of this policy. If available, information on rent increases was supposed to tracked and publicly reported in annual reports from 2012 to 2019. However, this did not occur. The City of Boulder could also perform pre- and post- retrofit assessments to observe and measure firsthand from the renters what difference the upgrades are making to their homes and quality of life. Fourth, cities should take on potentially controversial policy positions to advance climate and equity goals, when the political will exists to do so. For example, despite landlord opposition and lobbying, the City of Boulder was steadfast in their decision to put the financial onus on landlords to improve the energy efficiency of rental buildings, to the benefit of renters.

Lastly, on a related note, cities must implement protections for renters through other housing policies and regulations (through the local level if possible or advocacy towards higher orders of government) such as rent control to discourage further housing unaffordability. The capitalist housing market already incentivizes landlords to generate greater profit margins; cities that care about renters and housing affordability should proactively work to mitigate direct or indirect rent increases that may occur through any climate policy that relates to residential buildings.

Although the City of Boulder (like all cities in Colorado) is prohibited from implementing rent control measures, the City must acknowledge there is a real need for renters to have better protections from extreme rent fluctuations. Boulder could do more to advocate at the state level to obtain municipal authority to regulate private market rental costs through rent stabilization. Renters make up 53% of the urban residents in the City of Boulder. This is a significant component of the city, but renters' rights have not been at the centre of policy. Renters need to know their rights in order to exercise them to fight for improved tenant comfort, a sense of security and "ownership" even in rental housing, and ultimately better liveability in their homes. Renters interviewed noted that getting repairs and maintenance done depended largely on the "goodwill" of their landlord; better renter-centered policies would not rely so heavily on the generosity or proactiveness of the landlord in a profit-driven rental housing market. Renters will likely need to mobilize to demand such policies be implemented in a way that costs are not passed down through increased rent and resist the risk of displacement because of such policies.

Summary

Renters were involved in the policy design process of SmartRegs, but the findings indicate that they were neglected in the implementation and evaluation efforts. Boulder's renters were disadvantaged as many continued to live in inefficient, poor quality rental housing as landlords successfully lobbied to delay SmartRegs over a longer eight-year compliance period. SmartRegs was meant to make rental housing more comfortable, but most renters interviewed still face or have experienced poor housing quality concerns that negatively impact the liveability of their home. The City of Boulder was persistent in getting SmartRegs upgrades completed by landlords, to tout its high-compliance and promote this as a successful climate policy to be

replicated in other cities. However, renters continue to face numerous obstacles in getting their grievances addressed, largely due to tenant-landlord power dynamics. The literature showed, and renters interviewed expressed, getting rental housing issues addressed can be challenging from reluctant landlords, who are often profit-motivated in our capitalist housing market that prioritizes the exchange value of housing. In contrast, renters have not noticed or perceived any benefits from SmartRegs upgrades such as attic, wall, or crawlspace insulation, even if they are aware of the policy. Landlords who had to make SmartRegs upgrades to their property are communicating to their tenants about the energy efficiency of their home, but again, this does not seem to improve the perception of the policy for the tenants as they continue to experience other housing issues in their rental unit or property.

Affordability came up time and time again as a core need and aspiration for renters. In the interviews, renters differed on their immediate need to have their housing costs lowered, versus feeling frustration and concern about their long-term prospects when the housing market was so unaffordable. The City of Boulder recognizes that they are below their goal of affordable housing (i.e., rent should be no more than 30% of household income) for low to moderate-income renters. The lack of affordable rental housing supply also impacted prospective renters or renters who moved between properties. In the findings, renters expressed challenges in securing a good rental property, indicating that access to good rental housing options is a need and aspiration of renters in Boulder. For example, renters would point to local grassroots campaigns like “Bedrooms are for people” to find hope and optimism to increase rental housing supply and have the City acknowledge zoning changes that could potentially benefit many renters. The uncertainty of tenure and stability is a huge implication for many renters, who feel like renting

may not be a viable long-term option for them if they choose to live in Boulder. This is heavily connected to potential concerns around renter displacement due to SmartRegs. The City of Boulder notes this is a possibility in their final Council memo on the policy (City of Boulder, 2018a). Renters should be made aware that the lack of compliance by some rental property owners could result in their displacement. If owners do not make investments into their properties, they will have to pay fines to the City of Boulder and subsequently be operating an illegal rental property that does not meet the city's requirements (ibid). Further, owners who make investments into their properties, energy efficiency related or not, will want to recover those costs and even generate a profit. There is a possibility that owners will increase rent costs or sell the properties because of these energy upgrades, which may make it unfeasible for the renters to continue living there. One possible strategy to prevent this kind of displacement is the adoption of a renter right of first refusal on property sale (Samarripas & Jarrah, 2021). Other strategies go back to the 3P goals of protecting renters, preserving affordable communities, and producing affordable, environmentally sustainable rental housing (ibid).

The lack of affordable rental housing and the climate crisis further harms renters in Boulder and minimizes the potential benefits of the SmartRegs policy. Climate change has impacted, and will continue to impact, disproportionately the most vulnerable residents; as a threat-multiplier, the inequities marginalized populations are facing will only be exacerbated by the climate crisis. Boulder is experiencing more frequent and severe climate impacts, such as wildfires and flooding. Renters are considered a vulnerable group, as they are more likely to be low-income, racialized, or part of an equity-seeking group. Studies on energy poverty indicate that many low-income renters are facing high utility costs and lack the agency to improve the energy-efficiency

of their home or rent in more climate-friendly, energy-efficient homes to begin with (Canadian Urban Sustainability Practitioners, 2019; Daniel et al., 2020; Hernández & Bird, 2010; Willand et al., 2020). My findings indicate that renters in Boulder are concerned about their utility costs and change their behaviours to lower their energy consumption to try to make life more affordable. Ultimately, Boulder renters will be more vulnerable to climate shocks as they have limited ability to make changes to their home and typically already experience worse health outcomes than homeowners.

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Appendices

Appendix A: Semi-Structured Interview Questions for Research Participants

1. What do you like most about your home (unit or building)? What do you like least about your home?

2. Questions about your unit:
    a. How long have you lived in your current unit?
    b. What type of unit is it? Is it a room, house, apartment, high-rise?
    c. How many bedrooms are in your home?
    d. How many people live in your unit?
    e. How much is the rent?

3. How is your relationship with your neighbours?

4. Tell me about your relationship with your landlord and/or the building property manager.

5. Tell me about renovations to your unit. Have you had any since you've moved in?
    - If yes, what were they for? How were you consulted?
    - Were any of them for energy efficiency?
    - If not, why not?
    - If yes, did your rent go up as a result of renovations or energy-related upgrades to your unit or building?

6. Were you aware of Boulder's SmartRegs program prior to this interview? (Y/N)
   Is your current unit SmartRegs compliant, not compliant, or exempt? (Y/N/exempt/don't know)

7. Do you experience the following issues in your home? (Y/N/Don't know)[15]

[15] Note: Question 7 was adapted from ACORN Canada (2019) survey questions to renters from their study on tenant engagement in energy efficiency projects.

- Pests
- Ventilation problems (e.g., condensation, dryness)
- Bad smells or odours
- Window drafts
- General disrepair
- Too hot in summer
- Too cold in winter
- Mould
- Out of date appliance(s)
- Flooding

8. As a renter, what do you think are the main issues regarding rental housing in Boulder?

9. Tell me about your utility bills. Who pays for them? On average, are your utility bills too high, fair, or too low?

10. Would you pay more in rent to live in a climate-friendly, net-zero emissions home? (Y/N) If so, how much? ($)

11. What do you think are the main issues regarding climate change in Boulder?

12. Housing and climate change are listed as two of the City of Boulder's major priorities for 2020-2021. In what ways do you think these issues intersect?
    - In your opinion, how much of a priority is rental housing (e.g., quality/affordability) or climate change to the City of Boulder?

Appendix B: Research Participant Informed Consent Form

Study Name: Climate mitigation from a renter-centered perspective: A case study of Boulder's SmartRegs program

Researcher name:

- Diana Yoon, MA, Critical Human Geography, York University (Principal Investigator)
- Email: dyoon95@yorku.ca

Purpose of the Research:

- This research will focus on renters' perspectives and experiences as it pertains to climate change and affordable rental housing. The study will look to policies like the City of Boulder's SmartRegs residential rental energy efficiency program that can address both climate and housing issues simultaneously, rather than one at the expense of the other.
- To conduct this research, I will primarily be interviewing renters in the City of Boulder, with additional interviews with City staff and climate and/or housing-affiliated community organizations. My research will be published in my Master's thesis dissertation and likely as part of more accessible formats (e.g., blog posts, policy briefs, conference presentations).

What You Will Be Asked to Do in the Research:

- Participants will participate in an interview discussion over virtual conference call (Zoom). Video calls are preferred, but audio-only calls can be accommodated.
- Time commitment will be approximately 30-60 minutes.
- A virtual gift card (worth $10 US) will be provided following the interview for renters.

Risks and Discomforts:

- We do not foresee any risks or discomfort from your participation in the research. While unlikely, there may be a chance of potential discomfort regarding questions about your home environment. You will be allowed to pass or not answer any questions you do not feel comfortable answering.

Benefits of the Research and Benefits to You:

- This research can advance human-centered analysis of urban policy, to make such policy more humane, more just and more likely to be successfully implemented (e.g., housing-related policies should have buy-in from renters; green building policies should be mindful of tenants).
- The research may provide policy recommendations to improve climate action and/or housing quality in Boulder – which could be helpful for renters, residents, and community stakeholders engaged in these issues.

Voluntary Participation and Withdrawal: Your participation in the study is completely voluntary and you may choose to stop participating at any time. Your decision not to volunteer, to stop participating, or to refuse to answer particular questions will not influence the nature of

the ongoing relationship you may have with the researchers or study staff, or the nature of your relationship with York University either now, or in the future.

If you decide to stop participating, you may withdraw and you will still receive the promised inducement. In the event you withdraw from the study, all associated data collected will be immediately destroyed wherever possible. Should you wish to withdraw after the study, you will have the option to also withdraw your data up until the analysis is complete.

Confidentiality:

- The interviews will be captured by audio and video recording over the Zoom platform. Recordings (audio/video) will be saved in a password protected file to research team members' local computer, not the cloud-based service. Confidentiality will be provided to the fullest extent possible by law.
- Unless you choose otherwise, all information you supply during the research will be held in confidence and unless you specifically indicate your consent, your name will not appear in any report or publication of the research.
- Your electronic data will be safely stored in a locked hard drive with a password and only the researcher (and supervisor) will have access to this information. The electronic data will be stored and destroyed after the study by August 2025.
- This study will use the Zoom.us platform to collect data, which is an externally hosted cloud-based service. When information is transmitted over the internet privacy cannot be guaranteed. There is always a risk your responses may be intercepted by a third party (e.g., government agencies, hackers). Further, while York University researchers will not collect or use IP addresses or other information which could link your participation to your computer or electronic devices without informing you, there is a small risk with any platform such as this of data that is collected on external servers falling outside the control of the research team. If you are concerned about this, we would be happy to make alternative arrangements (where possible) for you to participate, perhaps via telephone. Please contact the researcher for further information.
- Please note that it is the expectation that participants agree not to make any unauthorized recordings of the content of a meeting / data collection session.

Questions About the Research?

If you have questions about the research in general or about your role in the study, please feel free to contact me at dyoon95@yorku.ca or my supervisor, Dr. Patricia Wood at pwood@yorku.ca. You may also contact the Graduate Program in Geography at gradgeog@yorku.ca or 1-416-736-5106

This research has received ethics review and approval by the Delegated Ethics Review

Committee, which is delegated authority to review research ethics protocols by the

Human Participants Review Sub-Committee, York University's Ethics Review Board,

and conforms to the standards of the Canadian Tri-Council Research Ethics guidelines. If

you have any questions about this process, or about your rights as a participant in the study, please contact the Sr. Manager & Policy Advisor for the Office of Research Ethics, 5th Floor, Kaneff Tower, York University (telephone 416-736-5914 or e-mail ore@yorku.ca).

Legal Rights and Signatures:

I _____ consent to participate in "Climate mitigation from a renter-centered perspective: A case study of Boulder's SmartRegs program" research study conducted by Diana Yoon. I have understood the nature of this project and wish to participate. I am not waiving any of my legal rights by signing this form. My signature below indicates my consent.

Signature _____ **Date** _____
Participant

Signature _____ **Date** _____
Principal Investigator

Additional consent

1. **Audio recording**

☐ I consent to the audio recording of my interview(s).

2. **Video recording or use of photographs**

☐ I consent to the video recording of my interview(s).

Signature _____ **Date** _____
Participant