FLAHERTY | HOOD P.A.

THE HOUSING CRISIS IN MINNESOTA

Understanding the Policy, Economics, and Communities involved

APRIL 2025

The housing crisis consists of many elements. Here we advance the argument that the model through which Minnesota produces new housing, site-built housing, should be critically examined for its capacity to solve the housing crisis. Alternative methods and innovation warrant serious consideration in the state's portfolio of policy decisions and investments to address the root causes of the housing crisis.

Flaherty & Hood Insights

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Executive Summary

Minnesota has invested a significant amount of resources in recent years into addressing the housing crisis. Housing advocates and policymakers have identified the housing supply shortage with respect to the types of housing needed, the relative demand among homeowners and renters, and have sought to remedy these shortages through legislative, state agency and private sector policy initiatives. In 2023, the legislature passed a $1 billion housing omnibus bill which invested into renter assistance, first-time homeownership and an array of other policies designed to meet statewide housing needs.

Largely absent from recent policy and investment considerations are three conditions which exist not only in Minnesota but in many areas of the U.S. These conditions are:

1. The model of site-built housing requires a wide array of workers with varying skills and costs for their services. Due to the historically low unemployment rate and projected demographic trends, the availability and cost of utilizing these workers will continue to hinder residential construction output capacity as well as increase cost to the finished product.
2. The price of materials required to construct a site-built home or apartment have consistently outpaced inflation in the last two decades. Price fluctuations in the supply chain of raw or processed materials like wood can further exacerbate regional or local supply challenges.
3. Due to the depressed housing output following the great recession of 2008-2010, Minnesota is tens of thousands of residential units below what is considered a “healthy market”. Combined with the increased cost of materials and labor, the shortage of available labor, the condition is such that for each new home produced currently, demand dictates that the sale price is unaffordable to a large majority of Minnesotans.

Public investment into addressing the housing crisis cannot focus solely on short or medium-term interventions. The state, however, can both support a sustainable housing stock in deeply impacted areas and populations while also addressing the core, systemic issue of the current housing production paradigm.

Given the volume of the current unit shortage statewide, the decreasing availability of future labor, and the increases to both labor and materials, alternative construction methods must be seriously explored as a part of the portfolio of state investment into housing. These alternative methods can include modular housing, manufactured housing, 3D printed housing, or other innovative material technologies. In each case, these alternative methodologies may offer less expensive materials, fewer materials and labor, and environmentally sustainable building practices.

For housing advocates and public representatives, determining the feasibility of implementing these alternative methods is paramount. Identifying the scale achievable through these methods can supplement the ongoing efforts to modify a historical construction paradigm which now produces housing which is both too few in number and too expensive for average Minnesotans.

Introduction: The Housing Crisis In Minnesota

The cost and availability of housing in Minnesota has, and will continue to be, a significant concern for the majority of Minnesotans. For many Minnesotans, rent is too expensive, and for hopeful homeowners the options to buy seem unaffordable or unavailable. More younger people are living with their parents than ever before. The state government has responded in a number of ways, including the passage of $1 billion omnibus housing bill[1] in 2023 which provides grants and subsidies to renters and first-time home buyers and funding to developers to subsidize housing construction. In the last legislative session, ending in May 2024, several bills were also introduced but not passed which sought to promote the construction of new housing and to remove perceived barriers to new construction. These bills contained a variety of policies which were meant to combat opposition to increased residential density, meet sustainability goals, and address historical racial prejudice with respect to homeownership. The desired outcome of these policies would be the expansion of areas in cities where new housing could be built and encouraging construction in communities which experienced systemic prejudice.

The majority of these policies did not pass into law for reasons we'll discuss in the following sections, but the conversation about housing will continue to be a focal point within future legislative sessions. Local zoning control, sustainable building practices, and the rising number of cost-burdened households are consistent themes which arise within the housing debate. Most Minnesotans agree that housing in Minnesota is too costly and that the state should take steps need to address the lack of supply[2]. The question remains: How should we employ our resources to optimal effect to create the outcomes desired? It is at this point that we should take a step back, question our understanding of the issue, and let the data inform the way we set our priorities.

We can summarize the process of new residential construction using this model through the following example:

A local government develops an area of land in order that a new neighborhood can be built. Streets are paved, sewer, water, and power are installed. The city makes an agreement with a homebuilding company or general contractor to produce apartments or homes on a series of lots. A general contractor from this company hires specialized subcontractors to create the foundation, frame the walls, install the wiring, etc. These subcontractors consist of a wide array of specialty trades and have differing costs for employing their labor and differing time requirements for completing their portion of the work. The general contractor purchases the building materials, materials are delivered to the lot, and work begins.

In the following sections we evaluate the process by which we build new housing and provide an overview of the components required to complete this process. The construction model described above is called "site-built" or "stick-built" construction. An estimated 95% of single-family homes and 86% of multi-family homes are built this way in the Midwest[3]. The general contractor model which is used to

[1] *Agency planning for funds*. (n.d.-c). https://www.mnhousing.gov/policy-and-research/agency-planning.html
[2] Yudhishthu, Z. (2024, May 11). *What new statewide polling teaches us about housing and land use policy*. Streets.mn. https://streets.mn/2024/05/10/new-statewide-polling-about-housing-and-land-use/
[3] US Census Bureau. (2019b, April 15). *CHARS - current data*. https://www.census.gov/construction/chars/current.html

build new housing has been in practice in the United States at least as far back as the 1870's[4]. The end product, a home or apartment, has increased in price to a level unaffordable to the average Minnesotan.

Because housing is a basic necessity, people cannot choose a substitute good with which to replace it. If there is a deficit in apartment supply, for example, it will only result in the increase of cost-burdened renters because the alternative is homelessness. As policy experts, lawmakers, and housing advocates seek to find solutions to increase housing production, and in turn increase supply and lower prices, we should take a moment to ask the question:

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*What should we do if the **way** we produce new housing can no longer solve the problem?*

In this paper, we will challenge the site-built housing model and the capacity of this model in solving the housing crisis. We evaluate the requisite components of the site-built model in order to identify whether policy action to modify these components will suffice, or whether it is the model itself which should be modified. Our analysis includes the following outline:

1. Background of the housing crisis in recent history.
2. Methods used to estimate the housing shortage, their differences in outcomes, and why the estimates matter.
3. The output capacity of the residential construction industry and the profile of housing built in recent history within the state.
4. The state and state agency policy agenda addressing the housing shortage and proposed legislation to address certain aspects of the housing crisis.
5. The future of housing production in Minnesota in relation to the current model.

[4] Wermiel, S. E. (2006). Norcross, Fuller, and the Rise of the General Contractor in the United States in the Nineteenth Century. *Structurae*. https://structurae.net/en/literature/conference-paper/norcross-fuller-and-the-rise-of-the-general-contractor-in-the-united-states-in-the-nineteenth-century

1. Background: How Did We End Up in a Housing Crisis?

Like many other states in the U.S., Minnesota has struggled to produce and maintain a housing supply which meets residents' demand. At a basic level, every geographic area must sustain a housing supply which meets two primary needs:

1. Creates available housing which aligns with population growth, and income profiles.
2. Sustains a housing supply which allows for intra-area mobility.

Figure 1

Net population increase between 2000 and 2010	384,433
Total housing unit increase between 2000 and 2010	282,296
Difference between net population growth and new housing units	-102,137

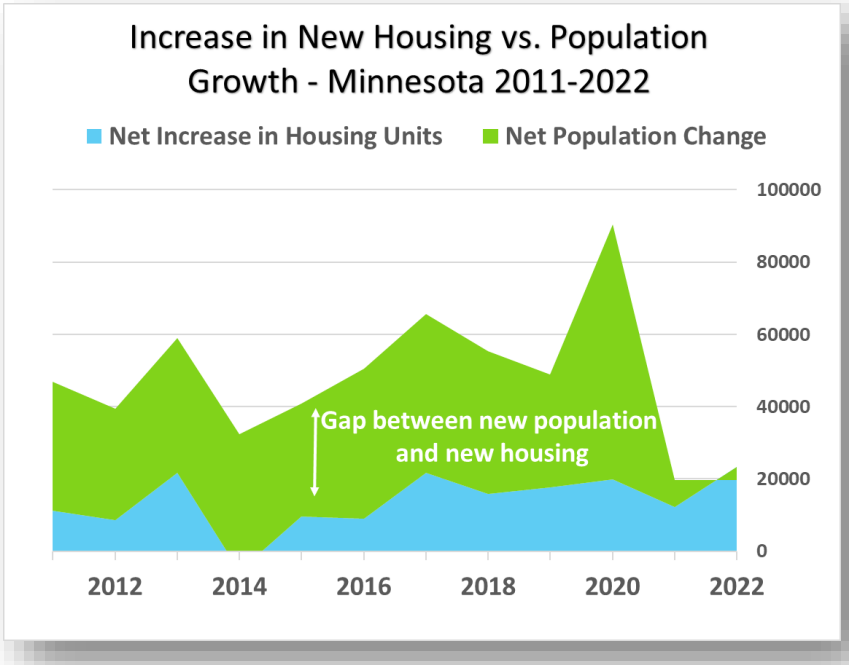
In terms of population growth, the rate of housing construction must both account for the year-over-year net growth, but also for generational growth. For example, the quantity of apartments built in the year 2000 must meet the demand for housing 18-25 years in the future. This is based on the number of children born that year who will be looking for apartments as they enter adulthood. Figure 1 shows the net population increase in Minnesota between 2000 and 2010, and the net housing unit increase during the same time period. This simplistic measurement does not account for multi-person households, or the type of housing unit demanded, but can be nonetheless descriptive of a long term trend in housing production.

During the Great Recession of 2008-2009, housing production fell dramatically. Still, in accounting for the entire decade, the number of residential units produced was 102k short of the number of new people in the state. It's not as though *no new housing* was built following 2008, but rather the level of production wasn't nearly enough to keep up with the pace of population growth[5]. Then, as the economy recovered and started to rapidly grow, more people had the income required to buy a home and found that there were a lot of other people in the same situation. The sudden growth in demand for housing far outpaced the capacity of the residential construction industry in Minnesota to meet that demand. Consequently, more families continually entered the market until there were few, if any, houses available in the areas they preferred to live.

[5] Figure 1 Population data source: www.macrotrends.net, original source: U.S. Census Bureau. Housing unit data source: ACS Housing units B25001.

In the following decade, the net increase to population continued to outpace the number of residential units produced by several orders of magnitude. Figure 2 below illustrates the year-over-year growth of population compared to the net increase in housing. The green portion of the graph depicts the gap between the number of new residents added and the net increase in housing for that year. This shows that the trend of underproduction has continued into the 2020's and also importantly it represents the underproduction of two decades ago in the early 2000's.

Figure 2



The housing market is not a monolith, however. We can ask how to "catch-up" on housing to increase supply, but a better question to start with is: Which *type* of housing do we need to make more of, and for who? To answer this question we should first identify the profiling of housing in the state to determine the number of people who live in each type of housing. As of 2022, Minnesota had approximately 2,322,190 occupied housing units[6]. Roughly 1.5 million of those units are single-family homes – a little over 66% of all housing. Single-family homes can be detached (stand-alone house) or attached (homes which have a separate entrance and a dividing wall between the other attached homes, like townhouses). If we assume the profile of housing type reflects consumer demand, we can conclude that Minnesotans prefer single-family homes over other types by a wide margin.

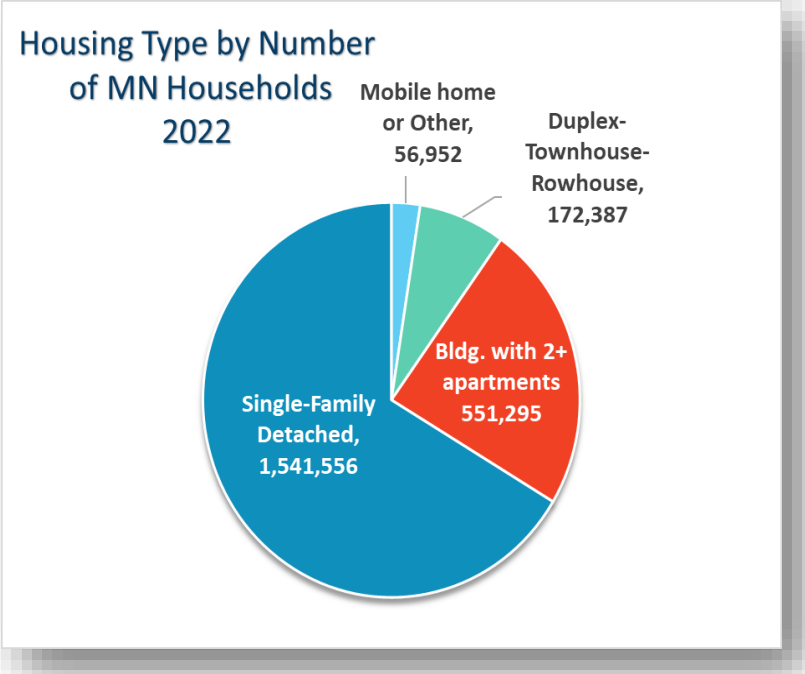


Figure 3

Consumers may change their preferences in terms of what a single-

[6] U.S. Census Bureau, 2022 American Community Survey 1-Year Estimates, Physical Housing Characteristics for Occupied Housing Units.

family home looks like (townhouse, duplex, etc.), where it's built, and what features it contains, but it is clear that in terms of consumer demand single-family homes are the overwhelming preference.

It's rare that a young worker enters the labor market and already has the financial resources to purchase a single-family home. Instead, they can continue living with their parents, find an apartment to rent within their budget, or find roommates to share an apartment or other housing. The rental market though has now also become too expensive for workers, even when splitting the cost with roommates. If the problem is that we haven't built enough new single-family homes, why would the rental market also see a huge increase in prices? To understand how these two markets are related, we first need to look at how and why people choose a type of housing. If we think about housing in terms of stages in a person's career and family, we can begin to understand the *cycle of demand.* **Figure 3** shows a very generalized cycle of demand for housing in a typical economic environment where supply mostly meets demand. The cycle describes the journey from the shabby studio rented by a recent college graduate starting their career, to the retired worker looking to downsize their home or move to Florida.

Between 2010 and the present, Minnesotans' demand for single-family housing far outpaced supply. Single-family homes became unavailable or prohibitively expensive simply because too many people wanted to buy one and there weren't enough available. Many people were forced to continue renting instead of buying. Consequently, a large group of people didn't transition out of the rental market and into the single-family home market. As a result, there were fewer apartments available for young workers entering the labor market. The bottleneck in housing production has disrupted the normal cycle of the entire market, making housing, any housing, more expensive than it ever has been.

Figure 4

A bottleneck of housing supply may occur at any point through figure 4, and will vary from city to city based on the unique demand features present. If we are going to develop and implement policies to address this issue, we need to have a clear understanding of not only *how many* housing units our population demands but also *what type* of housing and *where.* Estimating the quantity of additional apartments needed, for example, requires an in-depth geographical and demographic analysis which attempts to triangulate current demand with future supply.

1. Estimating The Housing Shortage

A statewide estimate of the housing shortage can serve as a useful benchmarking tool when the legislature or state agencies are making strategic planning decisions. Estimating the total number of units the state needs can also reveal whether the state's investment into housing is achieving its objectives. The state-level estimates are not useful, however, in describing the relative supply shortage in different parts of the state, the types of housing demanded in those places, and local nuances which can either promote or inhibit the production of new construction.

Some estimates of the housing shortage may focus on populations in the lowest income groups and calculate the number of affordable rental units required to meet demand at certain levels of income. Other estimates focus on homeownership. There is no "wrong" way to estimate a shortage of housing in a given location. Rather, we should recognize that for a given estimate a choice was made as to *what type of housing* to estimate and *the method used* to create estimate. These two factors can reveal the intended beneficiary population of the completed estimate.

We will consider three approaches to estimating the housing shortage in Minnesota and evaluate how effective each is with respect to policy objectives and benchmarking progress. The estimates provided between organizations vary substantially, and the methodology used to estimate Minnesota's housing shortage depends closely on the policies and priorities of the estimating organization.

Up For Growth Methodology:

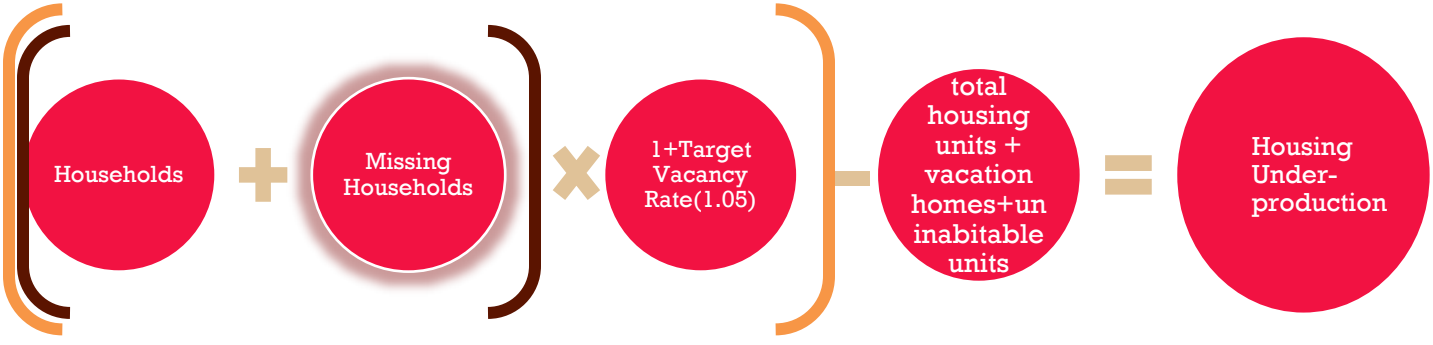
Up For Growth and their "Housing Underproduction Report" was cited by the Housing Affordability Institute (HAI). HAI is a 501c(3) non-profit founded by Housing First Minnesota, the homebuilding lobby. The report states that:

***Minnesota**'s 106,000-unit deficit is 3.42 times its annual housing production of 31,000 units 2022). With a 76,500-unit deficit, the greater Minneapolis-St. Paul area, the 12th most undersupplied market, represents more than **72%** of the state's housing shortage*

The formula used to provide this estimate is as follows[7]:

Housing Underproduction = ((Households + missing households) X 1.05) – (Total housing units + 2nd vacation homes + Uninhabitable Units)

Figure 5



[7] Up For Growth. (2023, November 29). *2023 Housing UnderproductionTM in the U.S. - up for growth*. Up for Growth. https://upforgrowth.org/apply-the-vision/2023-housing-underproduction/

The key variable present in this formula is "missing households" which is defined by **Up For Growth** as:

Defining *missing households* as children over the age of 18, single adults, and couples living together as roommates *at levels exceeding historical norms* presents further issues. This definition ignores student status, family orientation and other exogenous factors which may influence the lack of household formation. For example, families may choose to live in a multi-generational household for childcare purposes. The cost of education may delay graduates from renting or owning a home.

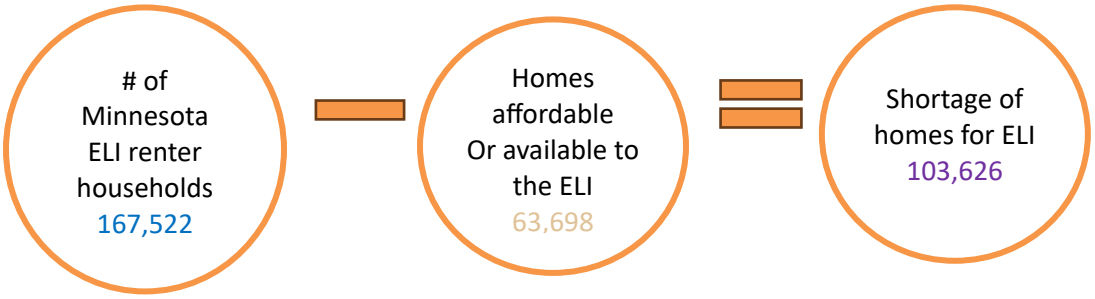
There are a variety of qualitative reasons why multiple adult individuals may live together rather than form an additional household. Quantifying the downward pressure on household inflation and correlating it with a single variable of housing risks fundamentally skewing the resulting estimate.

Minnesota Housing Partnership Methodology

The Minnesota Housing Partnership (MHP) focuses its estimate of the housing shortage on the rental market and specifically for people living in "extremely-low income households" (ELI). These are households which earn less than $30,190 annually. As reported in MHP's 2023 State Housing Profile[8] the total shortage of available/affordable housing for ELI households in Minnesota was 103,626. This estimate is produced by identifying the total number of Minnesota households qualifying as ELI and then comparing that to the number of available "homes" affordable/available to that level of income.

As stated in the MHP report, the shortage estimate was calculated as illustrated in figure 6:

Figure 6



This is a specific measure which provides an estimate of the housing shortage for ELI households but is not intended to describe the total housing shortage in Minnesota. The shortage figure also conflicts with other sources of shortage estimates such as the Minnesota Housing Finance Agency, detailed in the next section. The shortage figure 103,626 cannot used to provide a general estimate of the housing shortage in Minnesota as it does not consider home ownership, nor does it consider households who are above 30% AMI but are nonetheless cost burdened by rental costs.

This estimate is useful however to provide a scope of the issue for Minnesotans at the lowest income levels. To maximize the impact of state policy and investment action, a consensus must be formed as to what the underlying principles of the action are. Should the state prioritize those who need assistance the most, or provide relief to the greatest amount of people?

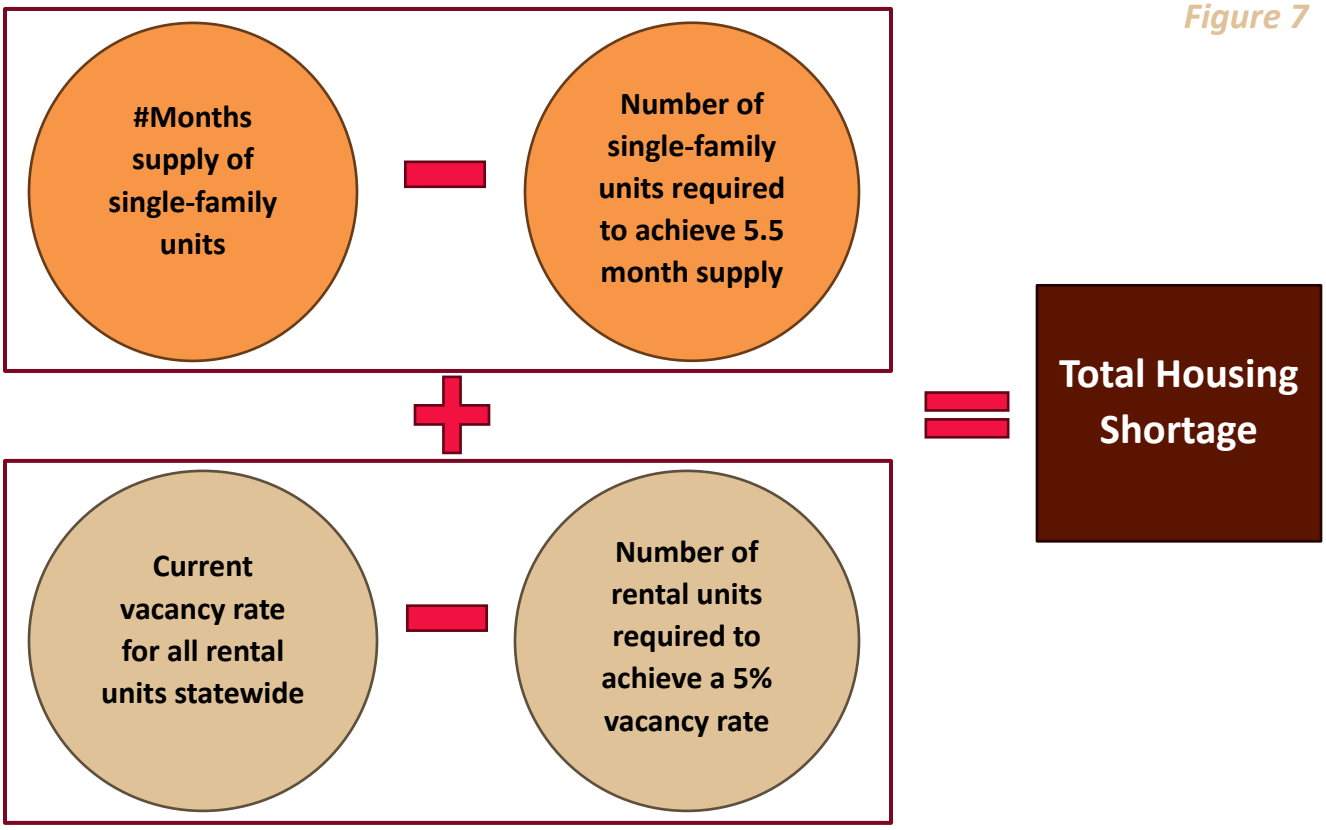
[8] *2023 Minnesota State Housing Profile – Minnesota Housing Partnership (MHP)*. (2024, July 17). https://mhponline.org/minnesota-state-housing-profile/

Minnesota Housing Finance Agency Methodology

The main difference between the estimate provided by the MN Housing Finance Agency (MNHFA) and the *Up For Growth* estimate is the inclusion of *missing households.* Where *Up For Growth* includes *missing households* as an addition to a more traditional estimate, MNHFA does not. Instead, MNHFA relies on homeownership and rental unit supplies to quantify the number of additional units needed to reach historical levels of equilibrium between supply and demand.

MNHFA outlines its estimate methodology in its May 2023 Draft Chart Book: Key Housing Needs and Issues[9]:

Figure 7



This model has the advantage of relying on strictly observable measures for which there is historical data. The model does not however consider explanatory variables which could describe in further detail the primary drivers of the housing shortage or household formation. Nevertheless, it provides a historical baseline with which to compare the relative "tightness" of the rental and ownership market. The MNHFA report estimates that Minnesota needs to create an additional 10,000 rental units and 40,000 single-family units to reach supplies consistent with a historically balanced market. Combined, the report estimates a shortage of 50,000 units which lay in stark contrast to the 106,000 estimate provided by *Up For Growth.*

[9] Minnesota Housing Finance Agency. (2023). Draft Chart Book: Key Housing Needs and. In *mnhousing.gov/policy-and-research*.

The Value of Housing Shortage Estimates

Given that there are finite resources to address the issue, all issues cannot be solved at once, and some issues may not be solved at all. The responsibility of the state legislature is to prioritize some policies over others and consider the trade-offs of each decision. This means that depending on which policies get selected, the methodology used to estimate the housing shortage should align with the objectives of the policy. We summarize each methodology in the following way;

- Both the NLIHC and Minnesota Housing Partnership estimates are useful guides for describing the housing shortage for a certain segment of the population, namely households earning 30% AMI or less. These estimates do not serve, however, to describe housing shortages for homeownership.
- The estimate provided by Up For Growth focuses on the lack of new household formation. This could be useful for identifying the shortage of single-family homes where new families could form. Its methodology, however, does not meet the specificity and veracity required to comport with the creation of sound policy objectives. Its approach doesn't consider whether missing households is the best proxy for a measurement of demand, even for single-family homes.

An estimate of housing demand, and by extension the policy and investment actions taken by the state to address the housing shortage, should closely match observable data and follow underlying principles built upon consensus. Leaders should consider the uses of these estimates, their purpose and target audience, and the implications of their use when forming policy. Estimates also provide valuable benchmarking measurements to determine the efficacy of investments and policy choices which achieve state goals. If, for example, the state adopts a strategic plan to prioritize creating rental units for the lowest income groups, it must first identify the total number of units which will satisfy housing demand for this group. The state can then chart the progress toward its final target and determine which policies and investments have produced the best results.

It may be the case that more than one estimate is used when establishing priorities, and an approach which synthesizes multiple estimates may provide the best policy solutions. Specifically, it is in the state's best interest to invest in a comprehensive housing study in which it considers housing needs across all markets, income groups, and regions of Minnesota. A successful study will reveal the relative demand for single family vs multi-family housing statewide and by region and synthesizing this data with each regions' capacity to set and meet production goals.

2. The Residential Construction Industry: Minnesota's Capacity to Produce New and Affordable Housing

The data shows that t-he rate of new housing construction in Minnesota has not kept pace with population growth and demand for the past two decades. While the number of workers within the residential construction industry continues to grow, the output capacity to build new housing remains inadequate to meet increasing demand, both for rental units and single-family homes. Nearly every industry which produces a tangible good undergoes disruptions as innovations are introduced. For example, before the printing press it took someone an entire day and several scribes to make just a few copies of a document. The printing press could produce up to 3,600 pages per workday[10]. This meant not only that it took fewer workers to make copies of something, but also that a publisher could produce *thousands more* copies in a single day. Due to innovation, the supply of reading material exploded while also requiring less labor.

Before the printing press, the number of books which could be produced was dependent on the number of people who could hand-copy the words. However, even if an entire village could somehow be convinced to drop everything and start copying, their efforts would still fall short of what a single machine could produce. For contemporary housing construction, we rely on a model called "site-built" or "stick-built" construction. This describes a process where materials are purchased and delivered to a site whereafter a wide array of contractors of differing trades and skill sets complete the construction on-site. Roughly 95% of single-family homes and 86% of multi-family homes are built this way in the Midwest[11]. From the analogy of the printing press, we examine the following questions relating to the site-built construction model:

1. Have there been innovations in the way in which Minnesota builds new housing in recent history?
2. Are we producing more housing with less labor over time (becoming more efficient)?
3. If the answer to the two questions above is no, how can we tell?

To start answering these questions, we first identify the number of workers who work in jobs which build new housing each year, whether it is single-family homes or apartments. These workers include general contractors, electricians, roofers, concrete and foundation contractors, and many others. We then determine the number of additional residential units were added to the state housing unit estimate from the previous year's estimate. Finally, we divide the total number of new residential units by the total number of workers, which gives us a very basic measure of the average number of workers it takes to produce one residential unit during that year. Figure 4 below shows this average for each year between 2011-2022[12].

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[10] *Wolf, Hans-Jürgen (1974), Geschichte der Druckpressen (1st ed.), Frankfurt/Main: Interprint*

[11] US Census Bureau. (2019b, April 15). *CHARS - current data*. https://www.census.gov/construction/chars/current.html

[12] U.S. Census Bureau, U.S. Department of Commerce and U.S. Census Bureau. "Units in Structure." *American Community Survey, ACS 1-Year Estimates Detailed Tables, Table B25024*, 2023, https://data.census.gov/table/ACSDT1Y2023.B25024?t=Units and Stories in Structure&g=040XX00US27&y=2023. Accessed on September 19, 2024.

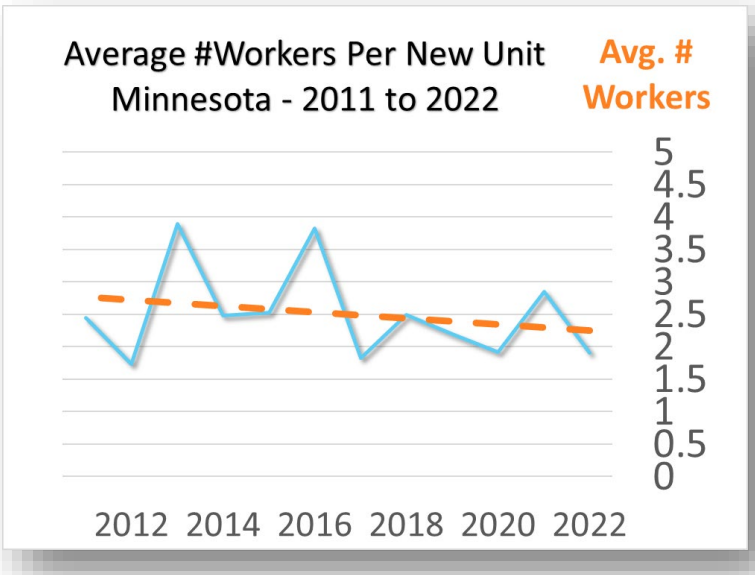


Figure 8

In 2011, there were over 29,000 workers in the industries which construct new housing[13], but as a state we only produced roughly 12,000 new residential units. This means that we employed about 2.4 workers for every residential unit produced that year. If we move forward through the years we see peaks and valleys in average number of workers per unit, with a small trend downward. In 2022 the average number of workers to construct one additional unit is about 1.9. This is certainly an improvement on years which required 2.5+ workers per unit, but it is also about the same level as 2012. This shows, albeit at a very general level, that during these 12 years of this data, unlike with the example of the printing press, we do not see a large, sustained decrease in the amount of labor needed to build new housing in Minnesota.

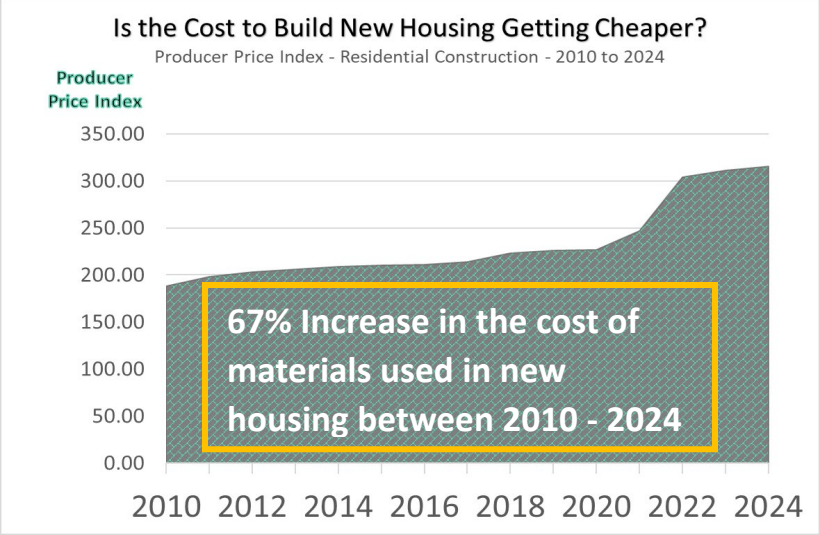
Minnesota, like most of the country, also has a very tight labor market. We had an unemployment rate of 2.9% in June 2024[14]. This means that essentially every person who wants to work has a job, and that there are more job openings than there are people able to fill them. If it's the case that we still need relatively the same number of workers to build a house or apartment and there are fewer workers available to enter the construction industry, it follows that our production capacity will be correspondingly limited. Further, because there are fewer workers to go around, the workers that already are in housing construction will demand wage increases. This means that cost of labor to the general contractor will increase and subsequently get passed through to the price of the completed house.

Another area we can look to for signs of innovation in housing construction is the price of materials. We might still need the same amount of people to operate the tools and machinery to build a new house, but maybe there has been a lot of innovation in the materials used. Figure 10 depicts the increase of the producer price index for residential construction over the last 15 years. This index tracks the price of materials used in the construction of new housing like wood, metals, plastics and chemicals. Like with labor, we are looking to see whether innovation has brought new materials or efficiencies to the material supply market. Unfortunately, also like labor, the costs of construction materials have clearly risen over time and have outpaced inflation. The spike in material costs beginning in 2020 was likely due to the supply shock resulting from the COVID-19 pandemic and associated "shutdown".

[13] See Appendix A for Methodology.
[14] U.S. Bureau of Labor Statistics

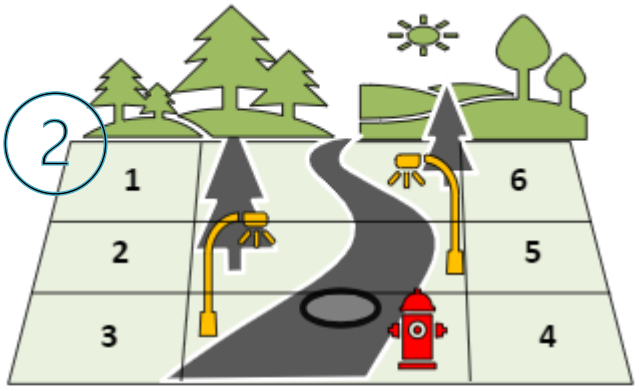
This spike in cost may have leveled off in 2024, but the cost of these materials has risen 67%[15] in just 15 years. The overall growth of inflation between 2010-2024 as measured by the Consumer Price Index (CPI) is approximately 44%[16], meaning that the price for goods used in residential construction are far outpacing the increase in general price inflation. It seems unlikely that we will see a proportional drop in material prices unless new innovation or technology replaces these materials or the construction industry transforms their construction process to require fewer of these materials.

Figure 9



So, the costs for materials and labor for new housing continues to increase, and those costs are passed-through and added to the price of the completed house. This dynamic occurs in many other industries which are subject to cost fluctuations in labor and materials, like the auto[illegible] makes the residential construction industry unique, we[illegible] anecdotal evidence:

A rural Minnesota city would like to create a new residential development to attract families to their city. The city leaders have a goal to create 6 new homes in the first year. Using tax revenue or bonding, the city develops the land, installs infrastructure, and begin to search for a home-builder who will come and build the new development.



Because the city invested funds into the development and infrastructure, it must sell each housing plot for $60,000 to keep within its budget. A home-builder is interested in the project and starts estimating the costs and returns for each house.

[15] Federal Reserve St. Louis, Producer Price Index by Commodity: Inputs to Industries: Net Inputs to Residential Construction, Goods, Index Jun 1986=100, Quarterly, Not Seasonally Adjusted

[16] *Inflation Calculator | Federal Reserve Bank of Minneapolis*. (n.d.). https://www.minneapolisfed.org/about-us/monetary-policy/inflation-calculator

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The home the builder will construct is 2,000 sq/ft and they know that for each house it will cost them $414,000 ($207 per sq/ft) for materials and labor (The average size in Minnesota for a single-family home is about 2,000 sq/ft and the median price per sq/ft is $207. The cost of the land ($60,000) and the cost of materials and labor ($414,000) add to a total of $474,000.

4

Finally, the average profit margin for single family homes is around 14%, which would be $66,360 for this example. If we add the cost to build and profit margin together we get $540,360 which will be the price of the house. This is where the breakdown occurs. The median value of other homes in the city is $310,000. In order to afford the new house for $540,360, a 20% downpayment would cost $108,000 and require the household to earn at least $129,000/yr. The profile of household wealth and income in the area does not meet the necessary level for 6 families to afford the new $540,360 houses based on median costs. The builder decides to pass on the project and looks elsewhere to build.

This scenario, while hypothetical, describes very real instances which occur around the state. There are some resources available to help drive down costs such as state infrastructure grants, low income housing subsidies, or low interest loans the city can utilize. Still, even with additional support, the cost to produce housing in many parts of the state is simply higher than what people can afford to pay. An existing family in the area may be able to upgrade to the newly built house, but will a new development of houses *attract new workers and families to the area?* Figure 11 on the following page shows a heatmap of median household income for each county in Minnesota. With the exception of a couple counties, every county outside of the metro area has a median household income of less than $75,000.

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[17] Picture 4: Industry Insights. (n.d.). *[Updated 2022] Despite turbulent 2020 home builder profit margins rose | CoConstruct*. https://www.coconstruct.com/blog/despite-turbulent-2020-home-builder-profit-margins-grew-8-5-yoy

[18] Mortgage Calculation: *Do I qualify for a mortgage? Minimum Required Income Mortgage Prequalification Calculator*. (n.d.). https://www.mortgagecalculator.org/calculators/how-much-income-do-i-need-to-qualify.php#currentrates

[19] Picture 3: ChFC®, D. C., CLU. (n.d.). How big is your home? Here is the average home size by state. *The Motley Fool*. https://www.fool.com/the-ascent/mortgages/articles/how-big-is-your-home-here-is-the-average-home-size-by-state/

In our hypothetical scenario we showed that even with a lower cost per square foot to build, and the median home size, most of greater Minnesota is priced out of new housing due to incongruent household income. What type of house *can* the median household afford then? Let's take $75,000 to be the median household income in a greater Minnesota county. We want to identify what the purchase price options are if we keep the mortgage payments to

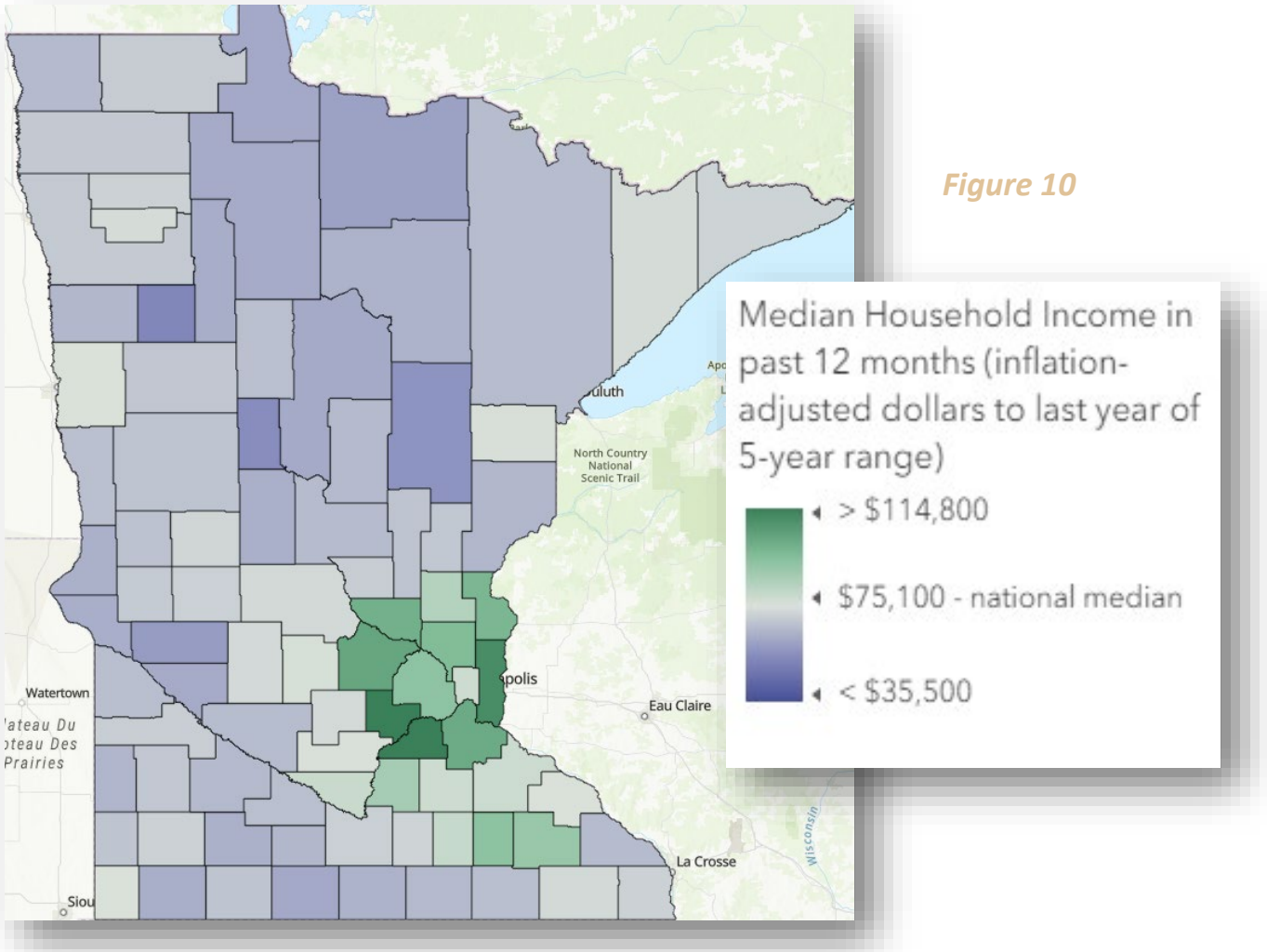


Figure 10

30% or less of household income (greater than 30% of income is considered "cost-burdened"). With a downpayment of $10,150 and an interest rate of 6.5%, a household earning $75,808 per year can purchase a home priced at $290,000. At this price, the household spends 28% of its income toward the house.

Next, we determine what type of house can be built and sold for $290,000. There are many different ranges reported for how much it costs per square foot to build a new home in Minnesota. One source

suggests a starter home or mid-range home costs between $275-$300 per square foot[20], not including the land. Another source claims that the average cost to build is between $125-$300 per square foot[21].

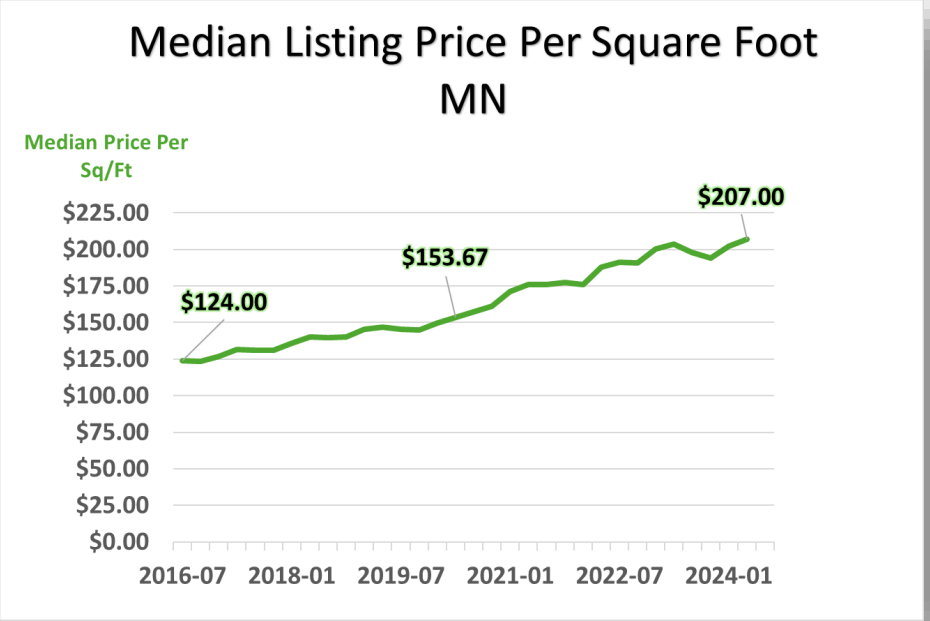
For sake of argument lets take the lowest end estimate of $125 a square foot, which is incidentally about the same as the median listing price per square foot in Minnesota in 2016. We will also take a cheaper lot price. Below is a table with the corresponding output:

Table 1

Total House Price at Sale	$290,000
Builder profit margin of 14%	$40,600
Lot price	$30,000
Money left for materials and labor	$219,400
Square Feet Possible at $125/sq ft	1,755 square feet

If a city could get a builder to build new homes for $125 per square foot, the hypothetical house could have around 1,755 square feet – ample size for a starter home. There are other costs however not captured in the chart above like permitting fees, HOA fees and other items that eat away at the sum of money for materials and labor. Additionally, the $125 sq/ft figure is at the extreme low end of one estimated range, and may not actually be found anywhere. In fact, as we show in figure 13 below the *median* listing price per square foot in Minnesota is $207.00 in 2024 and has not been at

Figure 11



[20] *How much does it cost to build a house | Sustainable9*. (2024, April 30). Sustainable9. https://sustainable9.com/news/how-much-does-it-cost-to-build-a-house#:~:text=For%20a%20typical%20starter%20or,or%20more%20per%20square%20foot.

[21] https://www.ferndalerealty.com/single-post/the-cost-of-building-a-home-in-minnesota

$125 per sq/ft since 2016[22].

Even if a builder *could* build a house in northern Minnesota for $125 sq/ft, it doesn't mean they will. If the builder has an opportunity to build in a rural area or a wealthier urban area, the builder will choose the wealthier area where they can build housing at $175 or $250 per sq/ft and thus increase their profit margin. This is one piece of a complex puzzle which explains the dearth of new housing construction in greater Minnesota: builders prefer to stay in the metro area because of the relatively wealthier incomes of potential buyers.

The obstructive economic conditions surrounding the housing market in Minnesota can be summarized as an asymmetry between the cost to build new housing under the current model and the inability for consumers to afford the finished product. Match this with our population growth which continues to be many thousands more people per year than new housing units built, and we are forced to concede that without significant intervention the situation must only get worse. The *type* of intervention we apply will be the most important factor in creating a long-term, sustainable housing supply. Fortunately, the housing crisis has garnered serious attention and effort on both sides of the political aisle.

In 2023 the Minnesota legislature passed a historic bill which invests over $1 billion toward housing[23]. During the spring 2024 legislative session, a number of bills were introduced which aimed at addressing various obstacles related to building new housing. Some policy contained within these bills had merit, and others didn't. There were no policies advanced to increase construction productivity or incentivize R&D into cheaper materials – two critical needs we've identified from the data. We should critically examine the assumptions and priorities made in recent legislation to see whether the objectives sought through the policies agree with the housing data.

Outcomes of New Residential Construction

Labor and material costs have risen over the past two decades, the cost for which is passed through to renters and homebuyers. If we as a state are going to invest, create policies, and act to address the housing crisis, we must first have a clear understanding as to what our current housing construction model has produced in recent years. This analysis is valuable in that it describes what type of housing, and for who, the residential market has produced. From this, we can glean which types of housing, and for which populations, require state intervention.

We start our analysis by describing the value portfolio of new housing built in the past two decades. One way to estimate cost trends is to chart the increase or decrease in permit value. Permit value is defined as:

"Permit valuations shall include total value of all construction work, including materials and labor, for which the permit is being issued, such as electrical, gas, mechanical, plumbing equipment, and permanent systems.[24]"

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[22] Realtor.com, Housing Inventory: Median Listing Price per Square Feet in Minnesota [MEDLISPRIPERSQUFEEMN], retrieved from FRED, Federal Reserve Bank of St. Louis; https://fred.stlouisfed.org/series/MEDLISPRIPERSQUFEEMN, September 20, 2024.

[23] *Agency planning for funds*. (n.d.). https://www.mnhousing.gov/policy-and-research/agency-planning.html#:~:text=In%20May%202023%2C%20Governor%20Walz,in%20housing%20in%20state%20history.

[24] Minnesota Administrative Rules 1300.0160 FEES, Subp. 3.

Importantly, permit valuations do not include the cost of land upon which the structure is built or other non-construction improvements such as connection charges and municipal improvements. Permit values are established by the building official appointed by the municipality.

While we cannot show a direct correlation between permit value and end consumer price, permit values, when aggregated over long periods of time, can provide an indirect measure of cost and price trends. Some research suggests that there may be a causal relationship between the volume of permits issued and short-term housing prices[25]. Others argue that permit values are inflated, and can lead to inflated or misleading figures[26]. Permit values are an imperfect measurement which is less useful for identifying patterns in particular communities or single years, but can nonetheless reveal long-term changes in the industry. Figure 12 on the following page shows two dimensions of permit values from historical data:

1. *The green columns show the **Metro total percent increase** in permit value per unit between 2010-2023.*
2. *The yellow columns show the **Statewide total percent increase** in permit value per unit between 2010-2023.*

We calculated both measurements on an individual-permit basis. For each permit, we take the total permit value, and divide it by the number of units to create an *average permit value per unit* figure. For single-family homes, there is only one unit per structure, so the resulting figure is simply the average permit value for all single-family homes built that year. For each multi-family permit, we again take the total permit value and divide by the number of units to create an *average permit value per unit.* We then Average all the *average permit value per unit* figures for all permits of each housing type for that year.

[25] Bahmani-Oskooee, Mohsen, et al. *House Prices and House Permits 323 INTERNATIONAL REAL ESTATE REVIEW*. Vol. 24, no. 3, 2021, pp. 323–361, www.gssinst.org/irer/wp-content/uploads/2021/10/v24-no3-1_On-the-Link-between-House-Prices-and-House-Permits_Asymmetric-Evidence-from-51-States-of-the-United-States-of-America.pdf.

[26] Housing First Minnesota. *Modernizing Residential Building Permit Fees HF 4271(Elkins) Bill Description*.

As figure 12 illustrates, the total increase in average permit value per unit has been higher for middle housing and multi-family units than for single family units. For example, the *average permit value per unit* grew 87.5% for triplex, and quadplex permits between 2010-2023. There are several factors which could explain the disproportionate increase in permit valuation for multi-family housing, including increased demand for rental units, material costs unique to multi-family construction, or the geographic locations which new developments take place. We should not ignore the general trend of increased permit value for multi-family during 2010-2022, particularly if increased permit values translate into more expensive buildings, which in turn have higher rents.

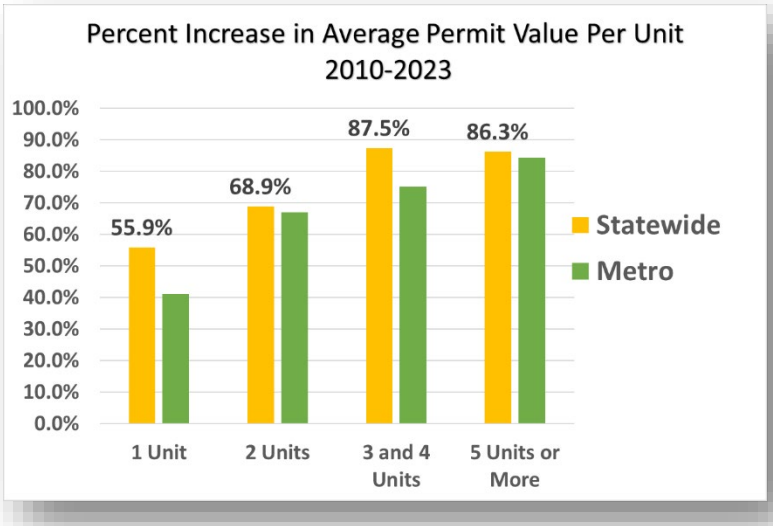


Figure 12

A Note On Naturally Occurring Affordable Housing

Naturally occurring affordable housing (NOAH) is generally defined as residential units which are unsubsidized but also affordable[27]. NOAH units are typically rental units which were built several decades earlier and provide are an important base of workforce housing in parts of the state. NOAH can also include single-family homes in certain cases, particularly when there is, for example, an existing stock of smaller, post WWII houses. These types of homes can be affordable to lower income households provided that there is also a corresponding supply of other types of single-family homes in the area.

Advocates of NOAH units, such as the NOAH Impact Fund[28], invest in preserving the stock of NOAH units in order to prevent the conversion of these NOAH units into premium, higher rent apartments. In such cases where they are converted, workers and families can be displaced by the increased rents required by the new units. Creating luxury rental units or single-family homes is not inherently detrimental to the local housing market. It is when the stock of NOAH units are replaced by housing which is affordable exclusively to higher income brackets that a local market cannot meet the comprehensive housing needs of its population.

For communities within Minnesota who lack existing NOAH stock, attracting new families and businesses can be particularly challenging. A local government which attempts to expand its housing stock, and thereby increase the number of available workers to attract new businesses, it must expand that stock to align with current and anticipated income profiles of the families moving there. As incomes in the area grow, the demand for larger housing may also increase. The current stock of NOAH units, however, must still be adequate in volume in order to sustain an increase to the population of the area. If this stock is

[27] *What is NOAH?* (2017, June 16). NOAH Impact Fund. https://noahimpactfund.com/impact-investing-affordable-housing-minnesota/what-is-noah/
[28] *About*. (2019, March 27). NOAH Impact Fund. https://noahimpactfund.com/about/

not sustained, then businesses will be disincentivized from establishing themselves in an area with an inadequate labor supply.

Creating new affordable housing, both rental apartments and single-family homes, has been challenging in many non-metro areas of the state. Without large influxes of population growth to sustain housing demand for larger, more expensive housing, home builders will likely choose other areas with greater demand that supports the construction of higher-priced housing.

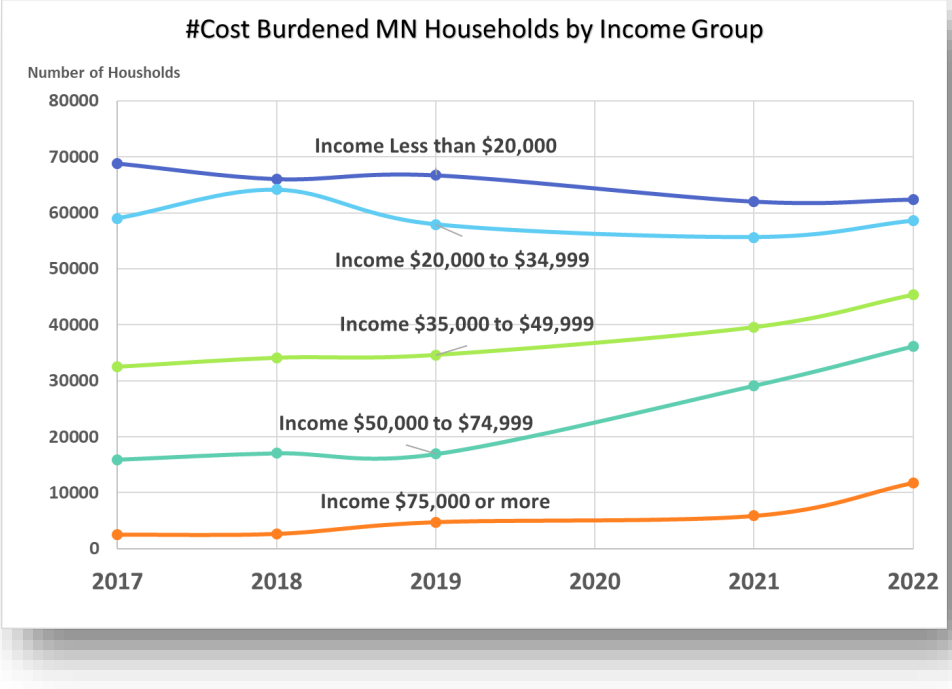
Assessing the Populations Served by Recent Construction

In general, the expansion of housing supply will drive consumer costs down, both for renters and potential homeowners. A unidimensional approach to increasing housing supply may drive costs down for a segment of the population in aggregate, but whether "just build more housing" approach benefits the population in a given area is highly contingent on the current profile of housing stock, median income, and existing infrastructure. Additionally, the *Missing Middle a*pproach ignores the large existing affordability gap.

There are several definitions of *affordable housing*. Some definitions are informal, general terms used to describe housing that is "reasonable" in terms of cost for a given area. Other definitions are policy based, such as in the HUD Minnesota Affordable Housing Guide which defines *affordable housing* as:

"a HUD affordable housing tenant pays 10 percent of gross income or 30 percent of adjusted income, whichever is higher…"

Figure 13

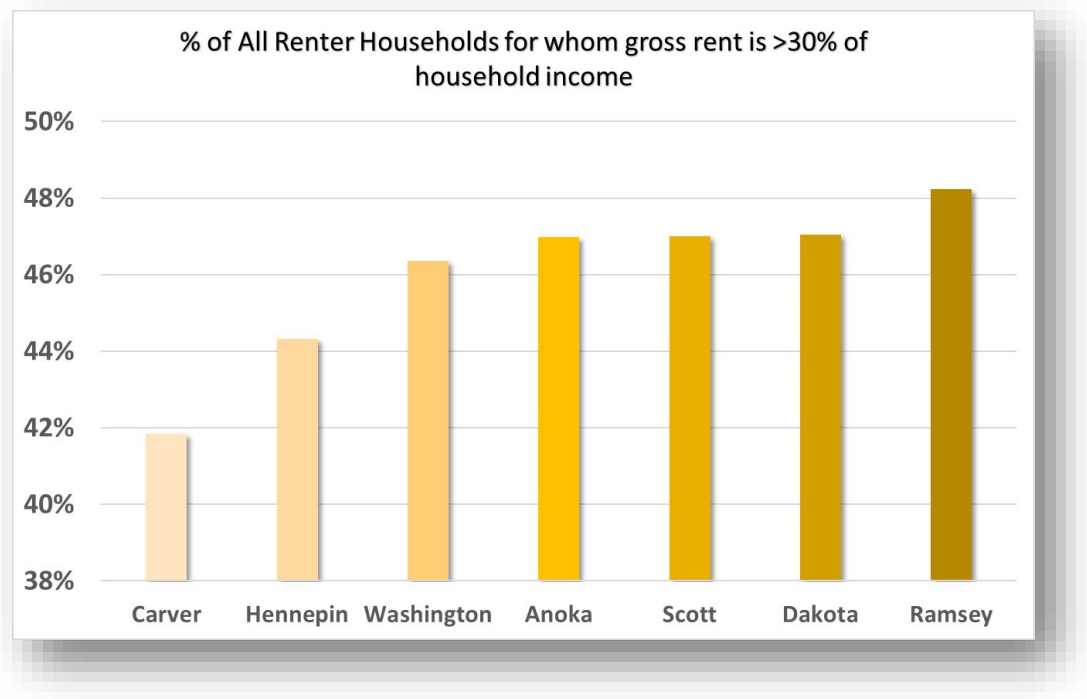


The Minnesota Housing Finance Agency, using data from the U.S. Census Bureau, estimated[29] that as of 2021, 48.3% of renters statewide were cost-burdened and spent greater than 30% of their income on housing. Figure 13[30] depicts the percentage of households which spend greater than 30% of their income on rent *for all income levels.* If we measure rental availability for households at 30%, 50%, and 80% of area median income(AMI) we can identify the housing need for those income levels and compare that need to the backdrop of new construction within the last decade.

Perhaps unsurprisingly, the total number of households who are cost-burdened by rents is directly related to which income quintile they belong to. Between 2017-2022, we see an increase in cost-burdened households for the three highest income groups ($35-49k, $50-74k, and $75k+ respectively). For the two lowest income groups (less than $20k, $20-34k) we see modest declines in the total number of cost-burdened households. We are unable to show whether these households are no longer cost burdened due to state intervention, or those households simply moved into another income group.

Using ACS data from the U.S. Census Bureau[31], we visualized the percent of renter households in each census tract who pay 30% or more of household income. The lowest three categories are colored grey because they represent percentages lower than the national average of 46% of renter households.

Figure 14



According to the Minnesota Housing Finance Agency 2022-2023 Affordable Housing Plan[32], 69% of newly constructed rental units in the last five years are not affordable to low-income renters(those with

[29] Draft Chart Book: Key Housing Needs and Issues, MN Housing Finance Agency, May 2023
[30] Source: U.S. Census Bureau
[31] ACS Housing Costs Variables, Esri Demographics, December 2023. Census data from 2018-2022 vintage.
[32] 2022-2023 Affordable Housing Plan, Minnesota Housing Finance Agency, 2022

incomes at or below 80% AMI). Additionally, in the Agency's 2023 report "Housing Trends and Needs in Minnesota in 2023"[33], it states that:

"For every 10,000 units being produced, only 100 have rents affordable at 30% of AMI and below and only 450 have rents affordable for renters with income between 30% and 50% of AMI." Figure 9 above illustrates the percent of Minnesota households, by income cohort, who spend greater than 30% of their income on rent. Households spending greater than 30% of income on housing are considered "cost burdened". With the exception of households earning less than $20,000, the number of cost-burdened households has increased across all income levels between 2017-2022.

The report states that there is a shortage of 57,355 units affordable to households at or below 30% of AMI. The report also produces a comparison between the profile of rental housing production in Minnesota currently, and the profile of production needed in order to meet demand. Figure 15 visualizes this comparison and shows the profile of production output for 10,000 units of rental housing.

The Minnesota Realtors Association states in an October 2023 article that, "only a few years from now, Minnesota will face a shortfall of 40,000 affordable homes and apartments[34]. The article later says however, "Even cities like Minneapolis and St. Paul that have overturned single-family zoning in many of their neighborhoods, are struggling to attract the affordable duplexes, triplexes, and small

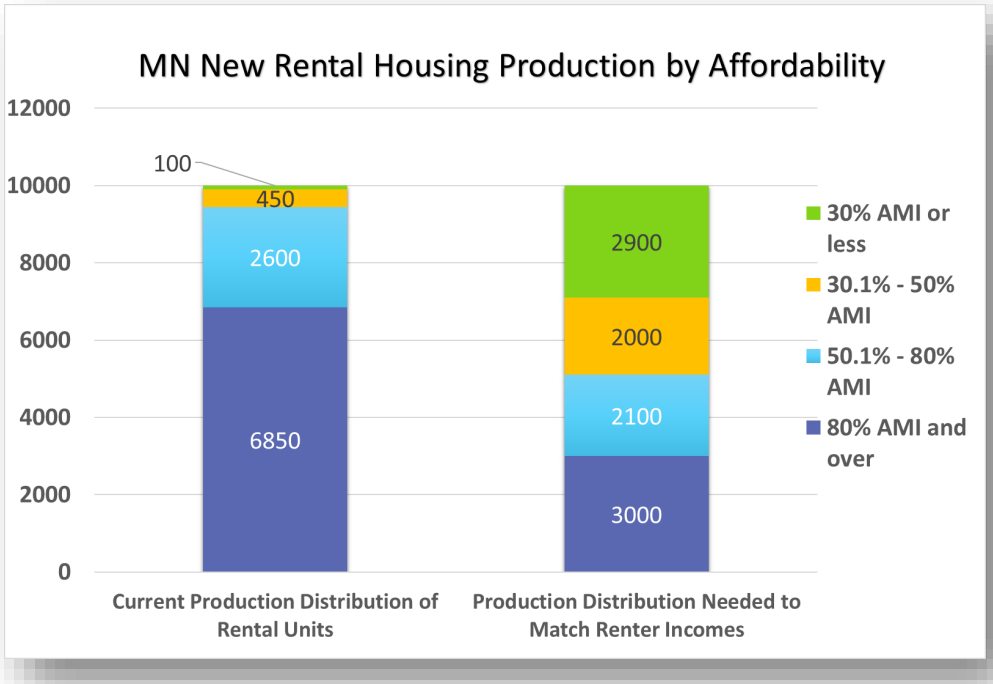


Figure 15

Advancing the growth of residential density without regard for local planning and community housing demand ignores the current landscape of the Minnesota Housing crisis.

[33] Housing Trends and Needs in Minnesota in 2023, Minnesota Housing Finance Agency, May 2023
[34] Can We Build Our Way Out of the Housing Crunch?, The Minnesota Realtor, Sept./Oct. 2023

apartment buildings envisioned in their 2040 plans." The post continues, "And developers say the affordable-price targets are unrealistic given land costs and construction expenses. For example, a 41-unit apartment building that was completed in Minneapolis in 2020 charges from $995 to $2,495 per month." While anecdotal, this points to a fundamental asymmetry between the current production landscape and the volume of affordable housing needed.

Advancing the growth of residential density without regard for local planning and community housing demand ignores the current landscape of the Minnesota housing crisis. A uniform increase in housing density will fail to address the most fundamental issues facing housing in Minnesota. Should cities be required to allow higher density housing, there is little to no evidence that the new housing produced will be more affordable and meet the long-term needs of a given community. Further, by supplanting local zoning decision processes, the bill risks contravening local strategic planning efforts, failing to capture idiosyncratic local growth, and may threaten long term housing stability.

3. Policy Solutions and the Tradeoff of Outcomes

When state or local government seeks to address an issue through legislation or policy, it must always consider the tradeoffs which are made as a result of the policy implementation. This is true for every issue in which our government expends resources to solve a problem or improve a condition. Because we have finite resources, we can't solve all problems for everyone at once, we have to prioritize which problems to solve, for which people, and in which location. The way in which we establish our priorities should follow a set a principles founded through common consensus, and made transparent through the legislative process.

Housing is unique among other policy issues in its scope and impact on Minnesotans. Since housing is a basic need, every single person in our state requires housing. People can take on roommates, or move back home with their parents, but eventually the existing housing will become unmanageably overcrowded without meaningful intervention. If the state decides that it must intervene, its lawmakers must make choices concerning how and where resources should be allocated. Proposed legislation must be clear about its intentions, and also explicitly state its policy objectives, such as:

1. Expanding the *total* new unit productive capacity in Minnesota.
2. Engender housing construction which benefits the *greatest number* of people.
3. Incentivize construction of housing for those whose are *worst off.*

Of course, these are not the only policy objectives the state could have, in fact there are dozens of competing housing policies, each with their own advocates. Given that there are finite resources to achieve our policy objectives, we cannot solve all issues simultaneously, and some issues may not be solved at all. The responsibility of the state legislature is to prioritize some policies over others and consider the trade-offs of each decision. This means that those who benefit from the state's investment will depend on which policies are selected.

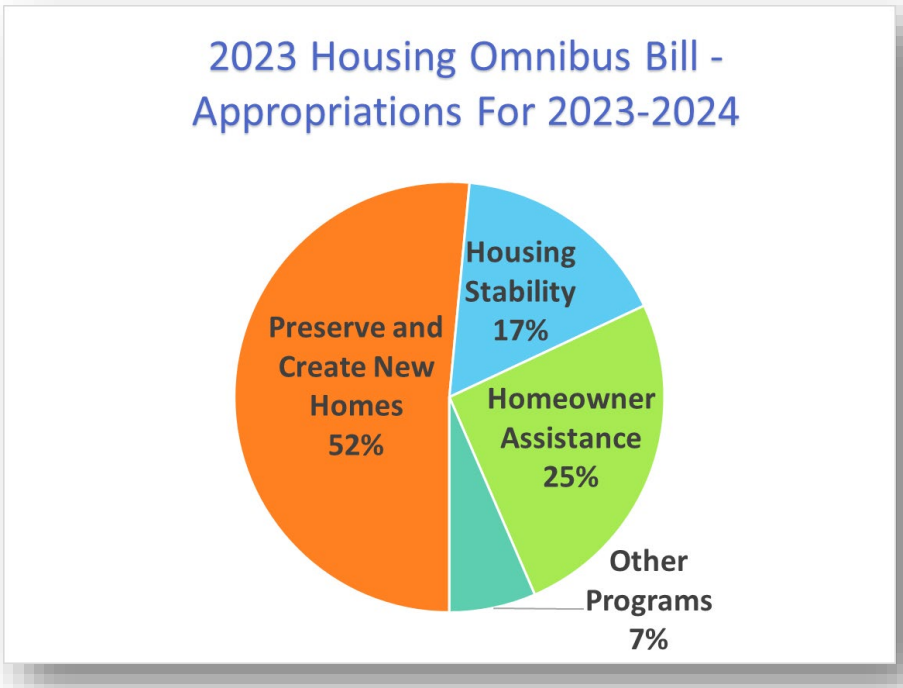
We have selected two examples of mechanisms used to address certain features of the housing crisis in Minnesota. Our analysis of each has two goals:

1. Provide a general description of what each mechanism is, how it appears to approach the housing crisis, and the populations it seeks to prioritize.
2. Identify the assumptions supporting the policy objectives and evaluate the potential efficacy of the policy in relation to the trends revealed in the data.

Housing Investment in the 2023 One Minnesota Budget

The Minnesota legislature passed the housing omnibus bill in 2023 which provided a total of $1.065 billion to the Minnesota Housing Agency, an increase of $950 million from the previous biennium. According to the agency planning report, the appropriated funds will be used in the four categories listed in figure 16[35]. $625 million will be allocated to existing programs, and $440 million will go to new programs. Given the data and analysis shown in the previous sections, we will consider whether the appropriations and related programs address the core issues of Minnesota's housing crisis.

Figure 16



The largest portion of the total Agency budget is allocated to capital resources which are to be used to preserve existing homes and create new ones. Many of the policies which govern this portion aim to benefit lower income and non-metro areas which have more pronounced issues with respect to housing affordability. The "Greater Minnesota Housing Infrastructure Grant Program" was allocated $39 million and provides grants to cities for up to 50% of the capital costs of public infrastructure required to build a workforce housing development. Another program, the "Workforce Homeownership Program[36]" was allocated $20 million for the 2023-2024 biennium. This program provides grants to local communities for development costs, rehabilitation and land development with the goal of increase the supply of single-family, owner-occupied homes which are affordable at the 115% area median income.

In the following table, we show the total amount of appropriations to the four main categories and a brief description of the investments and programs associated with each. For example, "Preserve and

[35] *Agency planning for funds*. (n.d.-b). https://www.mnhousing.gov/policy-and-research/agency-planning.html#:~:text=In%20May%202023%2C%20Governor%20Walz,in%20housing%20in%20state%20history.
[36] https://www.revisor.mn.gov/statutes/cite/462A.38

Create New Homes" is allocated $548.8 million from the Agency's budget, and will be spent on development and construction, or providing grants for the same. "Increase Housing Stability" is focused on the population of renters in Minnesota, the programs for which seek to provide rental gap funding and reduce the cost burden of high rent prices on those in lower income groups.

Table 2

1.Preserve and Create New Homes **$548.8 million**	**2.Increase Housing Stability** **$176 million**	**3.Support and Strengthen Homeownership** **$271.5 million**	**4.Other Housing Investments**[37] **$69.3 million**
Direct grants offered to build new housing for low-income areas	Short-term family homelessness prevention	Downpayment and closing cost assistance program	Lead identification and remediation
Financial assistance to build market rate housing in metro and greater MN	Rental assistance for those who have previously been homeless	First-generation downpayment assistance	Mediation program for renters and landlords
Rehab funding for single and multi-family housing	Rental assistance for children with families	Mortgage interest rate subsidy program	Grant matching for local housing trust funds
Greater MN residential infrastructure grants	Rental assistance for families impacted by mental illness	Grants for manufactured home downpayment or financing	Assistance for nonprofit rental properties

The third category "Support and Strengthen Homeownership" is allocated the second most in funding, and focuses largely on providing assistance to those who are first-time home buyers, come from families without homeownership, or would like to own a home but cannot afford the downpayment. Finally, the "other" category includes programs which address a range of issues not directly related to construction but supporting non-profit organizations and renter-landlord mediation.

The program policies contained within the housing omnibus bill represent a portfolio of investment and state/local initiative to address a wide array of issues. The largest investments and policy prescriptions indicate that the primary focus of the bill as a whole is to provide support and increase housing affordability for lower income households. As we reviewed in section 1, both the Minnesota Housing Finance Agency (MNHFA) and Minnesota Housing Partnership estimate the housing shortage through the lens of its impact to the lower income, rental and homeowner population. In its 2024-2025

[37]*Research on housing needs*. (n.d.). https://www.mnhousing.gov/policy-and-research/research-on-housing-needs.html

Affordable Housing Plan[38], the Minnesota Housing Finance Agency details the efforts and investments it plans to make during the next two years. The summary of its activities are as follows:

Table 3

Program Category[39]	Expected Investments by Activity in 2024-2025
Homebuyer financing and home refinancing	$2,498,000,000
Homebuyer/Owner Education and Counseling	$7,369,000
Home Improvement Lending	$75,544,000
Singel Family Production – New Construction and Rehabilitation	$398,747,700
Rental Assistance Contract Administration	$472,000,000
Housing Stability for Vulnerable Populations	$292,910,000
Multiple Use Resources	$447,750,000
Other	$67,202,000
COVID-19 Housing Recovery	$104,264,000
TOTAL	$4,533,370,700

The total investment pool of $4.5 billion includes the $1.3 billion investment from the state housing omnibus bill, as well as $3.2 billion from federal, Agency, and bond resources. The investments outlined above seem to balance the need to support low-income renters while also prioritizing homeownership. These are worthwhile endeavors which address real needs across Minnesota communities, and provide a basis of support where market failure occurs.

If we return to the premise that the state must maximize the outcomes of its investments, and that with finite resources available difficult decisions must be made, we must consider these investments within the context of the housing construction model in which we currently operate. The data on labor and material costs, infrastructure costs and market demand point to a situation where new housing, produced under our current model, is already too expensive for the typical person to afford. Some of the state investments do address infrastructure development costs and provide new construction subsidy. There is, however, no serious acknowledgement, nor investment into, addressing the ineffectiveness of our construction model in producing new affordable housing.

[38] *Agency plans*. (n.d.). https://www.mnhousing.gov/policy-and-research/agency-plans.html

[39] MNHFA Affordable Housing Plan 2024-2025

The state can, and should, provide a base level of support to prevent widespread displacement and homelessness. Some of the MNHFA programs directly serve this purpose. Lawmakers and housing policy advocates should strongly consider the need to direct some of our investment into enhancing or improving *the way* we make new housing.

Housing Policy at the Minnesota Legislature

Our second example involves the Minnesota legislature. In the spring 2024 legislative session, a number of bills were introduced which aimed at removing obstacles to producing more housing. One of these bills, known as the "*Missing Middle"* housing bill, sought to modify local zoning authority as well as remove barriers to upzoning. Ultimately, this bill did not pass into law, but we will examine this bill because it provides insight into the way lawmakers and policy advocates view the housing crisis. There are a wide range of opinions on what is preventing more housing from being built and policy advocates have proposed policies to address permit fees, construction taxes, labor regulation, and land use. It is this last topic, land use, that *Missing Middle* sought to address.

Local zoning authority has increasingly attracted more attention in recent decades from local government and housing advocates. Local zoning authority has been challenged due to a perceived uptrend in local opposition to increased housing density. Within the context of Minnesota's housing problem, local zoning control has been blamed for preventing the construction of new multi-family and "missing middle" housing.

Advocates of the *Missing Middle* bill characterize the issue as the following: a city needs more apartments for workers and decides that they want to rezone an area for multi-family housing. If the citizens of that city are against new apartments, they will pressure city governments to stop the zoning change and, consequently, the development. As a result, fewer people can move to, and live in the city. This results in fewer available workers over time and as a result attracts fewer businesses who rely on those workers. *Missing Middle* advocates believe this scenario occurs in such frequency, and in so many areas of the state, that local zoning control is the primary barrier to new housing construction.

It may be the case that there are some localities which are opposed to increased density and *Missing Middle* housing. For the state to employ its resources to maximum effect, it must first have a comprehensive view of the scope, depth, and motivations those localities opposed to higher density housing. A policy which considers local zoning control must have supporting evidence which demonstrates the true effect local zoning control has on the rate of new construction. Absent this measurable evidence, a policy approach risks adopting inefficient investment strategies and ignoring important local context which justifies local zoning control.

The specific questions our analysis of *Missing Middle* will address are as follows:

1. Are local zoning practices limiting the construction of new middle housing units? If so, how can we tell?
2. Should the requirements of *Missing Middle* be applied uniformly across all counties, metro and non-metro?
3. What will the impact be to the current housing profile, citizen need, population density, and market trends if the legislation is passed?
4. Do the policies contained within the proposed legislation consider the municipalities' ability to develop parcels, the existing infrastructure, and maintain local market sustainability?

Summary of *Missing Middle* as Introduced:

The central purpose of this bill is to mandate minimum allowable densities on residential lots in Minnesota cities. By establishing minimum lot densities, the bill's goal is ostensibly to increase the housing stock available and to make housing more affordable. With respect to housing stock, the bill places a large emphasis on increasing the volume of new "middle housing" construction. The following structures fall under the bill's definition of middle housing:

Table 4

Single Family Detached Homes	Duplexes
Townhouses	Tri/Quad/Five-plexes
Rowhouses	Cottage Housing
Stacked flats	Courtyard apartments

The bill requires that:

A city must authorize at least six types of middle housing other than single-family detached homes to be built on residential lots in the city to achieve the density requirements in this section. (Section 1 [462.3575] Subd 2.)

Next, the bill describes the density requirements for cities depending on their city class. Cities of the first class receive one set of density and permitting requirements, and all other cities a different set. These requirements, for both groups of cities, include mandates that cities allow for multiple residential dwelling units on a single lot. Further, if any units are all-electric, defined as affordable, or efficient, cities must allow for a greater number of permits on that lot.

Missing Middle as a Mechanism to Address the Housing Crisis in Minnesota

Conceptually, the bill attempts to remove or mitigate alleged barriers to the construction of new housing in Minnesota, especially affordable housing. The solutions advanced by *Missing Middle* advocates include the following:

1. Increasing availability and affordability of residential units generally. The bill attempts to accomplish this by mandating cities allow for new multifamily units at the expense of single family units.
2. Making the permitting process more efficient by removing local zoning control.
3. Removing barriers to new multifamily construction caused by local zoning control such as lot sizing, low density zoning, and architectural design restrictions.
4. Redress historical inequities related to racially prejudiced zoning and permitting practices. In examining the principles behind the policies advanced in the bill, we should also consider what assumptions the bill's advocates have about the causes, and potential solutions for, the housing crisis.

Unstated Assumptions of *Missing Middle*

- Local zoning control is prohibiting or limiting the construction of new middle or higher density housing units.
- Residential density requirements as proposed will not exacerbate current housing construction challenges.
- Cities in the second, third, and fourth class each have the same scope and nature of obstacles limiting the construction of middle housing.
- Mandated residential density minimums are an effective way to increase affordable housing.

The policies stipulated in the bill give us an opportunity to confront our understanding of the issues which contribute to the housing crisis. Using the language of the bill and its associated assumptions, we can evaluate which proposed solutions are likely to be successful, and which are not, based on the housing data.

Figure 17 on the following page shows the composition of new housing in the state by the type of housing built. It is based on housing stock estimates provided by the U.S. Census Bureau and shows the change in total units by type on an annual basis. The dotted trendlines reveal that as a state, single-family and apartment unit production reached parity between 2018-2019, after which we started producing more new units of apartments than single family homes. The red trendline shows a significant decrease of single-family attached homes as a portion of new units. Single-family attached homes (SFAH) are townhouses, duplexes, and rowhouses (among other types). These are some of the home types

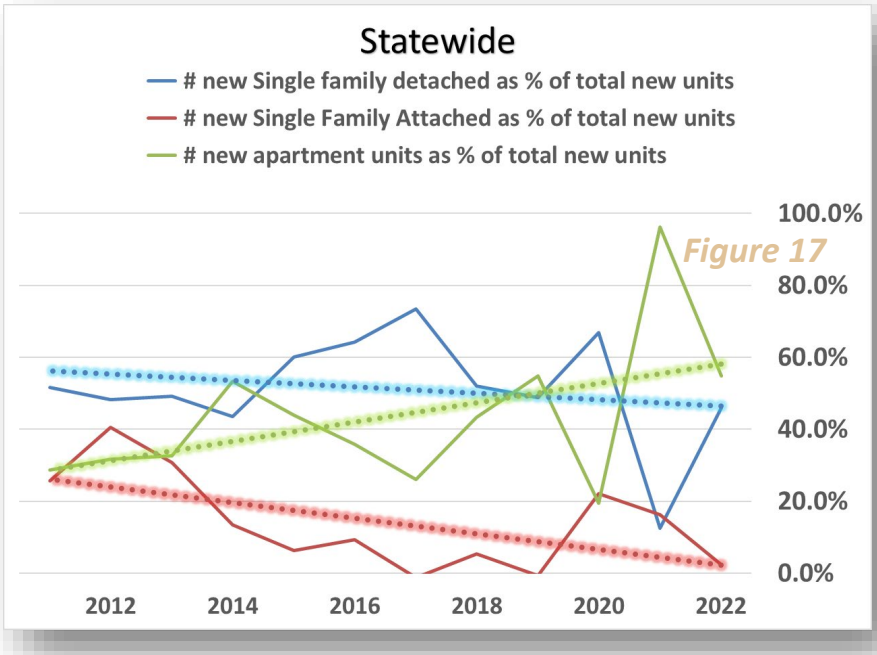


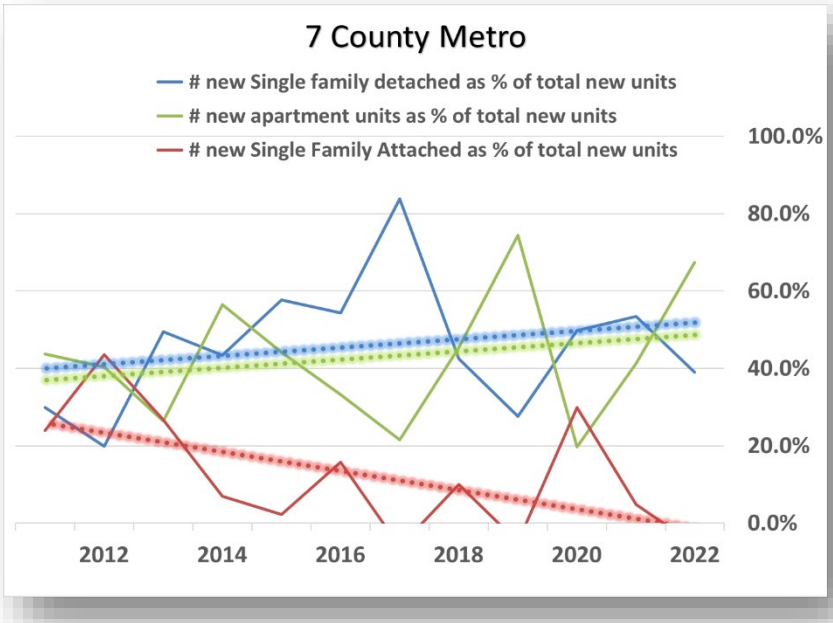
Figure 17

for which the bill seeks to increase production[40]. It is clear that we have produced fewer SFAHs between 2010-2022. What is unclear is the question of *why*? If proponents of the zoning requirements contained within *Missing Middle* believe it is local zoning practices which have caused this downward trend in single-family attached homes, how can they demonstrate its causality? In addition, if local zoning control was a primary driver of lower production of SFAHs why did this not also impact apartment unit production? A claim made by *Missing Middle* advocates is that there is opposition to increased density due to a perceived threat to extant property values. If this claim were true, and driven by local zoning choices, would

discourage the production of townhomes but not apartments, there must be clear and abundant evidence of the distinction and reasons thereof.

We should consider this an opportunity to reassess our approach to housing policy with respect to the substantive differences between the 7-county metro and the rest of the state. Figure 18 charts the same data as figure 17 except that it is only for the metro area. Unlike the statewide data, the data for the metro shows that single-family and apartment unit increases have closely matched each other between 2010-2022 but have not crossed.

Figure 18



It is here that we return to the central question regarding *Missing Middle*: *Will the bill's policies, or similar policies in the future, engender a meaningful increase in construction of middle housing and thereby improve housing availability and affordability?*

The mandatory required residential densities imposed on municipalities risks supplanting the expertise and experience of local elected officials, engineers, planners, and the will of the local electorate. The mandate additionally assumes that cities are not already taking steps to increase density without state intervention. The 2040 Comprehensive Plan for Shakopee, for example, closely examines the market demand for several types of housing and

[40] U.S. Census defines single-family attached units as: *a 1-unit structure that has one or more walls extending from ground to roof separating it from adjoining structures. In row houses (sometimes called townhouses), double houses, or houses attached to nonresidential structures, each house is a separate, attached structure if the dividing or common wall goes from ground to roof.*

integrates this demand into its long-term residential planning[41]. The plan carefully considers the need for a range of housing types beyond single-family homes, including senior living, townhomes, and condos. The city then establishes its development priorities by identifying the areas of opportunities within the city which are underutilized in terms of housing demand. The Alexandria 2040 comprehensive plan likewise identifies the need for future housing development to respond to population age, income, and location. The plan's goal is to

"provide a housing stock that is diverse in type, size and location, thereby appealing to all income levels, needs, and lifestyles.[42]"

In Alexandria, like Shakopee, we see a concerted effort to plan for and develop a portfolio of housing which does not consist solely of single-family homes. These two Plans consider an aging population, the need to provide housing for younger workers, and provide adequate supply overall for a growing population. A statewide mandate on zoning control ignores the closely considered planning of community leaders and professionals who are already implementing policies which improve the affordable housing crisis in cities around Minnesota.

[41] *Envision Shakopee*. (n.d.). Page 90. https://cld.bz/6IkEdse/90/

[42] *Comprehensive Plan - "Alexandria - 2040" - City of Alexandria*. (2021, July 20). City of Alexandria. https://alexandriamn.city/comprehensive-plan/

5. Middle Housing" and Zoning Legislation in Other States

States across the U.S. have attempted to address the housing crisis through legislative policy and state investment. In the table below, we provide an overview of passed legislation, or legislation which is currently being considered in each state's respective legislature. Generally, we find that legislation action falls into these categories:

1. Direct state investment into housing infrastructure, construction output capacity investment.
2. State grant/loan programs which incentivize local construction and/or increase in residential density.
3. State mandates which require cities to allow for increased zoning density by right for new developments.

We note also that there does not appear to be any states among those reviewed which includes zoning mandates which apply equally to all cities in the respective state. Additionally, there are no states which limit local zoning authority which do not also provide state support via grantmaking or direct investment.

State	Laws Passed Containing Zoning Mandates?	Zoning Preemption Description	Zoning Preemption Applies Equally to All Cities Within State?	State Subsidy Associated with Zoning Preemption?	Does Law Allow For Exemptions?
Arizona[43]	Yes, "Middle Housing" bill HB2721 (A.R.S. Title 9, Chapter 4).	Allow 2-4plex/townhomes on single family lots if within one mile of municipalities central business district. Municipalities may not: 1. Restrict housing to less than two floors 2. Restrict floor area ratio of less than 50% 3. Require owner occupancy of any structures on lot 4. Require more than 1 parking space per unit.	No. applies only to cities with 75,000+ population	No	Does not apply to: Unincorporated areas. Areas lacking sufficient urban services. Areas not zoned for residential use.

[43] https://www.azleg.gov/legtext/56leg/2R/laws/0197.pdf

Colorado[44][45]	Not directly.	If the state deems an area a "transit-oriented community", then that local government must meet the following density requirements: Averaged zoned housing density of 40 units/acre X #acres of transit related areas within the transit-oriented community. It is the responsibility of the transit-oriented community to ensure the goals are met. These requirements apply mostly to Denver metropolitan area.	No. Cities must be: • Is either entirely or partially within a metropolitan planning organization; • Has a population of 4,000 or more; and • Contains at least 75 acres of certain transit-related areas;	Yes – "Transit-Oriented Communities Infrastructure Grant Program". $35 million appropriated from general fund in 2024.	Additionally, on or before December 31, 2026, a transit-oriented community may notify the department that the transit-oriented community has an insufficient water supply to accomplish its housing opportunity goal, and the transit-oriented community may make a corresponding request for the department to modify the transit-oriented community's housing opportunity goal.
State	**Laws Passed Containing Zoning Mandates?**	**Zoning Preemption Description**	**Zoning Preemption Applies Equally to All Cities Within State?**	**State Subsidy Associated with Zoning Preemption?**	**Does Law Allow For Exemptions?**
Illinois[46]	HB1814 "Missing Middle Housing Act" Introduced 01/28/2025 in IL legislature. Not Passed yet.	- for all new development after January 1, 2026, each city with a population of 25,000 or more shall allow the development of all middle housing types on lots or parcels with a total area greater than 5,000 square feet and that are zoned for any type of residential use. - each city with a population of more than 10,000 and less than 25,000 shall allow the development of a duplex on each lot or parcel zoned for residential use that allows for the development of detached single-family dwellings.	No. Zoning mandates do not apply to cities with: - Population under 10,000 - Unincorp.	No.	Municipalities may regulate siting and design of middle housing required to be permitted under this Section, provided that the regulations do not, individually or cumulatively, discourage the development of all middle housing types permitted in the area through unreasonable costs or delay. Municipalities may regulate middle housing to comply with protective measures adopted under statewide land use planning goals.

[44] https://leg.colorado.gov/bills/hb24-1313
[45] CRS24-Title 29, Article 35, https://leg.colorado.gov/sites/default/files/images/olls/crs2024-title-29.pdf
[46] https://www.billtrack50.com/billdetail/1807452

State	Laws Passed Containing Zoning Mandates?	Zoning Preemption Description	Zoning Preemption Applies Equally to All Cities Within State?	State Subsidy Associated with Zoning Preemption?	Does Law Allow For Exemptions?
Iowa	No	NA	NA	NA	NA
Florida[47]	Not Directly State mandated land use entitlements for eligible affordable housing developments in areas zoned commercial, industrial, or mixed-use Projects must set aside at least 40% of total units for 120% AMI or below "Live Local Act"	- State mandated land use entitlements for eligible affordable housing developments in areas zoned **commercial, industrial, or mixed-use**-projects must set aside at least 40% of total units for 120% AMI or below. - Local govs. must reduce parking requirements by at least 20% if project is within ½ mile of major transport hub and has available parking within 600 ft.		Total = $811 million for funding and tax credits. New multi family with more than 70 units up to 120% AMI receive 75% property tax exemption and units that serve households below 80% AMI receive 100% property tax exemption. - $150m a year for SAIL funds (s. 420.50871) to be used for redeveloping existing aff. Units. Address urban infill, provide for mixed use of the location, propose using public lands, meeting housing needs in rural opportunity areas.	No.

[47] https://flhousing.org/wp-content/uploads/2024/10/FHC-Overview-of-the-Live-Local-Act.pdf

Massachusetts[48]	Chapter 40A, Section 3A "MBTA Communities Law" Chapter 40A "Housing Choice Initiative"	MBTA Communities Law Multi-family zoning requirements for 177 MBTA Communities (where public transport is available). Requirement is that these communities "shall have a zoning ordinance or bylaw that provides for at least 1 district of reasonable size" that permits multi-family housing as of right. Communities have the discretion as to where the multi-family zoned district will be placed. The district must[49]: - Have a minimum density of 15 units per acre - Be a minimum of 50 acres or 1.5% of the developable land, whichever is *less* - Be located not more than 0.5 miles from a commuter rail station, subway station, ferry terminal, or bus station.	No, only for MBTA communities	Yes. Housing Choice Initiative Grant Program[50] Provides up to $500k for site prep, building, infrastructure, and up to $150k for projects related to planning and zoning. No local match required.	No.
Michigan[51]	HB6097 was introduced in 2024 but did not pass	Local government units a residential duplex is a permitted use in a district in which a single-family residence is a permitted use.	Only applies to local government units located in whole or in part within or adjacent to a metropolitan statistical area.	No	No

[48] https://www.hklaw.com/en/insights/publications/2021/03/massachusetts-enacts-state-zoning-law-amendments
[49] https://www.mass.gov/doc/compliance-guidelines-for-multi-family-zoning-districts-under-section-3a-of-the-zoning-act/download
[50] https://www.mass.gov/doc/fy26-housing-choice-grant-program-guidelines/download
[51] https://legislature.mi.gov/documents/2023-2024/billintroduced/House/pdf/2024-HIB-6097.pdf

Montana[52]	Yes. "Montana Land Use and Planning Act", passed under SB382 The act also requires cities adopt a public participation plan detailing how the local government will meet the requirements.[53]	Zoning in applicable areas must include a minimum of 5 of the following housing strategies: 1. Allow duplex on single-unit zones 2. Zones for higher density near transit stations 3. Eliminate or r educe off-street parking (require no more than one parking space per unit) 4. Eliminate impact fees for ADUs 5. Allow for at least one ADU on single-family lot 6. Allow for single-room occupancy developments 7. Allow tri/quadplex on single-family lot 8. Eliminate or reduce minimum lot size by 25% 9. Remove aesthetic requirements for multi-family or mixed use developments, or remove half of those requirements 10. Eliminate setback requirements or reduce existing requirements by 25% 11. Increase building height limits by at least 25% 12. Allow multi family or mixed use where commercially zoned	No. Applies to municipalities with population 5,000+ in counties with a population 70,000+	No	No

[52] https://archive.legmt.gov/bills/2023/billhtml/SB0382.htm
[53] https://www.kalispell.com/883/Montana-Land-Use-Planning-Act#:~:text=In%20the%20last%20legislative%20session,new%20land%20use%20planning%20paradigm.

North Dakota	No	NA	NA	NA	NA
State	**Laws Passed Containing Zoning Mandates?**	**Zoning Preemption Description**	**Zoning Preemption Applies Equally to All Cities Within State?**	**State Subsidy Associated with Zoning Preemption?**	**Does Law Allow For Exemptions?**
South Dakota[54]	The only legislation relating to local zoning and land use is SD2021 HB1094. This was passed in 2021, and concerns adjustment boards, conditional use permits, and the process of appeals.	NA	NA	NA	NA
Wisconsin[55]	2025-2026 WI Legislature, Senate Bill 45, Section 102, 16.3066 INTRODUCED, No mandates	Grants to incentivize eliminating zoning barriers to affordable housing. Grants will be awarded to local governments who adopt one or more of the following policies: (a) Reduce minimum lot sizes and widths. (b) Reduce setback	NA	Yes, unclear what amount of funding for the grant program.	NA

[54] https://sdlegislature.gov/Session/Bill/21984/219952
[55] https://docs.legis.wisconsin.gov/2025/related/proposals/sb45.pdf

		requirements to allow greater use of existing lots. (c) Increase allowed lot coverages to match historic patterns. (d) Adoption of a traditional neighborhood development ordinance, such as the model ordinance developed under s. 66.1027 (2). (e) Allow accessory dwelling units.			

6. The Future of Housing in Minnesota

Both the public and private sector have utilized a portfolio of mechanisms intended to address features of the housing crisis. The state has invested into grantmaking to directly construct new housing and provided incentives to produce apartments and homes affordable to those with lower incomes. Housing policy advocates, within the legislature and without, have confronted a great number of barriers related to housing production and affordability. In few cases, however, has the discussion of policy seriously challenged the long-standing model of housing production in the state. The case must be made, borne from the data, that the traditional housing production paradigm lacks the conditions to produce the volume and type of housing required to meet the needs of the Minnesota population.

As a complex policy issue, there will not be a single cohesive solution to create the conditions required to meet housing needs. We can acknowledge that perhaps it will not be fully feasible for the open market to produce housing for the poorest Minnesotans, and therefore state subsidization is required. A critique of policies meant to address these issues is not a rejection of their existence, but rather a critical evaluation of whether our investments into those housing solutions will produce outcomes with maximum value and efficiency.

Our policy solutions and investments as a state have thus far been predicated on the notion that we need to "catch up" on housing production and that if certain barriers are removed the problem would solve itself. There are two critical conditions, as we've discussed in this paper, which this notion ignores:

1. Minnesota is in an extremely tight labor market, a situation which may last for some time. Consequently, the possibility of bringing large numbers of workers into the residential construction industry is very limited. The workers that are already occupied in this industry can, because of the tight labor market, demand higher wages which then drives up production costs.
2. The materials used in new residential construction are increasing in price faster than the rate of inflation.

we could make extraordinary investments into funding and labor and these investments would still only have a marginal impact on housing supply.

Site-built housing relies on a variety of skilled workers, the number of which is growing fewer and more costly and uses materials with which the market has not been able to make cheaper or use less of during construction. As we have shown, a great number of Minnesotans are priced out of new housing as soon as it's built, caused in part by these two conditions. The state, private sector, and housing advocates must consider that should these conditions hold true, we could make extraordinary investments into funding and labor and these investments would still only have a marginal impact on housing supply.

Certainly, action is required to meet this issue. The type of action, policy, or investment, must confront the reality of our traditional site-built construction model. The state has made large investments into sustaining this model, and new legislation continues to be introduced to augment, simplify, or otherwise remove perceived frictions inherent within this model. What has not been seriously advanced, is the argument that our investments should include exploration into alternative models of residential construction. These models may compliment or supplement, rather than replace site-built construction. We must consider policies and investments which explore the feasibility, integration, and operationalization of these alternative models.

3-D Printed Homes

One such model relies on 3-D printing technology and is having success elsewhere in the country. In February 2024, Smithsonian magazine interviewed the leaders of two companies who produce 3-D printed housing[56]: Alquist 3D out of Colorado, and Icon out of Texas. Each company serves different purposes, Alquist 3D is a construction firm that buys or leases the printers while Icon is a manufacturer who contracts with other construction companies to provide the printer and software.

Both leaders of both exhort the benefits of the technology in addressing features of the housing crisis. Icon's vice president for building performance and design, Melodie Yashar, claims that 3D printing can be 10-30% cheaper to build versus traditional means. This is based on the materials used in the printing process, in addition to the fact that 3-D printing machines require as few as two people to operate. In addition to the cost savings on materials and labor, advocates claim that the building process can be significantly greener than traditional building processes. One prototype produced at the University of Maine Advanced Structures and Composites Center, called BioHome3D, creates structures exclusively from bio-resins and other materials which are 100% recyclable[57].

Not only can firms like Alquist contribute efficiency and cost savings to housing construction, but they can also advance economic development. Alquist moved from Iowa to Greeley, Colorado where it expects to create 79 new jobs with above average salaries[58]. Additionally, the firm is partnering with Aims Community College to create an academic curriculum based on 3-D printing technology. This establishes a labor supply chain for workers interested in joining this expanding industry.

There are still a number of issues which may prevent 3-D printing technology from being scalable in a way that is needed to meet demand. The cost savings may only be realized in some cases if enough structures are built at the same time. There are other considerations which still need to be addressed such as weather-resilience, location specific material availability, and startup costs. It may be the case that this technology compliments the traditional building process in some way, rather than taking over the whole process.

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[56] Morrison, J. (2024, February 23). Can 3D printing help address the affordable housing crisis in the United States? *Smithsonian Magazine*. https://www.smithsonianmag.com/innovation/can-3d-printing-help-address-affordable-housing-crisis-in-united-states-180983821/#:~:text=%E2%80%9C3D%20printing%20is%20about%2010,added%20in%20terms%20of%20financing.

[57] *BioHome3D - Advanced Structures & Composites Center - University of Maine*. (n.d.). Advanced Structures & Composites Center. https://composites.umaine.edu/advanced-manufacturing/biohome3d/

[58] *Creating housing and new jobs: Manufacturer of 3D printed homes to expand in Greeley, company moving headquarters to Colorado | Colorado Governor Jared Polis*. (n.d.). https://www.colorado.gov/governor/news/10791-creating-housing-and-new-jobs-manufacturer-3d-printed-homes-expand-greeley-company

Prefabricated Homes

Prefabricated homes are also an alternative to the traditional building process. There are two types of prefabricated homes[59]:

1. Manufactured homes – these meet federal housing code laws.
2. Modular homes – these are regulated at the state and local level.

Manufactured homes are those which are constructed off-site and can be placed on either a permanent foundation, or a non-permanent foundation, such as a mobile home. Non-mobile manufactured homes can be designed to look and feel like single-family detached homes. Modular homes are also constructed offsite and then assembled on its permanent location. differ from types of manufactured homes such as mobile or trailer homes. For example, a modular home will generally still have a wood frame, while a mobile home may have a singular metal frame[60]. It is important to make this distinction clear; from The Urban Institute's 2022 Report The Role of Manufactured Housing in Increasing the Supply of Affordable Housing:

"*Before 1977, manufactured housing was unregulated at the federal level.*

And,

... The improved standards after 1976 also helped distinguish between the terms "mobile homes" and "manufactured homes," which were often used interchangeably before the HUD Code."

Modular homes also share a number of characteristics with traditional, site-built homes which make them attractive to potential homeowners. With a modular home, the buyer typically also purchases the land which the home is installed on. There is also some evidence that modular homes appreciate at similar levels compared to site-built housing. These two alternative methods, 3-D printed housing and modular/manufactured homes, represent an extremely small percentage of new homes built. According to one nationwide estimate, less than 4% of housing inventory consists of modular homes[61]. Given that these two alternative models rely on less labor, and potentially less or cheaper material, we should at the very least identify their feasibility in Minnesota.

A note on data availability

One challenge facing a serious analysis of modular home construction output is a lack of robust data sets. While there is data from the Census Bureau on number of single and multi-family homes produced through modular construction, these data do not exist at the state or county level. This prevents a local analysis of output capacity for modular construction.

[59] Khiatani, J. V. (2023, March 7). *Prefab home regulations & safety standards in the United States*. Compliance Gate. https://www.compliancegate.com/prefab-home-regulations-united-states/
[60] *Manufactured vs. Modular Homes.* https://emilms.fema.gov/is_0285/groups/134.html
[61] D'Allegro, J. (2023, December 22). *In a tough real estate market, a century-old housing idea could make a comeback*. CNBC. https://www.cnbc.com/2023/12/22/in-tough-real-estate-market-a-century-old-home-idea-could-come-back.html

Policy makers must make a serious, concerted effort to establish the benefits and drawbacks of utilizing these two approaches, explore for others, and assess to what degree alternative building models may supplement our current approach to building new housing.

In the likely event that a portion of public spending is allocated to the housing crisis, we must invest a portion into alternative construction model research and development, feasibility modelling, alternative construction infrastructure development and a comprehensive, statewide housing strategy which identifies where complementary models may produce the optimal effect.

Construction Innovation Around the U.S.

As Minnesota explores its options regarding improving construction output capacity, it can draw on examples from other states who have created policies to support new technologies. Some of these policies act to incentivize the construction of modular homes, for example, while others provide funding for research and development of new materials or construction models. Modular home construction and 3-D printing technology are just two examples of innovative construction models. These models will not wholly replace site-built housing in the near future but can compliment or supplement existing construction practices. Legislative or policy action should be centered around how Minnesota can best incorporate these innovations to reduce cost, scale these models to the level necessary, and produce the quantity of housing required to sustain a healthy market.

Some states are proactively exploring the use and role of modular or 3D printed housing. Some states have begun actively researching the capability of scaling construction of 3D printing or modular homes. Others have provided incentives for the private market to invest in these technologies. Below we provide a summary of how some states are considering these two construction methodologies.

Alaska

The Federal Housing and Urban Development Agency, the Denali Commission, and the Alaska Housing Finance Corporation, city of Nome and the Rasmuson Foundation collectively awarded $1.6 million to a non-profit housing research center[62]. An interdisciplinary team of researchers will using this funding to determine the viability of 3-D printed housing in rural Alaska. Through experimentation and trial and error, researchers hope to identify the potential impact of extreme weather on 3D printed materials.

California

In 2023 the California Energy Commission announced a $5 million grant to develop, test, and demonstrate cost effective modular homes[63]. The grant was awarded to a partnership between Mighty Buildings, a 3D construction printing company, Habitat for Humanity, and the Lawrence Berkeley National Laboratory. The project will produce homes which are both cost effective as well as zero-carbon or near zero-carbon. The project will use a combination of 3D printing technology and factory-built housing modules.

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[62] *3D printing affordable, sustainable and resilient housing in Alaska | Penn State University*. (n.d.). https://www.psu.edu/news/arts-and-architecture/story/3d-printing-affordable-sustainable-and-resilient-housing-alask

[63] Griffiths, L. (2023, December 21). *$5 million grant to support sustainable, affordable 3D printed housing development in California*. TCT Magazine. https://www.tctmagazine.com/additive-manufacturing-3d-printing-news/latest-additive-manufacturing-3d-printing-news/5-million-usd-grant-support-development-sustainable-affordable-3d-printed-housing/

Colorado

The Colorado Economic Development Commission approved up to $1,097,242 in performance-based Job Growth Incentive Tax Credits for the firm[64]. The Commission also approved up to $335,000 in a performance-based Strategic Fund incentive program over a 5 year period. Additionally, the city of Greeley is investing $2.85 million into a public-private partnership with the firm[65]. The investment includes an upfront forgivable loan, relocation expenses assistance, and equipment and staffing funding.

Maine

In March 2024, Maine's legislature passed L.D. 337 which requires that a municipality must allow manufactured housing wherever single-family dwellings are allowed[66].

Montana

In 2022, the Montana Department of Labor and Industry gave broad regulatory approval for the use of 3D printed concrete walls as an alternative to traditional methods[67]. By authorizing the use of the technology, Montana became the first state in the nation to provide state-level regulatory approval.

Oklahoma

The Oklahoma Policy Institute estimates that the state needs 77,000 more rental units for renters with extremely low income[68]. To address this shortage, Oklahoma State representative Dollens has proposed a legislative interim study on 3D printing technology. The study will focus on implementation, sustainability, regulatory codes and tax incentives.

In Minnesota

Minnesota is among 40 states which regulates modular housing at the state-level, an important first step in exploring future incentive or state-supported scaling opportunities. 3D homes, however, have not been integrated into the state's building code. Given the young age of the technology, there remains little state-level regulation or investment in states around the U.S. State building codes have not had sufficient time to examine the use of the technology within their existing regulatory regimes which can act as an obstacle to scaling up the technology.

In a tight labor environment where labor costs are at a premium and projections of the future labor market, we will likely have to acknowledge the fact that we will have to construct more with fewer workers in the future. Additionally, the price of materials for new residential construction has consistently risen faster than

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[64] *Creating housing and new jobs: Manufacturer of 3D printed homes to expand in Greeley, company moving headquarters to Colorado | Colorado Governor Jared Polis*. (n.d.). https://www.colorado.gov/governor/news/10791-creating-housing-and-new-jobs-manufacturer-3d-printed-homes-expand-greeley-company

[65] *Greeley Release — Alquist 3D*. (n.d.). Alquist 3D. https://www.alquist3d.com/greeley-release

[66] Ogrysko, N. (2024, March 21). New Maine law will allow manufactured homes on same lots as single family homes. *New England Public Media*. https://www.nepm.org/2024-03-20/new-maine-law-will-allow-manufactured-homes-on-same-lots-as-single-family-homes

[67] Johnson, O. (2023, April 26). *Montana becomes first US state to give broad regulatory approval for 3D printing in construction*. TCT Magazine. https://www.tctmagazine.com/additive-manufacturing-3d-printing-news/latest-additive-manufacturing-3d-printing-news/montana-becomes-first-us-state-to-give-broad-regulatory-approval-3D-printing-construction/#:~:text=Building%20code%20regulators%20at%20state,a%20standard%20cored%20concrete%20block.

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inflation for the past two decades. As materials and labor constitute the majority of the cost to build a home, trendline costs continue to further place new housing out of reach for the majority of Minnesotans.

Both modular construction and 3D printing technology potentially offer solutions to the housing crisis in Minnesota. Both methods used to construct new housing offer efficiencies in both labor and materials, allowing these methods to build more housing, faster, and using fewer workers. It is necessary that Minnesota being to take steps to identify the potential implementation and scaling of these models of construction in order to fully address the underlying conditions which brought the housing market to a crisis.