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# **Denver Housing Affordability Report**

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## ABOUT THE AUTHOR

**Steven L. Byers, Ph.D.** is the senior economist with the Common Sense Institute. Steven's Experience as an economist spans twenty-three years, including work at federal regulatory agencies (SEC, CFTC, PCAOB) and quantitative economic analysis supporting international trade litigation cases brought before the U.S. International Trade Commission.

## ABOUT COMMON SENSE INSTITUTE

**Common Sense Institute** is a non-partisan research organization dedicated to the protection and promotion of Colorado's and Arizona's economies. CSI is at the forefront of important discussions concerning the future of free enterprise in Colorado and Arizona and aims to have an impact on the issues that matter most to Coloradans and Arizonans.

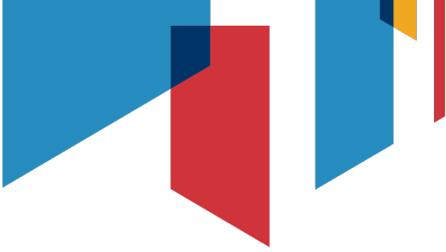
CSI's mission is to examine the fiscal impacts of policies, initiatives, and proposed laws so that Coloradans and Arizonans are educated and informed on issues impacting their lives. CSI employs rigorous research techniques and dynamic modeling to evaluate the potential impact of these measures on the Colorado and Arizona economies and individual opportunity.

Common Sense Institute was founded in 2010 originally as Common Sense Policy Roundtable. CSI's founders were a concerned group of business and community leaders who observed that divisive partisanship was overwhelming policymaking and believed that sound economic analysis could help Coloradans make fact-based and *common sense* decisions.

## TEAMS & FELLOWS STATEMENT

CSI is committed to independent, in-depth research that examines the impacts of policies, initiatives, and proposed laws so Coloradans and Arizonans are educated and informed on issues impacting their lives. CSI's commitment to institutional independence is rooted in the individual independence of our researchers, economists, and fellows.

At the core of CSI's mission is belief in the power of the free enterprise system. Our work explores ideas that protect and promote jobs and the economy, and the CSI team and fellows take part in this pursuit with academic freedom. Our team's work is guided by data-driven research and evidence.



## Table of Contents

ABOUT THE AUTHOR.....	2
ABOUT COMMON SENSE INSTITUTE .....	2
TEAMS & FELLOWS STATEMENT .....	2
DENVER HOUSING AFFORDABILITY STUDY .....	4
KEY FINDINGS .....	4
AFFORDABILITY AS MEASURED BY THE HOMEBUYER MISERY INDEX.....	5
HOME PRICES .....	9
HOURS OF WORK NEEDED TO AFFORD A HOME MORTGAGE .....	9
DENVER, CO HOUSING SUPPLY SHORTAGE.....	11
BUILDING PERMITS AND THE HOUSING SUPPLY DEFICIT.....	12
TYPES OF PERMITS ISSUED .....	15
HIGHER MORTGAGE RATES AND HOMEBUILDER CONFIDENCE .....	16
COST OF PROPOSED ELECTRIFICATION OF HOMES AND BUSINESSES .....	17
GOING FORWARD.....	19

## DENVER HOUSING AFFORDABILITY STUDY

Since 2005, Denver added 162,000 new residents, growing its population by 29%. Over the same period, the average priced home in Denver has increased 138% from \$260,600 to \$619,500. The increased population coupled with an insufficient number of new housing units has resulted in a tight housing market with reduced inventory and reduced affordability. Higher mortgage rates raise the cost of new home purchases, undoubtedly impacting demand for housing. While this may provide some relief in terms of availability, permitting for new housing units is tapering off and actual home completions will likely decline as builders gauge the impact of a slowing economy on housing demand.

This report analyzes trends in housing affordability and estimates whether there is a deficit or surplus in housing units in city and county of Denver. This study encompasses the period 2000 to 2022. The data sources used in this report and its most recent availability include: the American Community Survey (2021), the National Association of Homebuilders (2020), U.S. Department of Housing and Urban Development (January 2023), S&P CoreLogic Case-Shiller Home Price Indices (3<sup>rd</sup> Quarter 2022), Zillow (November 2022), and the Colorado State Demography Office (2022). The housing deficit/surplus in 2022 is estimated using forecasts of population and average household sizes. It is important to note that the housing unit deficit/surplus estimates may change with each new U.S. Census data release.

## KEY FINDINGS

- **The housing deficit in 2022 in Denver is in the range of 13,148 to 30,930 units. To meet population growth by 2028 and close the housing deficit, between 31,000 and 49,000 housing units will need to be built.**
- **Due to elevated housing prices and rising interest rates, the affordability of purchasing a home in Denver is at an all-time low.** In just the past 8 years the cost (purchase price plus mortgage interest) of purchasing a home has increased by 105% with a large part of that increase occurring over the last three years
- **Household incomes have not kept pace with rising housing costs.** Between November 2015 and December 2022, the average hourly wage increased 37% from \$28.26 to \$38.80. However, due to the rapidly increasing cost of housing, the number of hours of work required to cover the mortgage payment on an average priced house increased from 56 hours to 104 hours, an 85% increase, as seen in Table 4.
- **Between approximately 5,187 and 8,151 permits are needed annually through 2028 to close the housing supply deficit in Denver and meet the demands of future population growth.** Projected permitting for new housing in 2022 started off well, but it is tapering off as home builders reassess the demand for housing in a higher interest rate environment. Over the period 2006 to 2021, the average annual permitted units issued was 5,580 per year. This historic average is 68% to 108% of the needed permits to close the deficit and meet new housing demand by 2028. Based on permit data through November 2022, Denver has issued 7,839 permits, which is enough to close the deficit plus meet new housing demand by 2028 for the low estimate of needed permits but is insufficient under the high estimates of needed permits. Recent reports indicate that the homebuilding market may be contracting. To avoid a similar collapse in new home building that followed the last recession, permitting must remain at elevated levels for the next several years.

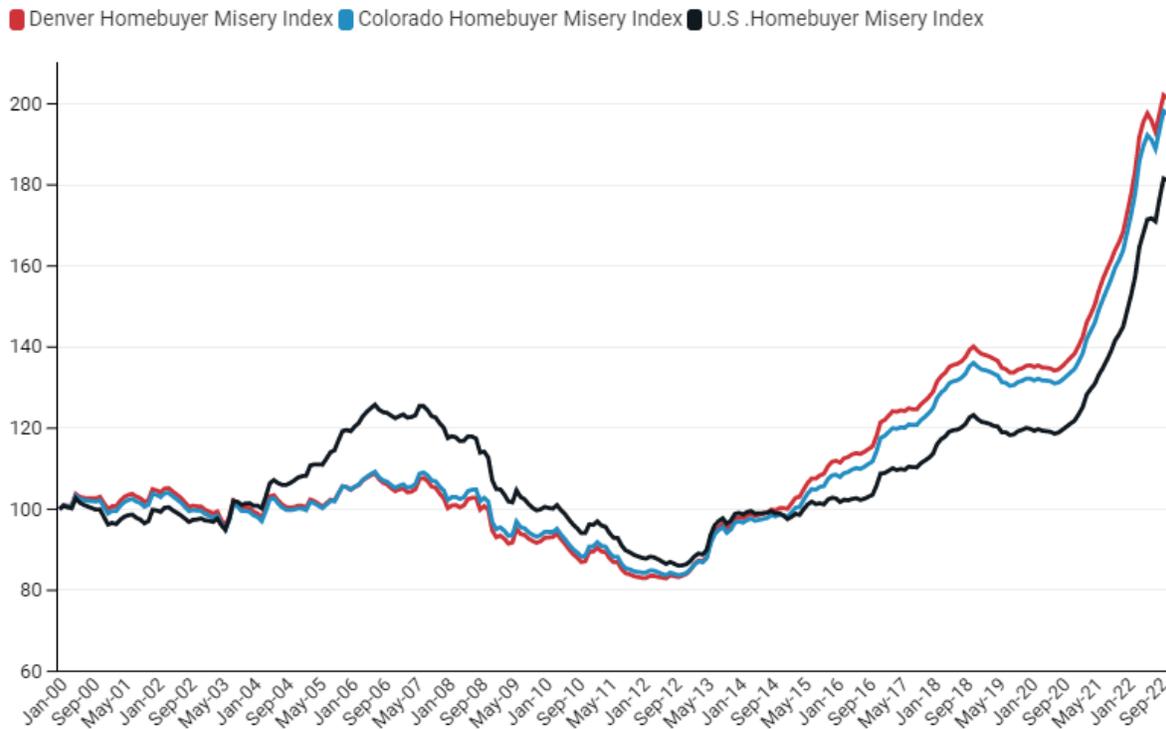
- **Denver issues the majority of housing unit permits for multi-family 5-plus structures.** Over the last ten years, 23% of housing unit permits were for single-family homes and 77% for multi-family.
- **Homebuilder confidence has declined 75% since a recent high in November 2020.** The National Association of Home Builders/Wells Fargo Housing Market Index for the Western Region has been falling for 9 straight months indicating a likely decrease in the rate of new housing creation going forward.
- **Proposed legislation before the State legislature and municipal governments pushing for electrification of homes and businesses will reduce affordability.** Based on a study of the cost of residential electrification done by Black Hills Energy, the public utility for Rocky Ford, CO, the combined cost of 'behind the meter' expenses and electric utility infrastructure needed to fully electrify all residential housing in Denver range between \$41K to \$47K per existing unit, for a total estimated cost to current Denver residents of \$8.6B to \$10B. **The total cost of full electrification of Denver homes will cost between 50% to 58% of median household income (\$81,630) per existing housing unit.**

## AFFORDABILITY AS MEASURED BY THE HOMEBUYER MISERY INDEX

The "Denver Homebuyer Misery Index", as developed by [Common Sense Institute](#)<sup>i</sup>, captures the impact of housing prices and mortgage rates on the affordability of purchasing a new home. The Denver, Colorado Homebuyer, and U.S. Homebuyer Misery indices are based on 30-year mortgage rates and Zillow home prices.

The mortgage rates are converted into an index with 2000 as its base year. The mortgage rate index is then added to the Zillow price index and normalized. The following graph shows the Denver Homebuyer Misery Index, the Colorado Homebuyers Misery Index, and the U.S. Homebuyers Misery Index. The Denver Homebuyer Misery Index is above the Colorado Homebuyer Misery Index and U.S Homebuyer Misery Index after 2013 and above the U.S. Homebuyer Misery Index. The substantial increase from 2012 to the end of 2020 was primarily a function of home prices increasing. Beginning in 2021, home prices in Denver went up dramatically and mortgage rates more than doubled by November 2022, consequently the cost to purchase an average priced home went up by 142% from 2012 to 2022. In the last two months of 2022, the misery indices have declined as home prices and mortgage rates have fallen. The graph of the Homeowner Misery Index is useful for evaluating and comparing trends to the Colorado and U.S. Homebuyer Index, but to determine the degree to which a region became more or less affordable relative to others, the change in the indices must be calculated between two points in time as is shown in in **Table 1**.

## Denver, CO Homebuyer Misery Index



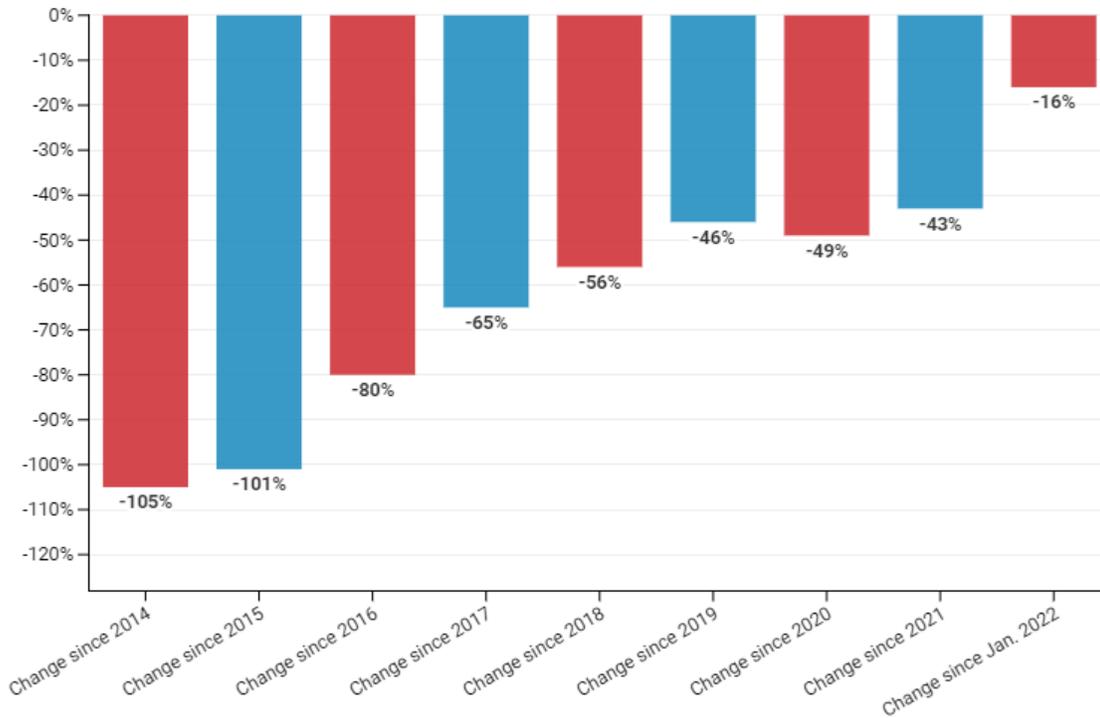
Source: Zillow, and St. Louis Federal Reserve Bank (FRED)

Home affordability in Denver has declined, falling 105% since January 2014 and has been near that for Colorado overall. However, it was above the level for the U.S. until January 2017. Since May of this year home prices have leveled off or decreased slightly, but affordability has continued to worsen as mortgage rates have increased. **Table 1**, shows the decline in affordability for Denver, Colorado, and the U.S.

Table 1- Percent Change in Housing Unaffordability for Denver, Colorado, and the U.S.			
% Change as of Dec. 2022 Since:	Denver	Colorado	United States
Jan 2014	-105%	-104%	-83%
Jan 2015	-101%	-101%	-86%
Jan 2016	-80%	-82%	-76%
Jan 2017	-65%	-67%	-66%
Jan 2018	-56%	-58%	-59%
Jan 2019	-46%	-47%	-49%
Jan 2020	-49%	-49%	-51%
Jan 2021	-43%	-45%	-47%
Jan 2022	-16%	-17%	-22%

The following graph shows the average change in affordability in Denver. Half of the change has occurred since January 2020 and 43 percent since the beginning of 2021.

### Changes in Housing Affordability in Denver



Source: Zillow and S&P Case-Shiller

The Wall Street Journal and Realtor.com began producing their Emerging Housing Markets Index in spring 2021 and has now published 6 quarterly estimates. The index identifies the top metro areas for home buyers seeking an appreciating housing market, strong local economies, and appealing lifestyle amenities. Three hundred of the most populous core-based statistical areas as measured by the U.S. Census Bureau are evaluated using two main areas: real-estate markets (50%) and economic health (50%). It utilizes 11 key indicators that are weighted and summed to create a single measure: real-estate supply (16.6%), real-estate demand (16.6%), medium home listing price trend (16.6%), unemployment (6.25%), wages (6.25%), regional price parities (6.25%), amenities (6.25%), small businesses (6.25%), and property taxes (6.25%).<sup>ii</sup>

**Table 2** shows the rankings of the Denver core-based statistical areas relative to all three hundred most populous areas included in the index. The Denver MSA is in the top fifteen percent (ranked 45 or higher) of all metro areas in terms of future home price appreciation. This index provides some perspective that while housing affordability is near record lows, as of the latest data, fall 2022, Denver is generally ranked in the upper tier of the 299 other MSA's that are in the Emerging Housing Market Index and is viewed as relatively attractive

given the potential for prices to continue to rise and for other quality of life amenities and economic factors.

**Table 2 - Wall Street Journal/Realtor.com Emerging Housing Markets Index, Ranked Relative to 300 Metropolitan Statistical Areas**

	Spring 2021	Summer 2021	Fall 2021	Spring 2022	Summer 2022	Fall 2022
Colorado Springs	32	14	11	25	20	14
Boulder	31	46	20	6	14	33
Denver-Aurora-Lakewood	115	88	59	52	66	38
Grand Junction	60	39	90	126	50	43
Fort Collins	96	68	24	8	11	47
Pueblo	86	55	83	102	78	98
Greeley	153	140	93	108	113	168

This table is ranked by comparison to three hundred of the most populous metro areas in the U.S. Colorado metro areas that were ranked in the top ten in any given year are highlighted in orange. The index identifies the top metro areas for home buyers seeking an appreciating housing market, a strong local economy and appealing lifestyle amenities.

**Table 3 shows** the relative rank of other major MSA’s in Colorado. Though prices in Denver are historically high, among the other MSA’s in Colorado, it is still considered to have some potential for future home price appreciation.

**Table 3 – Wall Street Journal/Realtor.com Emerging Housing Markets Index, Ranked Relative to Colorado Metropolitan Statistical Areas**

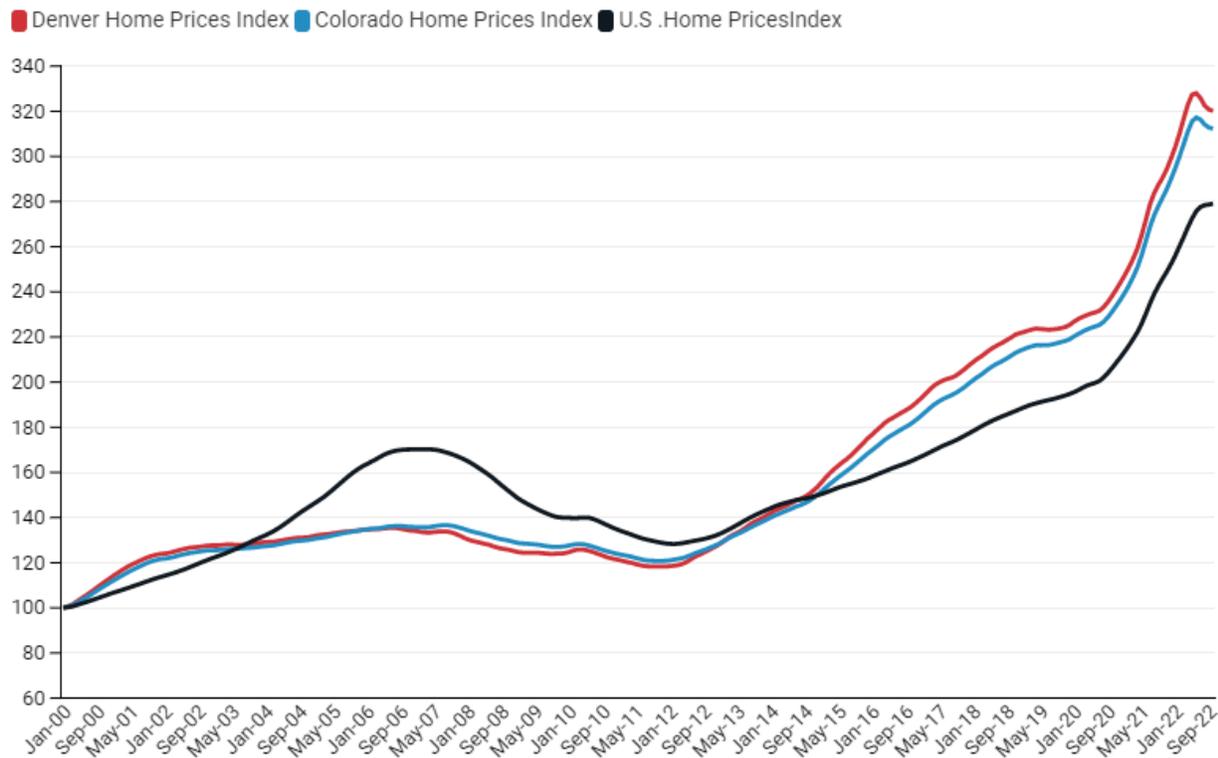
	Spring 2021	Summer 2021	Fall 2021	Spring 2022	Summer 2022	Fall 2022
Colorado Springs	2	1	1	3	3	1
Boulder	1	3	2	1	2	2
Denver-Aurora-Lakewood	6	6	4	4	5	3
Grand Junction	3	2	6	7	4	4
Fort Collins	5	5	3	2	1	5
Pueblo	4	4	5	5	6	6
Greeley	7	7	7	6	7	7

This table is ranked by comparison to seven of the most populous metro areas in Colorado. The index identifies the top metro areas for home buyers seeking an appreciating housing market, a strong local economy and appealing lifestyle amenities.

## HOME PRICES

The following graph shows home price indices for Denver, Colorado, and the United States. Home prices in Denver increased 170% since 2012 and 41% from the beginning of the Covid-19 pandemic through June 2022. Since mid-2022, home prices in Denver have begun to taper off, falling 2.5% since June 2022. Nationally, home prices increased 44% from the beginning of the Covid-19 pandemic through October 2022 and have declined 0.3% since May 2022.

### Denver Home Price Index



Source: Zillow

## HOURS OF WORK NEEDED TO AFFORD A HOME MORTGAGE

To measure the impact on the average homeowner in Denver, Common Sense Institute calculated the number of hours that one would have to work while earning the average hourly wage in November of each year from 2013 to 2022 to cover the monthly mortgage payments shown in **Table 4**. Over just the last 12 months, driven primarily by the increase in mortgage rates, an additional 36 hours of work per month has become necessary to cover the mortgage on a newly purchased average priced home.

**Table 4 – Denver Home Prices, Mortgage Rates, Monthly Payment, Wage Rates, and Hours Required to Cover Monthly Mortgage Payment**

Date	Average Home Price	30-Year Mortgage Rate	Mortgage Payment	Average Wage Rate	Hour of Work at the Average Wage Rate Required to Cover Mortgage Payment	% Annual Change in Hours of Work Required
11/2013	\$270,961	4.26%	\$1,334	\$27.78	48	N/A
11/2014	\$294,082	4.00%	\$1,404	\$28.35	50	3.1%
11/2015	\$335,409	3.94%	\$1,590	\$28.26	56	13.7%
11/2016	\$368,222	3.77%	\$1,709	\$28.82	59	5.4%
11/2017	\$398,592	3.92%	\$1,885	\$29.29	64	8.5%
11/2018	\$428,119	4.87%	\$2,263	\$31.17	73	12.8%
11/2019	\$434,853	3.70%	\$2,000	\$32.58	61	-15.4%
11/2020	\$466,983	2.77%	\$1,910	\$33.40	57	-6.9%
11/2021	\$570,284	3.07%	\$2,425	\$35.57	68	19.2%
11/2022	\$619,451	6.81%	\$4,040	\$38.80	104	52.7%

Freddie Mac, 30-Year Fixed Rate Mortgage Average in the United States [MORTGAGE30US], retrieved from FRED, Federal Reserve Bank of St. Louis; <https://fred.stlouisfed.org/series/MORTGAGE30US>, Colorado - May 2021 OEWS State Occupational Employment and Wage Estimates (bls.gov).

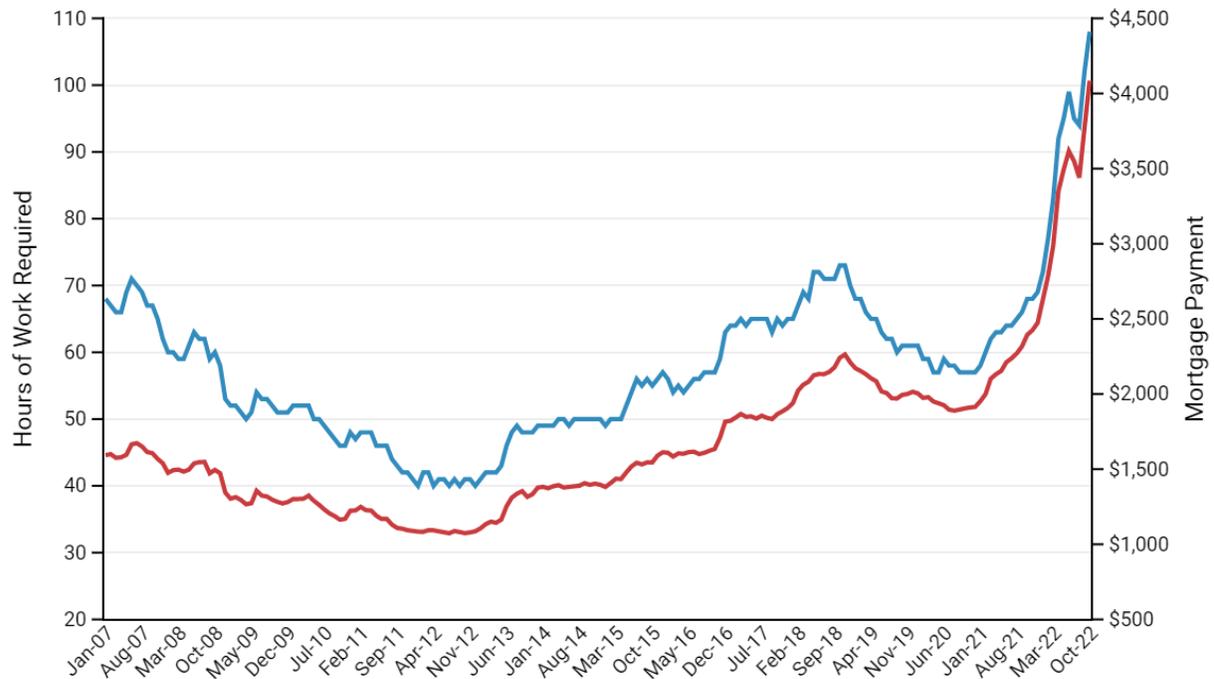
The graph below shows the evolution of monthly mortgage payments on an average price home and the required hours of work necessary to cover the payment. Required hours fluctuated around 55 from January 2007 until the summer of 2020, after which, they increased dramatically as home prices increased. Beginning in the spring of 2022, mortgage rates have increased as the Federal Reserve addresses inflation, having a dramatic impact on the cost of purchasing a home.

Since the start of the pandemic the hours of work required to afford a mortgage on an average priced home increased 70 percent from 61 hours to 104 hours.

## Mortgage Affordability in Denver

Hours of work require to afford an average thirty-year mortgage

■ Typical Mortgage Payment ■ Hours of work required to afford a typical 30-year mortgage payment



Source: St. Louis Federal Reserve Bank Source: St. Louis Federal Reserve Bank

## DENVER, CO HOUSING SUPPLY SHORTAGE

Denver has failed to build enough housing to keep pace with demand. Standard housing market reports like those developed by the National Association of REALTORS® track inventory based on homes listed for sale. What those reports do not capture is the total stock of homes needed to maintain a healthy housing market.

CSI estimates the number of homes needed in Denver to achieve a healthy housing market under two scenarios. Each scenario is intended to measure the difference between the actual number of homes in a county relative to the number of homes needed to maintain a more stable market for the local population. The first scenario averages the values of a housing deficit or surplus based on the low estimate of homes held off the market for purchase by the local population. The second scenario averages the values of a housing deficit or surplus based on the high estimate of homes held off the market for purchase by the local population.

**Housing units and households** – Each scenario uses both the estimate of housing units and households from U.S. Census Bureau’s American Community Survey (ACS) and the Colorado State Demography Office. We adjust the housing units by removing those that are considered uninhabitable by virtue of having no kitchen or lacking plumbing facilities.

**Homes held off the market** – Total homes held off the market reflect existing housing units not available for purchase by the local population. The estimate includes a range of second homes at the county level released by the National Association of Homebuilders,<sup>iii</sup> along with an estimate of uninhabitable homes from ACS. Denver has between 0% and 4.99% of the housing stock allocated to second homes.

**Desired ratio of total units to local population** – To estimate the target number of housing units, the value of 1.1 housing units per household was used to represent a healthy market. This value is derived from the historic average ratio of vacancy rates for the U.S. and was the basis for a housing supply report done for the state of Oregon.<sup>iv</sup> **Table 5** shows the forecasted change in population and the number of households in 2028 and 2033.

Table 5 - Change in Population and Households in Denver, in 2028 and 2033				
Region	Population		Households	
	2028	2033	2028	2033
Denver	39,177	77,643	17,973	35,621

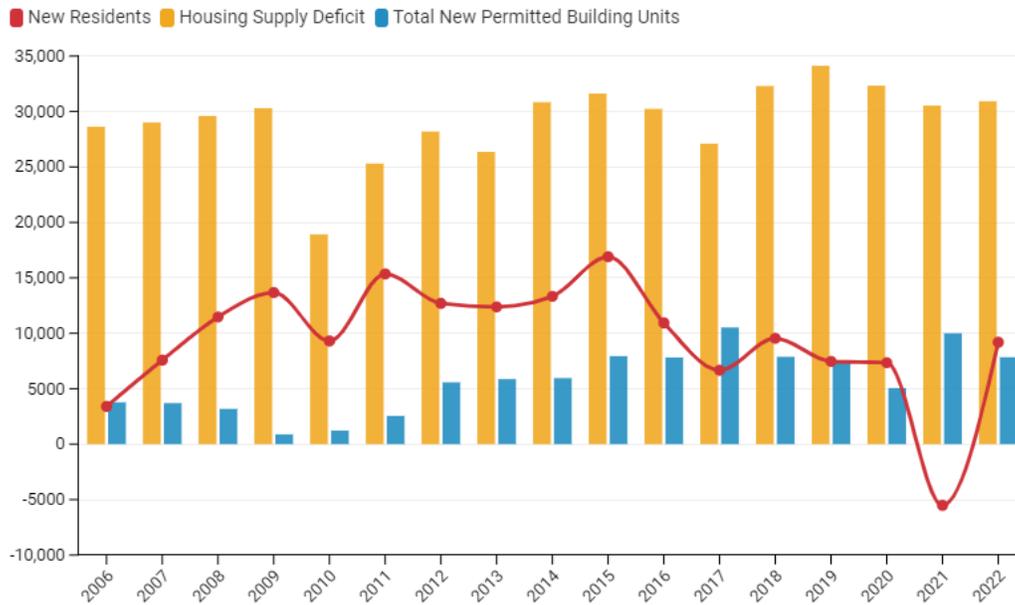
Using the scenarios discussed above, the deficit in housing units in 2022 is estimated to have been between 13,148 and 30,930 units. These deficits represent 3.7% and 8.7% of the existing housing stock in Denver. **Table 6** presents summary results Denver considered in this study. CSI will continue to monitor new data as it becomes available and will amend the estimates and methodology as required.

Table 6 - Housing Deficit/Surplus in Denver 2022					
Region	Housing Stock 2022	Housing Deficit/Surplus in 2022		Deficit/Surplus as a Percent of 2022 Existing Stock of Housing Units	
		Scenario 1	Scenario 2	Scenario 1	Scenario 2
Denver	356,370	(13,148)	(30,930)	3.69%	8.68%
Scenario 1 uses the NAHB low estimate of the percent of homes held-off-market Scenario 2 uses the NAHB high estimate of the percent of homes held-off-market					

## BUILDING PERMITS AND THE HOUSING SUPPLY DEFICIT

As shown in the following graph, the housing supply deficit has increased slightly from 2006 to 2009 as the number of new residents increased, it dropped in 2010, and then gradually increased on average through 2022. Annual permitting increased after 2009, but not enough to reduce the supply deficit.

### Denver - Population Growth, New Unit Permits, and the Housing Supply Deficit



Sources: National Association of Homebuilders, Colorado State Demography Office, U.S. Census Bureau ACS

To erase the estimated statewide deficit and meet new population-driven demand for housing by 2028, an additional 31,121 to 48,904 permitted units are required in total, 5,187 to 8,151 per year, see **Table 7**. CSI is tracking building unit permits by county on a quarterly basis to evaluate whether the level of issuance is sufficient to close the existing housing deficit and meet new demand for housing as the population grows.

**Table 7 - Permits Required to Close the 2022 Deficit and New Housing Demand in Denver in 2028**

Region	Number of Permits Required to Close the Deficit Plus New Demand for Housing in Denver by 2028		Permits Issued per Year in Denver	Deficit/Surplus in Permitted Units Issued in Denver	
	Scenario 1	Scenario 2	2022 (November)	2022 Scenario 1	2022 Scenario 2
<b>Denver, CO</b>	31,121	48,904	7,839	2,652	(312)

Scenario 1 uses the NAHB low estimate of the percent of homes held-off-market  
 Scenario 2 uses the NAHB high estimate of the percent of homes held-off-market

To erase the estimated statewide deficit and meet new population-driven demand for housing by 2033, an additional 48,768 to 66,551 permitted units are required in total, 4,433 to 6,050 per year, See **Table 8**. Closing the deficit and meeting new housing demand by 2033 requires fewer permits per year than does closing the deficit by 2028, because filling the 2022 housing deficit is spread out over an additional five years.

**Table 8 - Permits Required to Close the 2022 Deficit and New Housing Demand in Denver in 2033**

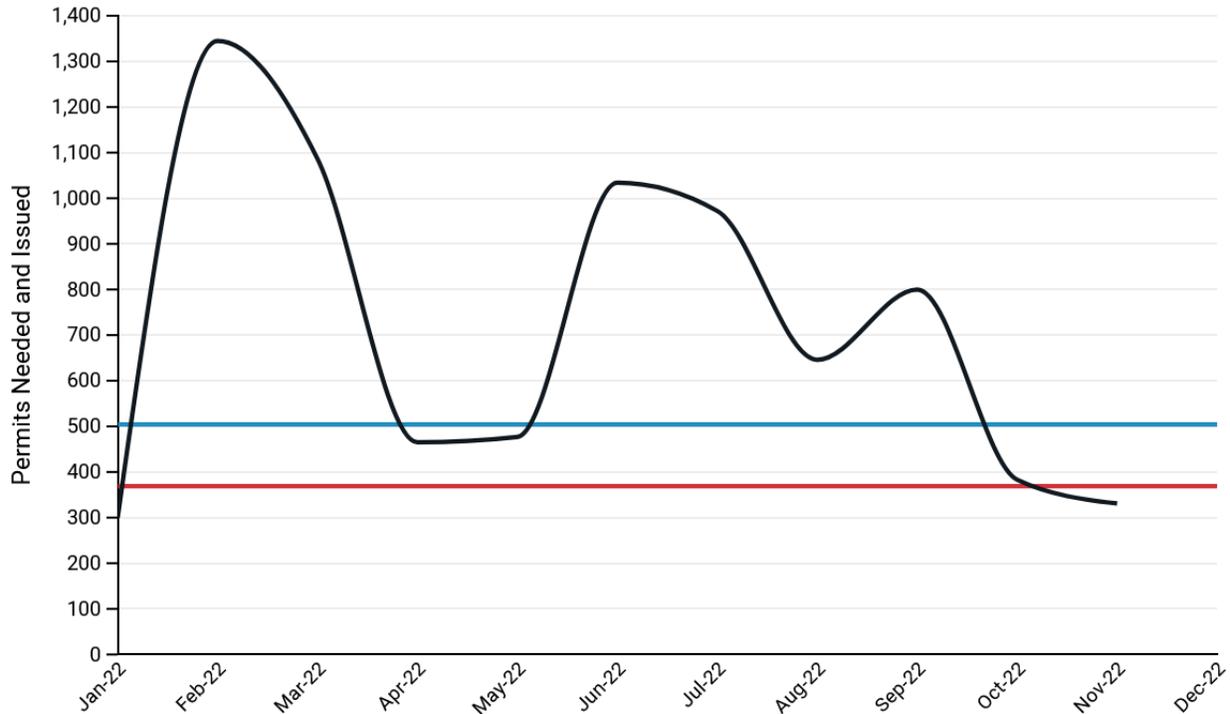
Region	Number of Permits Required to Close the Deficit Plus New Demand for Housing in Denver by 2033		Permits Issued per Year in Denver	Deficit/Surplus in Permitted Units Issued in Denver	
	Scenario 1	Scenario 2	2022 (November)	2022 Scenario 1	2022 Scenario 2
<b>Denver</b>	48,768	66,551	7,839	3,406	1,789

Scenario 1 uses the NAHB low estimate of the percent of homes held-off-market  
 Scenario 2 uses the NAHB high estimate of the percent of homes held-off-market

The following graph shows the number of housing unit permits needed monthly to close the deficit by 2028 for 2 scenarios, and the number of permits issued monthly through November 2022. The red line shows the average monthly required permits to close the 2022 deficit and meet new housing demand by 2028 for scenario 1. The blue line is for scenario 2. In scenario 1, enough permits have been issued in nine months over the first eleven months of 2022 to cover the housing deficit and meet new demand for housing by 2028. In scenario 2, enough permits have been issued in six months out of eleven to cover the housing deficit and new housing demand by 2028. However, permitting is trending down as high interest rates are dampening demand for housing and builders are applying for fewer permits.

## Average Monthly Housing Unit Permits Needed vs. Issued

■ Permits Needed in Denver -Scenario 1 ■ Permits Needed in Denver -Scenario 2 ■ Permits Issued in Denver



Source: HUD

## TYPES OF PERMITS ISSUED

**Table 9** shows the number of housing unit permits issued in total, and the percentage of each type, issued from 2012 through November 2022. Annual permitted units issued have increased from 5,578 in 2012 to 7,839 in 2022, or by 41%. The percentage share of permitted units issued has gone from 19 percent single-family in 2012 to 16 percent in 2022. The percentage permits for multi-family structures have increased from 81 percent in 2012 to 84 percent in 2022 with the majority of multi-unit structures occurring in the 5-plus unit multi-family structures.

**Table 9– Denver - Permits by Percentage of Type Issued**

	<b>Total Units</b>	<b>Units in Single-Family Structures</b>	<b>Units in All Multi-Family Structures</b>	<b>Units in 2-unit Multi-Family Structures</b>	<b>Units in 3- and 4-unit Multi-Family Structures</b>	<b>Units in 5+ Unit Multi-Family Structures</b>
2012	5578	19%	81%	3%	0%	78%
2013	5872	22%	78%	4%	0%	74%
2014	5958	29%	71%	5%	0%	66%
2015	7940	23%	77%	2%	0%	75%
2016	7818	25%	75%	4%	0%	71%
2017	10525	23%	77%	2%	0%	76%
2018	7878	31%	69%	1%	0%	68%
2019	7330	31%	69%	0%	0%	69%
2020	5059	23%	77%	0%	0%	77%
2021	10000	16%	85%	0%	0%	84%
2022	7839	16%	84%	0%	0%	84%
2012-2022	81797	23%	77%	2%	0%	75%

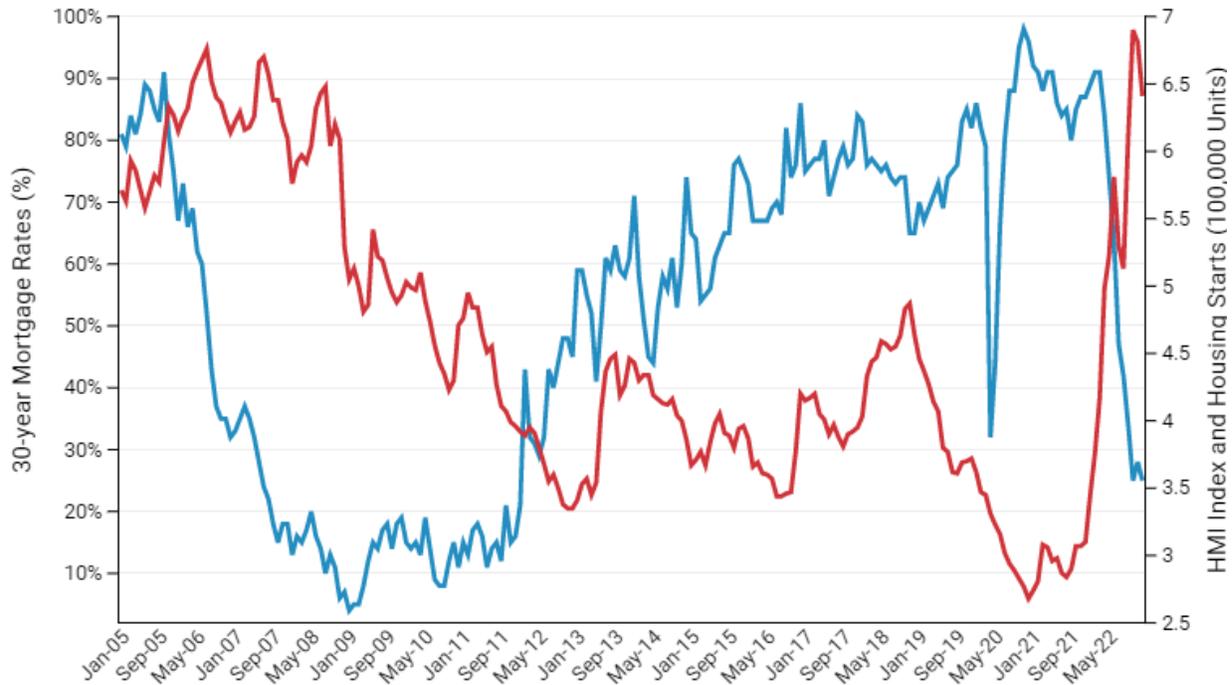
### HIGHER MORTGAGE RATES AND HOMEBUILDER CONFIDENCE

As shown in the following graph, as mortgage rates (red line) have increased since March 2022, demand for housing has begun to taper off and, in response, many home builders are re-evaluating their plans for new housing. The December Housing Market Index (HMI) (blue line) released by the National Association of Homebuilders, which reflects builder confidence in the market for newly built single-family homes, fell for the 10<sup>th</sup> straight month to the lowest point since April 2020.<sup>v</sup>

If builders in Denver reduce new construction, which looks increasingly likely based on the HMI, the housing unit deficit will not decrease. If population growth continues as forecasted, absent sufficient new housing units, the deficit in Denver will grow. Developers might consider changes to the mixture of housing they build such as a transition to building higher-density and less-expensive housing so that the deficit can be reduced even in a high-interest rate environment.

## NAHB/Wells Fargo Housing Market Index (HMI), New Single-Family Starts and Mortgage Rates

■ 30-Year Mortgage Rate ■ NAHB/Wells Fargo HMI - West



Source: NAHB/Wells Fargo Housing Market Index (MNI) and the St. Louis Federal Reserve Bank (FRED)

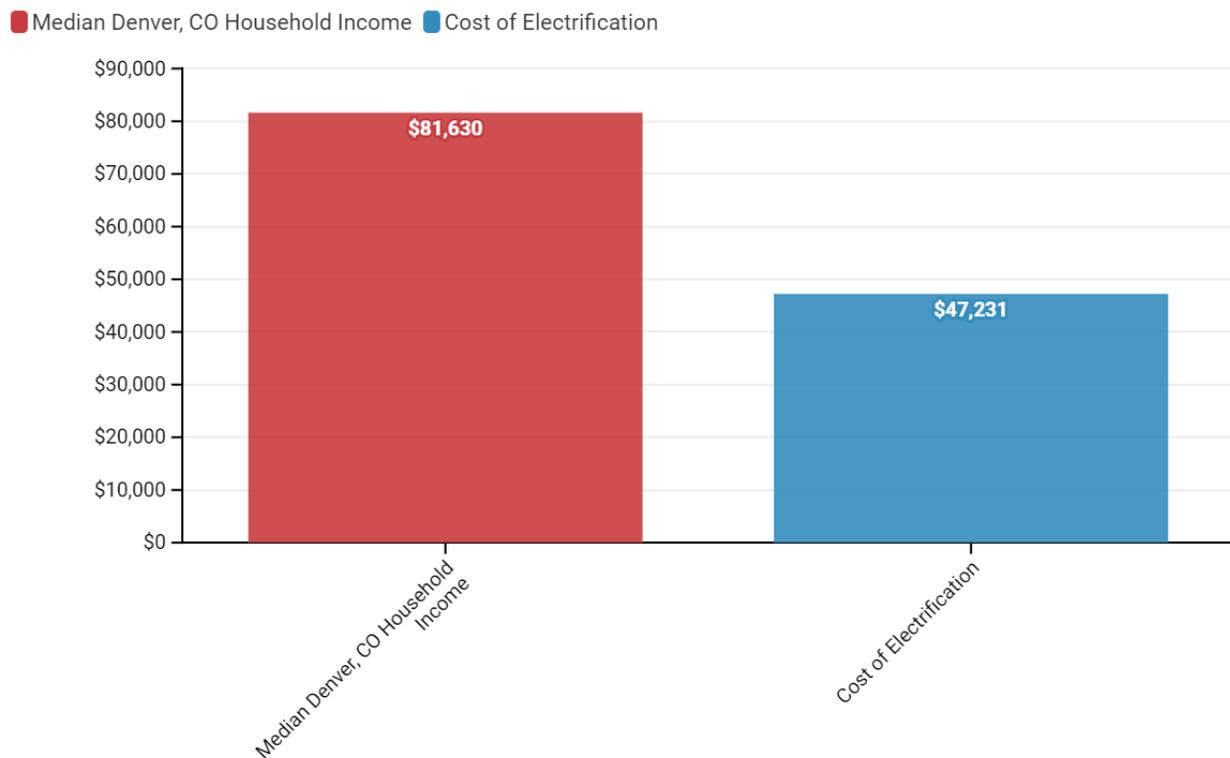
## COST OF PROPOSED ELECTRIFICATION OF HOMES AND BUSINESSES

During the 2022 legislative session, the General Assembly passed HB 22-1362 which was signed into law by the Governor on June 2, 2022. It requires the adoption of model code language that would achieve energy performance “equivalent [to] or better” than the 2021 International Energy Conservation Code (IECC). It also requires the development of an electric and solar ready code and a model green code by a newly established Energy Code Board convened by the Colorado Energy Office (CEO) and the Department of Local Affairs (DOLA). The legislation goes further than earlier legislation passed in the 2019 session (HB 19-1260) which required local jurisdictions to adopt one of the three most recent versions of the IECC at a minimum, upon updating any other building codes. At that time, the most current IECC model energy code was the 2018 IECC which only changed slightly from prior versions going back to 2012 and did not dramatically alter standards from prior code iterations. The changes in the 2021 IECC represent a major change in energy efficiency requirements over the 2018 version. The U.S. Department of Energy determined that the 2021 IECC was 9% more efficient than the 2018 version. Thus, the passage of HB 22-1362 which requires codes “equivalent or better” energy performance than the 2021 IECC represents a larger energy efficiency hurdle for new buildings in the state. With the passage

of HB22-1362, the state departed from local home rule governance policies that characterize housing development in the state of Colorado. In doing so, they have stated that energy conservation in the built environment supersedes local preferences and standards. In contrast to a uniform statewide building code which focuses on the safety and integrity of structures, the 11 June 2022 state has dedicated its policy priorities to energy conservation and stretch codes that will pave the way for full electrification of buildings.

In September 2020, Black Hills Energy provided an estimate for the costs of electrification for customers within Rocky Ford, CO. Their analysis includes the infrastructure to provide the electricity to all housing units, appliance cost, and behind the meter costs which are costs to be covered by the customer individually. The analysis found that the total cost to electrify all 1,543 housing units in Rocky Ford would be \$50.2B on average, \$32,538 per housing unit. CSI extended the results of the Rocky Ford study to all 210,844 housing units in Denver that are not using electricity as a heating and cooking fuel, thereby assuming that the 113,232 housing units that use electricity as a heating and cooking fuel will not have to be retrofitted. The cost of electrification per housing units in Denver is estimated to be \$47,231. This is equivalent to 58% of the median household income of \$81,630.

### The Cost of Electrifying an Average Housing Unit is 58% of Denver Median Household Income



The total cost to electrify all the 210,844 housing units that are not currently using electricity as a heating and cooking fuel ranges between \$8.6 billion and \$10 billion, see **Table 10**.

**Table 10 - Cost of Residential Electrification  
(Rocky Ford, CO and Denver, CO)**

	Rocky Ford	Grand Junction
<b>Number of Residential Units Switching to Full Electrification</b>	<b>1,450</b>	<b>210,844</b>
Total Utility Infrastructure Costs – Low	\$19.1K	\$27.7K
Total Utility Infrastructure Costs – Mid	\$19.1K	\$27.8K
Total Utility Infrastructure Costs – High	\$22.2K	\$32.3K
Total Behind the Meter Costs – Low	\$13.0K	\$13.0K
Total Behind the Meter Costs – Mid	\$14.0K	\$14.0K
Total Behind the Meter Costs – High	\$15.0K	\$15.0K
Total Electrification Cost – Low	\$32.1K	\$40.8K
Total Electrification Cost – Mid	\$33.2K	\$41.8K
Total Electrification Cost – High	\$37.1K	\$47.2K
Total Cost Community – Low	\$46.6M	\$8.60B
Total Cost Community – Mid	\$48.1M	\$8.81B
Total Cost Community – High	\$53.8M	\$9.96B

Source: Alternative Fuel Analysis – Preliminary Study of Electrification of Customers within Rocky Ford, Colorado. Sept 2020, Black Hills Energy, and CSI Calculations

## GOING FORWARD

Denver is an attractive city to live in, and the population has increased by 29% since 2005. At the same time, the supply of new housing has not kept pace and there exists a housing supply deficit ranging between 13,148 and 30,930 units. To close the existing deficit by 2028 and meet new demand for housing, 31,000 to 49,000 housing unit permits need to be issued per year.

Addressing affordability requires issuing an adequate number of housing units permits to close the deficit and meet future housing demand, changes to zoning, increasing the mix of housing types permitted so that more housing can be offered at affordable price points, and setting realistic and cost conscious goals for transition to clean and renewable energy so that they do not overburden homeowners.

<sup>i</sup> <https://commonsenseinstituteco.org/>

<sup>ii</sup> [https://www.wsj.com/articles/see-the-full-rankings-for-wsj-realtor-coms-summer-emerging-housing-markets-index-11658779946?mod=article\\_relatedinline](https://www.wsj.com/articles/see-the-full-rankings-for-wsj-realtor-coms-summer-emerging-housing-markets-index-11658779946?mod=article_relatedinline)

<sup>iii</sup> The Nation’s Stock of Second Homes, Zhao, Na., May 2013, National Association of Home Builders

<sup>iv</sup> Implementing a Regional Housing Needs Methodology in Oregon: Approach, Results, and Initial Recommendations. August 2020. ECONorthwest.

<sup>v</sup> <https://www.nahb.org/news-and-economics/press-releases/2022/07/builder-confidence-plunges-as-affordability-woes-mount>