Housing and Climate Crises: Housing Sufficiency Policies to Address Supply Shortage in BC

by

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Abstract

British Columbia is currently dealing with the climate crisis and a housing affordability crisis. CMHC recommends that the province increase housing supply by an additional 500,000 units by 2030 to meaningfully improve affordability, but doing so will increase greenhouse gas emissions. BC's current environmental and housing policies are incapable of reconciling the province's GHG emission reduction and housing affordability goals. This study applies the 'sufficiency framework' for environmental policy to the BC housing context and uses a literature review and jurisdictional scan to identify housing sufficiency policies and to determine the most significant barriers to their implementation in BC. I develop four policy options for increasing housing supply and minimizing GHG emissions, and conduct a multi-criteria analysis to evaluate their effectiveness. Ultimately, this study recommends that the Government of BC pass legislation to allow the development of multi-family dwellings on all residential lots zoned for single-detached housing across the province.

Keywords: Housing Policy; Climate Change; Sufficiency; British Columbia; Dwelling Size; Residential density

To my parents. To my sister, for supporting me and helping me believe in myself. And to all my fellow Canadians who long for affordable housing and a sustainable future.

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List of Acronyms

SFU	Simon Fraser University
OECD	Organization for Economic Co-operation and Development
COVID-19	Coronavirus disease 2019
BC	British Columbia
IPCC	Intergovernmental Panel on Climate Change
SFH	Single-family Home
SDH	Single-detached Home
LCDC	Land Conservation and Development Commission
GHG	Greenhouse Gas
IPCC	Intergovernmental Panel on Climate Change

Glossary

Affordable Housing	“In Canada, housing is considered “affordable” if it costs less than 30% of a household’s before-tax income. Many people think the term “affordable housing” refers only to rental housing that is subsidized by the government. In reality, it’s a very broad term that can include housing provided by the private, public and non-profit sectors. It also includes all forms of housing tenure: rental, ownership and co-operative ownership, as well as temporary and permanent housing.” (CMHC, 2018a)
Apartment in a building that has fewer than five storeys	A dwelling unit attached to other dwelling units, commercial units, or other non-residential space in a building that has fewer than five storeys. (Statistics Canada, 2013)
Apartment in a building that has five or more storeys	A dwelling unit in a high-rise apartment building which has five or more storeys. (Statistics Canada, 2013)
Apartment or flat in a duplex	One of two dwellings, located one above the other, may or may not be attached to other dwellings or buildings. (Statistics Canada, 2013)
Carbon intensity	A measure of carbon dioxide and other greenhouse gases (in CO_2e) per unit of activity, such as the generation of a product or electricity.
Life cycle energy use (or consumption)	The sum of all energy used or consumed throughout the life cycle of a building.
Movable dwelling	Includes mobile homes and other movable dwellings such as houseboats and railroad cars. (Statistics Canada, 2013)
Other single-attached house	A single dwelling that is attached to another building and that does not fall into any of the other categories, such as a single dwelling attached to a non-residential structure (e.g., a store or a church) or occasionally to another residential structure (e.g., an apartment building). (Statistics Canada, 2013)
Row Dwelling/House	One of three or more dwellings joined side by side (or occasionally side to back), such as a townhouse or garden home, but not having any other dwellings either above or below. Townhouses attached to a high-rise building are also classified as row houses. (Statistics Canada, 2013)
Semi-Detached Dwelling/House	One of two dwellings attached side by side (or back to back) to each other, but not attached to any other dwelling or structure (except its own garage or shed). A

	semi-detached dwelling has no dwellings either above it or below it, and the two units together have open space on all sides. (Statistics Canada, 2013)
Single-Detached Dwelling/House	A single dwelling not attached to any other dwelling or structure (except its own garage or shed). A single-detached house has open space on all sides and has no dwellings either above it or below it. A mobile home fixed permanently to a foundation is also classified as a single-detached house. (Statistics Canada, 2013)
Efficiency	Efficiency refers to the use of fewer units of input to achieve the same outcome or level of output. In the case of energy efficiency, this means using less energy to achieve the same result.
Sufficiency	Sufficiency refers to a reduction in consumption to “sufficient” or adequate levels. In the context of energy this refers to reducing energy use by focusing on reducing the consumption of energy.
Embodied Emissions	Embodied emissions are the GHG emissions associated with manufacturing or producing a good/service. This includes emissions from material extraction, processing, and construction. Related terms include embodied energy and embodied carbon.
Operational Emissions	Operational emissions are the GHG emissions associated with the ongoing operation and use of a building. This includes emissions from all energy sources used to provide electricity, heat, and cool a building. Related terms include operational energy and operational carbon.
Rebound Effect	The rebound effect refers to the reduction in anticipated gains from energy efficiency improvements which occurs when cost savings are used to increase consumption.

Chapter 1.

Introduction

The unavailability of affordable housing is an ongoing issue across Canada. Canada's house price to income ratio, which is calculated by dividing average home prices by average incomes with a higher ratio indicating lower affordability, rose from 95% in Q1 2012 to 150.5% in Q1 2022. As of 2018, 40% of renters in Canada spent more than 30% of their household income on housing costs and 18% spent more than 50% (BC Non-Profit Housing Association, 2018). The problem is most pronounced in BC and Ontario, where 43% and 46% of renters spent more than 30% of household income respectively, and in both provinces, 21% spent more than 50% of household income on housing costs. Similarly, an analysis of house prices in large Canadian metropolitan cities by the Canada Mortgage and Housing Corporation (CMHC) revealed that over the 2010-2016 period, average house prices increased most significantly in Vancouver and Toronto, with increases of 46% and 40% respectively (CMHC, 2018b).

CMHC has identified poor supply growth as one of the major factors in some Canadian metropolitan centers, namely Toronto and Vancouver (CMHC, 2022b). For Vancouver, they noted that 75% of increases in housing prices over the 2010-2016 period can be attributed to conventional economic factors (CMHC, 2018b), such as excess demand and insufficient supply. The CMHC calculates an additional 3.5 million housing units beyond projected business-as-usual estimates must be built by 2030 to restore housing affordability across Canada (CMHC, 2022a). Because housing affordability is worst in BC (Statistics Canada, 2022c) and meeting the recommended supply increase will still leave BC with the least affordability of all provinces, and because most housing policies relevant to the problem fall under provincial jurisdiction, it is important to analyze this issue through a provincial lens. Therefore, this report will focus on the BC housing context where CMHC estimates an additional 0.57 million housing units beyond the currently projected 2030 housing stock of 2.64 million units will be needed to achieve a target affordability level of 44%[1]. In other words, CMHC

[1] Affordability levels represent a ratio of housing cost to pre-tax income, meaning that a lower affordability level represents a higher degree of affordability. (CMHC, 2022a)

estimates 570,000 new housing units are required to be built in BC over the next 7 years if prices are to drop enough to reach the targeted level of affordability.

At the same time, BC must contend with the ongoing climate crisis resulting from climate change. To stay within either the 1.5° C or 2° C targets agreed to in the Paris Accords, and to meet BC's target of a 40% reduction in GHG emissions from 2007 levels by 2030, CleanBC has released the *Roadmap to 2030* which outlines the actions being taken to achieve these targets (CleanBC, 2021). However, this does not account for the additional 0.57 million required units calculated by the CMHC report. Given the embodied GHG emissions of buildings, the climate impact of building an additional 0.57 million units in the next 8 years will be substantial, placing BC's carbon reduction and housing affordability goals in conflict with one another. **Thus, the policy problem addressed by this study is that current supply-focused housing policies in BC are not capable of achieving BC's dual goals of emission reduction and housing affordability.**

Though sustainability strategies aimed at increasing energy efficiency in housing may offset operational emissions and some embodied emissions, higher material costs and barriers such as a lack of familiarity with new technologies are likely to increase building costs further contributing to the affordability crisis (Röck et al., 2020). To reconcile the disconnect between these goals, some suggest implementing a 'sufficiency' framework that focuses on reducing housing resources, such as land and living space while also realizing efficiency improvements (Bohnenberger, 2020; Lorek & Spangenberg, 2019). In addition to the emission reductions that can be expected from reduced consumption, sufficiency strategies may also be structured to redistribute housing resources, thereby improving affordability.

While there is an emerging body of work applying the sufficiency framework to housing policy in countries such as Germany, and some related policies have been implemented in most major Canadian cities, to date there are no known attempts to apply this research framework to either the BC or Canadian housing contexts. This is a potential opportunity for significant GHG reductions as average-sized single-detached homes in Canada are among the largest in the world (Harvey et al., 2014; Point2Homes, 2017) and the average size of single-detached dwellings has continued to increase (Viggers et al., 2017).

Chapter 2.

Problem Framing: Housing Supply and Environmental Outcomes

2.1. Housing Starts and Embodied GHG Emissions

It is important to understand how housing relates to GHG emissions as we aim to increase supply, as decisions made about the housing type and location may affect the resulting level of GHG emissions. As of 2019, the residential sector accounted for 43.13 Mt of CO_2e or 8.4% of Canada's GHG emissions (Natural Resources Canada, 2022c). Residents use energy to heat and cool buildings as well as to power lighting and appliances. Each of these actions may lead to GHG emissions depending on the energy type and production source. British Columbia produces approximately 95% of its electricity using renewable sources such as hydro, and as a result, electricity produced in BC has a comparatively low carbon intensity of 7.3 g of CO_2e per kWh (Canada Energy Regulator, 2021) when compared to the Canadian average of 110 g of CO_2e per kWh (Canada Energy Regulator, 2022). Thus, residential electricity use accounts for a negligible amount of BC's total GHG emissions (Natural Resources Canada, 2022a). Instead, the primary sources of residential GHG emissions in BC are space & water heating, which typically use natural gas instead of electricity (Natural Resources Canada, 2022b). This is particularly notable, as these sources of energy use are linked more directly to the building's built form, meaning that choices made about a dwelling's characteristics will have an impact on the GHG emissions from space heating and limit the effectiveness of more efficient forms of heating.

The residential emissions accounted for above are not the only forms of emissions that can be attributed to dwellings. The transportation and industrial sectors, which account for the highest levels of GHG emissions country-wide with 196.75 & 156.12 Mt of CO_2e respectively, are also associated with residential buildings (Natural Resources Canada, 2022c). The location of a building, its proximity to amenities, and access to alternative modes of transportation can affect GHG emissions that are associated with the transportation sector (Clark, 2013; Hong & Shen, 2013; Norman et al., 2006). Building construction, including the manufacturing and processing of the

materials necessary for said construction, also causes GHG emissions (Azari & Abbasabadi, 2018; Canada Green Building Council, 2021).

The different types of energy use and emissions that are associated with buildings, excluding the impact of location on transportation emissions, can broadly be categorized as “operational” or “embodied”. Operational energy or emissions (also referred to as operational carbon) refers to the energy use and resulting emissions that are caused by the ongoing use and operation of the building including sources such as space heating, cooling, and lighting. In other words, operational emissions refer to the emissions that are associated with the ‘residential sector’ as outlined above. Embodied energy and emissions, on the other hand, refers to the energy that is used for (and the emissions that result from) the “raw material extraction, manufacture, transportation, and installation of materials used in construction” (Canada Green Building Council, 2021).

Traditionally, most emission reduction efforts in the residential sector have focused on operational emissions over embodied (Azari & Abbasabadi, 2018; Röck et al., 2020) for several reasons. First, operational emissions are easier to measure and track (Langston & Langston, 2008) as they can be calculated based on the carbon intensity of a building’s energy source(s) and household consumption. Second, operational emissions have until recently accounted for most building-related emissions. Where emissions from building operations accounted for 28% of energy-related GHG emissions globally in 2020, embodied energy related to building construction (including renovations) accounted for approximately 10% (Röck et al., 2020; United Nations Environment Programme, 2021). Further, embodied energy was historically believed to contribute an even lower proportion of a building's full life cycle energy use, with some estimates placing it as low as 10% (Ramesh et al., 2010). This has changed as operational energy use has become more efficient and as construction materials have changed to enable these increases in efficiency, resulting in an increase in both relative and absolute embodied GHG emissions (Röck et al., 2020). Röck et al. estimate that for “New Advanced” buildings[2] the share of embodied emissions out of total building emissions for both residential and office buildings rose from ~20% to ~50%, with some extreme cases reaching as higher as ~90%. They found that the average embodied

[2] Refers to buildings assessed in “studies assessing passive houses, low-energy buildings or near/net zero energy or emission (NZEB) buildings” (Röck et al., 2020)

emissions of residential buildings have increased from approximately 6.7 kg CO_2e/m^2a to 11.2 kg CO_2e/m^2a for advanced buildings, while office buildings have seen a decrease. This is further corroborated by a literature review from Chastas et al., which found that shares of embodied energy for low energy and "nearly zero energy" buildings range from 26% - 57% and 74% - 100% respectively (2016). In BC, research indicates that buildings that meet step 5 of the BC Energy Step Code[3] can lead to embodied emissions increases of up to 67% (Tolia, 2020). Beyond the relative increase that results from a decrease in operational emissions in energy-efficient buildings, the increase in embodied emissions can also be associated with greater and more carbon-intensive material use in the construction process (Ramesh et al., 2010).

While the precise contribution of embodied emissions to the full lifecycle emissions of a residential building may differ depending on factors such as the carbon intensity of local electricity production, heating/cooling methods, local climate, and construction materials, it nonetheless presents a serious problem in the context of British Columbia's housing affordability and climate crises. As of 2018, the median total living area for residential properties in British Columbia was 1610 f^2 or ~150 m^2(Statistics Canada, 2019a). This can be broken down further by building type as follows:

Table 2.1 Dwelling Type and Size

Dwelling Type	Median total living area f^2
Single-detached house	2120 f^2
Semi-detached house	1660 f^2
Row house	1430 f^2
Condominium apartment	876 f^2

Though it is beyond the scope of this paper to determine the specific size and dwelling form distribution that would result from the province building an additional 570,000 units, we can use the above values to give an approximate scale of the embodied emissions that could result from meeting CMHC's recommendation. If we assume that the distribution of dwelling types for British Columbia remains the same

[3] The BC Energy Step Code is an optional compliance path in the BC Building Code that municipalities can use to incentivize or require higher levels of energy efficiency in new buildings. It sets 5 performance level "steps" above the base BC Building Code, increasing in energy efficiency with each step. (CleanBC, 2022)

(Single-detached houses 42%, Semi-detached houses 3%, Row houses 8%, and Condominium apartments 44% (Statistics Canada, 2022a)), we can predict an additional 239400 single-detached houses, 17100 semi-detached houses, 45600 row houses, and 250800 condominium apartments. This, in combination with the living space estimates above, gives an approximate value of 819,938,723 f^2 of new floor space to be built over the next 7 years. It should be noted, however, that this does not take into account changes to unit size as current trends show increases in single-detached house sizes and decreases in apartment sizes (Statistics Canada, 2019b). Building a total of 570000 additional housing units in BC at embodied emission levels ranging from 6.7 kg CO_2e/m^2a to 11.2 kg CO_2e/m^2a would therefore lead to additional embodied emissions ranging from approximately 510,371,160 kg CO_2e/m^2a to 853,157,760 kg CO_2e/m^2a. This equates to a range of 12% to 20% of BC's residential emissions for 2019 (Natural Resources Canada, 2022a).

While the increased embodied emissions associated with energy-efficient buildings may be mitigated in the long term by decreases in operational energy, in the context of climate change the timing of emissions matters. The IPCC estimates that to achieve the 1.5°C goal of the Paris Accords, GHG emissions need to peak by 2025 (IPCC, 2022). Regardless of whether life-cycle emissions per housing unit decrease, any emissions released in the short-term run the risk of triggering tipping points should we reach 1.5°C (Armstrong McKay et al., 2022; Werners et al., 2013). Given the scale of emissions that would be released in building 570,000 housing units by 2030 and the fact that additional emissions in other parts of our living environments increase our likelihood of reaching tipping points and causing yet *more* emissions, it is imperative that BC aims to reduce the emissions produced by additional housing units where possible.

Beyond the short-term carbon spike associated with low GHG emission buildings, there is also cost to attend to. Building costs impact the extent to which the new units can increase affordability in BC. Using certain low-carbon building materials, such as "hempcrete," may also result in increases in project costs of 8-12% (Anderson et al., 2022). Further, industry experts indicate that other barriers to low-carbon material adoption, such as a lack of training or expertise leading to more complex planning, can lead to higher costs on their own (Giesekam et al., 2016). In the absence of new policies, higher project costs will either decrease the number of social housing units or

increase the market price as private developers pass the increased costs onto their residents.

The literature reveals several policy solutions for the reduction of embodied emissions that may be useful in the context of housing affordability. For instance, Pitt (2013) finds that embodied emissions for more compact multi-family building forms are lower than embodied emissions for single-detached homes at a given unit size. This is because multi-family dwellings share walls and materials while also making better use of land. Other than building types, using alternative materials such as timber instead of concrete for buildings has been shown to reduce embodied emissions substantially (Bowley & Evins, 2020; Ibn-Mohammed et al., 2013), and is recommended by the federal government (Environment and Climate Change Canada, 2016). Though regulations differ between municipalities, mass timber buildings cannot be built to the same heights as concrete buildings. Due to the province's "Tall Wood Initiative," 21 communities (plus Vancouver) now allow mass timber buildings of up to 12 storeys in height (Office of Housing and Construction Standards, 2021). Therefore, for embodied emissions reductions, compact buildings under 12 storeys should be prioritized.

2.2. Housing Size and the Problem with Energy Efficiency

In addition to the problem of embodied energy and the expected emissions which will result from additional housing supply, there is also the problem of housing unit size to contend with. Both embodied emissions and operational emissions are linked to dwelling unit size (Azari & Abbasabadi, 2018; Chastas et al., 2016; Clune et al., 2012; Cohen, 2021). In the case of embodied emissions, a unit of housing with larger floor areas requires more materials to construct and in the case of operational emissions, it takes more energy to heat a larger home and to provide electricity to more lighting and appliances. This is particularly problematic in BC where space heating accounts for 62% of residential GHG emissions (Natural Resources Canada, 2022b). Land is also a limited resource, particularly in the Lower Mainland which is BC's most unaffordable and populous area (BC Non-Profit Housing Association, 2018; CMHC, 2018b). As one would expect from the principles of supply and demand, large homes in land-constrained areas decrease the available square footage per capita and lead to higher prices.

This is noteworthy in the Canadian context for several reasons. Firstly, the average home size in Canada is 1792 f^2, the third largest in the world following Australia (2032 f^2) with the largest and the U.S. with the second largest (1901 f^2) (Clune et al., 2012; Point2Homes, 2017). Further, Canada has the 2nd largest average living area per person at 618 f^2. In British Columbia, the median total living area for all residential properties is 1610 f^2, while the median total living area for single-detached homes (SFH) is 2120 f^2 (Statistics Canada, 2019a). SFH sizes are not only significantly larger in Canada, they are also increasing (Cohen, 2021; Statistics Canada, 2019b). The median total living area of an SFH in BC built in 1960 or earlier was 1720 f^2, an SFH built in 1991-2000 was 2460 f^2, and an SFH built from 2011-2015 had a median total living area of 2670 f^2 (Statistics Canada, 2019a), although homes built in 2016/2017 showed signs of a decrease in size with the median total living area being just 2420 f^2. Notably, while SFH sizes have increased over time, apartment/condo sizes have decreased (Statistics Canada, 2019b). This presents additional cause for concern as single-detached homes can contribute more GHG emissions (both embodied and operational) than an equivalently sized multi-family dwelling (Pitt, 2013).

Though there are no universally accepted maximum home size values based on the environmental capacity of the planet, a study by Maurie J. Cohen (2021) uses

minimum social floor values and maximum biophysical ceiling values to estimate that a "sufficient" home size for a single individual is between 150 f^2 and 215 f^2. They estimate that for a four-person household, the "sufficient" home size would range from 450 f^2 to 860 f^2. Considering that the average household size for both Canada and BC is 2.4 persons and that the median total living area for BC is 2120 f^2 for SFH or 1610 f^2 for all building types, this is a drastic disparity. Cohen further estimates that to achieve their calculated sufficient home size, Canadians would need to reduce their living space to approximately 25% of current sizes (Cohen, 2021).

While increases in energy efficiency are capable of partially offsetting increases in home size (Energy Information Administration, 2015), substantial *reductions, not offsets,* in emissions are required to meet global climate change targets. In the context of BC and the climate crisis, any new builds at all will put us beyond our currently forecasted targets. The impact of building so many new housing units before 2030, cannot be brushed aside using decreased lifecycle emissions. Regardless of the extent to which energy efficiency improvements can decrease emissions, building larger houses inherently limits the effectiveness of these improvements. A larger house will always require more materials to build than an equivalent smaller house and more energy to heat. This phenomenon, wherein increases in energy efficiency result in fewer energy savings than expected because of increases in consumption, is referred to as the "rebound effect" (Gillingham et al., 2016). Without additional policies, emissions reductions from efficiency improvements will be limited by the extent to which savings are used to facilitate increased consumption, while at the same time, increased home sizes will diminish available land making it more difficult to meet housing supply goals.

2.3. Sufficiency Strategy in the Housing Context

To ensure that GHG emission reductions are fully realized and that the gains from lower building prices (where applicable) are oriented toward improving affordability rather than increasing oversized homes, the concept of “sufficiency” may be applied. Contrasted with the efficiency environmental policy approach, which focuses on increasing the “rate of output to input of materials and energy” (Bohnenberger, 2020), sufficiency is focused on reducing demand or consumption for goods/services (Bohnenberger, 2020; Cohen, 2021; Jungell-Michelsson & Heikkurinen, 2022; Lorek & Spangenberg, 2019; Thomas et al., 2019). Since increases in efficiency can result in increased consumption offsetting the GHG emission reductions, sufficiency aims to either prevent further consumption increases or decrease consumption overall. This makes sufficiency a natural compliment to efficiency as a way of mitigating the rebound effect. This focus on decreasing consumption connects the concept of sufficiency to the “degrowth” movement, which argues that combatting climate change is incompatible with current economic policies aimed at perpetual growth (Alexander, 2013; Kanschik, 2016; Kropfeld et al., 2018; Spangenberg, 2014; Tröger & Reese, 2021). Unlike normal goods where economies of scale caused by increased consumption may lead to price decreases, housing is intrinsically tied to land availability, and as a result increased ‘consumption’ of housing cannot be assumed to decrease prices. Therefore, since overconsumption of housing resources decreases the availability of resources for others, and since shelter is a fundamental human need, limiting the overconsumption of housing is more justifiable than traditional consumable goods.

Three main factors consistently emerge in the literature pertaining to reducing consumption in the housing context: the density of a given neighbourhood, the location of residential buildings relative to public transit and other amenities, and finally the physical size of the building (Cohen, 2021; Heinonen et al., 2013). This effectively means a reorientation of housing policy towards meeting people’s needs rather than wants. While some residents may prefer lower-density neighbourhoods, relative remoteness, and larger dwelling sizes, a sufficiency perspective prioritizes diminishing the environmental impact of housing and addressing needs before desires.

Sufficiency is more of a framework than a specific policy goal with several consistent policy themes or categories. First, given the link between home size and

emissions, policies aimed at capping or disincentivizing the continued increase in home size should be considered (Bohnenberger, 2020; Clune et al., 2012; Lorek & Spangenberg, 2019). These may take the form of regulations limiting the size of new buildings or taxation policies that include measures of home size per capita in property tax assessments.

The second category deals with policies which increase density and facilitate the building of multi-family housing (Clune et al., 2012; Lorek & Spangenberg, 2019; Pitt, 2013). The prevalence of single-detached zoning in North America is particularly important here, and policies aimed at removing or limiting single-detached zoning where possible should be considered. Another possibility is either removing or changing minimum lot-size requirements which prevent the building of compact or small houses.

The third category deals with the problem of homeownership-centred policies, which tend to incentivize the building of larger housing units and single-family homes (Bohnenberger, 2020; Clune et al., 2012). Policies aimed at combatting this might include the removal of certain home-ownership incentives, though admittedly this may be politically challenging.

Finally, sufficiency may be achieved in the housing sector using policies focused on the redistribution of existing housing stock to better meet residents' needs (Bohnenberger, 2020; Lorek & Spangenberg, 2019). This may include policies that allow seniors to downsize while maintaining equity or policies that allow tenants to swap flats while maintaining rental caps.

To conclude, the purpose of the sufficiency approach to housing policy is to address the "overconsumption" of housing resources as they pertain to GHG emissions. This overconsumption refers to the disproportionate consumption of land through dwelling type choices which prevent the building of multi-family housing and thereby contribute a disproportionately to GHG emissions and the consumption of housing space by occupying dwellings substantially larger than necessary to meet a household's needs and contributing to GHG emissions through the excessive operational and embodied emissions.

Chapter 3.

Research Context

3.1. Housing Consumption Patterns in British Columbia

To determine which sufficiency policies are best suited to addressing supply shortages within BC, this section identifies and analyzes current housing consumption patterns. The median total living area for single-detached homes in BC was more than double that of condominium apartments with 2120 f^2 to 876 f^2 median total living area respectively. A difference in median dwelling size does not necessitate overconsumption of floor space without incorporating the number of persons per household. Given, however, that the average household size for a single-detached house is only 2.7 (0.3 points higher than the overall average), the number of residents alone does not justify the substantially larger dwelling sizes of single-detached houses (Statistics Canada, 2022b). Apartments or flats in duplexes in BC have a higher average household size at 2.9, though other apartments have notably lower average household sizes of 1.8 and 1.7 for apartments in buildings with fewer than 5 storeys and more than 5 storeys respectively. Other forms of compact dwellings, such as row houses, also tend to be smaller in size than single-detached homes despite similar average household sizes (2.6).

Of the 2041835 occupied private dwellings in BC, 42.4% are single-detached houses, 0.3% are semi-detached houses, 8.3% are row houses, 12.2% are apartments or flats in duplexes, 20.4% are apartments in buildings with less than five storeys, 10.9% are apartments in buildings with more than five storeys, 0.2% are other types of single-attached houses, and 2.5% are “moveable dwellings”[4] (Statistics Canada, 2022a). Multi-family forms of housing that are more compact, such as apartments, make up a similar portion of the BC housing stock at 43.5%. Given the average household sizes per dwelling type above, there is little reason to assume that this is because of an inherent need for more space that could not be met be either row houses or apartments/flats in duplexes. Nonetheless, there are currently far fewer occupied row houses (8.3%) and

[4] “The category 'Movable dwelling' includes mobile homes and other movable dwellings such as houseboats, recreational vehicles and railroad cars.” (Statistics Canada, 2022)

duplex apartments (12.2%) than there are single-detached houses (42.4%), despite being able to meet similar needs in more dense form factors.

The number of private dwellings in BC with two, three, or four+ bedrooms is similar with around 550000 units available, however, there are fewer one-bedroom dwellings available at only 354000 (Statistics Canada, 2022a). This demonstrates a mismatch between the number of bedrooms and household size, as the most common household size is 2 persons at 719,870 households, followed by 1-person households at 600,705 (Statistics Canada, 2022b). Households with 4 or more persons were the second least common at 425,065, followed only by 3-person households at 296,200. Thus, there appears to be a lack of 1-bedroom dwellings based on current household sizes and consumption patterns.

Another essential observation of housing sizes in Vancouver is that following the under 1000 f^2 tier, the tier with the second largest number of residents is the 2501+ f^2 tier. While concrete conclusions cannot be drawn based on this data, this appears to indicate that Vancouver residents are comparatively more likely to desire larger homes. However, since the lowest tier has by far the greatest difference between actual and desired home sizes (9%) it may be possible to meet these needs by increasing the number of homes in the middle tiers. It is possible, for instance, that residents who live in accommodations below their preferred size misperceive precisely how large a 2501+ f^2 home is and that their needs could be met by a more moderate increase in home size.

3.2. Current Housing Policies

3.2.1. Zoning Policies

Current housing policies in British Columbia do not adequately value or distribute the available land and housing resources. Although there have been recent pushes to increase density, such as the recently approved “Vancouver Plan” which if implemented would result in every residential district in Vancouver being zoned for dense residential dwellings of at least low-rise 3-6 storey apartment buildings (City of Vancouver, 2022b), most major municipalities in BC still have restrictive zoning regulations. Most policies that are relevant to the conversation of sufficiency in housing, such as zoning regulations that establish allowable levels of density and minimum lot size requirements, fall under municipal jurisdiction. This makes it difficult to establish a province-wide strategic approach to housing as the success of provincial policies aimed at facilitating smaller more compact housing is limited by the availability of properly zoned land.

Currently, as much as 70% (Gordon Price, 2021) of land in Vancouver is zoned as “RS” which allows for the building of single-detached houses, “laneway” buildings, and duplexes (Zoning By-Law District Schedule RS 1, 2022). While this is not strictly single-detached zoning, it nonetheless acts to limit density and sufficiency policies by privileging certain forms of housing over others and broadly aims to accomplish similar goals to single-detached zoning. Similar policies exist in most of BC’s major municipalities, with the top 5 most populated cities having some form of single-detached zoning in place. Surrey, Burnaby, Richmond, and Langley, all have substantial portions of residential land zoned primarily for single-detached homes (R1 – Residential District, 1965; Zoning Bylaw 2100, 1996; RS1/A-H, J-K, RS2/A-H, J-K Single Detached, 2011; Surrey Zoning By-Law 12000, 1993).

All of the aforementioned cities have a sizable number of districts zoned with the express purpose of facilitating traditional single-family housing neighbourhoods. While some districts allow the building of duplexes or accessory units that can provide an additional housing unit per lot, these additional units are only allowed in-so-far as they do not detract from the single-detached “neighbourhood character.” Accessory units, for instance, typically cannot be the same size as the primary housing unit. Other limitations

to sufficiency include minimum lot-size requirements, which prevent the building of “tiny homes” and other forms of compact housing.

The prevalence of this form of municipal zoning policy presents several problems. Firstly, research indicates per-capita GHG emission reductions are greatest when increasing density from single-detached “low-density” to medium-density[5] rather than from medium to high-density (Gately et al., 2015). Specifically, transportation emissions are found to decrease rapidly up to a density of 1650 persons per km^2 and shortly thereafter, while taller high-density buildings are shown to increase life cycle emissions over medium-density dwellings (Pomponi et al., 2021). Since medium-density dwelling types such as row houses and duplexes have similar average household sizes to single-detached houses and are thus best situated to meet the needs of households currently living in low-density housing, medium-density housing must be prioritized in efforts to increase density.

To increase the proportion of medium-density housing, however, zoning regulations must facilitate their prioritization by having more land zoned for these housing types and by allowing the development of medium-density dwellings in neighbourhoods where high-density housing is not allowed. Otherwise, a lack of land zoned for medium density combined with competition for upzoned land between medium and high-density projects will inevitably result in a prioritization of high-density developments as developers seek to maximize the return on their investment. Second, low-density and single-detached zoning policies have been linked to higher rates of automobile usage and thus GHG emissions (Clark, 2013; Ewing et al., 2009; Newman, 1996). Finally, single-detached zoning regulations will tend to promote building houses as large as the regulations allow to make the most efficient use of the lot that is being paid for. This is demonstrated by research showing that cities which adopted inclusionary housing or zoning policies, including density bonuses which allow developers to build more densely if they provide some percentage of below-market-rate housing, saw increased single-detached home prices and decreased home sizes (Bento et al., 2009).

[5] Medium-density refers to low-rise high-density forms of housing such as walk-up apartments, or row-houses. High-density refers to high-rise high-density forms of housing.

3.2.2. Environmental Policies

The housing policies in BC most relevant to the environment are the BC Building Code and BC Energy Step Code. These policies specifically aim to address operational emissions by offering designers/builders the option of meeting prescriptive requirements (the building code) or performance-based targets (the energy step code) to satisfy the obligations of the code (Province of British Colombia, 2017). The prescriptive approach is most commonly used and requires buildings to meet specific requirements for insulation, windows, furnaces, water heaters, lighting and more. While this simplifies the process for designers and builders, the downside of this approach is that the building may not perform as well as expected. Comparatively, the performance-based BC Energy Step Code sets required levels of energy efficiency and leaves it up to the builders and designers to choose how to achieve them. Energy efficiency improvements above the base level of performance outlined by the BC Building Code's prescriptive measures (operationalized using a reference housing unit) are left to municipalities and other authorities with jurisdiction over the code to either require or incentivize.

While the energy efficiency requirements set out by the BC Energy Step Code play a key role in reducing the GHG emissions associated with the residential housing sector, they do not in any way address the problems associated with an efficiency-focused approach, such as the rebound effect. Embodied emissions are not included or measured in the step code and as a result, buildings which meet the highest level of the step code may see embodied emissions increases of up to 67% (Tolia, 2020).

Finally, I found limited policies requiring the reduction of embodied emissions in the course of my scan of environmental policies in BC. This is substantiated by the following study which reviewed policies for reducing embodied emissions within BC and found no policies that mandated embodied emissions reductions (Skillington et al., 2022). At most, some municipalities required LEED certification for municipal-owned or funded projects, however, LEED certification does not mandate embodied emission reductions. Instead, it requires the achievement of a set number of credits including the option of embodied emission reductions. Thus, while requiring LEED certification may result in embodied emissions reductions, it does not guarantee or mandate them.

3.2.3. Housing Supply Policies

One of the methods through which BC municipalities currently aim to increase housing supply is density bonusing. Through this method, developers are allowed to build additional floor area beyond the amount for which the lot is zoned in exchange for providing amenities and affordable housing (City of Vancouver, 2022a). The policy is seen as an effective method of increasing density and housing supply while also providing additional amenities and affordable housing units.

However, this policy has some drawbacks from an environmental perspective. By using increased density as an incentive for the development of social or other non-market-rate housing, there is nothing to prevent developers from upzoning to high-density where profitable. Housing developments which are significantly larger than their surrounding neighbourhood commonly face pushback from other residents and the upzoning process can be long and arduous, costing developers. The combination of these incentives pushes developers to pursue bonus density on low-cost land where residents are less likely to stall development, and to pursue as much of an increase in density as profitable. As residents in neighbourhoods zoned for SDHs are less likely to approve of high-density projects (Whittemore & BenDor, 2019), density bonusing is likely to occur in neighbourhoods that already allow increased density in some form or another. Given that research indicates that GHG emission reductions are greater when upzoning from low-density to medium-density rather than medium to high (Gately et al., 2015), this limits the potential for emission reductions from upzoning. Additionally, this implies that the possibility of housing unit size decreases as a result of density bonusing will necessarily be from units which were already small when compared to SDHs. This is further demonstrated by research which highlights the gentrification effects of density bonusing (Jones & Ley, 2016; Stabrowski, 2015)

As density bonusing follows a discretionary process, it does not upzone all residential land across the province equally. Instead, it is likely to result in the redistribution of land and housing space, not based on need, but on the criteria stipulated by the discretionary process. This will also result in the emissions reductions resulting from density bonusing being incidental rather than deliberate or targeted, as it will depend on the location of a lot, the size of the original building per capita, and the size of the new building per capita. Therefore, while density bonusing may be used in

tandem with housing sufficiency policies, it is not ideal as a sufficiency policy in and of itself.

Chapter 4.

Methodology

This report uses several qualitative research methods to gather and analyze data which are outlined in this chapter. These methods include a jurisdictional scan and a multi-criteria analysis (MCA). The jurisdictional scan was used together with a review of the literature to determine the relationship between housing and GHG emissions, identify policy options, and analyze their suitability in the context of BC's housing crisis. Ultimately, the MCA was used to answer the research question: how can housing policies help BC reconcile its GHG emission reduction and housing affordability goals?

4.1. Jurisdictional Scan

A jurisdictional scan was conducted to identify and evaluate housing policies that a literature review revealed as being suitable to the sufficiency framework. Cases were selected based on the following criteria: the policy's ability to either reduce overconsumption of housing resources or facilitate lower levels of consumption, its ability to either mitigate or bypass current barriers to housing sufficiency, and its suitability to the geographical and political constraints of the BC's housing sector.

4.2. Multi-Criteria Analysis

Using data gathered from an initial literature review, and policies identified in the jurisdictional scan, a suite of policy options was developed and then assessed using a multi-criteria analysis. A set of criteria and measures were defined against which the policy options are analyzed. Following the analysis of each policy option, they are compared to determine the policy options most suitable to addressing the identified policy problem.

Chapter 5.

Barriers to Housing Sufficiency Policies

5.1. Consumer preferences

In the discussion of barriers to sufficiency in the housing sector, consumer preferences are significant. At a high level this is particularly relevant, as research indicates a consumer preference in the North American context towards both larger homes (Clune et al., 2012; Cohen, 2021; Huebner & Shipworth, 2017; Point2Homes, 2017) and lower-density SDHs (Manville et al., 2020; Morrow-Jones et al., 2004; Phipps, 2021). This poses a significant barrier to the implementation of sufficiency policies since density and unit size are core variables related to the consumption of housing.

However, increasing sizes do not necessarily indicate a consumer preference for larger homes, but rather that new homes are being built larger and research indicates that housing consumption trends may be partially the result of constrained/manufactured choices (Levine, 2005; Manville et al., 2020; Wegmann, 2020). This is corroborated by evidence indicating changing preferences in house sizes in some Canadian cities (Phipps, 2021). Further, there is at least some indication that the availability of public parks and open space can mitigate some of the preference for larger SDHs (Morrow-Jones et al., 2004).

Similarly, high-level data has the potential to obscure a desire for medium-density “missing middle” housing. While research indicates that, all else being equal, residents prefer low-density homes, there is also evidence of an emerging preference for walkable medium-density housing amongst younger age groups in the US (Parolek, 2020). Decreasing household sizes in Canada and many other developed economies have contributed to an increasing preference for walkable communities. While in a vacuum SDHs were still the preference of most respondents with 62% of single-person households and 71% of households with children preferring it, the preference for walkable communities was similar at 70% overall. Further, except for households with children, respondents preferred walkable communities by larger shares than they preferred SDHs, with 76% of single-person households and 63% of multi-adult

households preferring walkable communities. In the US this represents substantial unmet demand as approximately 27 million households want to live in attached units in walkable communities but do not (Parolek, 2020). In Canada, the preference for walkable neighbourhoods is slightly lower, with as many as 64% of Toronto and Vancouver residents strongly preferring walkable neighbourhoods depending on other neighbour design elements (Frank et al., 2014). Should current trends of decreasing household sizes (Statistics Canada, 2015) continue, likely, young Canadians will increasingly prefer medium-density housing in walkable communities, especially given their comparatively high concern for environmental issues (Baldwin et al., 2022; Wallis & Loy, 2021).

Unrelated to actual housing needs, consumers view large SDHs not only as a desirable place to live, but also an investment vehicle (Cohen, 2021; Forrest, 2021), a “means of generating competitive social advantage” (Conley, 2001; Filandri & Bertolini, 2016), and as a status signifier (Leguizamon, 2016; Nethercote, 2019). Of these factors, the most important is the role of housing as an investment vehicle since any impacts sufficiency policies may have on residents’ investments and retirement savings are important considerations for policy design due to the potential for pushback.

5.2. Industry & Other Stakeholders

Another key barrier to sufficiency policies is potential pushback from various industries and stakeholders. Though specific policies may differ and receive pushback from a given stakeholder as a result, the general principles of sufficiency push up against stakeholder interests in three key areas. Reducing the overconsumption of housing resources, both in terms of area per unit and in terms of land (i.e., density), is the core principle of sufficiency. Thus, two of the stakeholder groups which require attention are those with an interest in maintaining the current trend of increasing house sizes and those with an interest in maintaining the prevalence of single-detached zoning. The third sufficiency principle which may result in stakeholder backlash is that of de-growth or anti-commodification. Housing sufficiency’s explicit goal of tailoring housing policy to meet individuals' needs rather than wants fundamentally pushes back against the treatment of housing as an investment or as a commodity. The third principle of sufficiency is likely to lead to pushback from stakeholders who have an interest in maintaining the financialization of housing.

Under current single-detached zoning regulations, stakeholders within the housing sector such as developers, architects, and builders, are incentivized to build larger homes (Cohen, 2021). To maximize the return on their investment for land costs, developers are incentivized to build as large as possible when they are unable to increase the number of units they build. This is only under current regulations, however, and the removal of single-detached zoning would better align developer and industry incentives with the goals of the sufficiency framework by allowing them to decrease the size per unit to increase the number of units.

One of the primary stakeholders of concern regarding zoning reform is municipalities. As zoning falls within the municipal jurisdiction any attempts at reforming zoning at the provincial level necessarily impinge on the autonomy and control of municipalities. This may lead to concerns surrounding municipal infrastructure, which may not be sufficient to handle increased density. Additionally, some municipalities may have their own plans for addressing housing unaffordability and environmental concerns, whose efficacy may be impaired by provincial reforms.

The final area of concern, the financialization of housing, has several different stakeholders who may be opposed. These stakeholders include but are not limited to, homeowners, mortgage brokers, lenders, investors, real estate agents, and financial institutions. Absent broad action on housing de-financialization, homeowners who view their homes as assets are the most likely to oppose sufficiency policies due to the intended impact on home prices. Additionally, there is the problem of local opposition in the form of “NIMBYism,” wherein local homeowners may oppose developments for a variety of reasons including the impact on local homes, the insufficiency of municipal infrastructure, and neighbourhood character (Whittemore & BenDor, 2019). Sufficiency policies such as increased density and de-financialization that may impact home values or threaten local input in the zoning process are likely to face pushback from these stakeholders.

Chapter 6.

Jurisdictional Scan

The sufficiency approach acts as a useful framework to guide the selection of policy options based on their ability to reduce consumption. As such policy options that meet the criteria of the sufficiency framework have been implemented in countries throughout the world, even when the sufficiency framework has not been used to evaluate and identify them. Sufficiency in housing includes policies that have the potential to reduce the overconsumption of housing resources, both in the form of land use per unit of housing and in the form of unit size. Of note is that the focus is on addressing overconsumption, rather than consumption altogether, and as such these policies must also be suited to addressing BC's need for increased housing supply and not merely intended to reduce the consumption of housing. Thus, for this jurisdictional scan, cases were selected based on the policy's ability to either reduce overconsumption of housing resources or facilitate lower levels of consumption, their ability to either mitigate or bypass current barriers to housing sufficiency, and their suitability to the geographical and political constraints of the BC's housing sector.

While research using the sufficiency framework has been conducted in other jurisdictions, such as Germany, differences in their housing context limit the potential for direct application. In particular, Germany does not face the same struggles with housing affordability that Canada does (Durning, 2021), and as such is not facing the same degree of supply shortage. This makes policy options focused on the re-distribution of existing housing stock more viable than in regions with greater housing supply shortages. Thus, this jurisdictional scan focuses on attempts at implementing policies which achieve the reduced consumption goals of the sufficiency framework, in regions with similar housing contexts. In particular, countries with similar approaches to residential zoning and governmental structure were chosen.

6.1. Oregon

6.1.1. Single-Family Zoning Reform

In 2019, Oregon was in the midst of a housing crisis, with one of every three families spending more than 30% of their income on housing costs (Oregon Center for Public Policy, 2018). One of the core barriers to affordable housing and increasing Oregon's housing supply was zoning regulations. Substantial portions of land were zoned for single-detached houses. To address this barrier, the State of Oregon passed the "Housing Choices" House Bill 2001 in July 2019. The bill, intended to provide Oregonians with more affordable housing choices, requires all cities in Oregon with a population greater than 10,000 and less than 25,000 (medium cities) to allow the building of duplexes "on each lot or parcel zoned for residential use that allows for the development of detached single-family dwellings" by June 30th, 2021 (State of Oregon, 2019). Further, it requires that all cities in Oregon with populations great than 25,000 (large cities) allow other forms of multi-family housing, such as triplexes, quadplexes, and townhouses to be built in areas zoned for single detached houses by June 30th, 2022.

To assist municipalities in Oregon through the transition, the Department of Land Conservation and Development led three "rulemaking efforts" to help cities comply with the bill's requirements (State of Oregon, 2019). These efforts included the creation of model codes, the establishment of compliance standards, and the development of an evaluation process and criteria to address the resulting infrastructure needs. Further, the state's Land Conservation and Development Commission (LCDC) adopted model housing codes, one each for medium and large cities, to guide the development of the newly allowed forms of housing. Additionally, LCDC adopted a set of minimum standards for each city size with which cities must comply. Cities could then choose whether to regulate the new housing forms based on the model housing codes, the minimum standards, or a combination of the two. Finally, the bill provides the Department of Land Conservation and Development with $3.5 million to aid city governments in planning regulations for new housing forms and aid them in developing plans for the necessary infrastructure expansion.

Cities which lacked the sufficient infrastructure to implement the new housing requirements could apply for an “Infrastructure-Based Time Extension Request”. The application requires that cities provide a timeline for addressing the insufficient infrastructure, their plans to implement the new housing forms in other areas, and an explanation of how their request for an extension might impact housing opportunities for those in need.

The adoption of House Bill 2001 in the State of Oregon is particularly relevant in the context of BC since their governmental structure is similar in the sense that cities (or municipalities) traditionally have jurisdiction over residential zoning. As such many of the barriers that the Province of BC can be expected to face when implementing a similar bill were overcome in Oregon. Stakeholders had similar reasons to reject the bill and residents can be expected to have had similar housing consumption preferences.

6.2. California

6.2.1. Accessory Dwelling Units

Another potential policy option for increased density can be found in California’s Accessory Dwelling Unit (ADU) Law. Accessory dwelling units are secondary dwellings on a plot of land that is zoned for or occupied by a single-family dwelling. They may be attached, detached, or interior (ex. Basement suites). The law, Assembly Bill No. 68, took effect in the state on January 1st, 2020, and provides homeowners with the option to build an accessory dwelling unit on their property regardless of whether it would be allowed by municipal zoning or the Homeowners Association’s policies (Assembly Bill No. 68, 2019). It is not the first bill of its kind, nor the first in California, as the state has introduced several pieces of legislation in recent years with the express purpose of increasing the number of ADUs in 2016 and 2017.

These bills allow homeowners to build one external ADU and one internal (junior) ADU per single-family home, which the owner may then rent out provided they still occupy the primary residence. External ADUs cannot exceed 50% of the primary residence size and the total floor area cannot exceed 1200 f^2, while internal ADUs cannot exceed 500 f^2. ADUs are not available for sale separate from the main property, meaning that they must either be used by the homeowners or rented. These policies

thereby facilitate the provision of purpose-built rental dwellings without removing the single-family zoning as done in Oregon. It should be noted, however, that ADUs may not end up on the rental market as evidence from Portland indicates 85% of tenants in ADUs are family or friends of the ADU owner (Palmeri, 2014).

Finally, along with making it simpler for homeowners to add ADUs to their property, the bills are accompanied by funding opportunities. California's Housing Finance Agency (CalHFA) launched an ADU Grant Program in 2021 which provides homeowners with up to $40,000 in funding which can be used for pre-development and other non-recurring costs that result from the construction of the ADU (CalHFA, 2021). To qualify for the grant, homeowners must fall under the income limit which varies by county. As of December 9th, 2022, the program has financed 2500 potential ADUs and awarded up to $100 million in grants.

While these bills are notable and useful, they may also not be the best suited to the BC context. As noted in Section 4.2.1, many of BC's largest municipalities already allow homeowners to build ADUs. Thus, while the province of BC does not currently require municipalities to allow ADUs, they are not overly restricted either. Nonetheless, there is a value to consistency across the board and not all municipalities currently allow ADUs, and as such there remains potential in BC for similar legislation. In particular, providing funding opportunities that help homeowners mitigate the costs of ADU development while also allowing ADUs in all residential areas zoned for single-detached housing may be a potential policy option for introducing sufficiency principles into BC's housing market.

6.3. Australia

6.3.1. Incentivizing Pensioners to Downsize

The reorientation of housing consumption to housing needs is another aspect of the sufficiency approach to housing policies. In particular, the potential GHG emission reductions that could be achieved by increasing the number of seniors who downsize their homes were noted. Australia has recently enacted legislation with this intended purpose, known as the "Incentivizing Pensions to Downsize" Act 2022 (Social Services and Other Legislation Amendment (Incentivising Pensioners to Downsize) Act 2022,

2022). The bill was introduced following reports indicating that most senior Australians are not downsizing, with only 18% of people over 65 moving houses in the period between 2006 – 2011 as opposed to 39.2% of all Australians (Australian Housing and Urban Research Institute, 2018).

The bill aims primarily at addressing financial barriers to downsizing, particularly as it relates to pension eligibility. The two core elements of the policy are an extension to the existing asset test exemption and a decrease in the deeming rate. Currently, Australia provides pensioners with a 12-month exemption from the pension asset test, meaning that so long as a homeowner purchases a new home within a year of selling, they will be able to avoid counting the revenue gained from the sale of their home against their financial assets. The new bill extends the exemption period from 12 to 24 months and allows pensioners more time to find a new home before their pension is impacted. Additionally, the bill lowers the deeming rate from the sale of a home from 2.25% to 0.25%, effectively lowering the taxable income from the sale of the home.

There are some notable differences between BC and Australia which make the direct application of this policy a challenge. Firstly, BC is a province within a federal state while the policy was implemented at the federal level in Australia, as such BC is unable to exercise the same level of control over pension policy. Second, Canada and Australia have notably different public pension systems. Australia's "Age Pension" system provides retirees who meet the requirements with funding based on their income and assets (Services Australia, n.d.), while the Canada Pension Plan is instead a fund which working Canadians must contribute to at set rates and which provides funding based on the retiree's average earnings throughout their working life, contributions to the plan, and the age at which the retirement is started (Employment and Social Development, 2015). While neither of the policies implemented in this bill is directly applicable to the Canadian context this policy provides a potential framework which may be useful in the Canadian context to incentivize downsizing.

6.4. Halifax

6.4.1. Removal of Minimum House Size Requirements

Following significant increases in housing costs (Moira Donovan, 2022) during the Covid-19 pandemic, the city of Halifax has recently moved to amend bylaws to remove barriers and allow for the development of small SDHs such as mobile and shipping container homes (Dyment, 2022; Halifax Regional Council, 2022). This bylaw update follows prior policy changes which allowed the development of ADUs as part of the Halifax Regional Municipal Planning Strategy (City of Halifax, 2022). The new updates to the bylaws and the planning strategy remove limits on which forms of housing qualify as SDHs. Previously SDHs were required to have a minimum of 20 feet between the unit's outside walls, effectively mandating a minimum square footage of approximately 400 f^2. Additionally, homes without permanent foundations, or homes which could be moved such as mobile homes, faced restrictions, and did not qualify as SDHs. Removing these barriers will allow the construction of "tiny homes" such as mobile or prefabricated homes in eight community plan areas which were previously restricted to traditional SDHs.

Restrictions remain in place on the types of homes which can be built, and non-SDHs such as duplexes remain restricted. Given the drastic increase in rental costs for purpose-built rentals, it is likely that this policy is insufficient to address rising rental costs. Unlike certain forms of medium-density housing, such as row houses or walk-up apartments, that can be built as purpose-built rentals, tiny houses and mobile homes continue the emphasis on housing commodification that has been identified as a cause of both housing unaffordability and greater GHG emissions.

In the context of BC, most major municipalities already allow for ADUs in residential areas zoned for SDHs. While there is potential for a similar policy to see a measure of success in BC, there are several adjustments that would need to be made. Building on similar policies for the removal of single-family zoning in Oregon, the province of BC might implement such a reform in municipalities based on their populations and local requirements. Additionally, it would be wise to conduct consultations with municipalities and provide them with infrastructure-based extensions. Minimum lot size requirements, which are used in most major municipalities in BC, will

also limit the effectiveness of such a policy, but the removal of minimum lot sizes may have other negative outcomes like over-density in poorer neighbourhoods and underdeveloped infrastructure.

Chapter 7.

Policy Criteria and Measures

The following chapters examine and analyze policy options for implementing the sufficiency framework in BC as a method of increasing housing supply while limiting GHG emissions. These options will be analyzed using the criteria and measures outlined within this chapter, which are: effectiveness, stakeholder acceptance, equity, cost, and administrative complexity. A summary of the criteria and measures can be found in table 7.1, which also outlines the scoring scale for each measure. Each policy option will be assigned a score for each measure based on my research, namely a literature review and jurisdictional scan, with colours being assigned based on the score. A policy option which achieves poor outcomes is assigned a score of 1 and the colour red, moderate outcomes a score of 2 and yellow, and good outcomes a score of 3 and green. In cases where policy options are not significantly different enough to warrant different scores, some measures may be poor/moderate or moderate/good and assigned scores of 1.5 or 2.5 respectively.

It should be noted that many of the policy options discussed are not mutually exclusive and could be bundled together as a policy package. Nonetheless, as many of the policy options are viewed as politically difficult given stakeholder pushback, they are evaluated and recommended individually so that the best policy options can be prioritized.

Table 7.1 Criteria and Measures

Criteria	Measure	Score
Effectiveness (/6)		
Decrease in consumption of land and living space	Extent to which the policy increases density and/or decreases living space per capita.	Good (3) Moderate (2) Poor (1)
Stakeholder Acceptance (/6)		
Support by stakeholders	Extent to which stakeholders (developers and homeowners), support the policy.	Good (3) Moderate (2) Poor (1)
Political viability	Extent to which municipalities can be expected to accept or support the policy.	Good (3) Moderate (2) Poor (1)
Equity (/3)		
Economic distributional impact	Extent to which the economic benefits of the policy are equitably and progressively distributed.	Good (3) Moderate (2) Poor (1)
Cost (/3)		
Cost to government	Cost to the provincial government to implement and administer the policy annually.	Good (3) Moderate (2) Poor (1)
Administrative Complexity (/3)		
Ease of implementation	Extent to which the policy requires coordination between provincial and municipal governments.	Good (3) Moderate (2) Poor (1)

7.1. Effectiveness

To reconcile the dual goals of increasing the housing supply while decreasing GHG emissions, this criterion assesses the extent to which a given policy reduces the overconsumption of housing resources in the form of land and living space. As the specific degree to which a policy will increase housing density is dependent on the number of units built, which in turn relies on a variety of factors from the availability of workers to the cost of money, it is beyond the scope of this paper to assess the actual extent to which a policy will increase density. Rather, this policy assesses the extent to which this policy will increase allowable density and decrease per capita living space. Thus, a successful policy will be one which either legalizes or facilitates forms of housing with more units per lot and decreases the living space per capita of a given housing unit.

7.2. Stakeholder Acceptance

Stakeholder acceptance assesses the expected level of support for the policy from three key groups, developers, the general public and homeowners, and municipal governments. For developers, a successful policy will not limit their ability to build and allows more profitable forms of housing. For homeowners, support for a policy will be determined by the expected impact on home values and the impact on neighbourhood character. For municipal governments, successful policies will be those which have the lowest impact on municipal autonomy and allow municipalities to serve the needs of their constituents.

As opposition from municipalities can be expected to be a significant barrier to the successful implementation of several policy options, stakeholder acceptance for municipalities is evaluated independently under “political viability.” To calculate the overall score for stakeholder acceptance the assessed scores for acceptance amongst developers and homeowners will be averaged with the acceptance scores for political viability to achieve a final score out of 3.

7.3. Equity

Equity assesses the extent to which the economic distribution of the policy is progressive. Specifically, it analyzes how the proposed policy will impact land values and home prices to determine how equitably distributed the economic benefits of the policy are. A successful policy, therefore, will minimize economic benefits to homeowners and other wealthy residents and maximizes the economic benefit to low- and moderate-income British Columbians.

7.4. Cost

Cost assesses the cost of the policy to the provincial government for both implementing and administering the policy. This will include fixed costs for establishing the policy as well as ongoing administration costs.

7.5. Administrative Complexity

Administrative complexity assesses the required coordination between the provincial government and municipalities. Policies which require greater coordination between levels of government will be assigned a lower score.

Chapter 8.

Policy Options

8.1. Single-Detached Zoning Reform

This policy option introduces new provincial legislation requiring municipalities to allow for medium-density forms of housing. BC municipalities with populations greater than 10,000, but less than 25,000, would be required to allow the building of up to two housing units on any lot of land zoned for residential use that currently allows the development of single detached homes. Municipalities with populations greater than 25,000 would be required to allow the building of up to four units of housing on any lot of land that currently allows the development of single detached homes. Cities with more than 10,000 residents, but less than 25,000, will have up to 1 year following the passing of the legislation to make the necessary changes and allow the new forms of housing, while cities with more than 25,000 residents will have up to 2 years.

To ensure the success of the policy and aid municipalities in the transition, the Government of BC may follow the State of Oregon's lead (State of Oregon, 2019) and undertake rulemaking efforts to establish model zoning codes for both city size categories which municipalities may either use as is or as a reference for the development of their own codes. These model codes will also be implemented in cities which do not make the necessary changes on their own within the allocated time frame. To ensure compliance the province will also create a set of minimum compliance standards alongside an evaluation process, including established criteria and measures, against which new city zoning codes will be judged.

Additionally, to ensure that municipalities can meet the infrastructure needs of increased density, the new legislation will allow cities to apply for infrastructure-related extensions, provided they can demonstrate how current infrastructure is insufficient to meet the needs of increased density and they include a detailed plan on how they intend to improve infrastructure. This will allow municipalities more time to upgrade infrastructure before either their newly developed codes or the provincial model codes come into effect.

8.2. Accessory Dwelling Units

This policy option would require that all municipalities allow homeowners to build ADUs on residential lots which currently allow the development of single-detached homes. While 98% of surveyed communities allow the building of secondary suites[6], this legislation will allow other forms of ADUs, such as garden suites or "tiny homes", provided they have a living area greater than 210 f^2 and less than 1200 f^2 and the units are less than 50% of the primary dwelling's size. Further, homeowners will be allowed to build both an internal and external ADU on one lot provided both meet the above requirements. As parking requirements are currently a barrier to ADU development (BC Housing, 2021) the legislation will reduce off-street parking requirements and allow ADUs to be developed without additional parking being required.

Similar to Policy Option 1, this legislation will be accompanied by the creation of model codes for cities of various sizes, an evaluation process, and infrastructure-related extensions. Further, to help homeowners with the process of building an ADU on their property, the province will develop comprehensive guidelines for the development process.

ADUs will be owned and controlled by homeowners and will not be available for sale separate from the main dwelling. As ADUs are currently allowed in many municipalities without seeing significant development, grants will be provided through BC Housing to incentivize development provided homeowners meet an income limit set by municipalities and provided they occupy the primary residence.

8.3. Incentivizing Downsizing

To incentivize BC residents to downsize to smaller homes, this policy option removes barriers to downsizing for BC residents by reducing or eliminating the property transfer tax when moving into a qualifying smaller home. This is based on the existing first-time homebuyers program (Province of British Colombia, 2022), which reduces or eliminates the property transfer tax for those who are purchasing their first home. This will only apply to residents selling their principal residence to move into a new principal

[6] Secondary suites are accessory dwelling units that are in or attached to a detached home.

residence that is at least 25% smaller. The new residence must be used only as a principal residence and cannot be rented, though renting any available ADUs is allowed.

Property transfer tax will be eliminated for houses under $750,000. Homes above $750,000 will receive a partial reduction that decreases gradually before reaching zero for homes at or above $2 million. Qualifying houses will also be limited to a maximum of 1000 f^2 per resident.

8.4. Removal of Minimum House Size Requirements

This policy would see the removal of minimum house size requirements in all municipalities with populations greater than 25,000. While this legislation will not mandate the removal of minimum lot sizes, it will allow the building of smaller homes on residential lots currently zoned for single detached homes and thereby facilitate smaller living spaces. Additionally, this legislation removes limits on which forms of housing qualify as single-detached homes, allowing mobile homes or “tiny homes” (such as prefabricated small houses) to qualify as single-detached homes and be placed on lots zoned accordingly.

To ensure proper implementation of the legislation, and to address any unforeseen consequences, the provincial government will also engage in consultation with municipalities to develop a model code for the removal of minimum house size requirements. As this option does not increase density per lot, it is unlikely that it will require significant infrastructure development, and thus this option does not include an infrastructure-based extension request.

Chapter 9. Policy Analysis

This chapter evaluates the four identified policy options using the criteria and measures established in chapter 7. I use evidence from the literature and housing data to inform the scores. The following table summarizes the results of the evaluation, with full rationales being provided in the subsequent sub-sections.

Table 9.1 Summary of Policy Option Evaluation

	Policy Option 1 Zoning Reform	**Policy Option 2 ADU**	**Policy Option 3 Downsizing**	**Policy Option 4 Min. House Size**
Effectiveness				
Decrease in consumption of land and living space.	Good (6)	Moderate (4)	Poor (2)	Poor/Moderate (3)
Effectiveness Score (/6)	**6**	**4**	**2**	**3**
Stakeholder Acceptance				
Support by stakeholders	Moderate (2)	Moderate (2)	Moderate (2)	Poor (1)
Political viability	Poor (1)	Moderate (2)	Good (3)	Moderate (2)
Stakeholder Acceptance Score (/3)	**1.5**	**2**	**2.5**	**1.5**
Equity				
Distributional Effects	Moderate (2)	Poor/Moderate (1.5)	Poor (1)	Moderate (2)
Equity Score (/3)	**2**	**1.5**	**1**	**2**
Cost				
Cost to Government	Moderate/Good (2.5)	Poor (1)	Poor (1)	Good (3)
Cost Score (/3)	**2.5**	**1**	**1**	**3**
Administrative Complexity				
Collaboration Between Province and Municipalities	Moderate (2)	Moderate (2)	Good (3)	Moderate/Good (2.5)
Administrative Complexity Score (/3)	**2**	**2**	**3**	**2.5**
TOTAL (/18)	**14**	**10.5**	**9.5**	**12**

9.1. Analysis of Policy Option 1: Single-Detached Zoning Reform

9.1.1. Effectiveness

Score: Good (6)

This policy decreases the overconsumption of both land and living space per capita by both increasing density and decreasing per capita living space. Specifically, in the case of large cities, those with more than 25,000 residents, this policy will provide an increase in allowable density of 4x in residential zones which do not currently allow ADUs and 2x in those that allow either ADUs or duplexes.

Of the policy options considered, policy option 1 performs the best regarding overconsumption of land as it allows the greatest increase in density per lot. Concerning the expected number of new builds, evidence from Portland has demonstrated the potential as, following the passing of Portland's Residential Infill Plan (City of Portland, 2021), from August 2021 to Aug 2022 45% of new development consisted of missing middle housing (DeVoe, 2022).

Further, the forms of housing facilitated through this policy (duplexes through quadplexes and row houses) tend to be smaller than single-detached homes per capita. Evidence suggests that in BC these forms of housing are occupied by households of similar sizes to those who occupy single-detached homes. The average household size in BC for a single-detached home is 2.7 with relevant missing middle forms of housing ranging from average household sizes of 2.5 to as high as 2.9. Thus, by upzoning and replacing single-detached homes with multi-family housing, it can be expected that more housing units will be developed per square foot of land and that the same number (if not more) of people will be housed per square foot of housing space, thereby accomplishing both goals of sufficiency and as such this policy option is scored **good (6).**

9.1.2. Stakeholder Acceptance

Score: Poor/Moderate (1.5)

Support by stakeholders:

Developers have an inherent interest in the removal of single detached zoning, as doing so will allow them to build and sell more housing units on a single lot of land, allowing them to maximize profits. Of all of the policy options considered, policy option 1 provides the greatest increase in density that can be capitalized on by developers, and as such should see support from this stakeholder group. When similar legislation was passed in Portland, several key supporters were affordable housing developers (Portland Neighbors Welcome, 2022). Given that there is little financial incentive for developers to oppose this policy option, that they stand to gain from increased density, and that developers have supported past initiatives, this policy option will likely be among the most popular options for developers.

While historically homeowners have expressed concerns about the removal of single detached zoning due to its potential impact on home values, recent evidence suggests this may be changing in BC. A 2019 poll of Vancouverites found that 71% supported allowing duplexes, quadplexes, townhouses, and 3-4 storey apartments in neighbourhoods that are currently zoned for single detached houses (Canseco, 2019). Further, since residents can support legislation in general but not building in their neighbourhoods, the survey found that only 8% oppose building denser forms of housing up to quadplexes in their own neighbourhoods. Additionally, another survey found that British Columbians are generally supportive of inclusionary zoning policies (BC General Employees' Union, 2022). It is therefore likely that, while some homeowners will oppose the policy, support for policy option 1 amongst homeowners is likely to be higher than expected.

As this policy can be expected to receive broad support from developers while inevitably facing some backlash from some homeowners who are concerned about decreasing property values, albeit to a lesser extent than expected, support by stakeholders for this option is scored **moderate (2).**

Political Viability:

Political viability for this policy option is particularly problematic, as the main group that stands to oppose this option is municipalities. As this policy option strips cities of some of their own power and agency by requiring that they allow increased density,

the Union of BC Municipalities has expressed concerns regarding elements of Premier David Eby's housing plan that are similar to this policy option (Union of BC Municipalities, 2022). Specifically, they expressed concerns that the proposal to allow the building of up to three units on a single lot will be accompanied by complex trade-offs that will require extensive consultation between municipalities and the provincial government. While this policy option aims to address some of these concerns by allowing infrastructure-based exemptions and by allocating funding for municipality consultations, it remains likely that this policy option will receive minimal support from municipalities as regardless of any collaborative "rule-making efforts," the changes implemented in this policy are ultimately mandatory.

Given that this policy option does not provide any benefits or incentives to municipalities, while requiring they implement increased density, political viability is scored **poor (1).**

9.1.3. Equity

Score: Moderate (2)

By rezoning residential lots province-wide to allow up to four units of housing Policy Option 1 allows the construction of more affordable forms of housing, such as duplexes and quadplexes, across the province. In doing so the policy acts to redistribute housing resources from those who are overconsuming both land and space, increasing access to affordable housing in desirable locations for low- and moderate-income households.

The median assessment value per square foot is lower for semi-detached houses than single-detached houses, at $317 and $305 per square foot respectively (Statistics Canada, 2019a), indicating that the units will be comparatively affordable, especially since they can be expected to have smaller unit sizes as well.

However, when upzoning land currently zoned for single-detached housing to allow medium-density housing forms, evidence suggests that the expected economic result is an increase in land value (Kulish et al., 2012). While the effects of this increase will be mitigated by the fact that this policy upzones all existing single detached housing lots, and thus the comparative value of medium-density versus low-density land will be

removed, it is likely that in the short-term house prices will increase providing an economic benefit to homeowners.

Thus, while policy option 1 will create more affordable forms of housing, the forms of housing created are not substantially more affordable and the increase in land value will benefit comparatively wealthy homeowners. Given this and the fact that this policy option does provide homeowners with funding directly, this option is scored **moderate (2).**

9.1.4. Cost

Score: Moderate (2.5)

The projected cost of this policy to the government is $5 million CAD based on the funding provided by the government of Oregon through House Bill 2001 (State of Oregon, 2019). The House bill provided the DLCD with $3.5 million USD to develop model codes, carry out evaluations of proposed codes and infrastructure extension requests, and carry out consultations with municipalities. As this makes the cost to the government of this policy option the second lowest of the available options, this policy is scored **moderate-good (2.5).**

9.1.5. Administrative Complexity

Score: Moderate (2)

Collaboration between the provincial government and municipalities will be required for the development of model codes and minimum compliance standards. Different municipalities will have different priorities and needs which they may wish to see reflected in the new codes and standards. The infrastructure-based extension process will require the establishment of new teams and departments within the Ministry of Housing to assess requests in the short term. Further, as municipal infrastructure needs will be most strained by the level of density this policy affords, the expected number of extension requests and coordination required to ensure the necessary infrastructure is developed will be greatest for this policy option. Nonetheless, once the coordination process has been completed and the period for extension requests has

expired, there will not be a significant collaboration between the provincial and municipal governments required, and as such this policy is scored **moderate (2).**

9.2. Analysis of Policy Option 2: Accessory Dwelling Units

9.2.1. Effectiveness

Score: Moderate (4)

This policy option decreases the overconsumption of housing resources by increasing density and decreasing unit size per capita. By allowing the development of ADUs across the province on land that is currently zoned for single-detached houses, this policy increases allowable density by up to 3x in areas which do not currently allow ADUs and by up to 1.5x in areas which allow only 1 ADU per lot.

However, there are constraints that limit the effectiveness of this policy and will decrease its impact on housing supply. ADUs are already allowed in many of the most populated cities in BC. While the policy would streamline regulations and standards in smaller communities, which currently vary substantially in the prevalence of ADUs (BC Housing, 2021), it would have less of an impact in heavily populated cities where the need for more housing supply is greatest.

Concerning household size and housing space consumption, it is difficult to assess the strengths of ADU legislation as Statistics Canada does not collect data on average household size for ADUs. Some conclusions can be drawn, however, from the fact that ADUs tend to be smaller than medium-density housing such as duplexes or quadplexes. In Burnaby, for instance, many residential zones limit accessory dwellings to ~603 f^2, and the legislation proposed in policy option 2 would cap external ADUs at 1200 f^2. Given the lack of 1-bedroom housing units highlighted earlier, the housing units created through this policy would be well suited to facilitate smaller living for those looking for 1-bedroom apartments. However, the effectiveness of these units in decreasing space consumption is limited by the extent to which the units are available on the market. Evidence from Portland, where 85% of units are occupied by friends or family of the homeowner, suggests that a significant majority of the units will not be available to the public (Palmeri, 2014).

Nonetheless, this policy option does offer potential avenues for mitigating some of these barriers and increasing the supply of ADUs in more populous regions by accompanying the province-wide legislation with grants and other forms of assistance to help homeowners develop more ADUs. Following the passing of initial ADU legislation in 2016, California has seen significant increases in ADU permitting, with annual increases each year of 42% to 76% (Gray, 2022). Thus, while it is unlikely that BC will see supply increases of the same degree given existing municipal legislation and the prevalence of illegal basement suites which limit the potential for policy uptake, it can be expected that this policy will result in a moderate increase in housing supply. As such this policy option is scored **moderate (4).**

9.2.2. Stakeholder Acceptance

Score: Moderate (2)

Support by stakeholders:

While policy options 1 & 2 are the most similar, they differ in their anticipated stakeholder support. Unlike policy option 1, option 2 does not provide substantial benefits to institutional developers. As this option does not allow ADUs to be sold separately from the main dwelling, the potential for increased profits for developers is smaller. By allowing developers to make strategic decisions over which properties to develop and how they can capture the economic value of a specific dwelling type in a specific location. With policy option 2, however, ADUs will likely be developed at the behest of homeowners who will capture any additional value in the rent they can charge. Further, since ADUs are included in the property value and will therefore increase property taxes, the market for purpose-built properties with included ADUs will be limited to those who are not financially constrained or who wish to operate a rental property.

Homeowners, on the other hand, can be expected to support this policy option at least as much as policy option 1 if not more. As mentioned previously, public support for increased density has risen and even had it not, this policy will see less of a density increase than option 1 while also mitigating some of the concerns of certain homeowners' groups around property value and neighbourhood character. Lastly, this

policy option includes grant funding for homeowners to develop ADUs on their property, allowing them to profit while minimizing their up-front costs.

Given that developers have no strong incentives to support this policy while homeowners can be expected to support the policy for the economic benefits they gain, support by stakeholders is scored **moderate (2).**

Political viability:

Municipalities will likely see policy option 2 as similarly problematic to option 1, given that both result in a loss of power and control over local planning. Further, cities will similarly be required to address infrastructure concerns, resulting in increased spending from municipalities. As expected, the Union of BC Municipalities expressed the same concerns regarding the ADU portion of David Eby's housing plan as they did for the upzoning elements of option 1 (Union of BC Municipalities, 2022).

Political pushback from municipalities may be mitigated somewhat, however, by the fact that ADUs are already legal in many municipalities and thus the impact of the required changes will likely be smaller. Given this, political viability for policy option 2 is scored **moderate (2).**

9.2.3. Equity

Score: Poor/Moderate (1.5)

Like option 1, this policy option will see the creation of more affordable housing units, however, the policy also provides significant economic benefits to homeowners. By allowing the construction of ADUs, this policy increases the value of land and provides homeowners who choose to construct ADUs with economic benefits by renting the unit.

While the forms of housing are better likely to be more affordable to low- and moderate-income earners than option 1, as the units will necessarily be rental housing and likely smaller in size, this policy option provides further economic benefits to homeowners through grant funding. Although grant funding is limited to pre-development costs and restricted to low- and moderate-income earners, homeowners are still wealthier overall than renters. Additionally, evidence from Portland suggests that as

much as 85% of ADUs are occupied by friends/family of the homeowner (Palmeri, 2014). Thus, the government funding provided through this program will not be equitably distributed.

Given that this policy provides direct economic benefits to homeowners through grants and increased land/home values, while also creating affordable housing that is well suited to meeting the needs of low- and moderate-income renters, it is scored **poor/moderate (1.5).**

9.2.4. Cost

Score: Poor (1)

The projected cost to the government of policy option 2 is $55 million CAD. This is based on the same $5 million CAD estimate from policy option 1/House Bill 2001 for the development of model codes and evaluations, as well as an initial $50 million CAD in grant funding that will be made available. This is the highest expected cost to the government of the available policy options and as such it is scored **poor (1).**

9.2.5. Administrative Complexity

Score: Moderate (2)

As is the case with policy option 1, the administrative complexity associated with option 2 is primarily related to initial consultations between the provincial government and municipalities to establish the initial model codes and minimum standards. New teams within the Ministry of Housing to establish and enforce these model codes and standards, as well as to assess infrastructure-based extension requests, will be required. Several municipalities already allow the development of accessory dwelling units, and thus the initial consultation process may require less coordination to develop the model codes. Finally, these municipalities will have already addressed some existing infrastructure needs and the level of density facilitated by this option will require less infrastructure development. Nonetheless, the difference in the extent of coordination between provincial and municipal governments from policy option 1 is not substantial and thus, this policy option is scored **moderate (2).**

9.3. Analysis of Policy Option 3: Incentivizing Downsizing

9.3.1. Effectiveness

Score: Poor (2)

Unlike prior policy options, which increase supply and decrease emissions by facilitating an increase in density or the construction of smaller housing units, this policy option achieves reduces consumption through the re-orientation of housing consumption patterns to match housing needs. In essence, then, it does not increase density through the number of housing units per lot, but it may decrease unit living space per capita by removing barriers to households' ability to downsize. In theory, this policy has the potential to allow senior households to sell their home for a smaller dwelling that meets their needs following their children moving out. This would free up the supply of larger housing units for larger families, thereby better matching housing consumption per person to actual needs.

However, the effectiveness of this policy is limited by the availability of suitable alternatives for those who wish to downsize. As identified earlier in this paper, evidence suggests that there is currently an oversupply of larger homes with 4+ bedrooms and undersupply of smaller homes. Thus, the extent to which this policy is capable of decreasing the consumption of living space per capita is limited by the availability of smaller homes on the market for senior residents to downsize into. This, combined with a preference amongst older Canadians for larger single-detached homes (Phipps, 2021), strongly indicates that this policy is unlikely to meaningfully address the consumption of living space per capita in and of itself.

As this policy option does not contribute to increasing density and is limited in its ability to reduce consumption of living space per capita, it is scored **poor (2).**

9.3.2. Stakeholder Acceptance

Score: Moderate/Good (2.5)

<u>Support by stakeholders:</u>

Unlike prior policy options, option 3 will not provide opportunities for increased density or the development of new forms of housing. As such, it is unlikely that this policy option will receive either support or opposition from developers.

When Australia passed legislation supporting pensioners to downsize, there was little reported opposition from the general public and homeowners (Lowrey, 2022). Combined with the fact that this policy option will financially benefit those who chose to downsize their homes, acceptance from homeowners can be expected.

~~Though this policy does provide economic benefits to homeowners, and thus may face backlash from the non-homeowning general public, the benefits are less transparently inequitable and more directly tied to positive environmental outcomes. Where option 2 would provide financial benefits to homeowners at little cost, policy option 3 at the very least requires reduced consumption, potentially mitigating general public backlash.~~

Given this, support by stakeholders for this policy is scored **moderate (2).**

Political viability:

As this policy option does not interfere with municipalities' ability to dictate their own zoning and doesn't facilitate an increase in density that would require additional infrastructure, there is no reason to anticipate municipal opposition to this policy. Given this, political viability for this option is scored **good (3).**

9.3.3. Equity

Score: Poor (1)

As this policy option does not directly increase the supply of housing, while simultaneously providing homeowners who wish to downsize with a subsidy by reducing the property transfer tax, the economic benefits of this policy are poorly targeted. Access to comparatively affordable housing is only facilitated by the extent to which the homes that are being downsized from are affordable and by the extent to which competition for larger homes is decreased. There is no reason to believe that the increased availability of larger homes, given the oversupply outlined earlier, will decrease property values, and

make housing more affordable. As such, comparatively wealthy homeowners are more likely to see the economic benefits of this policy option and as such it is scored **poor (1).**

9.3.4. Cost

Score: Poor (1)

Funding required for implementing this policy option will include funding for program implementation, which will be less than prior policy options at $1 million due to the lack of consultation and planning required. As the policy provides a tax exemption, however, the actual cost to the government will increase depending on the number of people who qualify and choose to downsize, as well as the cost of the new home. A full breakdown of the property transfer tax reduction amounts can be found in Table A.11.1 Property Transfer Tax Reduction. The cost to the government, if all recipients downsized to a house of the median qualifying value, would be a loss of $6,500 in tax revenue per home.

Unlike other policy options, this will be an ongoing cost to the government for as long as the policy stands. Projections from the Rennie Group find that as many as 1,888 55–64-year-old homeowners in Vancouver may downsize over the next 5 years (Kevin Hinton & Ryan Mckenzie, 2022). As this only accounts for 55-64-year-old homeowners from Vancouver, and additional research suggests that up to 10% of British Columbian homeowners are considering downsizing, it can be assumed that the number of BC residents who take advantage of this policy option will be greater than 1,888 over the next 5 years, bringing the total cost of this policy option to > $12,272,000.

Thus, it is likely that the projected cost of this policy option is greater than option 1, though the extent to which it exceeds the cost of option 1 is dependent on factors such as which households downsize, the values of the homes they buy, and the number of households who downsize. As the projected number of downsizers over the next 5 years is 1888 for Vancouver or a little more than 1% of single-detached homeowners, this option may meet or exceed the cost of option 2. Given the potential cost of this option and its lack of predictability, this policy option is scored **poor (1).**

9.3.5. Administrative Complexity

Score: Good (3)

As this policy option does not impact zoning regulations or any other facet of housing that currently falls under municipal jurisdiction there will be little to no consultation or collaboration between the provincial and municipal governments required. As such this policy option is scored **good (3).**

9.4. Analysis of Policy Option 4: Removal of Minimum House Size Requirements

9.4.1. Effectiveness

Score: Poor/Moderate (3)

Policy option 4 has the potential to reduce the overconsumption of housing resources, specifically living space per capita, by increasing the availability of smaller forms of housing. It accomplishes this by lowering the barrier to entry for housing construction, allowing the development of smaller homes such as prefabricated homes and mobile homes across the province on lots zoned for single-detached housing. As these forms of houses tend to be smaller than standard single-detached homes, this will allow the construction of smaller homes.

The main limitation of this policy's ability to reduce the consumption of housing resources is the cost and availability of land. In dense regions such as the lower mainland, where land is in short supply and thus expensive, it is unlikely that otherwise suitable land will go undeveloped given the profit potential. As such, allowing smaller buildings to be built on land that would have otherwise been developed for larger homes is unlikely to result in smaller homes being built.

While both policy options 3 & 4 are limited in their expected policy uptake by the housing context and market forces, in cases where the policy is effective policy option 4 can be expected to achieve greater reductions of living space per capita given the significantly smaller units being built. As such this policy option is scored **poor/moderate (3).**

9.4.2. Stakeholder Acceptance

Score: Poor/Moderate (1.5)

Support by stakeholders:

Although policy option 4 facilitates the building of new housing forms, these housing forms are poorly suited to profitability for developers. Removing minimum house size requirements and allowing mobile homes and other compact homes on single detached lots, will allow prospective homeowners to attain homeownership without significant involvement of developers. Developers may be involved in the construction of infrastructure or installation of the unit, but like policy option 2 they will be unable to capture surplus value through strategic development choices. As such, developer support for this policy option can be expected to be at best neutral if not negative.

Homeowner opposition based on neighbourhood character can be expected here, particularly in the case of shipping container homes or “tiny homes” that will be notably distinct from the neighbourhood character. Further, this policy option does not facilitate increased density or otherwise provide financial benefits to homeowners.

Given the lack of economic benefits provided to developers or homeowners, along with potential concerns surrounding neighbourhood character, support by stakeholders for this policy option is scored **poor (1).**

Political viability:

As with options 1 & 2, municipalities have some reason to oppose this option as it also reduces their agency and control over local zoning and related legislation. While municipality opposition is likely to be lower given that this option does not facilitate increased density and thereby require additional infrastructure, some opposition can still be expected as it imposes new requirements on municipal governments. Given this, political viability for this policy option is scored **moderate (2).**

9.4.3. Equity

Score: Moderate (2)

By removing minimum house size requirements, and thereby decreasing the development costs of houses given there are fewer materials required while allowing more affordable housing forms such as mobile homes, this policy stands to increase the availability of more affordable forms of housing such as mobile homes, this policy stands to increase the availability of more affordable forms of housing. Additionally, this policy option does not subsidize or benefit homeowners, as it does not allow for increased density and thus it will not result in increased property values as a result of increased land value. Further, given the established relationship between house size and price, as well as evidence demonstrating the impact of minimum lot sizes on house prices (Zabel & Dalton, 2011), it can be assumed that this policy will result in the creation of more affordable homes.

The effectiveness of this policy in creating more affordable housing units, however, is limited by the cost of land. As land is the costliest element of house prices in land-constrained regions such as the Lower Mainland, it is unlikely that this policy will result in the creation of enough housing units to meaningfully affect affordability.

Given that this policy option is unlikely to create a significant number of affordable housing units, but also does not provide homeowners with a majority of the economic benefits, this option is scored **moderate (2).**

9.4.4. Cost

Score: Good (3)

The projected cost to the government for policy option 4 is $3 million CAD. This is based on the $5 million CAD estimate for policy option 1 for the development of model codes and evaluations. As this policy option does not include infrastructure based-exemption requests, however, and is of a smaller scope than policy option 1, the estimate has been reduced to $3 million CAD. Thus, this policy option has the lowest projected cost to the government of the available options, and it is thus scored **good (3).**

9.4.5. Administrative Complexity

Score: Moderate (2.5)

As with policy options 1 & 2, this option will require some degree of consultation between the provincial and municipal governments to develop model codes and minimum standards. However, while options 1 & 2 will facilitate increased density, option 4 will not as it does not increase allowable density. As such, while model codes will still be required to ensure issues that may arise from allowing new forms of housing such as mobile and prefabricated homes are addressed, municipal infrastructure should not be strained. Thus, this policy option does not include an infrastructure-related extension request and therefore the extent of collaboration required will be lower than options 1 & 2. Given that this option does require some formal consultation, but notably less than options 1 & 2, it is scored **moderate (2.5).**

Chapter 10. Recommendations

Given the results of the analysis presented in Chapter 9, this study recommends that policy option 1 be implemented.

The Government of BC should prioritize the implementation of policy option 1 by passing legislation that allows the building of up to 2 units of housing on any residential lot which allows the building of SDHs for cities with populations greater than 10,000 and less than 25,000, and up to 4 units of housing for cities with populations greater than 25,000. This legislation should include funding allocated to the Ministry of Housing for the establishment of model codes and minimum standards, as well as the infrastructure-based extension request process. The current premier of BC, David Eby, outlined a housing proposal during his leadership campaign which includes elements similar to those included in this policy option (Eby, 2022). Thus, the implementation of this policy option can be carried out more swiftly by building upon this existing proposal and making changes where necessary.

This policy option best meets the criteria of the sufficiency framework and as a result, is best suited to addressing the simultaneous and potentially conflicting priorities of increased housing supply and decreased GHG emissions. By providing the greatest increase in allowable density this policy option will incentivize a decrease in the size of the average housing unit built while simultaneously allowing more housing units to be built per development project. While it is beyond the scope of the study to project the extent to which each policy option will increase housing supply, it is relevant that policy option 1 will provide the greatest number of new housing units per external building frame. As the exterior of a building accounts for the greatest portion of embodied energy (Simonen et al., 2017) multi-family units which share internal walls have reduced embodied emissions per housing unit (Pitt, 2013). Further, as increased density has been linked to reduced transportation-related emissions (Senbel et al., 2014), even in absence of sufficient public transit infrastructure, this policy option also performs the best in decreasing transportation-related GHG emissions. It achieves the greatest increase in housing supply and reduction in GHG emissions per new unit by reducing the consumption of both housing space and land space as recommended by the sufficiency framework. As emissions associated with housing unit size, form, and embodied

materials are effectively set in stone once the new buildings are developed, this will allow any future emission reductions from new technologies that improve efficiency to be maximized, thereby reducing the rebound effect.

10.1. Considerations

The scope of this research paper is limited to housing policies which facilitate or otherwise contribute to an increase in housing supply while also allowing for decreased GHG emissions. Both the core problems of housing affordability and GHG emissions can be addressed individually through other means. For instance, policies intended to directly decrease embodied emissions by incentivizing the use of low-carbon materials and policies which decrease operational emissions through increased adoption of more efficient technologies, such as heat pumps, remain necessary and should be implemented alongside the recommendations made within this paper. Rather, the recommendations made within this paper will ensure that the GHG emission reductions from said policies are more fully realized.

Chapter 11. Conclusion

British Columbia currently faces several interwoven crises, including a crisis of housing affordability and the global crisis of climate change. While there are a variety of factors that have led to the current housing affordability crisis, one of the most significant is a lack of housing supply. A report from CMHC has calculated that an additional 500,000 new housing units beyond those currently planned for development are required to address the supply gap and bring housing affordability back within reach of BC residents (CMHC, 2022a). At the same time, however, each new unit of housing developed will contribute additional GHG emissions beyond those currently projected and accounted for in the province's climate change plans. While current policies which incentivize advancements in technology to improve energy efficiency will help mitigate some of the GHG emissions associated with household operations, they will be unable to address all of the additional emissions that will result from increasing home sizes and the embodied emissions of new buildings. These emissions will be "built-in" as BC seeks to increase its housing supply and the effectiveness of any future emission reduction strategies for the housing sector will be limited by current development choices. Allowing house sizes to continue increasing and failing to allow increased density, will result in lower levels of GHG emission reductions from efficiency improvements and removing these limitations will require additional building resulting in more embodied emissions from the demolition and construction processes.

To address the limitations on potential GHG emission reductions for new housing stock, this study used the sufficiency framework to analyze housing policy in the BC context. This framework emphasizes the importance of decreasing consumption as a way of addressing GHG emissions. Using this framework, this study highlighted the potential for decreasing consumption to simultaneously address the supply shortage by re-distributing both land and housing space while limiting GHG emissions. After researching and analyzing housing in the BC context, through consumption patterns and existing policies, as well as barriers to the implementation of sufficiency policies, a multi-criteria analysis was conducted to assess the feasibility of sufficiency policies in BC.

The policy option that is recommended is well suited to implementing the sufficiency framework in BC's housing sector. It will facilitate the development of more &

smaller housing units and increase allowable density while avoiding barriers to implementation associated with consumer preferences for larger homes in lower-density neighbourhoods and pushback from stakeholders. Implementing the recommended policy will allow BC to increase its housing supply while minimizing additional GHG emissions and meeting the housing needs and preferences of BC residents.

As the policy recommended does not directly create new housing units and additional barriers exist, future research should be conducted to examine policies which can further incentivize the building of the newly allowed housing forms. Further, once additional supply is created through these policies and BC's housing stock has increased both overall and in the availability of smaller housing units, policies intended to more directly incentivize residents to choose smaller homes (such as a tax on large homes) should also be researched and considered.

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Appendix A.

Policy Option 3 – Property Transfer Tax Reduction

Policy Option 3 proposes the reduction or elimination of property transfer tax for residents who are downsizing their primary residence by at least 25%. The following table outlines the precise amount of tax reduction that can be expected based on home value.

Table A.11.1 Property Transfer Tax Reduction

Fair Market Value	Exemption Amount	Tax Payable
$750,000	$13,000	$0.00
$800,000	$12,480	$1,520.00
$850,000	$11,960	$3,040.00
$900,000	$11,440	$4,560.00
$950,000	$10,920	$6,080.00
$1,000,000	$10,400	$7,600.00
$1,050,000	$9,880	$9,120.00
$1,100,000	$9,360	$10,640.00
$1,150,000	$8,840	$12,160.00
$1,200,000	$8,320	$13,680.00
$1,250,000	$7,800	$15,200.00
$1,300,000	$7,280	$16,720.00
$1,350,000	$6,760	$18,240.00
$1,400,000	$6,240	$19,760.00
$1,450,000	$5,720	$21,280.00
$1,500,000	$5,200	$22,800.00
$1,550,000	$4,680	$24,320.00
$1,600,000	$4,160	$25,840.00
$1,650,000	$3,640	$27,360.00
$1,700,000	$3,120	$28,880.00
$1,750,000	$2,600	$30,400.00
$1,800,000	$2,080	$31,920.00
$1,850,000	$1,560	$33,440.00
$1,900,000	$1,040	$34,960.00
$1,950,000	$520	$36,480.00
$2,000,000	$0	$38,000.00