

# Welcome to the Housing Affordability Hearing

Hosted by the NIBS Consultative Council

# Welcome Remarks

Stephen T. Ayers, Interim CEO, NIBS





# Opening Remarks

Brian Pallasch, EVP & CEO, IIBEC  
*Chair, NIBS Consultative Council*



# Session 1: The State of Housing Affordability



**Robert Dietz, Ph.D.**

Chief Economist and Senior  
Vice President for Economics  
and Housing, NAHB



**Solomon Greene**

Principal Deputy Assistant  
Secretary for Policy  
Development and Research,  
Dept. of Housing and Urban  
Development



**Chris Herbert, Ph.D.**

Managing Director, Joint  
Center for Housing Studies of  
Harvard University



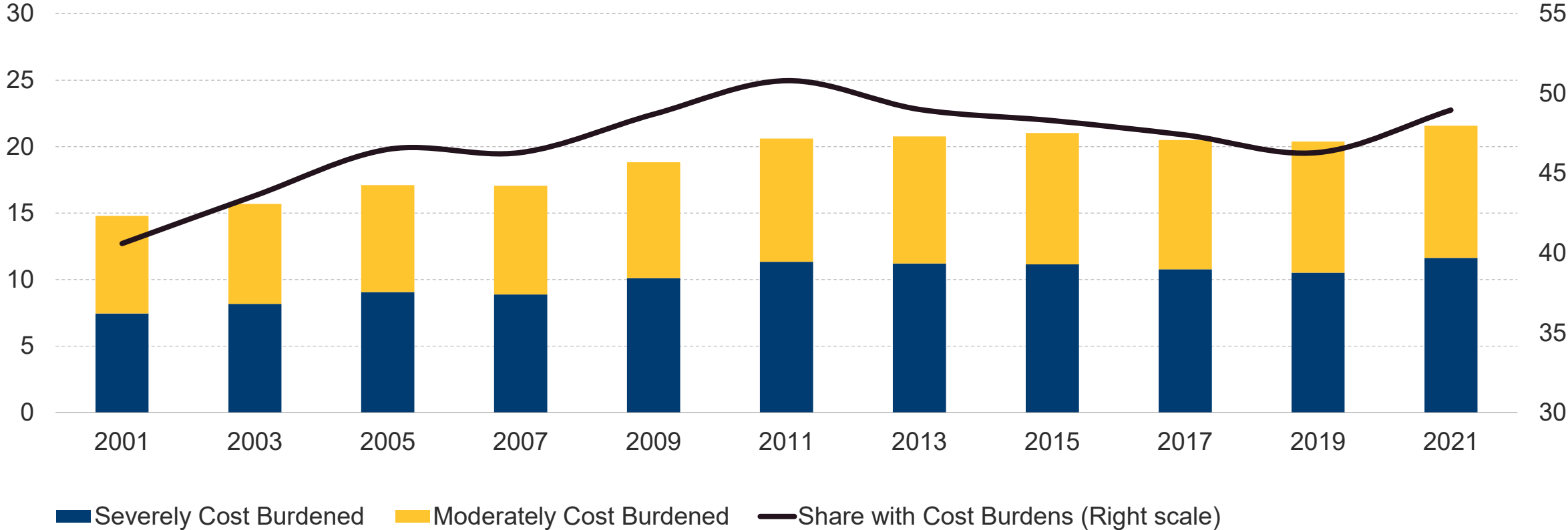
**Brian Pallasch- Moderator**

EVP & CEO, IIBEC  
Chair, NIBS Consultative  
Council

# After Improving Slightly Over Last Decade, the Number of Cost-Burdened Renter Households Has Reached a Record High

Number of Renter Households (Millions)

Share with Cost Burdens (Percent)



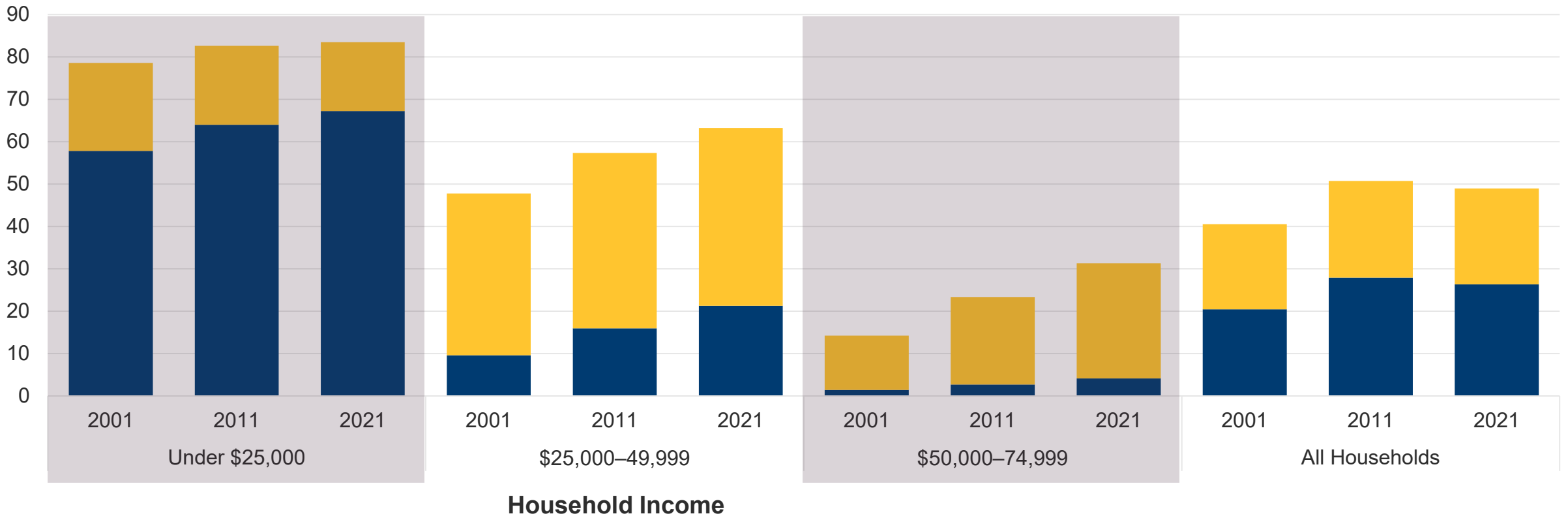
Notes: Moderately (severely) cost-burdened households pay more than 30% (more than 50%) of income for housing. Households with zero or negative income are assumed to have burdens, while households paying no cash rent are assumed to be without burdens.

Source: JCHS tabulations of US Census Bureau, American Community Survey 1-Year Estimates.



# Even as Overall Cost Burdens Were Edging Down, Rates Were Rising in the Middle of the Income Scale

Share of Renter Households with Cost Burdens (Percent)



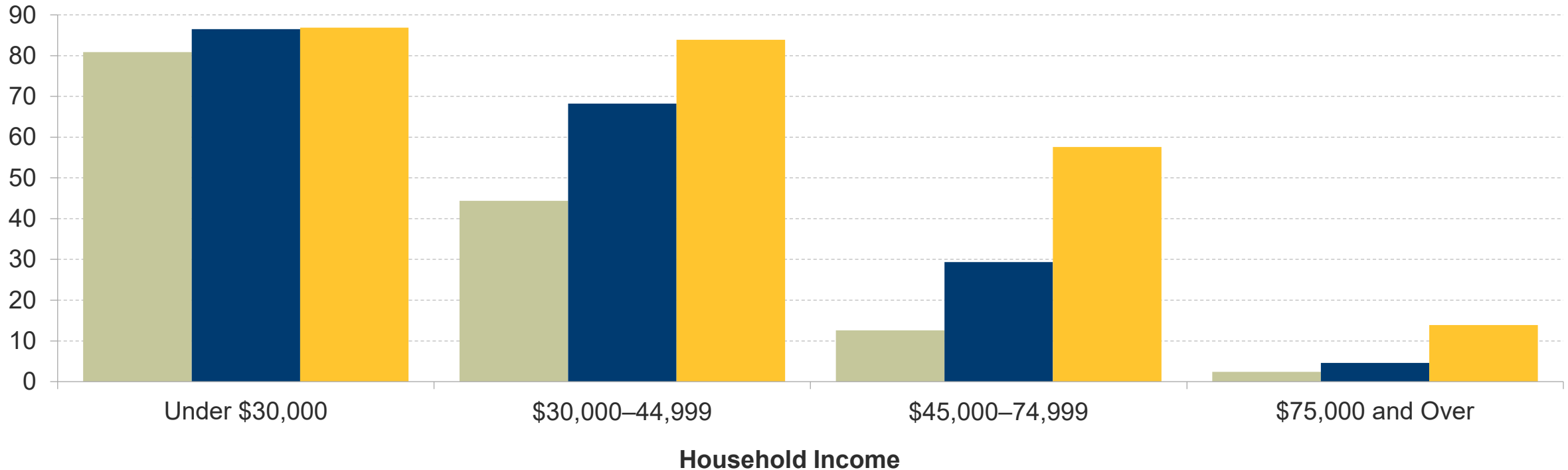
■ Severely Burdened      ■ Moderately Burdened

Notes: Incomes are adjusted for inflation using the CPI-U for All Items. Moderately (severely) cost-burdened households pay 31–49% (50% or more) of income for housing. Households with zero or negative income are assumed to have severe burdens, while households paying no cash rent are assumed to be without burdens.

Source: JCHS tabulations of US Census Bureau, American Community Survey 1-Year Estimates.

# Cost Burdens Among Middle-Income Households are Most Evident in High-Cost Markets

Share of Cost-Burdened Renters (Percent)

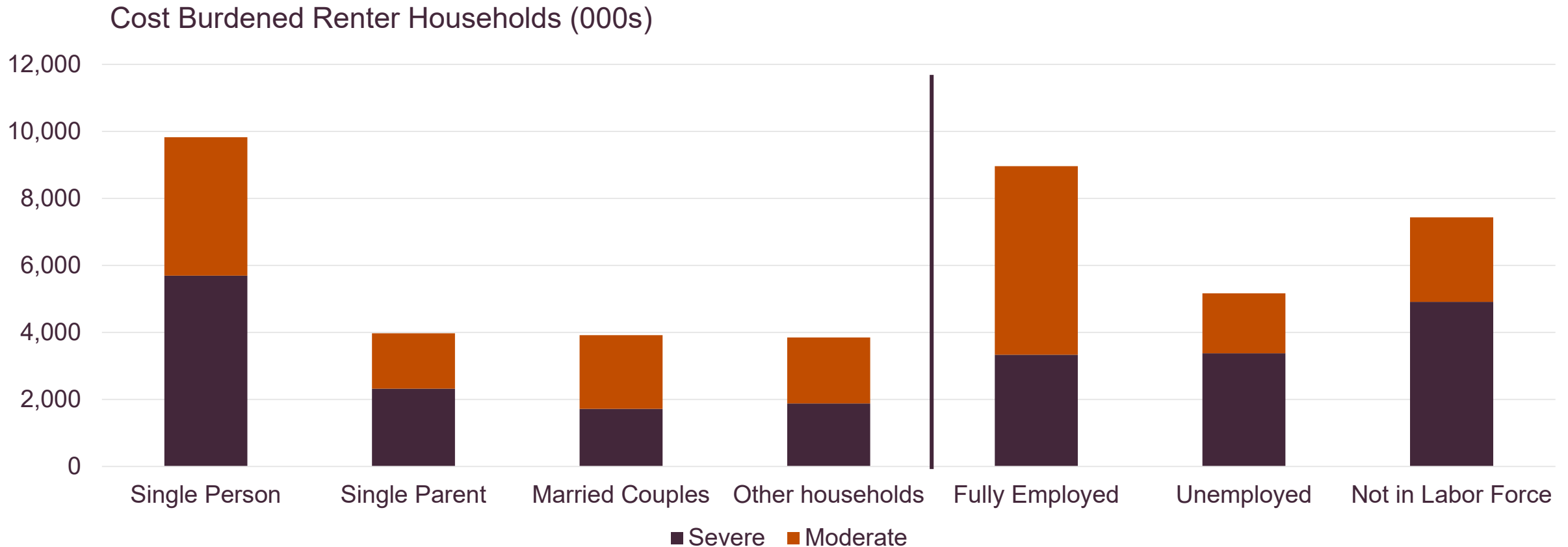


■ 25 Lowest-Cost Metros ■ Middle 50 Metros ■ 25 Highest-Cost Metros

Notes: Cost-burdened households pay more than 30% of their income on housing. Households with zero or negative income are assumed to have burdens, while households paying no cash rent are assumed to be without burdens. Only the 100 largest metro areas by the number of households are shown, categorized by the median gross rent.

Source: JCHS tabulations of US Census Bureau, 2021 American Community Survey 1-Year Estimates and Missouri Census Data Center.

# Single Persons and the Fully Employed Account for Largest Number of Cost-Burdened Renters



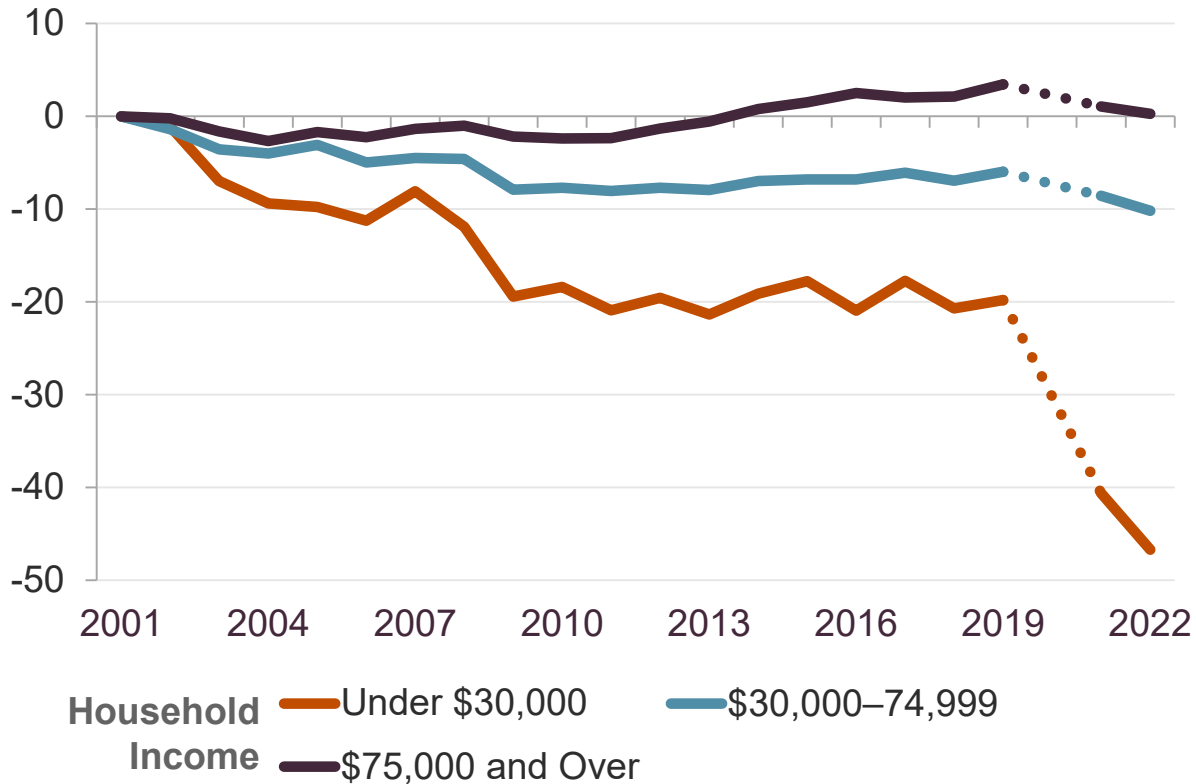
Notes: Moderately (severely) cost-burdened households pay more than 30% (more than 50%) of income for housing. Households with zero or negative income are assumed to have burdens, while households paying no cash rent are assumed to be without burdens.

Source: JCHS tabulations of 2021 American Community Survey 1-year estimates.

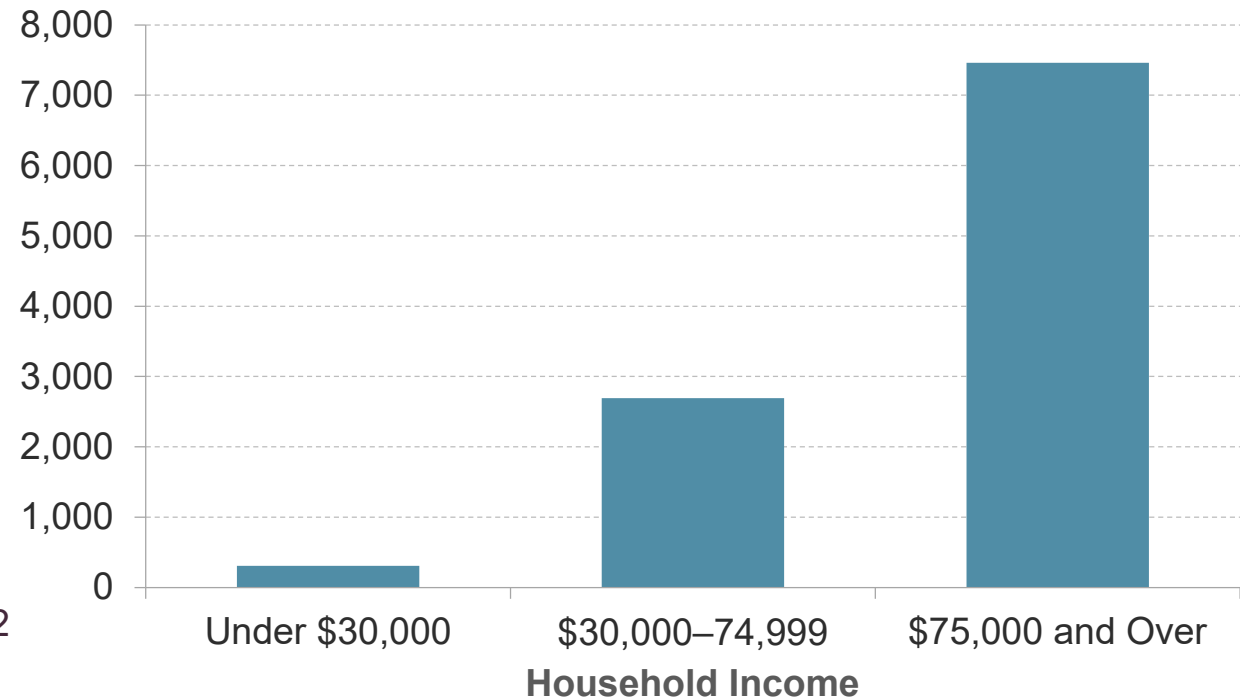


# Lower-Income Renters Have Less Income Left Over After Paying Rent Than Ever Before

Change in Residual Income (Percent)



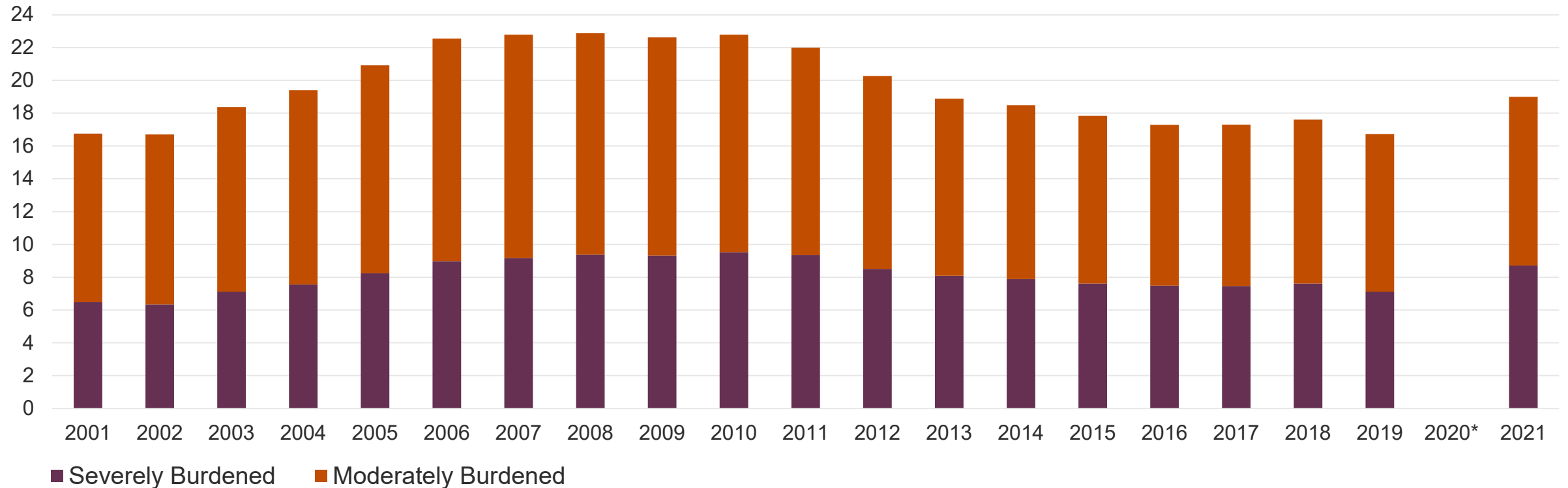
Median Residual Income in 2022 (Dollars)



Notes: Household incomes and residual incomes are adjusted for inflation using the CPI-U for All Items.  
Source: JCHS tabulations of US Census Bureau, American Community Survey 1-Year Estimates.

# Number of Cost-Burdened Homeowners Rose Sharply in 2021, a First Since the Mid-2000s

Cost-Burdened Homeowner Households (Millions)

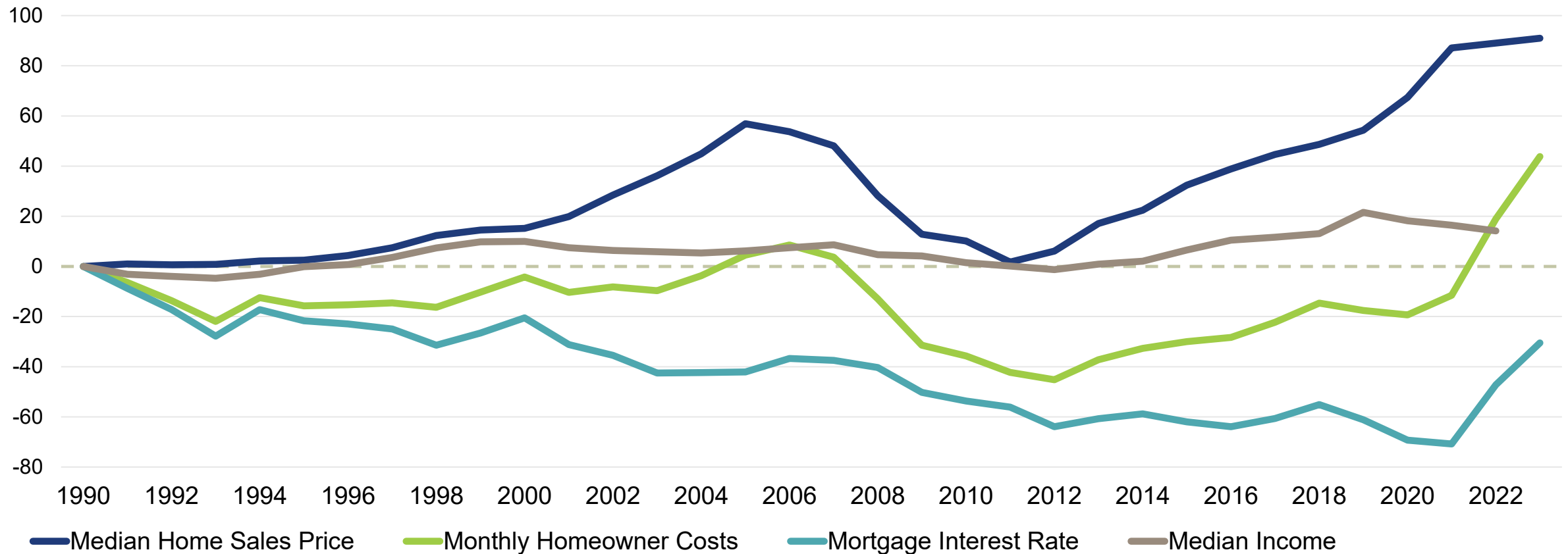


Notes: Moderately (severely) cost-burdened households spend more than 30% (more than 50%) of income on housing. Estimates for 2020 are omitted due to data collection issues experienced during the pandemic.

Source: JCHS tabulations of US Census Bureau, American Community Survey 1-Year Estimates.

# Buying a Home Has Gotten Much Harder as Rising Prices and Interest Rates Have Sharply Increased in the Monthly Cost of Homeownership

Indexed Percent Change in Real (Inflation-Adjusted) Values Since 1990 (1990=0)



Notes: House prices and monthly homeowner costs are adjusted to 2020 dollars using the CPI-U for All Items less shelter. Monthly homeowner costs assume a 3.5% downpayment on a median-priced, existing single-family home (including condos and coops); property taxes of 1.15%, property insurance of 0.35%, and mortgage insurance of 0.85%. Last value is Q3 of 2023.

Source: JCHS tabulations of Moody's Analytics estimates; US Census Bureau, Current Population Surveys; and Freddie Mac, Primary Mortgage Market Surveys.



# The Number of Renters with Incomes High Enough to Qualify to Buy the Median Home Has Been Nearly Cut in Half

	March 2022	March 2023	September 2023
Median US Home Price (Dollars)	379,300	375,400	394,300
Interest Rate (Percent)	4.2	6.5	7.20
Downpayment and Closing Costs	24,700	24,400	25,600
Total Monthly Owner Costs	2,500	3,000	3,300
Annual Income Needed @ maximum 31% debt to income	97,400	117,100	129,500
Renter Households in 2022 with Income Needed	8.8 million	6.1 million	4.9 million

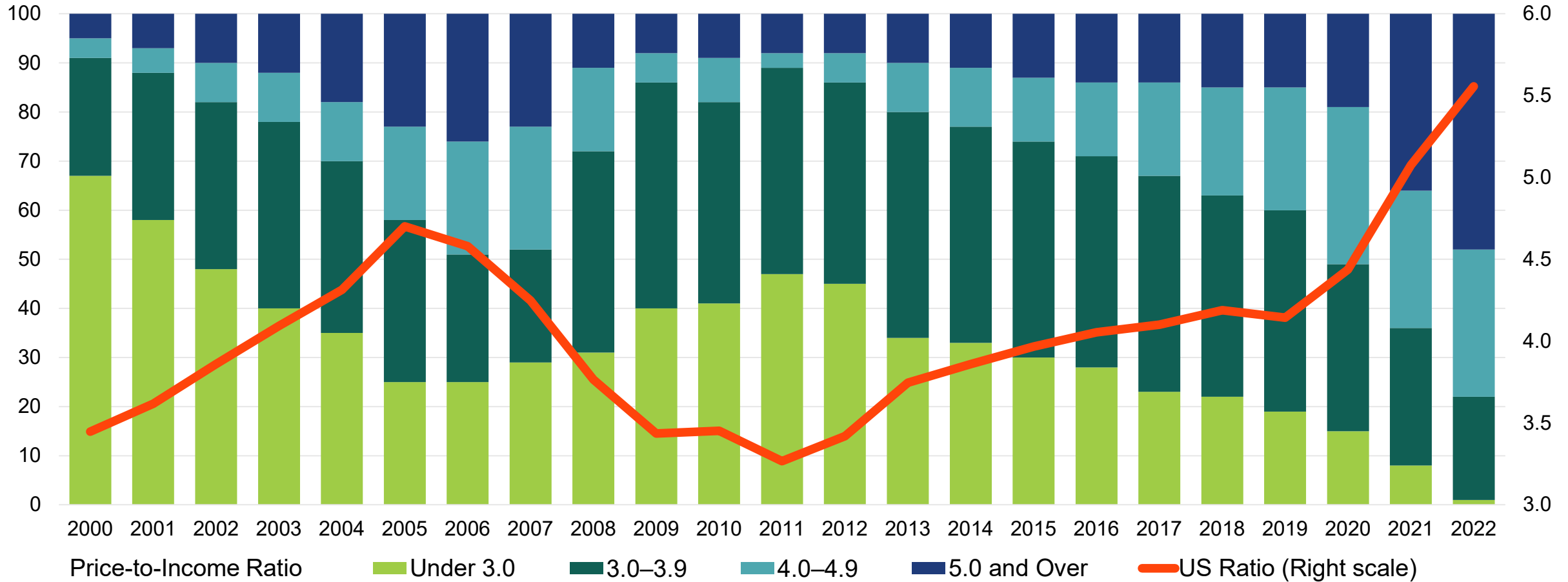
Note: Estimates assume a 3.5% downpayment on a 30-year fixed-rate loan with zero points, 0.85% mortgage insurance, 0.35% property insurance, 1.15% property taxes, 3% closing costs, and a maximum 31% debt-to-income ratio.

Source: JCHS tabulations of Freddie Mac, Primary Mortgage Market Surveys; NAR US median sales prices for all existing homes.

# Home Prices Are at Record Levels Relative to Incomes Making Saving for a Downpayment Increasingly Out of Reach

Number of Metro Areas

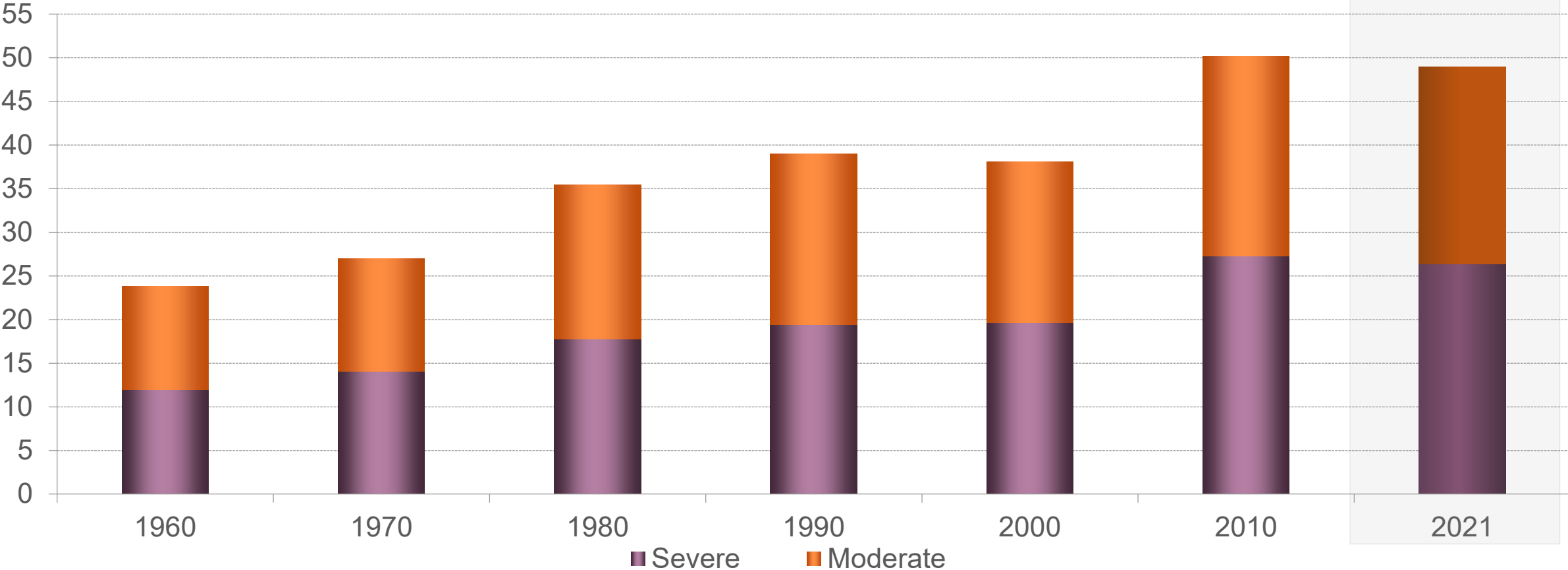
US Ratio



Notes: Price-to-income ratios are for the 100 largest metro areas by population. Income data for 2022 are based on Moody's Analytics forecasts.  
 Source: JCHS tabulations of NAR, Metropolitan Median Area Prices; Moody's Analytics estimates.

# But Rental Housing Affordability Has Been Deteriorating for Decades—and Actually Improved Slightly Even as Underproduction Grew

Shares of Cost-Burdened Renter Households (Percent)

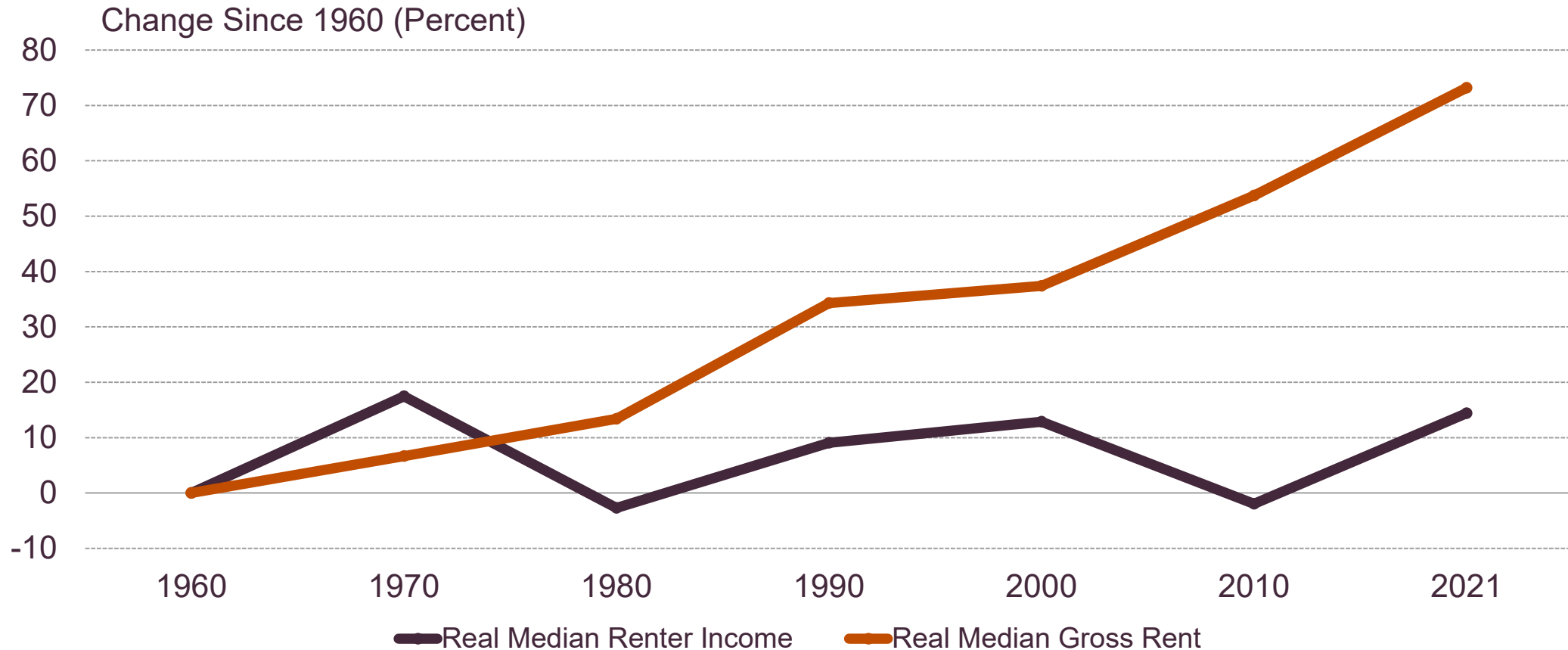


Notes: Moderate (severe) burdens are defined as housing costs of 30-50% (more than 50%) of household income. Households with zero or negative income are assumed to be severely burdened, while renters not paying cash rent are assumed to be unburdened.

Sources: JCHS tabulations of US Census Bureau, Decennial Census and American Community Surveys.



# At the Most Fundamental Level, Trends in Rental Affordability Reflect a Long-Term Divergence in Growth in Rents and Incomes



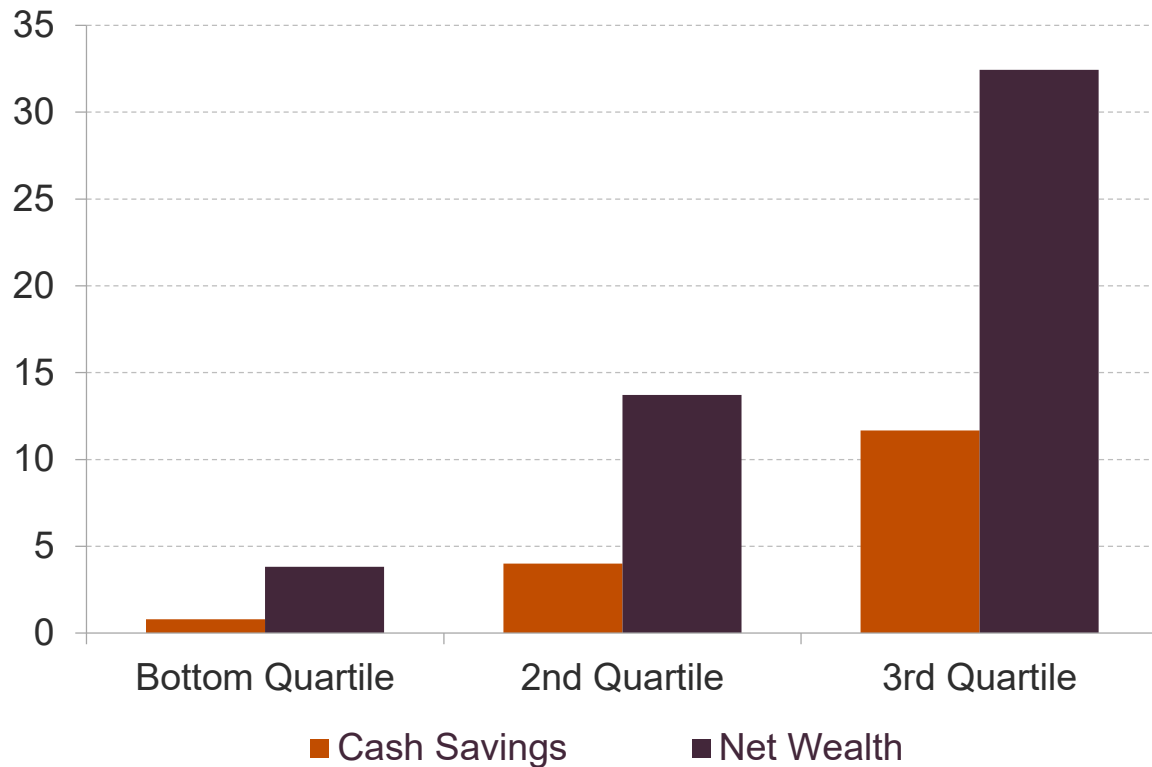
Note: Underlying values are adjusted for inflation using the CPI-U for all items.

Source: JCHS tabulations of the US Census Bureau, Decennial Census and American Community Surveys via IPUMS USA.

# Renters Have Little Wealth or Cash Savings for Downpayments and Closing Costs

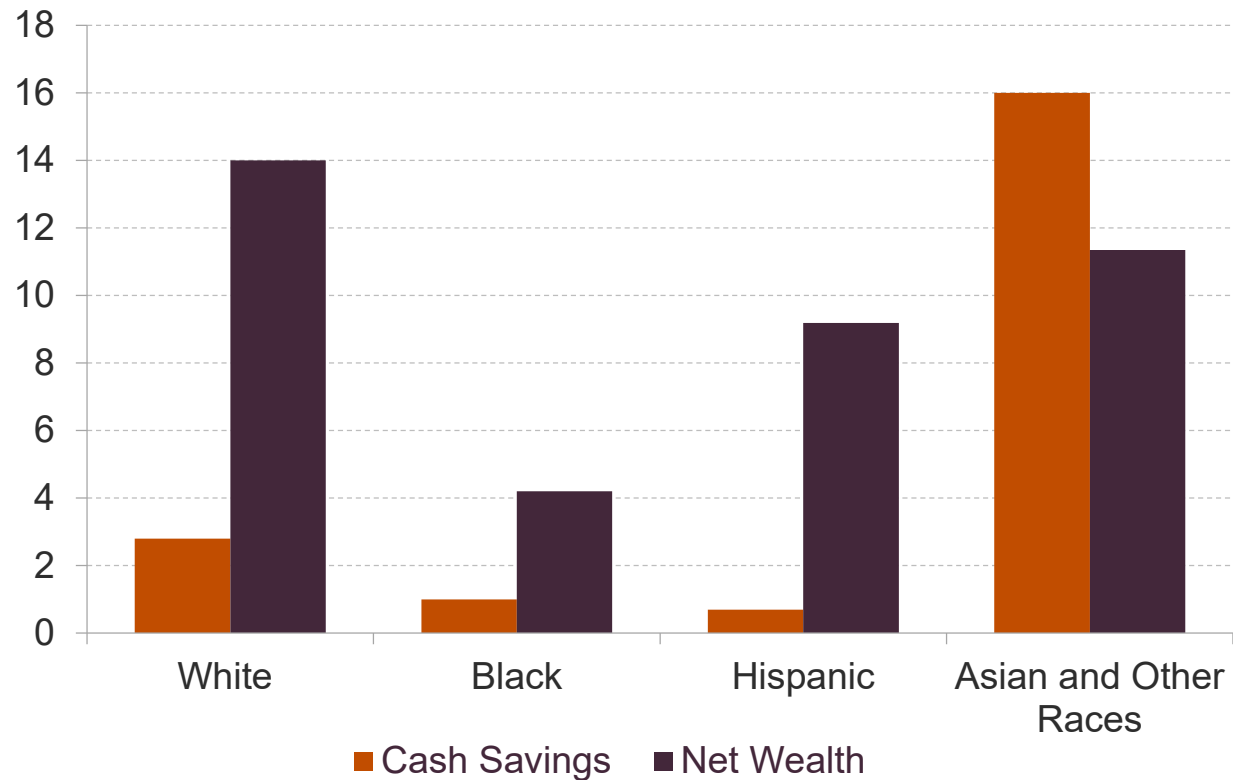
## Households by Income

Median (Thousands of 2022 Dollars)



## Households Headed by Race/Ethnicity

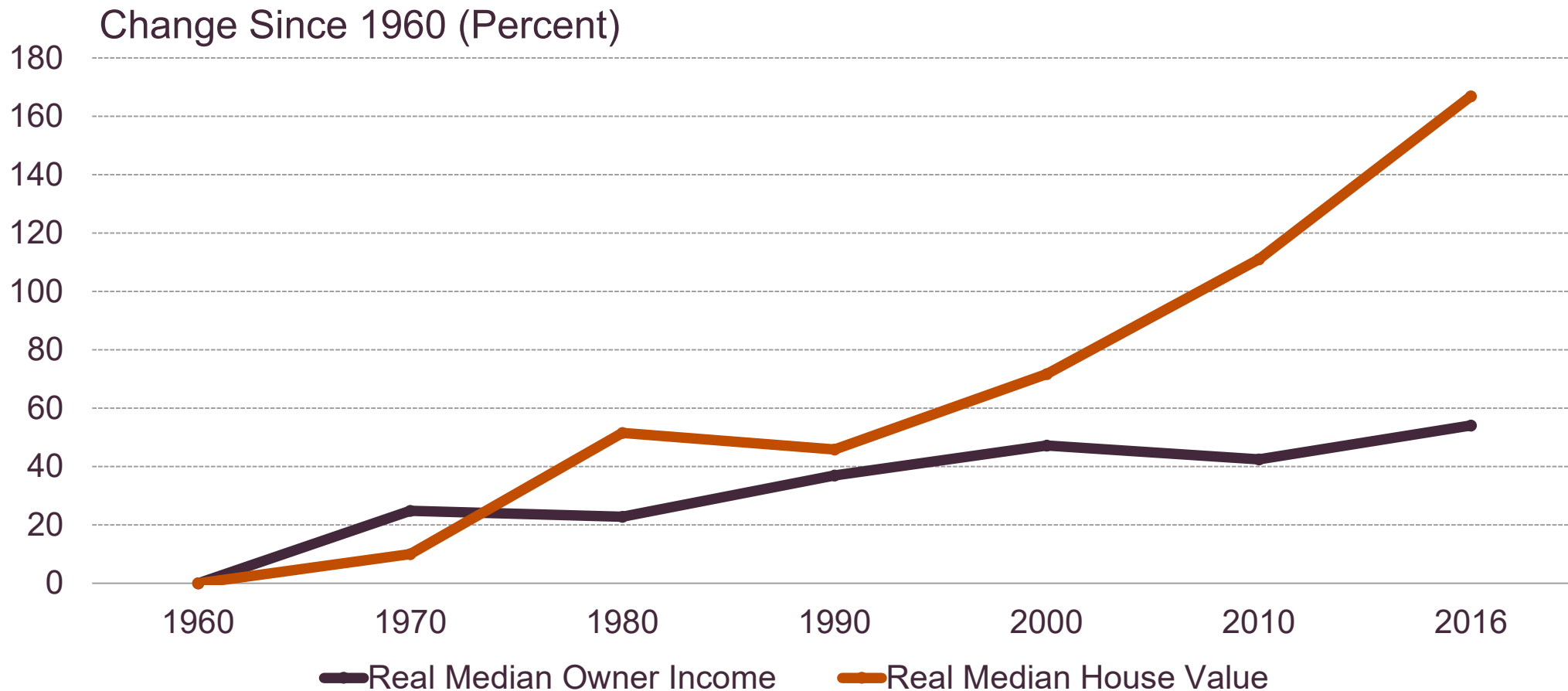
Median (Thousands of 2022 Dollars)



**Note:** White, Black and Asian and Other Races are all non-Hispanic; Hispanics may be of any race.

**Source:** JCHS tabulations of Federal Reserve, Surveys of Consumer Finances, 2022.

# While Homeowner Incomes Have Increased More, They Have Still Lagged Home Values By a Substantial Degree



Note: Underlying values are adjusted for inflation using the CPI-U for all items.

Source: JCHS tabulations of the US Census Bureau, Decennial Census and American Community Surveys via IPUMS USA.

# Concluding Observations

- Rental affordability is most severe for lowest-income households but has been getting worse for moderate income renters over last two decades—particularly in high-cost markets
- Homeowner cost burdens are largely kept in check by mortgage underwriting and mostly reflect whether first-time buyers are active in the market
- Homebuyer affordability is a growing concern as high interest rates have priced millions of renters out of the market
- The downpayment constraint is increasingly important as house prices are at record levels as multiples of incomes—and particularly for BIPOC renters with little savings to draw on
- Housing affordability has been worsening for decades as rents and price growth consistently outpace income
- While income supports are clearly needed, so too are new approaches to producing more modestly priced housing for both rentals and homeownership

# Housing Affordability Hearing

Chris Herbert

National Institute of Building Sciences

Washington, DC

National Press Club

November 6, 2023



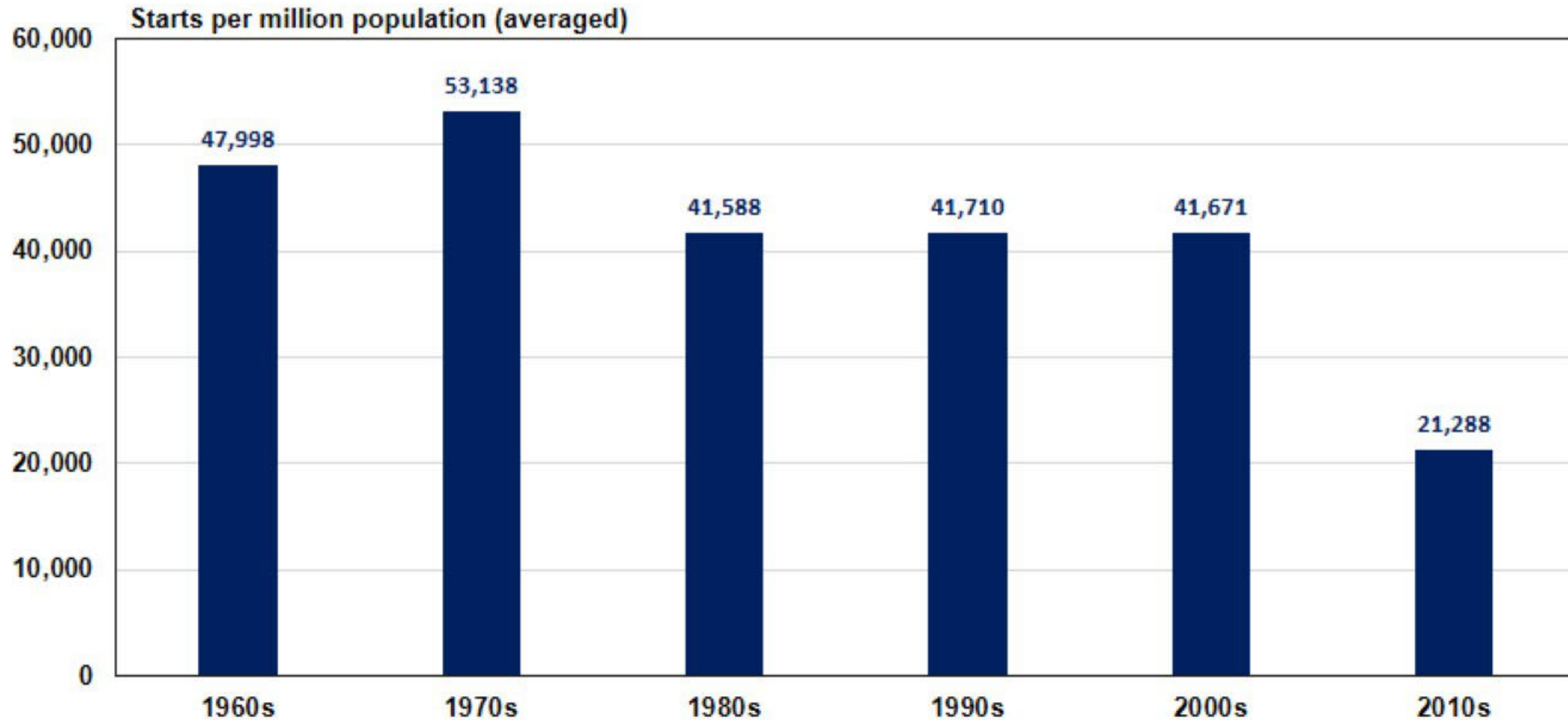
# Housing Deficit and Affordability

*National Institute of Building Sciences*  
*November 6, 2023*

*Robert Dietz, Ph.D.*  
*NAHB Chief Economist*



# Single-Family Starts by Decade: Population Adjusted



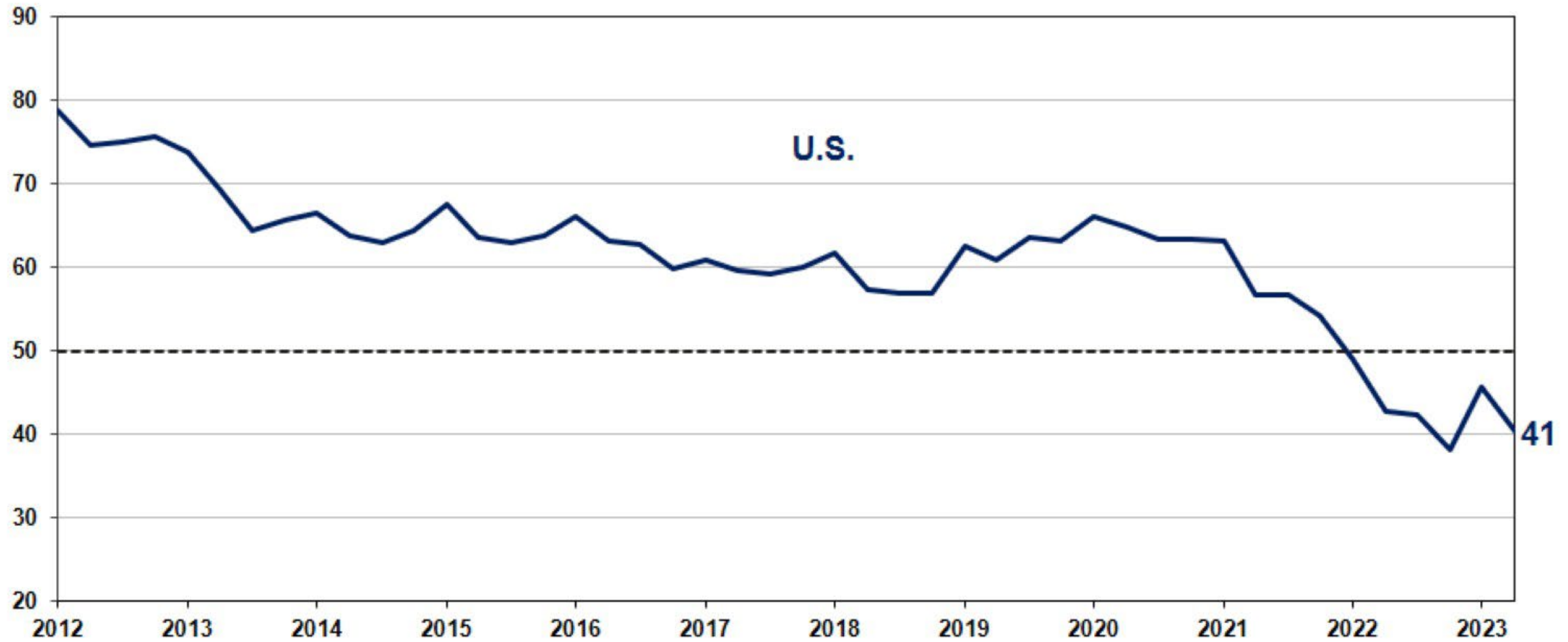
Source: Census Bureau and NAHB analysis

# Reasons for Underbuilding After the Great Recession

- *Strongly rooted on the supply side of the housing sector*
  - *Deficit estimates vary – 1.5 million to 5+ million*
  - *Particularly challenging for entry-level and more affordable housing*
- *NAHB warnings in 2014 and thereafter*
  - *5 L's as the challenges limiting construction*
    - *Labor*
    - *Lots*
    - *Lending*
    - *Lumber/materials*
    - *Legal/regulatory burdens*
- *Housing policies that fail to address all of these challenges will fail*



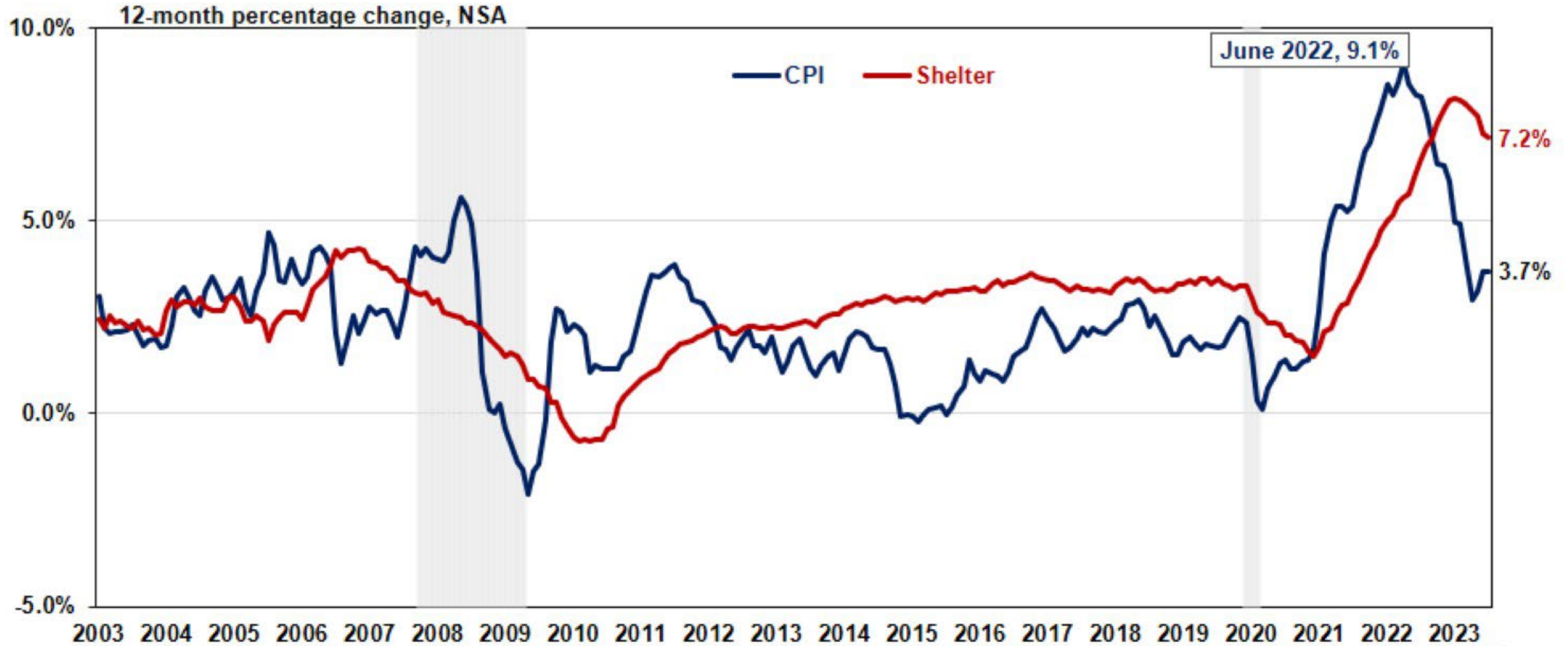
# Housing Affordability Declines? NAHB/Wells Fargo HOI Lower



Source: NAHB/Wells Fargo Housing Opportunity Index (HOI).

# Consumer Inflation – Headline Rate and Shelter

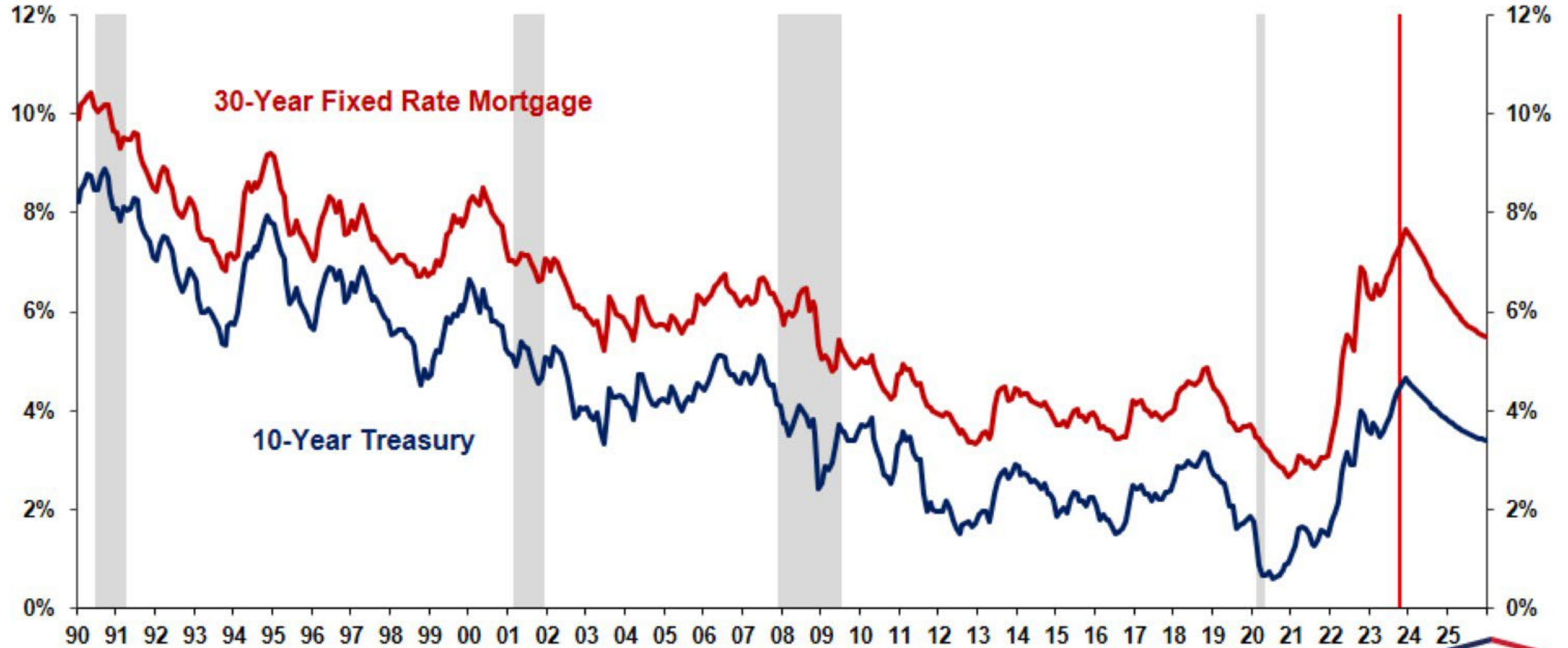
*Shelter costs continue to rise despite Fed policy tightening --- “Gimmie Shelter”*



Source: U.S. Bureau of Labor Statistics (BLS)

# Mortgage Rates Near Cycle Peak

*Housing affordability at more than decade low*



Source: Federal Reserve and Freddie Mac data and NAHB forecast.

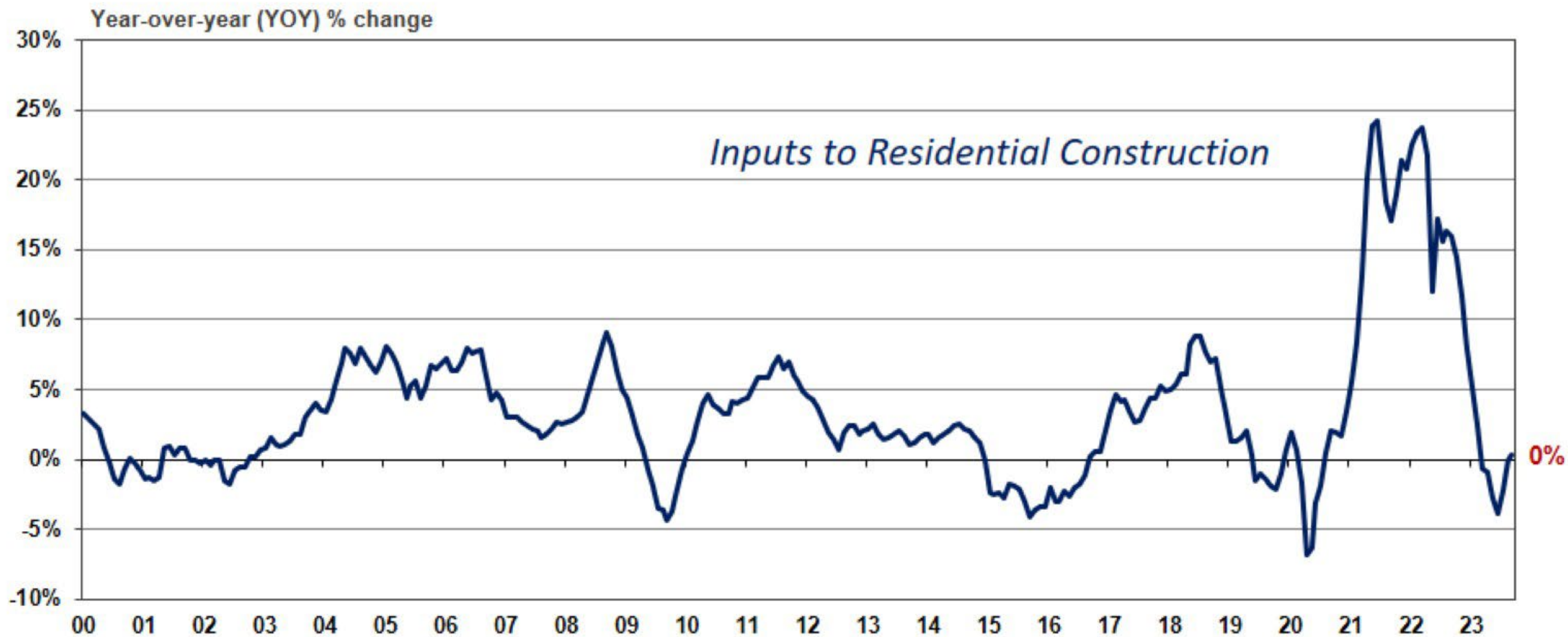


A decorative graphic on the left side of the slide. It features a horizontal dashed line of five gold dots. To the right of the dots is a vertical bar that is split into two colors: dark blue on top and red on the bottom. The bar is slightly tilted to the right.

# Supply-Side Challenges For Builders



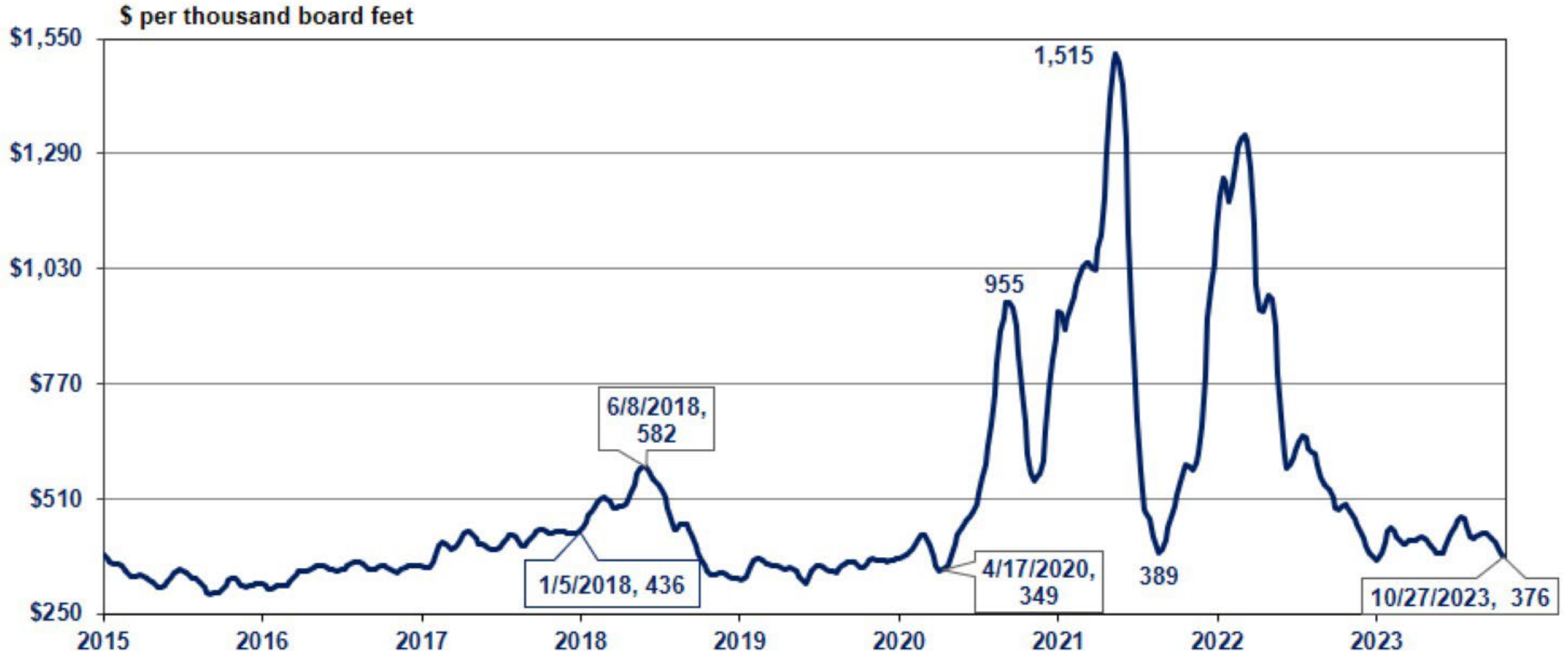
# Building Materials - Residential Construction Cost



Source: U.S. Bureau of Labor Statistics (BLS): Producer Price Index (PPI)

# Lumber Prices Edged Down

Current October price is \$376; down 13% over the past seven weeks



Source: NAHB Analysis; Random Lengths Composite Index

# Framing Alternatives

*Over the past three years, wood share increasing and concrete share decreasing*

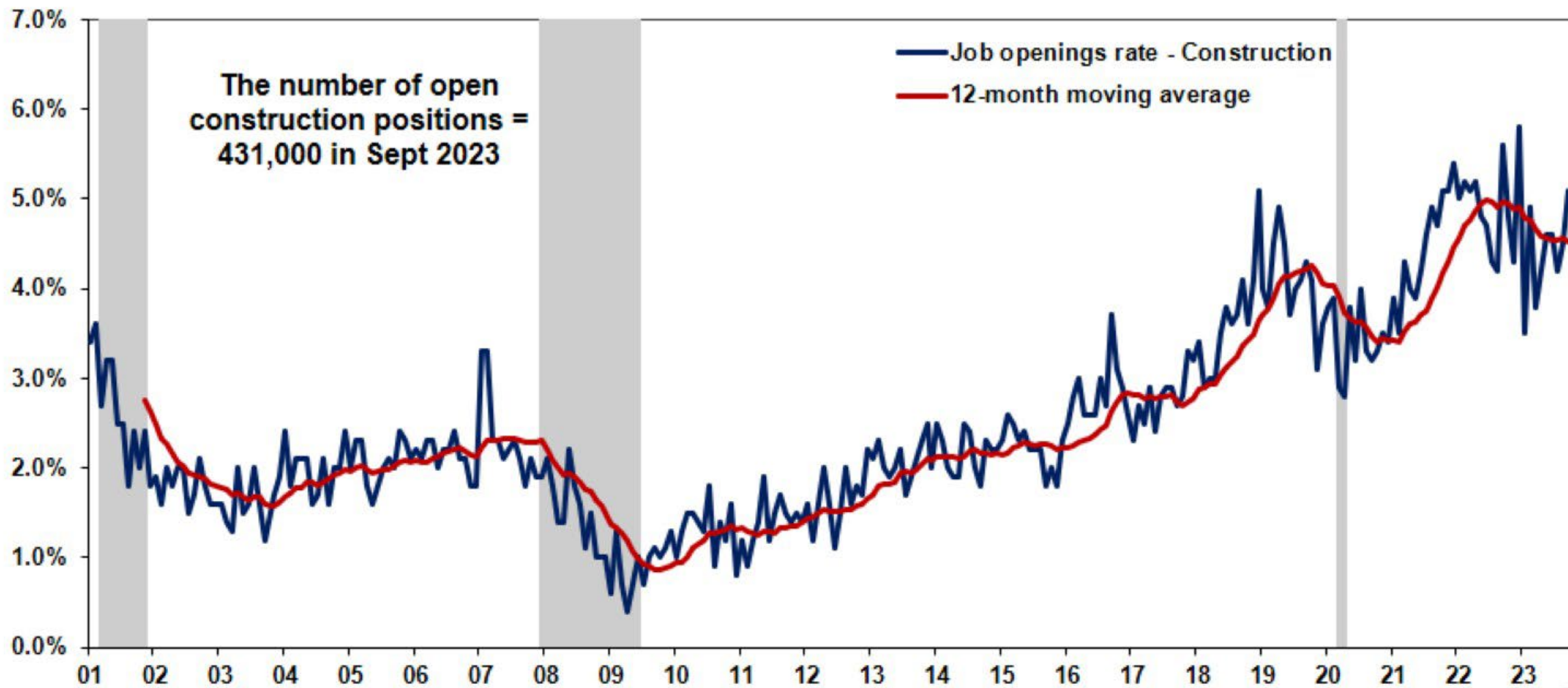


Source: NAHB tabulation of data from Survey of Construction, U.S. Census Bureau



# Labor – Construction Job Openings Peaked for Cycle?

*Skilled labor shortage persists; 352,100 net gain for residential construction since Jan 2020*



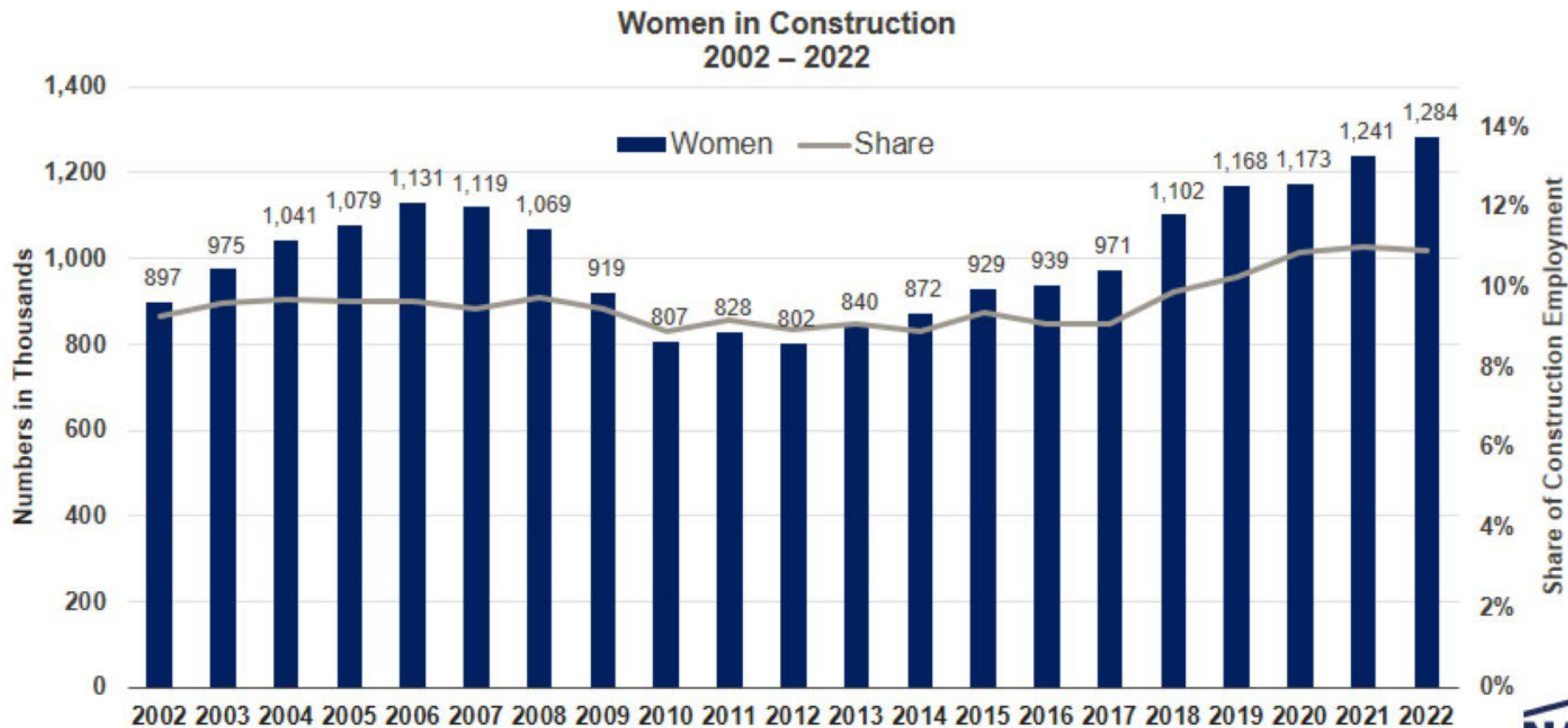
The number of open construction positions = 431,000 in Sept 2023

Source: U.S. Bureau of Labor Statistics (BLS).



# Women in Construction: 10.9% of Jobs

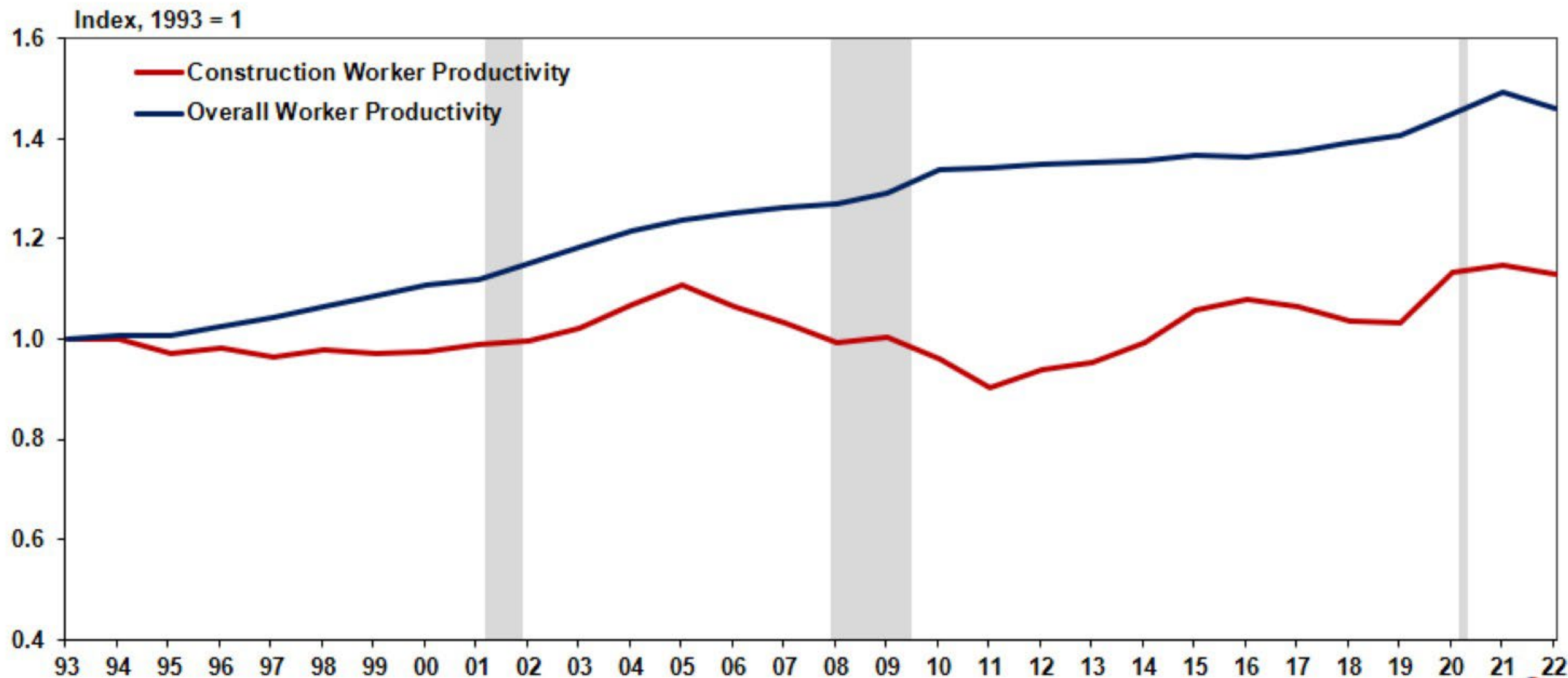
*Rising count: finally surpassed 2006 peak – not true for total construction jobs*



Source: NAHB analysis of data from the Current Population Survey (CPS)

# Construction Sector Productivity Lags

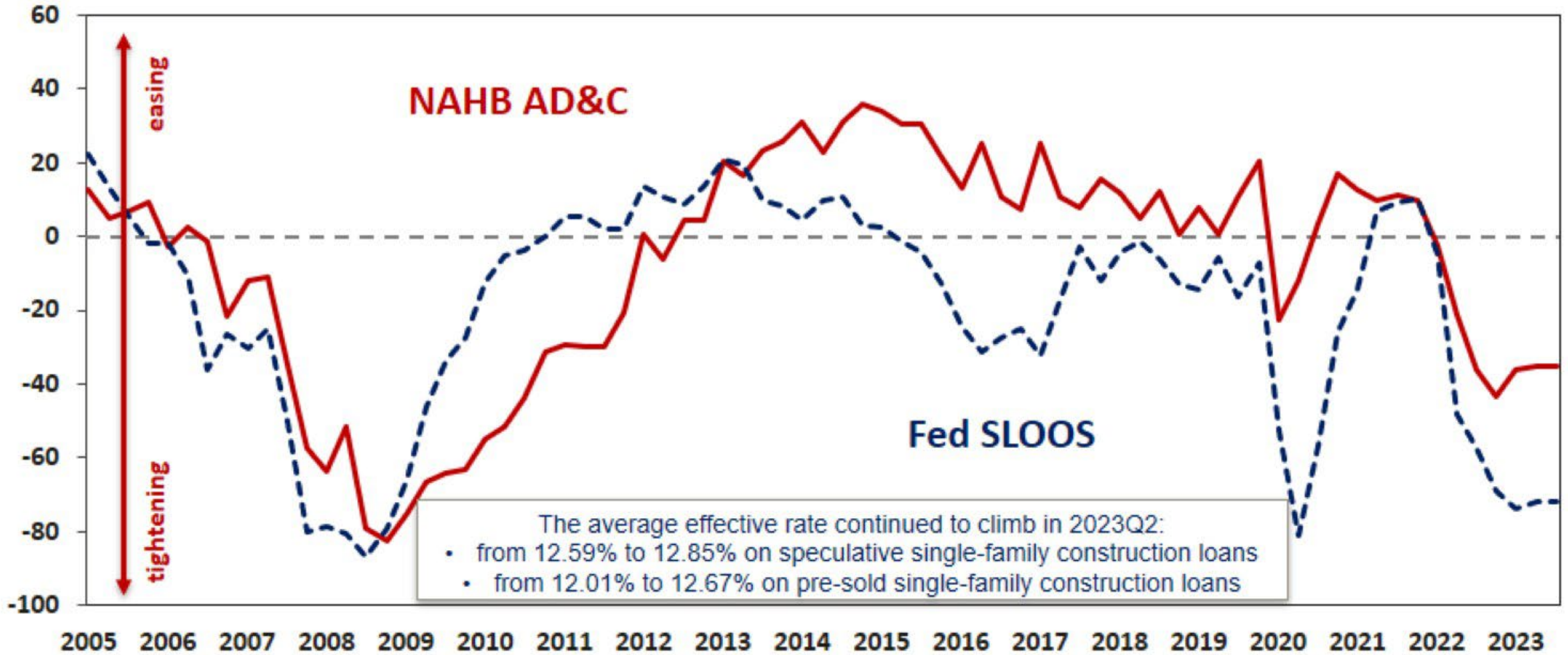
*13% gain for construction compared to 46% gain for overall economy*



Source: U.S. Bureau of Labor Statistics (BLS).

# Lending – AD&C Loan Conditions

*Credit for builders tightens as rates climb*

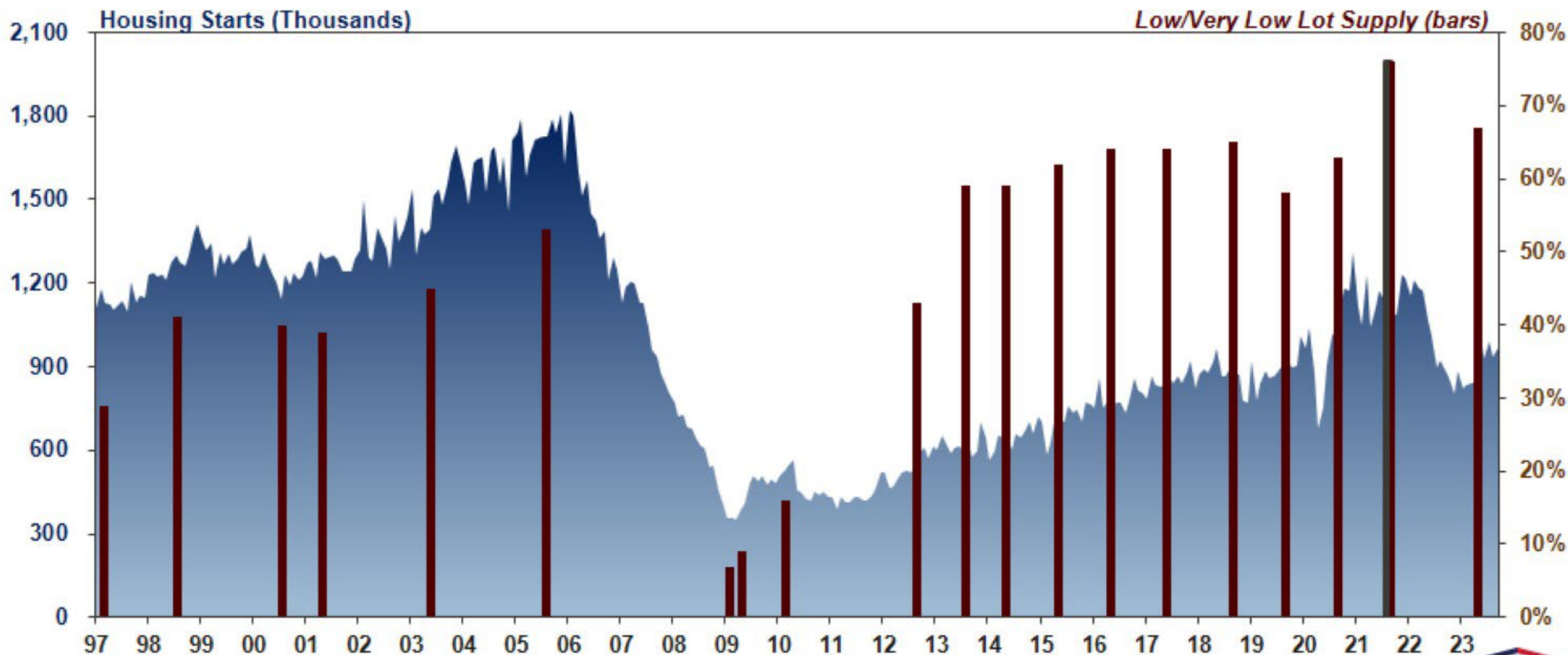


Source: NAHB survey; Federal Reserve's Senior Loan Officer Opinion Survey (SLOOS)



# Lot Shortages Reported by Single-family Builders

*Shortage of lots reached a new record in 2021*

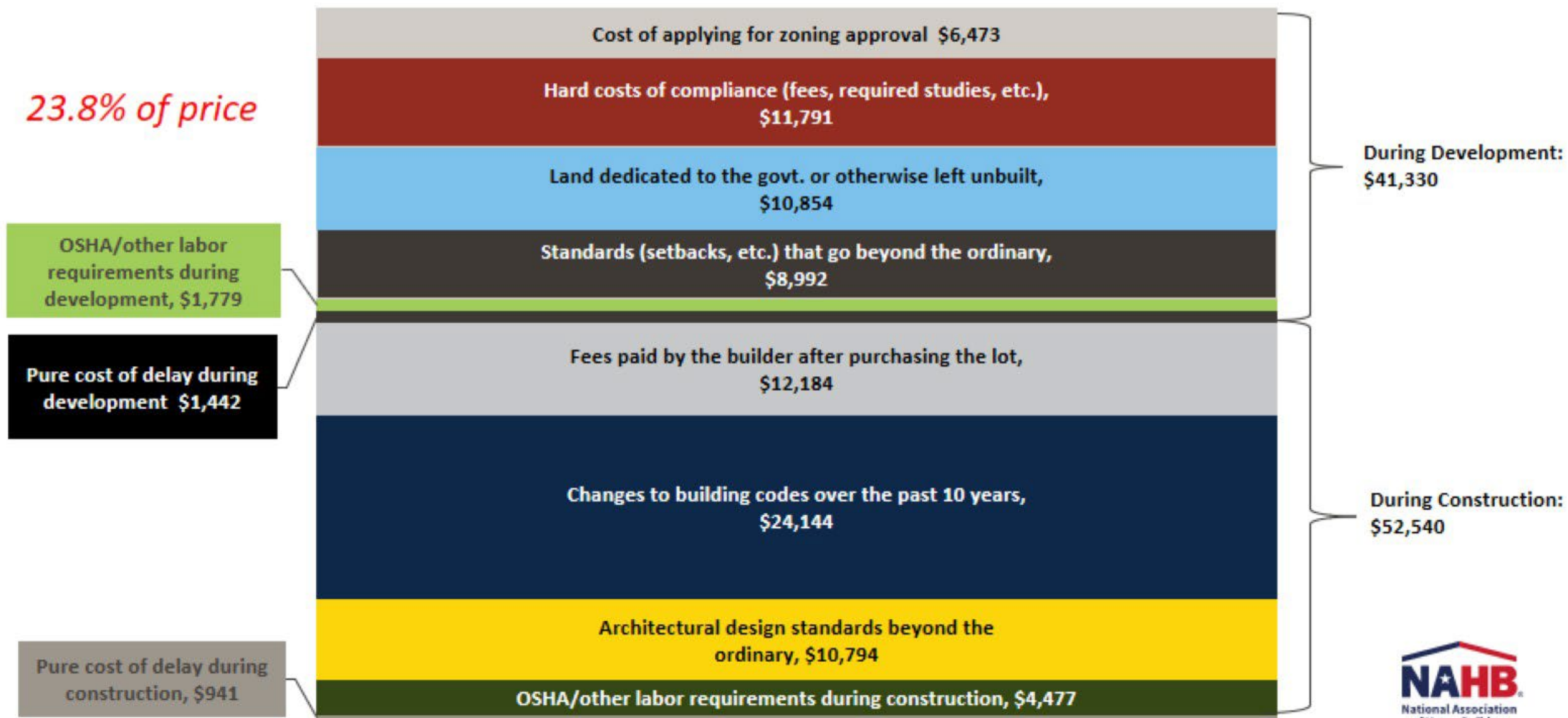


Source: Census Bureau and NAHB/Wells Fargo HMI survey

# Regulatory Costs \$93,870 Per New Home (11% Gain 2016 to 2021)

Total effect of building codes, land use, environmental and other rules

23.8% of price

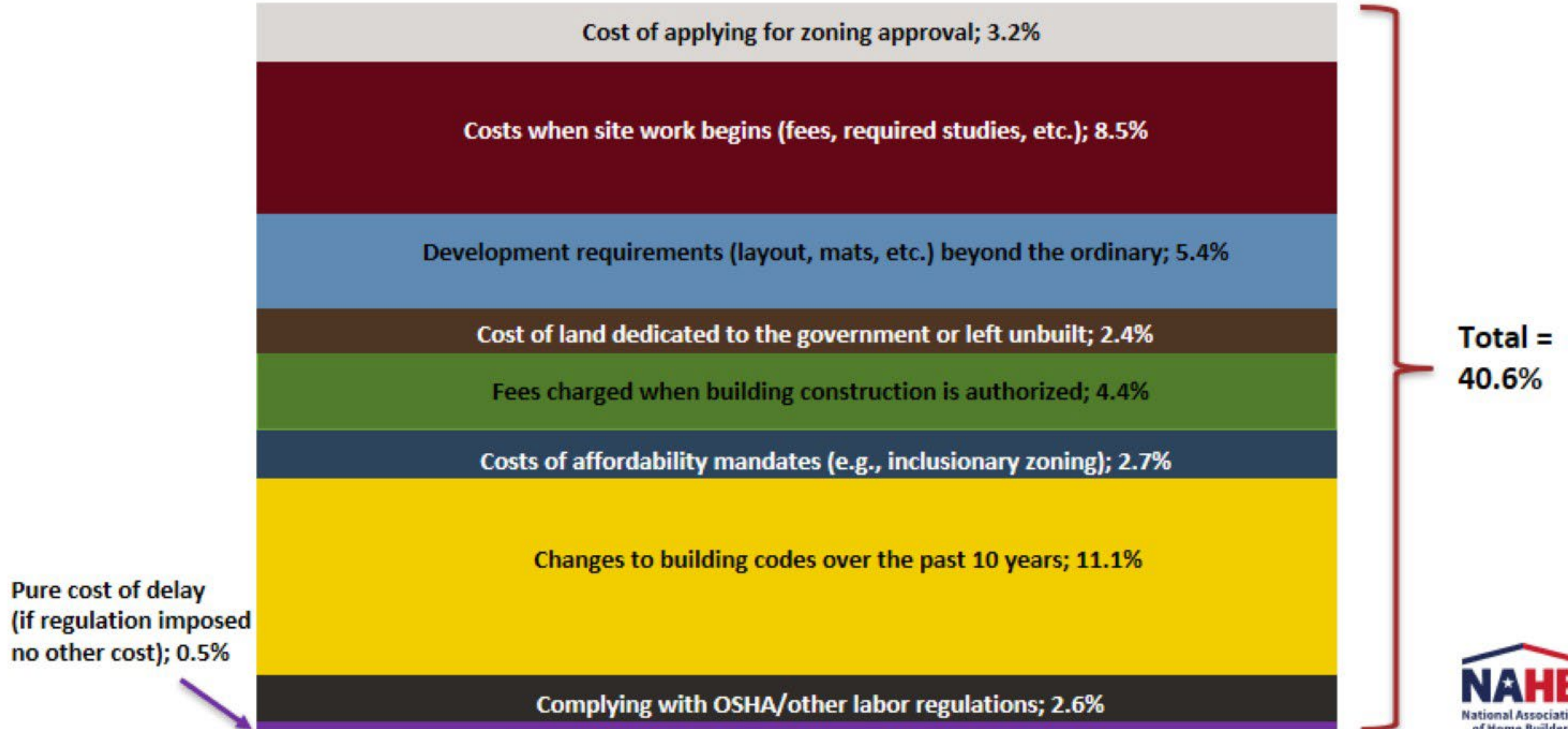


Source: NAHB/Wells Fargo Housing Market Index (HMI)

# Regulations - 41% of Multifamily Development Costs

NAHB-NMHC research

## Government Regulations as a Share of Multifamily Development Costs



Source: NAHB/Wells Fargo HMI survey with additional NMHC survey respondents



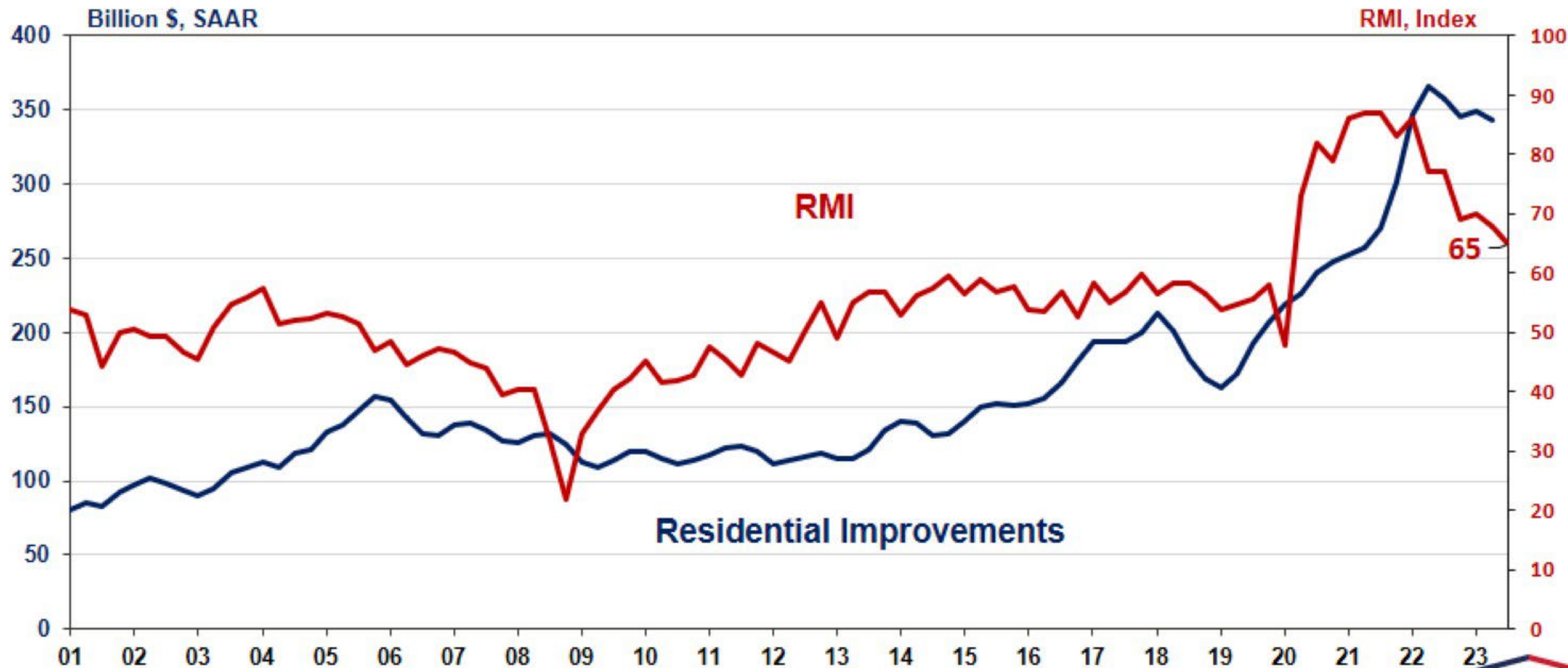


# Construction Outlook



# NAHB/Royal Building Products Remodeling Market Index

Remodeling market sentiment declined in Q3; expect mild growth in 2024 and 2025

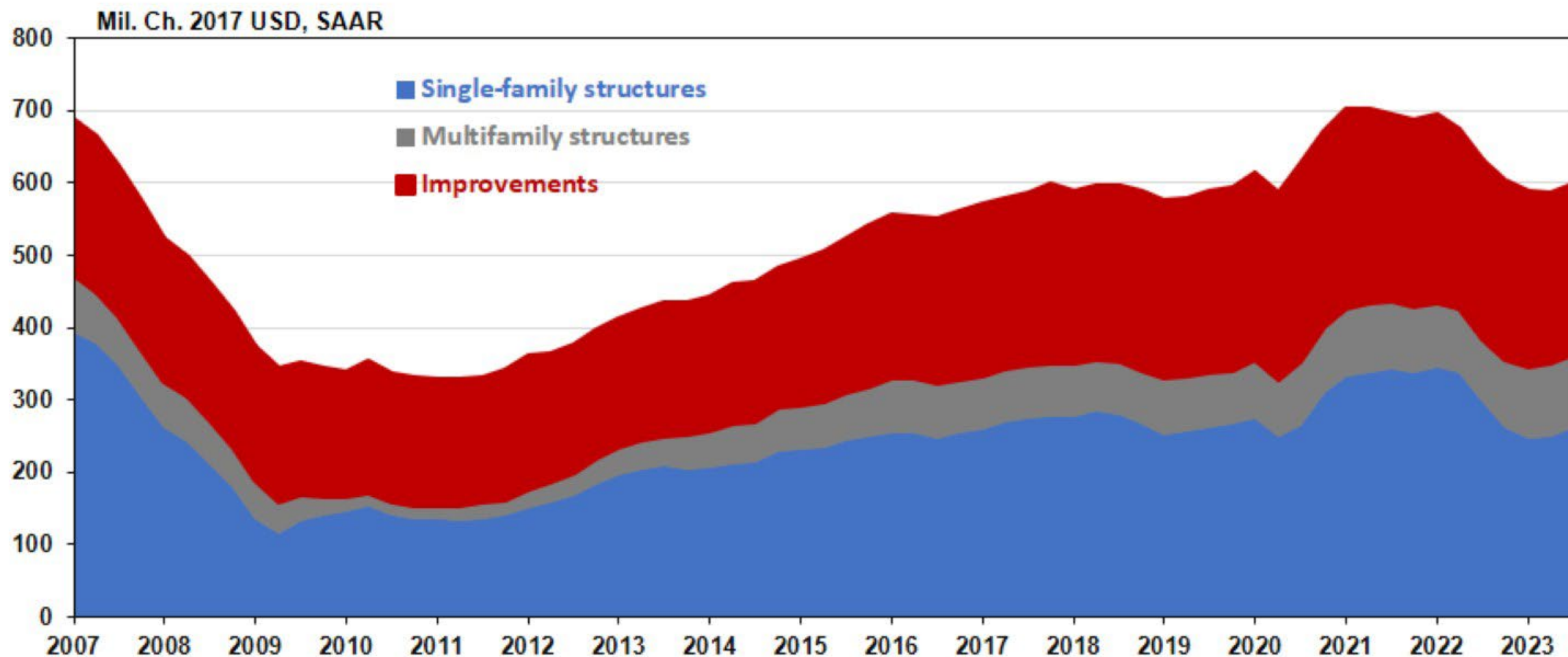


Source: U.S. Census Bureau (BOC) and NAHB/Royal Building Products RMI



# Remodeling Gaining Market Share for Residential Construction

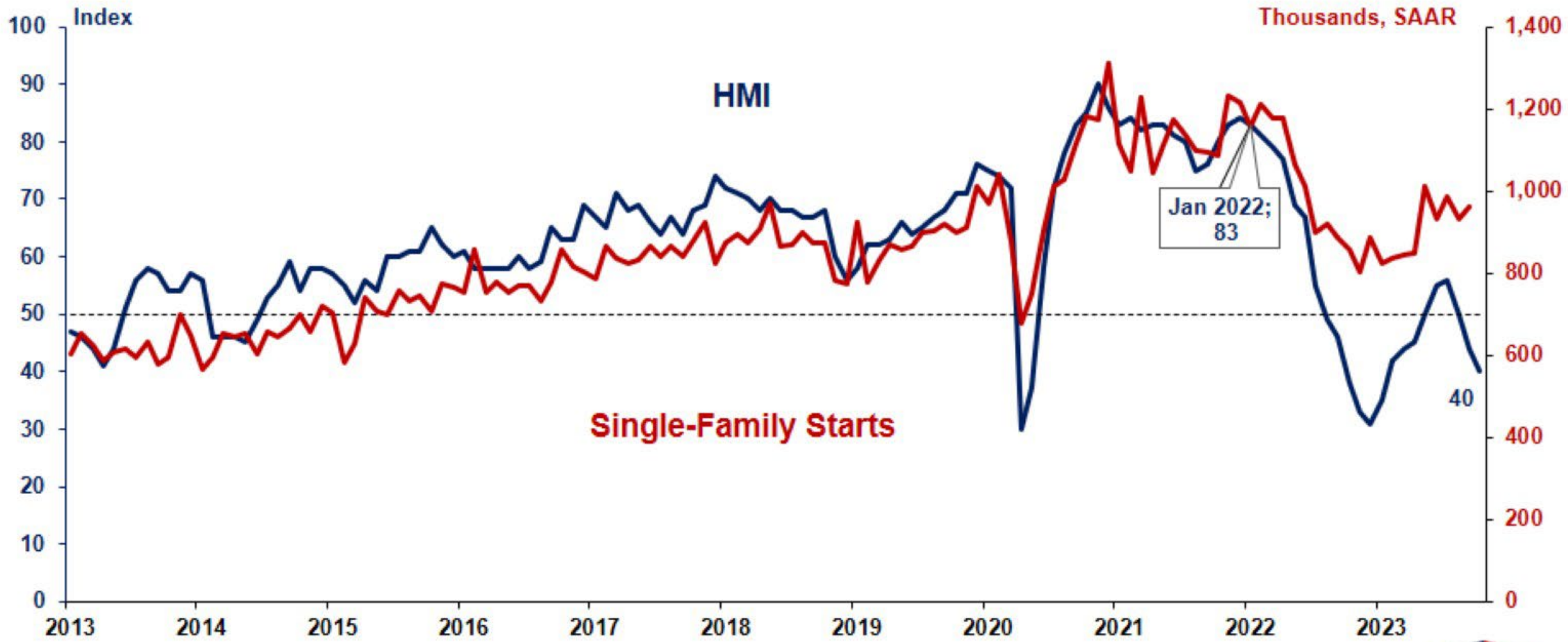
*Improvement spending share increased from 33% in 2007 to 39% in 3Q 2023*



Source: Bureau of Economic Analysis

# NAHB/Wells Fargo Housing Market Index (HMI)

*Mortgage rates well above 7% continue to hammer builder confidence*

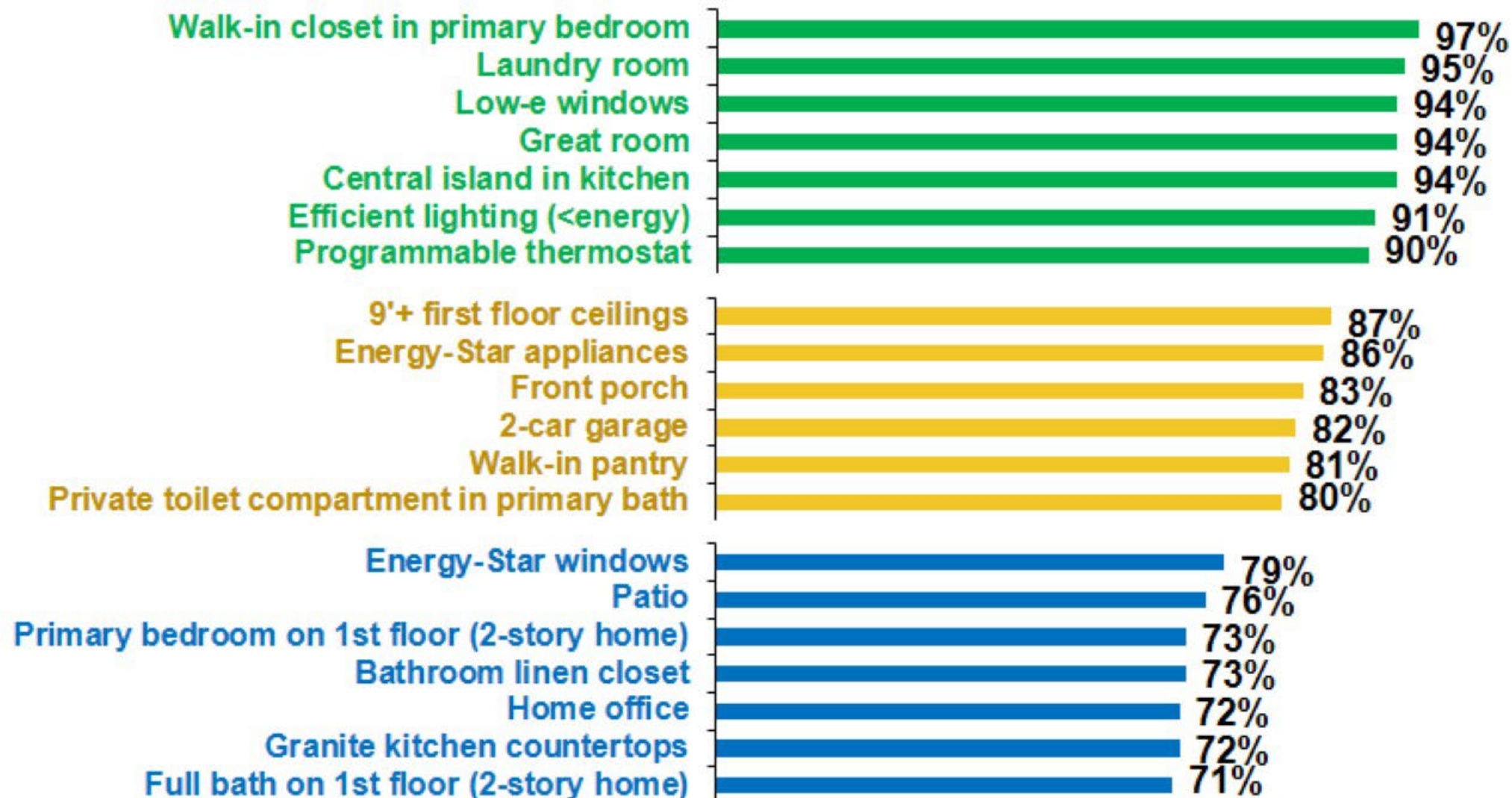


Source: Census Bureau and NAHB/Wells Fargo HMI survey



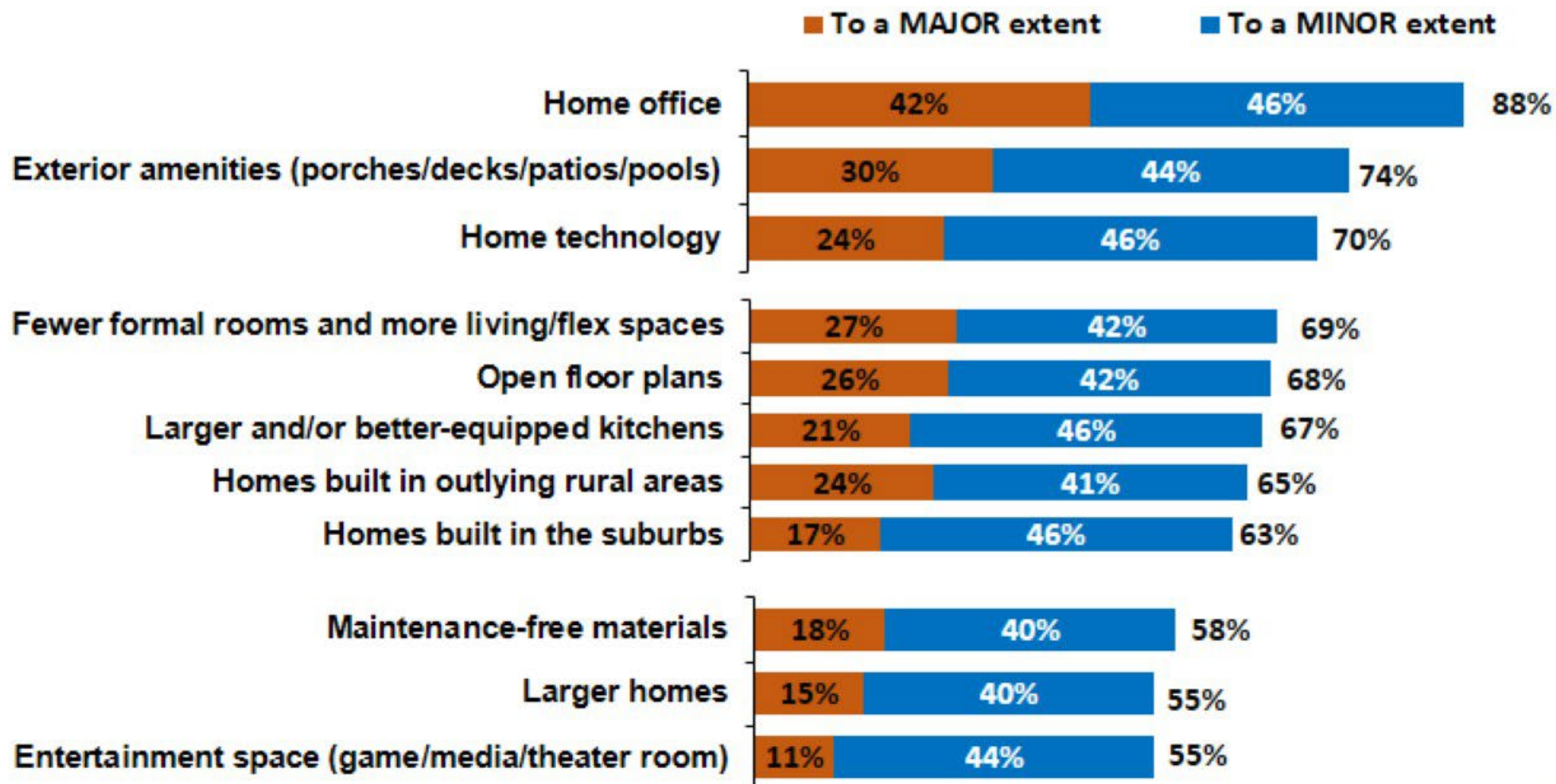
# Most Likely Features in Typical 2023 New Home

(% of Builders Rating Likely to Very Likely)





# Due to COVID-19, Most Builders Saw Demand Increase for...



# Most Wanted Features

1<sup>st</sup> Time Buyer

Laundry room
Exterior lighting
Ceiling fan
Hardwood flooring (main level)
Walk-in pantry
Double kitchen sink (side-by-side)
Patio
Security cameras
Drinking water filtration
Table space for eating in kitchen

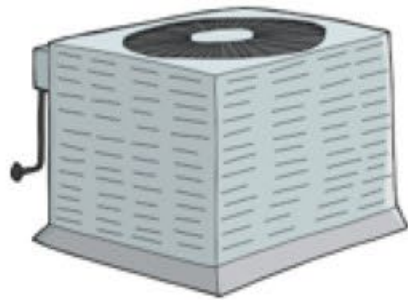
Repeat Buyer

Laundry room
Exterior lighting
ENERGY STAR windows
Ceiling fan
Patio
Front porch
ENERGY STAR appliances
Hardwood flooring (main level)
Walk-in pantry
Efficient lighting (uses < energy)

Common to both

# Preference for Energy Source

## Air Heating/ Cooling



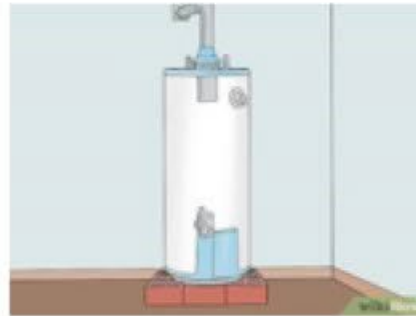
1<sup>st</sup> Time  
Buyers

Gas: 19%  
Electric: 57%

Repeat  
Buyers

Gas: 35%  
Electric: 51%

## Water Heating



Gas: 29%  
Electric: 48%

Gas: 47%  
Electric: 39%

## Cooking



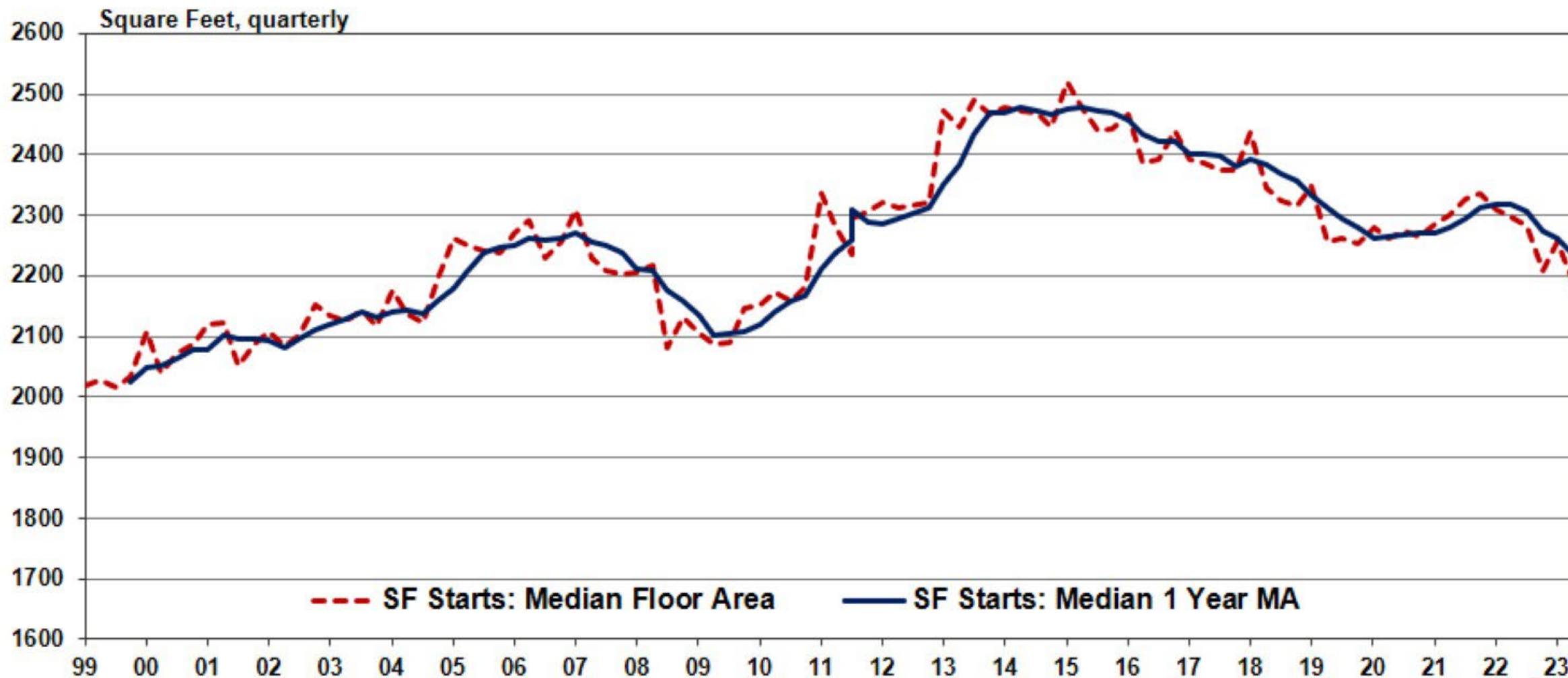
Gas: 39%  
Electric: 46%

Gas: 53%  
Electric: 38%



# Typical New Home Size

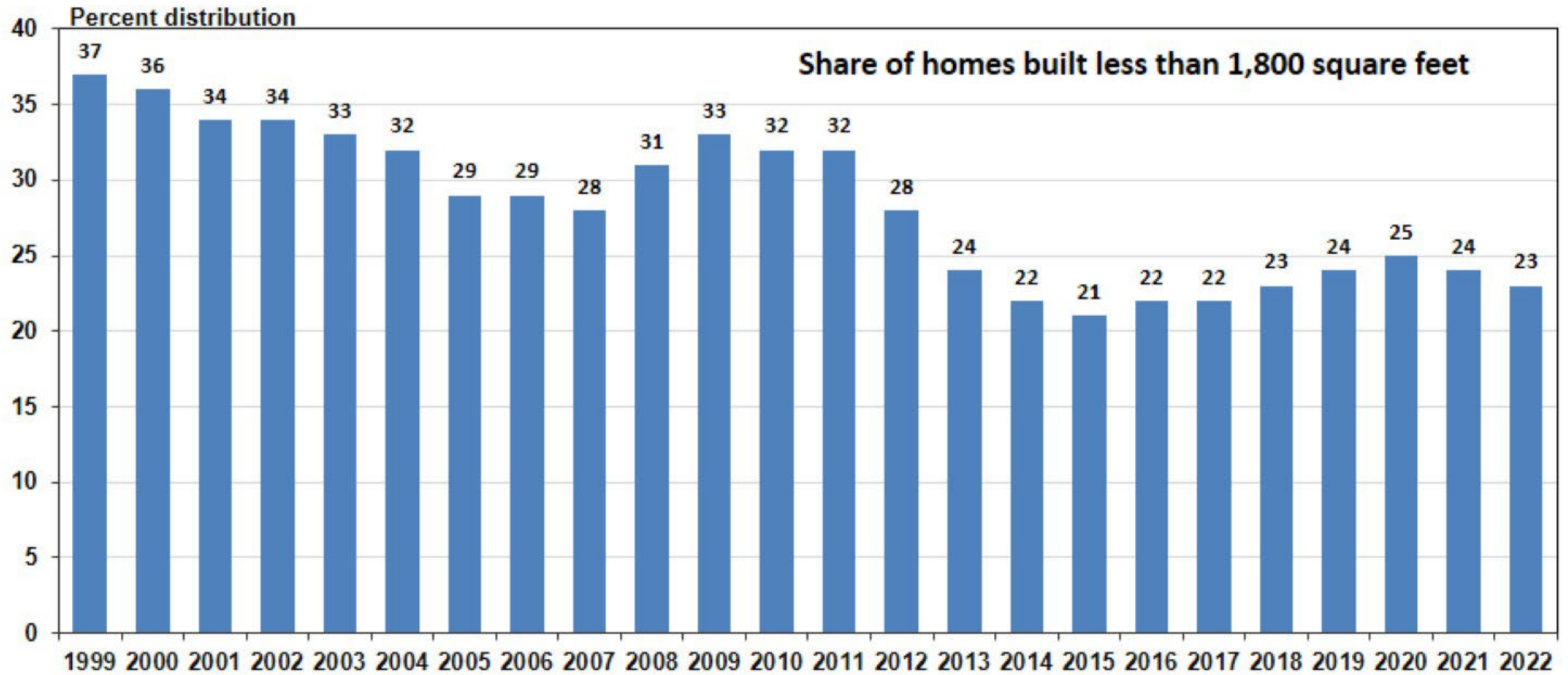
*Size trending lower*



Source: U.S. Census Bureau (BOC)



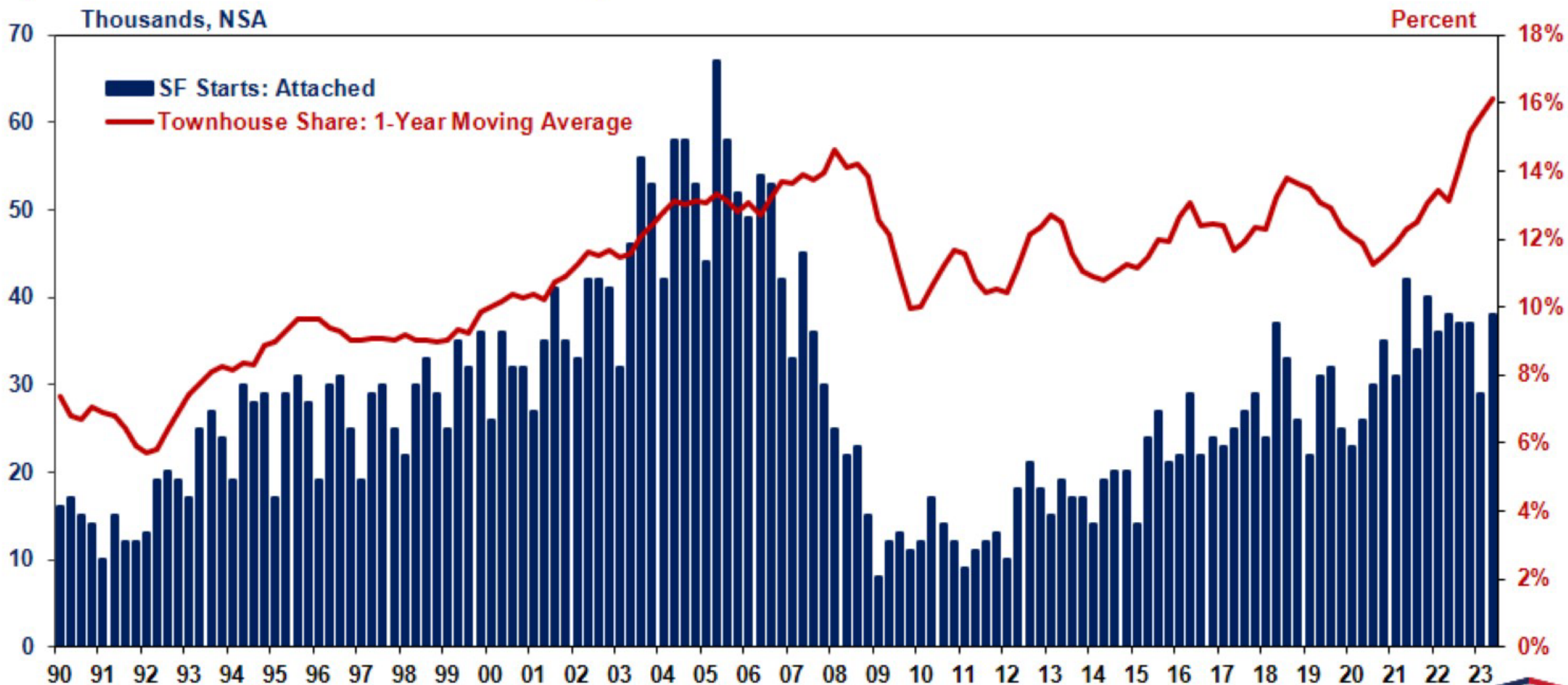
# Distribution of New Single-Family Home Size



Source: U.S. Census Bureau (BOC)

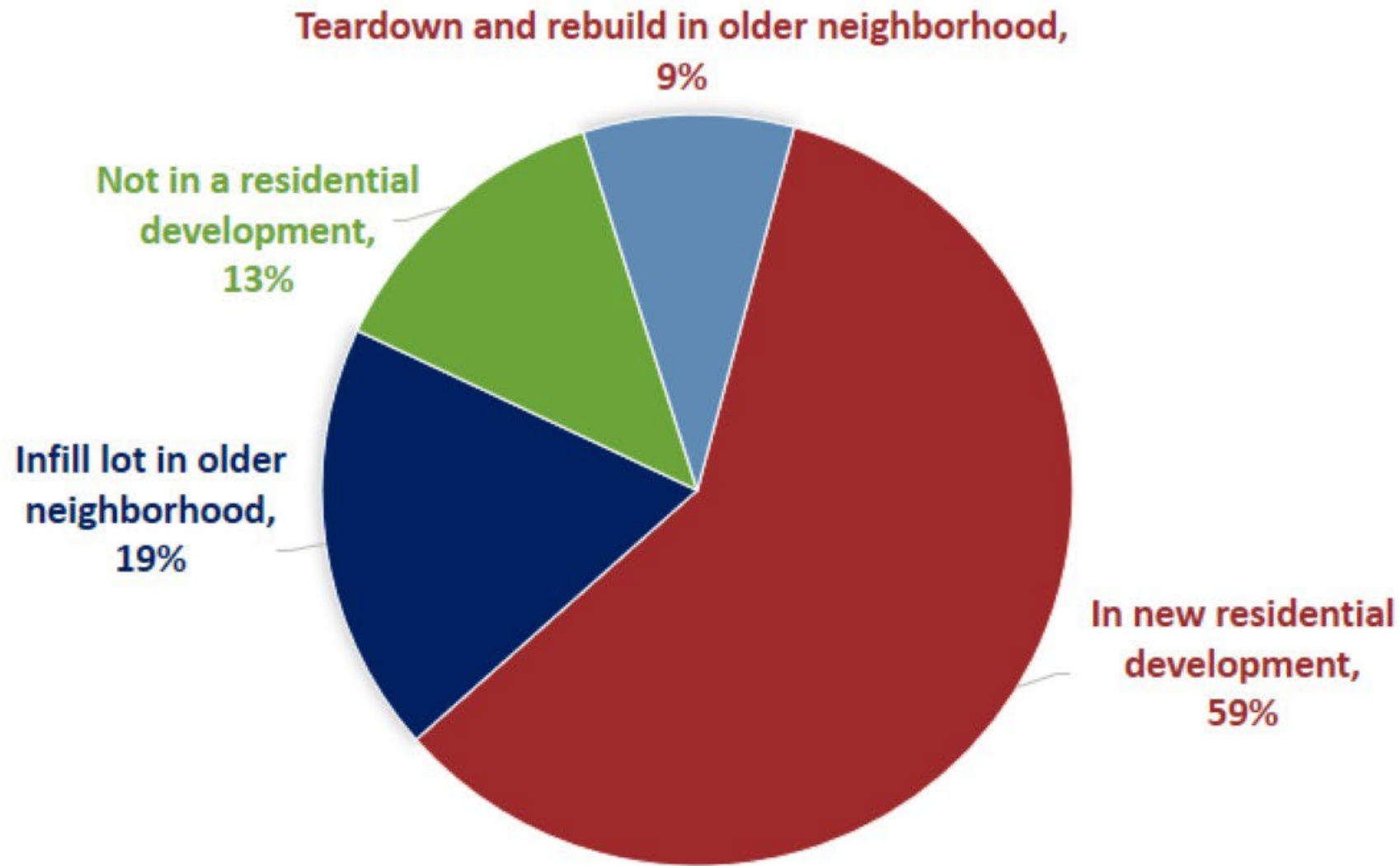
# Townhouse Market Cools at Start of 2023

Market share at multidecade high



Source: U.S. Census Bureau (BOC)

# Shares of New Single-family Homes Built in 2021



Source: 2022 Builder Practices Survey

# Top 10 Largest Single-Family Markets by Permits

Top 10 Largest SF Markets	Aug 2023 (# of units YTD, NSA)	YTD % Change (compared to Aug 2022)
Houston-The Woodlands-Sugar Land, TX	34,841	-3%
Dallas-Fort Worth-Arlington, TX	28,338	-16%
Atlanta-Sandy Springs-Roswell, GA	16,894	-14%
Phoenix-Mesa-Scottsdale, AZ	15,889	-27%
Charlotte-Concord-Gastonia, NC-SC	12,919	-9%
Orlando-Kissimmee-Sanford, FL	11,734	-3%
Austin-Round Rock, TX	10,925	-35%
Nashville-Davidson-Murfreesboro-Franklin, TN	9,971	-14%
Tampa-St. Petersburg-Clearwater, FL	9,578	-17%
Raleigh, NC	8,726	-8%

Source: U.S. Census Bureau (BOC).



# NAHB Home Building Geography Index

*Home construction shifted dramatically to lower density, lower cost markets after Covid*

## Large Metro Exurbs (mapped)

4Q19: 8.7% of SF permits

2Q23: 9.4% of SF permits

## Small Metro Exurbs

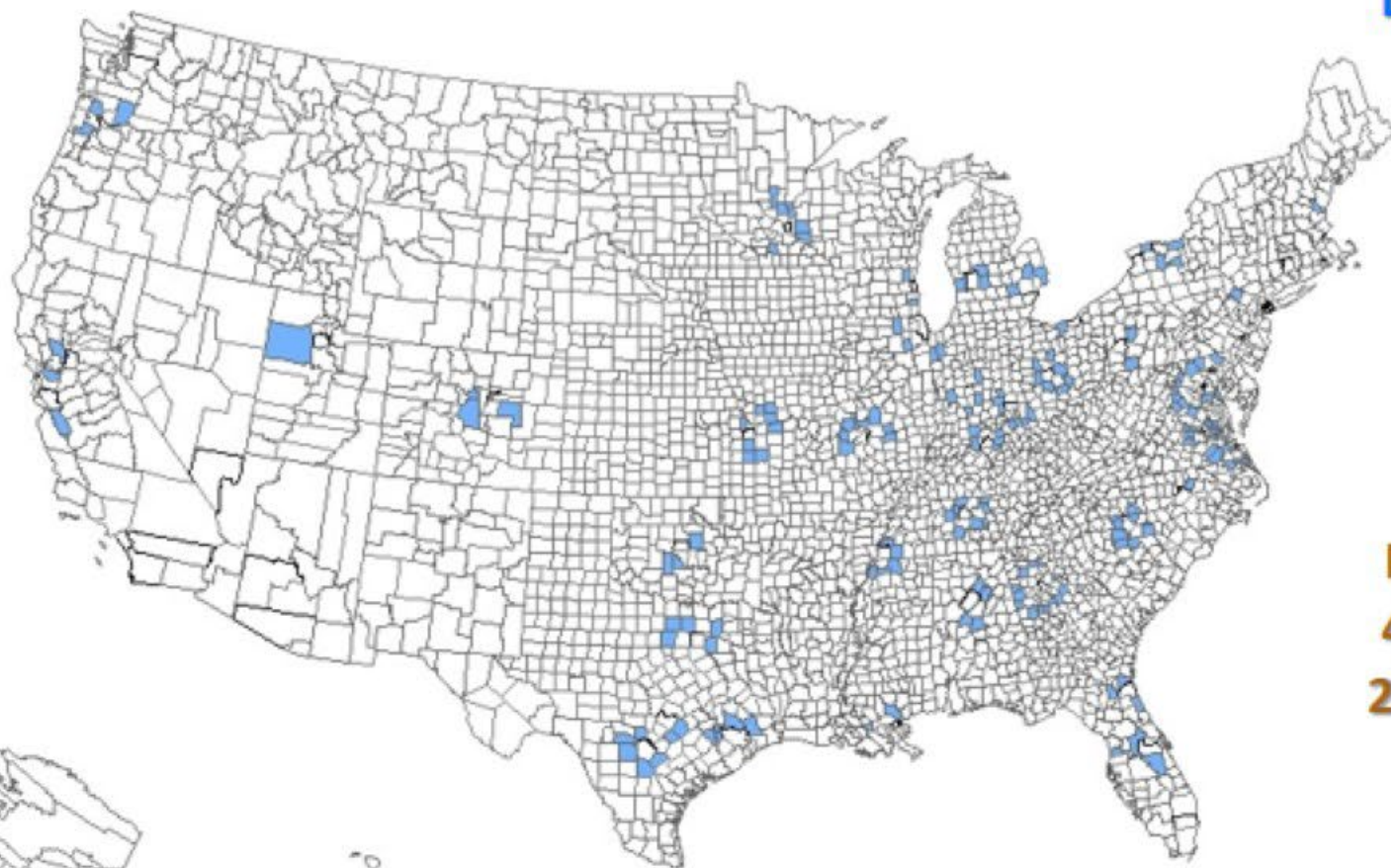
4Q19: 8.7% of SF permits

2Q23: 9.9% of SF permits

## Rural Areas/Small Towns

4Q19: 9.4% of SF permits

2Q23: 11.7% of SF permits

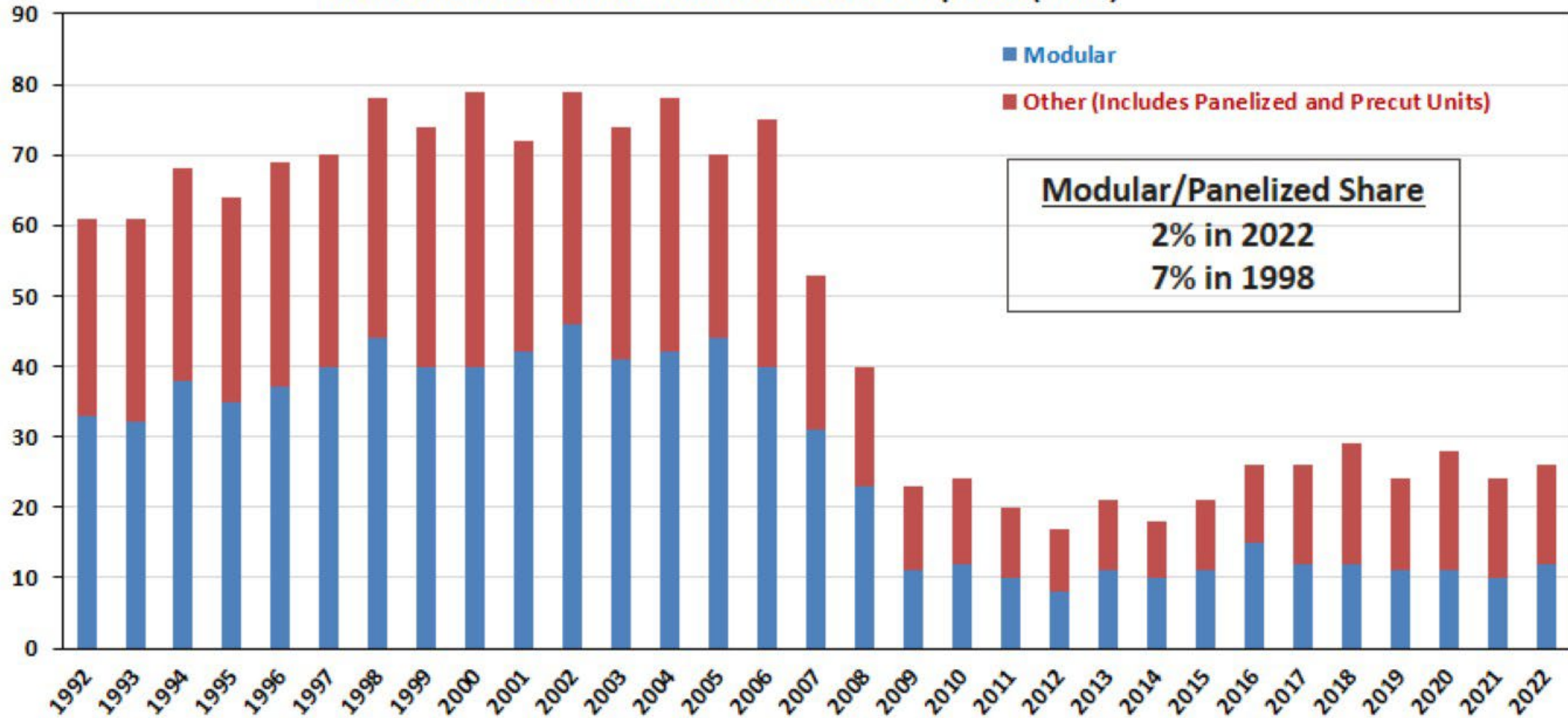


**Collectively – these geographies increased from  
26.7% to 31.1% of total SF permits**

Source: NAHB Analysis of Census data (Building Permits and ACS)

# Modular/Panelized Production

Number of Modular and Panelized Houses Completed (Ths.#)

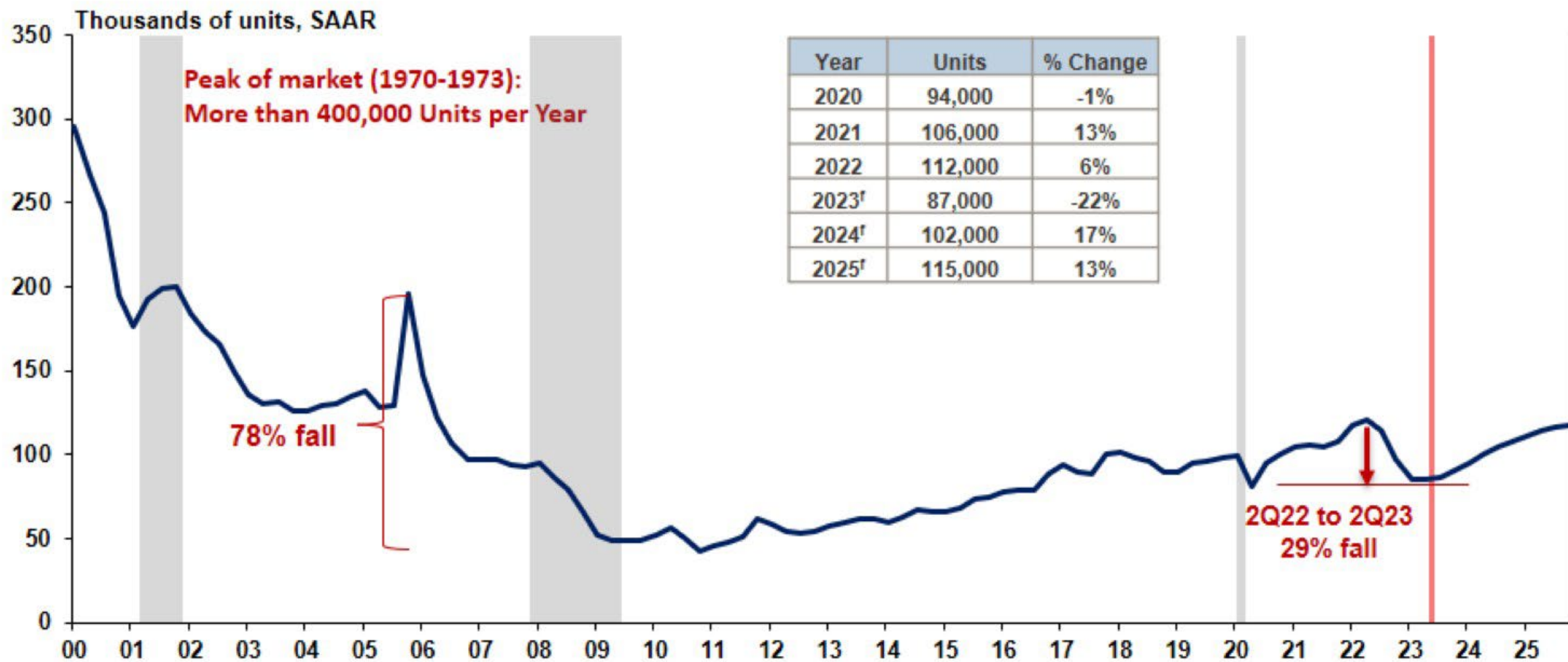


Source: NAHB tabulation of data from the Survey of Construction, U.S. Census Bureau.



# Manufactured Home Shipments

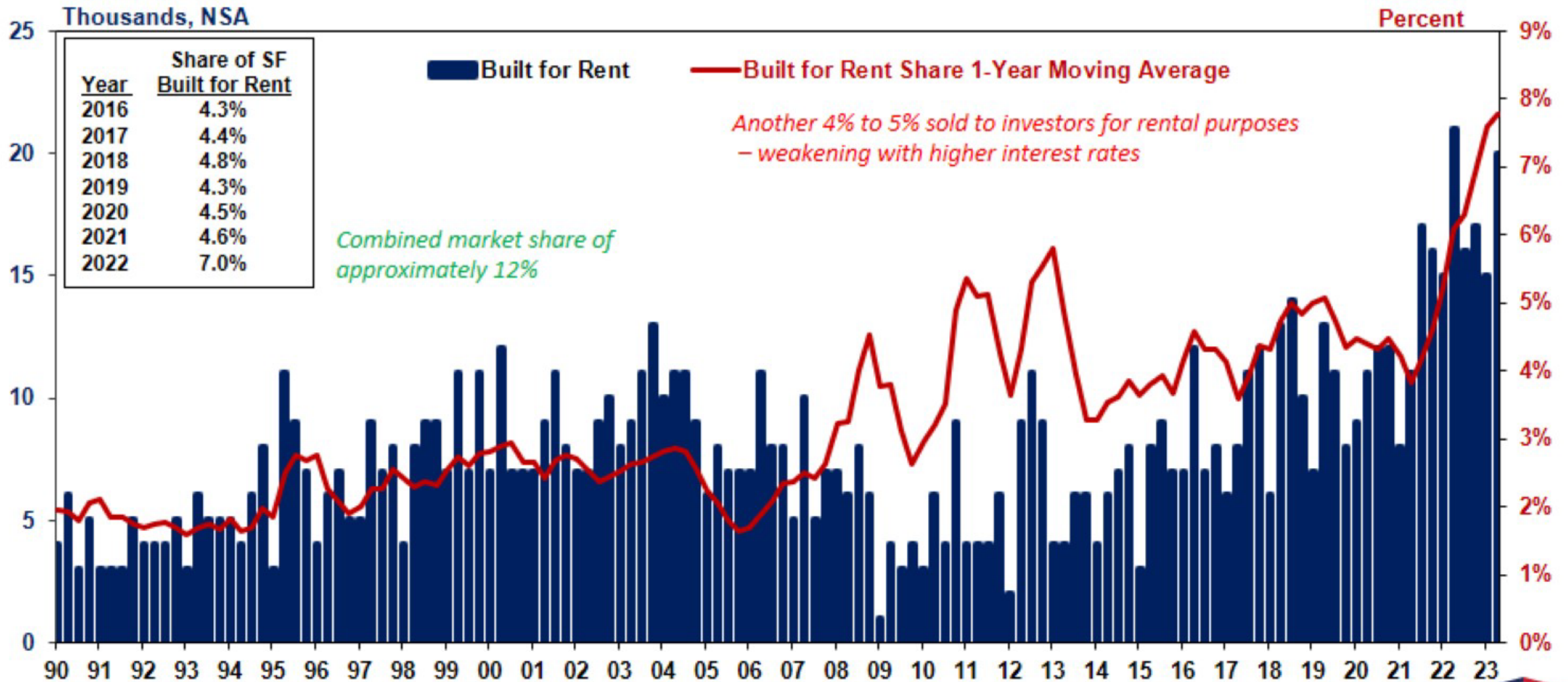
Forecast calls for limited declines due to affordability concerns



Source: U.S. Census Bureau (BOC) and NAHB forecast

# Single-Family Built-for-Rent Construction

*Is the market cooling?*

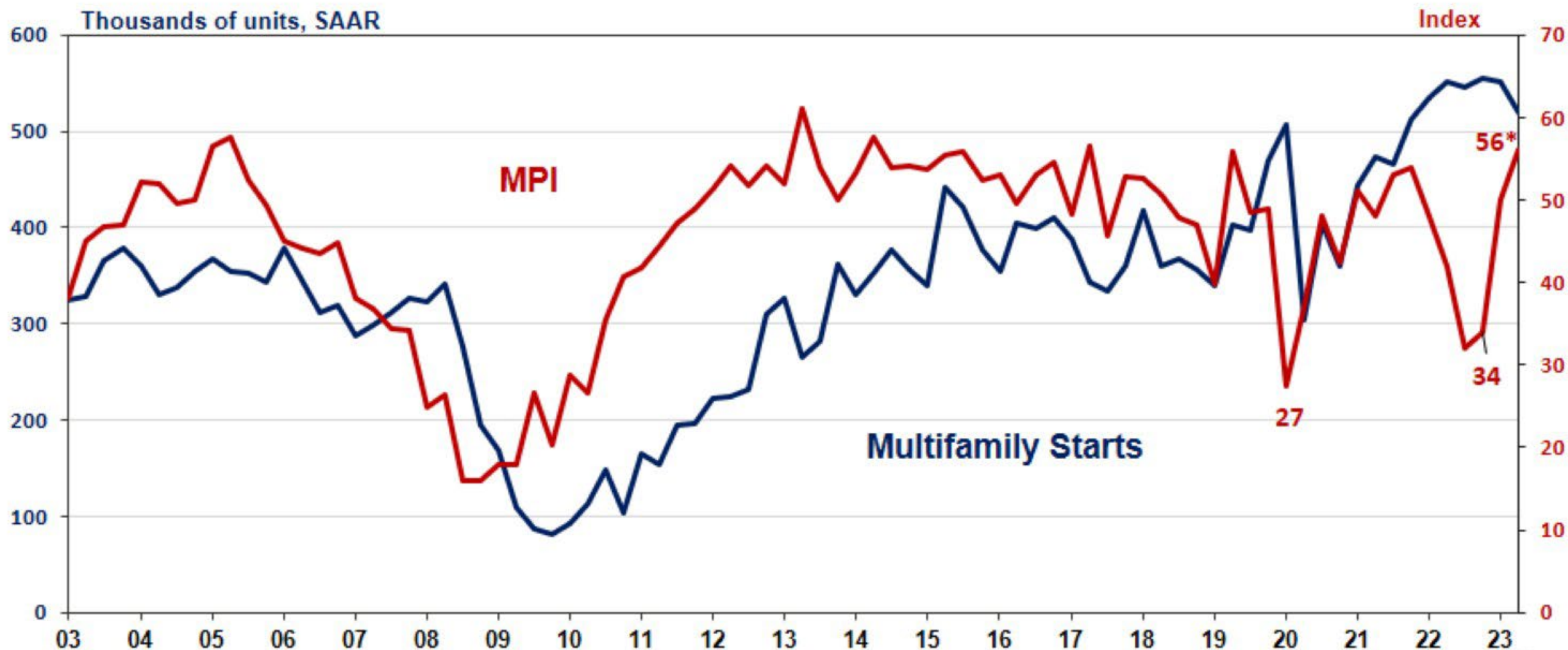


Source: U.S. Census Bureau (BOC)



# NAHB Multifamily Production Index

*Multifamily developers are still experiencing many headwinds*

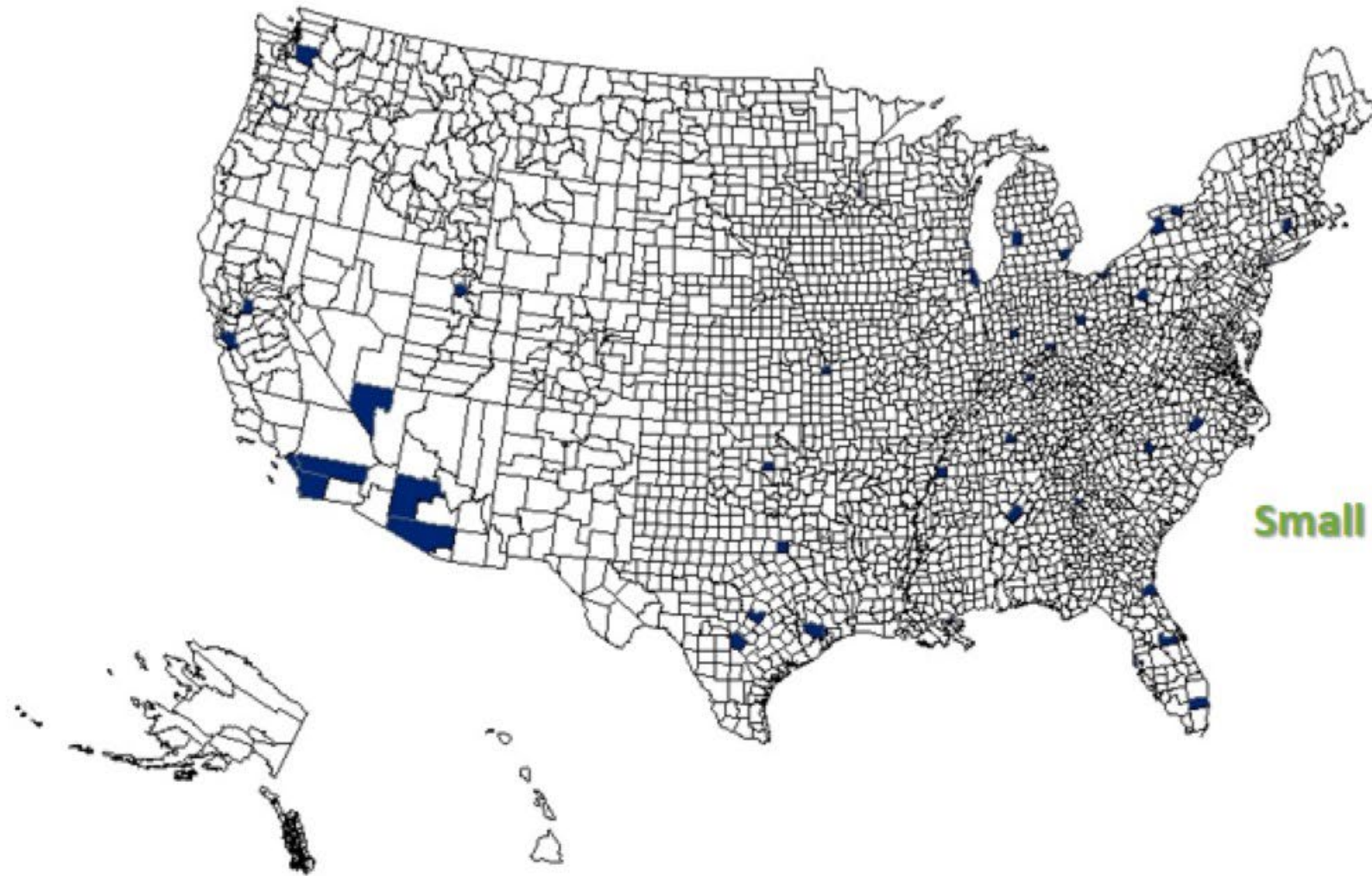


Source: U.S. Census Bureau (BOC) and NAHB Multifamily Market Survey (MMS).

Note: \* NAHB redesigned its Multifamily Market Survey (MMS) in the first quarter of 2023 to make it easier to interpret and more similar to the NAHB/Wells Fargo Housing Market Index (HMI) for single-family housing.

# NAHB Home Building Geography Index

*Large metro core counties have lost apartment market share since Covid*



**Large metro core counties**  
**4Q19: 41.7% MF permits**  
**2Q23: 37.4%**

**Large metro suburban counties**  
**4Q19: 27.1% MF permits**  
**2Q23: 27%**

**Small metro, exurban and rural counties**  
**4Q19: 31.3% MF permits**  
**2Q23: 35.6%**

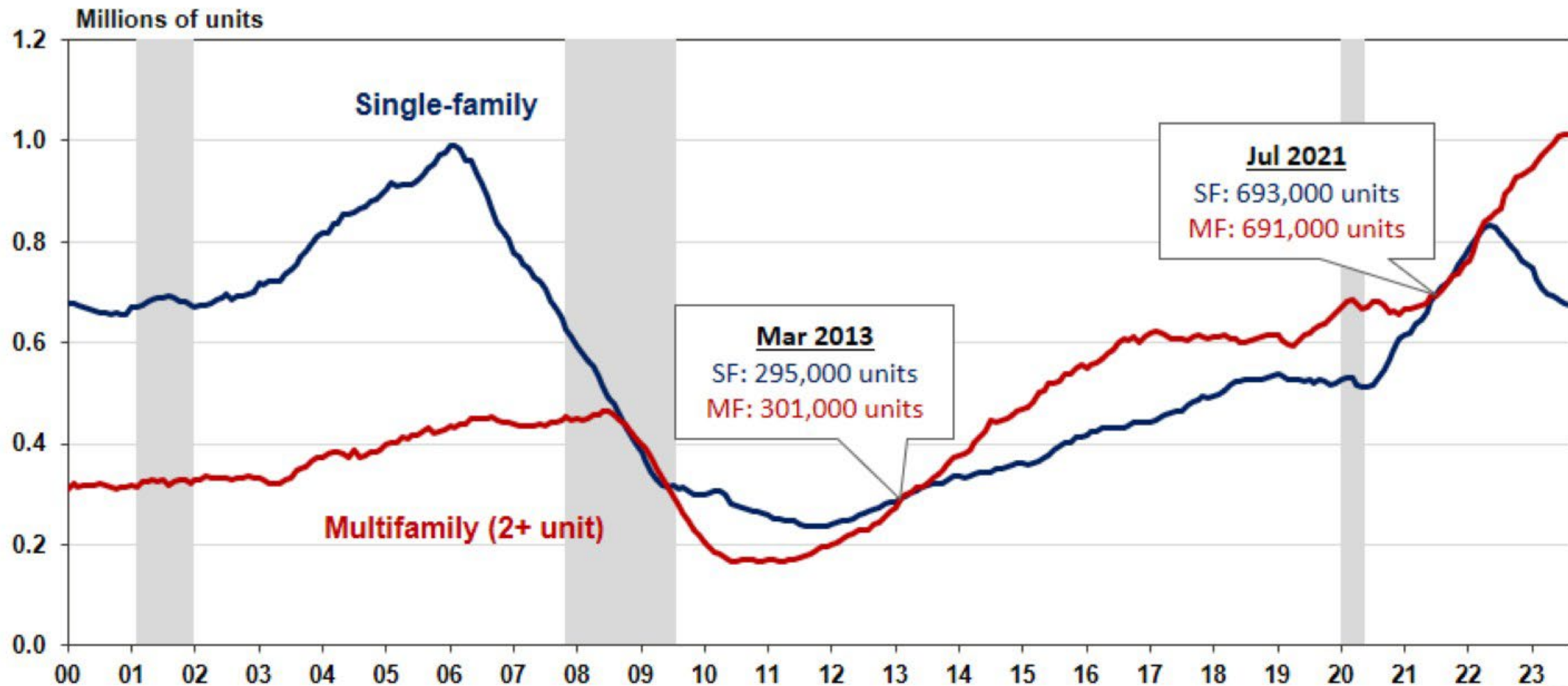
Source: NAHB Analysis of Census data (Building Permits and ACS)





# Housing Units under Construction

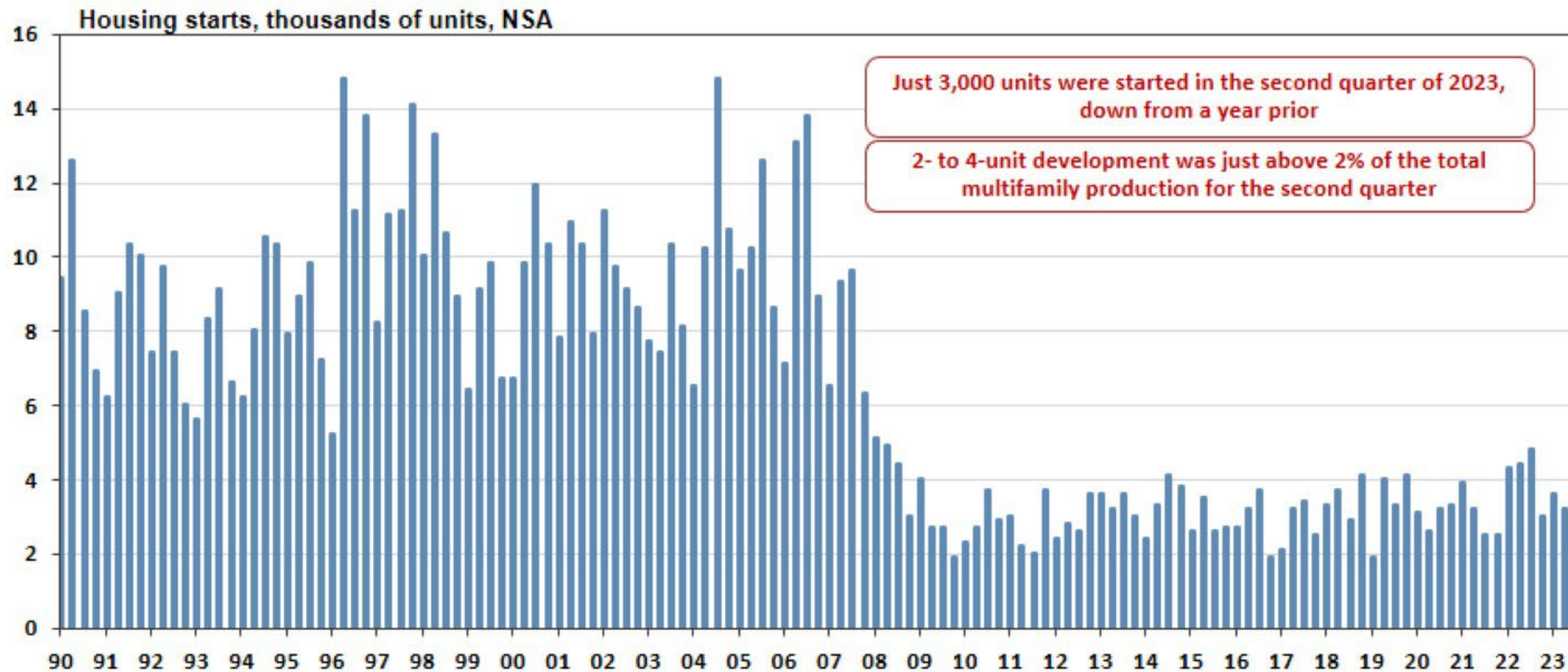
*Highest count of apartments under construction since late 1973*



Source: U.S. Census Bureau (BOC)

# Multifamily Missing Middle

*Still missing....*

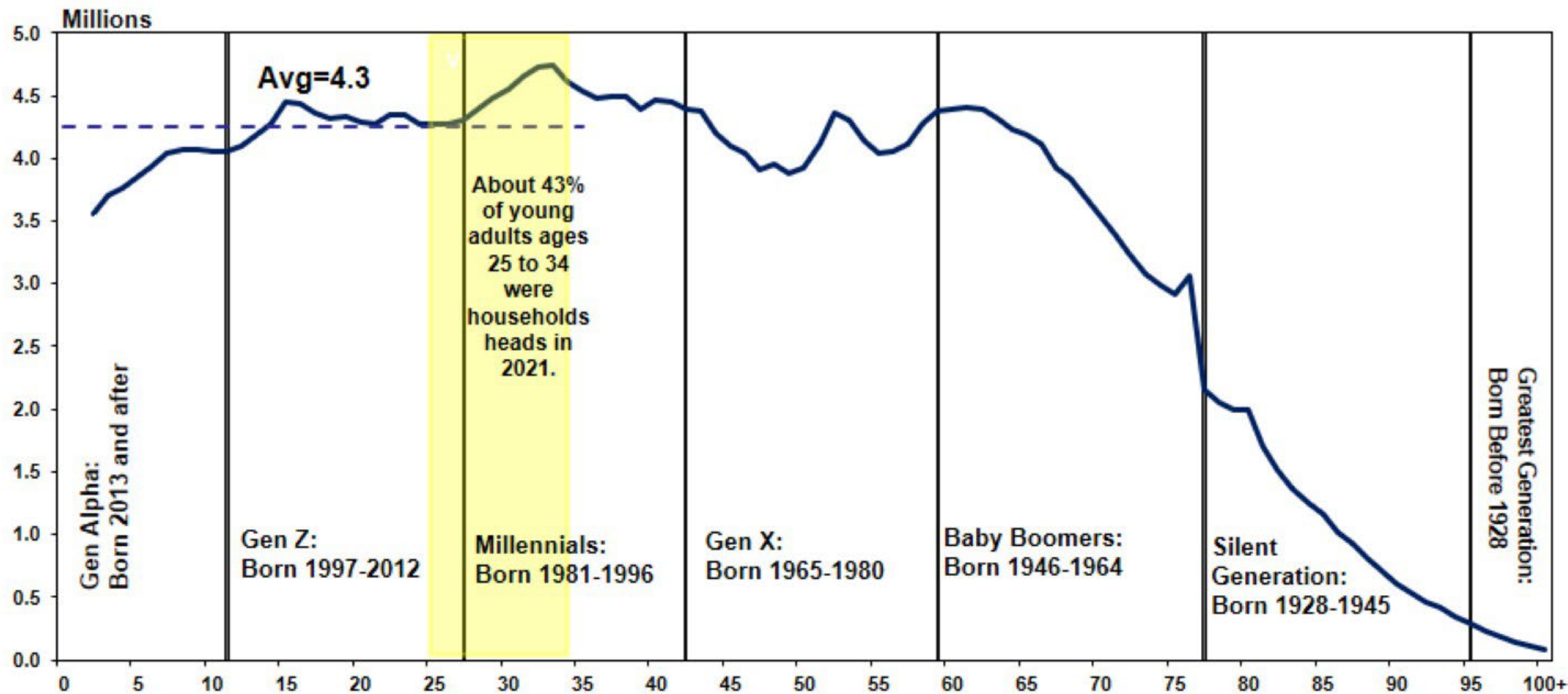


Source: U.S. Census Bureau (BOC).



# Rising Population Entering Housing Demand Years: 2023

*Gen X the majority of new construction home buyers*



Source: U.S. Census Bureau (BOC).

# Thank you

*Questions?*

[rdietz@nahb.org](mailto:rdietz@nahb.org)

[@dietz\\_econ](#)



Economic Leadership Sponsor



Home Mortgage

[eyeonhousing.org](http://eyeonhousing.org)

[housingeconomics.com](http://housingeconomics.com)



# State of Housing Affordability

***NIBS Housing Affordability Hearing***

*Monday, November 6, 2023*

***Solomon Greene***

*Principal Deputy Assistant Secretary*

*Office of Policy Development and Research*

*U.S. Department of Housing and Urban Development*



# Roadmap

## Rental Housing Affordability

Challenges

Solutions

## Homeownership Affordability

Challenges

Solutions



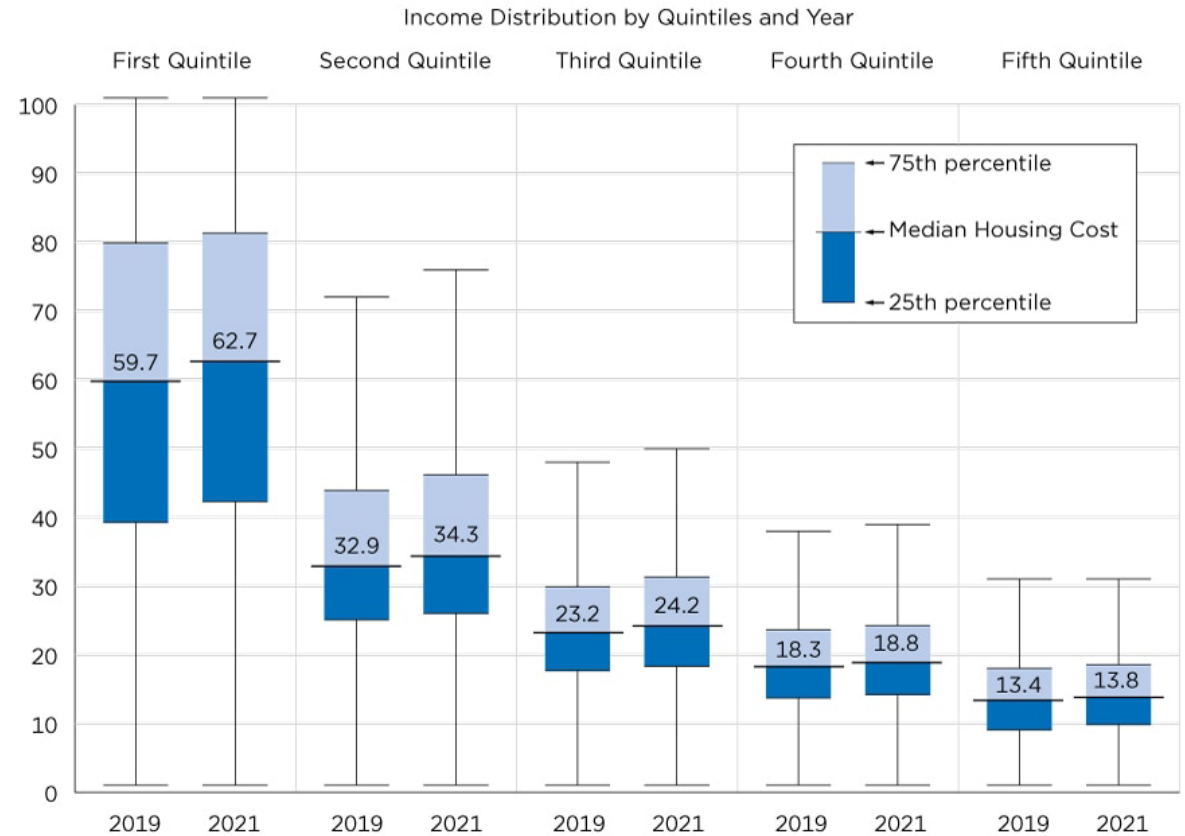


# Rental Housing Affordability



# Rental Affordability Challenges are Greatest for Unassisted, Low-Income Renters

Figure 2.  
**Housing Cost Ratios for Renter-Occupied Households by Income Quintile: 2019 and 2021**



Source: U.S. Census Bureau, 2019 and 2021 American Community Survey 1-year estimates.

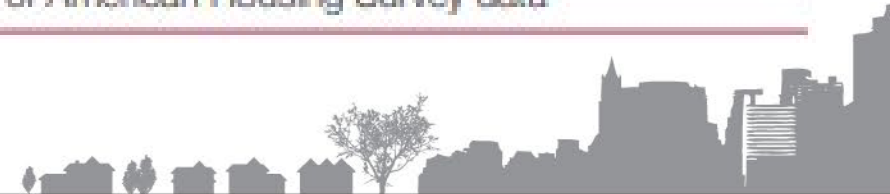


# Rental Affordability Challenges Have Increased Since the Pandemic

Exhibit ES-1. Change in Worst Case Housing Needs, 2001–2021



Source: HUD-PD&R tabulations of American Housing Survey data



# Driven by Supply Shortages ...

From 2019 → 2021:

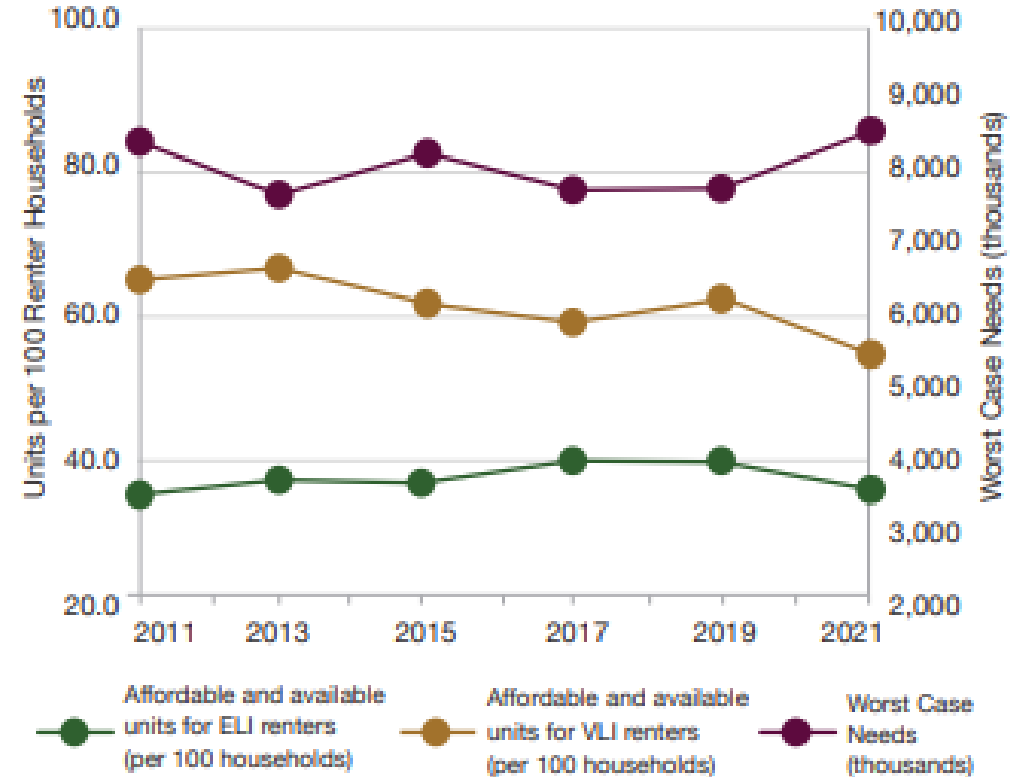
**950,000**  
increase in VLI  
households

**463,000**  
decrease in VLI  
A&A units

**571,000**  
increase in ELI  
households

**252,000**  
decrease in ELI  
A&A units

Exhibit ES-3. Trends in Housing Supply Mismatch and Worst Case Needs, 2011–2021



ELI = extremely low income. VLI = very low income.

Source: HUD-PD&R tabulations of American Housing Survey data



# ... and Insufficient Subsidies and Incentives

- Government subsidies and tax incentives are necessary to make affordable housing deals pencil out, but there aren't enough resources available
- Only 1-in-4 eligible households receives federal rental assistance
- As a result, many families wait years to receive federal rental assistance



# Addressing Rental Affordability Challenges Requires Concerted and Comprehensive Action

Federal  
State & Local  
Private

Production  
Preservation  
Protection



# Recent Federal Actions on Production

**White House Housing Supply Action Plan:** launched in May 2022, includes dozens of actions to boost supply and reduce burden of housing costs. Notable initiatives include:

- Issued joint guidance with the Department of the Treasury on the use of State and **Local Fiscal Recovery Funds** for affordable housing
- Restarted the **Federal Finance Bank's Risk Share Program** (HUD/Treasury)
- Allocated **\$5B in HOME-ARP funds** to develop housing for vulnerable populations
- Launched **\$85M Pathways to Removing Obstacles to Housing** (PRO Housing)
- Expanded **FHA LIHTC Pilot**
- Created new lending authority for residential development via **TIFIA and RRIF** (DOT)

HUD has also collaborated with NIBS and MOD X on the development of the **Offsite Construction for Housing Research Roadmap** and funded research on removing barriers to off-site construction and boosting supply through **land use and zoning reforms**.



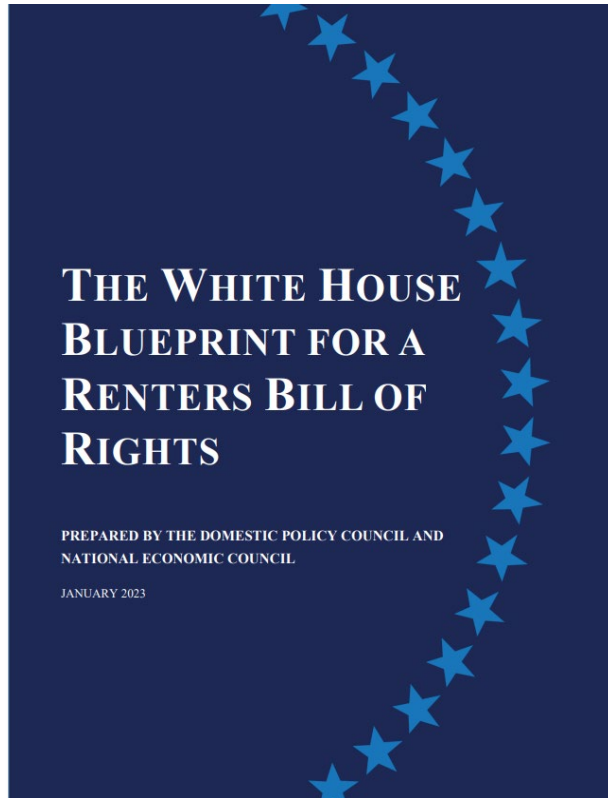
# Recent Federal Actions on Preservation

- **Green and Resilient Retrofitting Program:** \$800M in grants and up to \$4B in loans
- **Choice Neighborhoods:** 50 communities and nearly \$7B invested since inception
- **Rental Assistance Demonstration:** over \$16B in capital investment to improve or replace nearly 193,000 deeply rent-assisted homes since inception
- **Updated CDBG notice** to promote acquisition, preservation, and other supply uses
- **Launched HUD Funding Navigator** to identify IRA and BIL resources for climate resiliency and energy efficiency improvements.





# Recent Federal Actions on Tenant Protections



WH issued first-of-its-kind **Blueprint for a Renter Bill of Rights**, which contains principles for fairness in the rental market and agency actions to advance those principles.

HUD commitments include:

- Make permanent the **30-day notice** for advanced notification of lease termination due to nonpayment of rent
- Provide \$10 million for **tenant outreach and education** via the Section 514 NOFO
- Launch **NSPIRE**
- Inform PHAs and multifamily-assisted property owners of **adverse action** and FCRA obligations
- Expand **Eviction Protection Grant Program**

In addition, HUD has taken several important steps to improve and expand **Housing Choice Voucher Program**, resulting in increase in utilization rates and expanded housing choices.



# State & Local Actions

## Production

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- Removing barriers to new production (e.g., “Montana miracle”)
- New bonds and other revenue for housing production (e.g., Minnesota’s \$1B housing omnibus bill)

## Preservation

---

- Right of first refusal requirements (e.g. DC)
- Preservation inventories (e.g., Chicago)

## Protection

---

- Access to counsel (e.g., Kansas City)
- Good cause eviction protections (e.g., Washington)
- Eviction prevention and diversion (e.g., Memphis)
- Using positive rental reports to boost credit scores (e.g., CA)



# Private Sector Actions

- **Production**
  - Innovation in off-site construction and other building technologies
  - Use of IRA tax credits
- **Preservation**
  - Use of IRA tax credits and rebates
- **Protection**
  - Online rental platforms promoting listings that accept vouchers and improving transparency in their rental listings

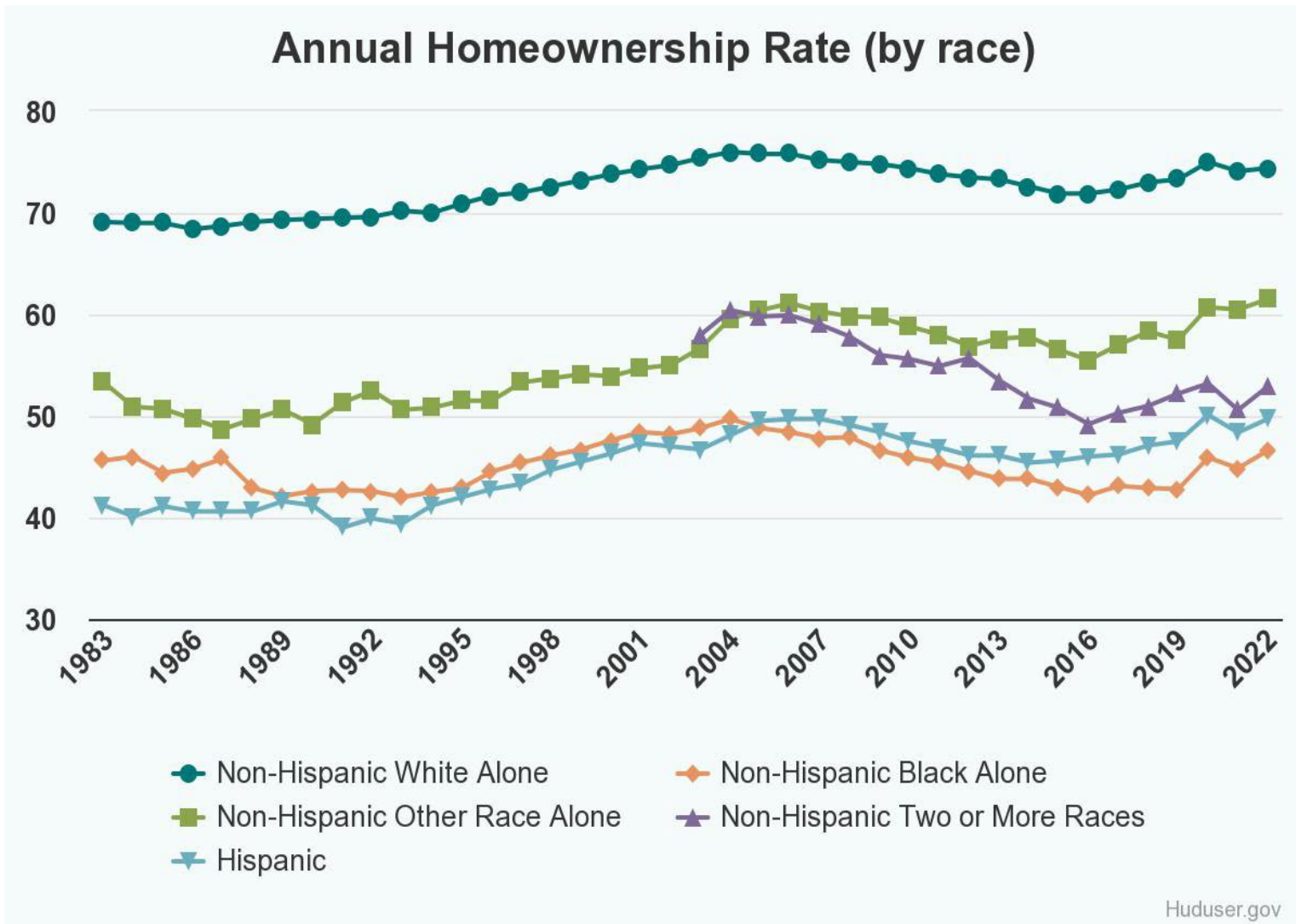


# Affordable Homeownership





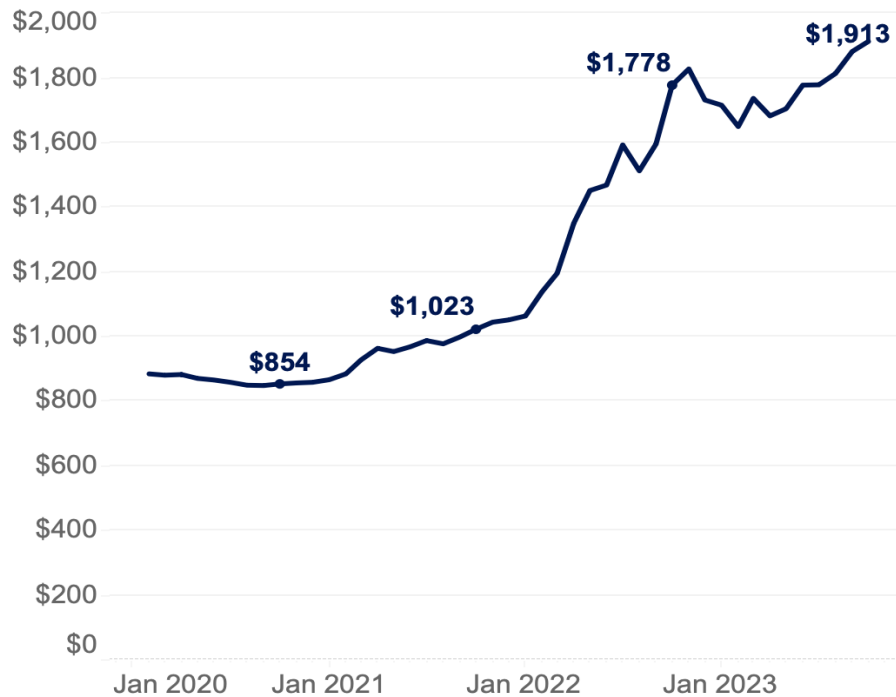
Homeownership Rates are Higher than Pre-Pandemic, but Remain Lower Than Pre-Recession Peak



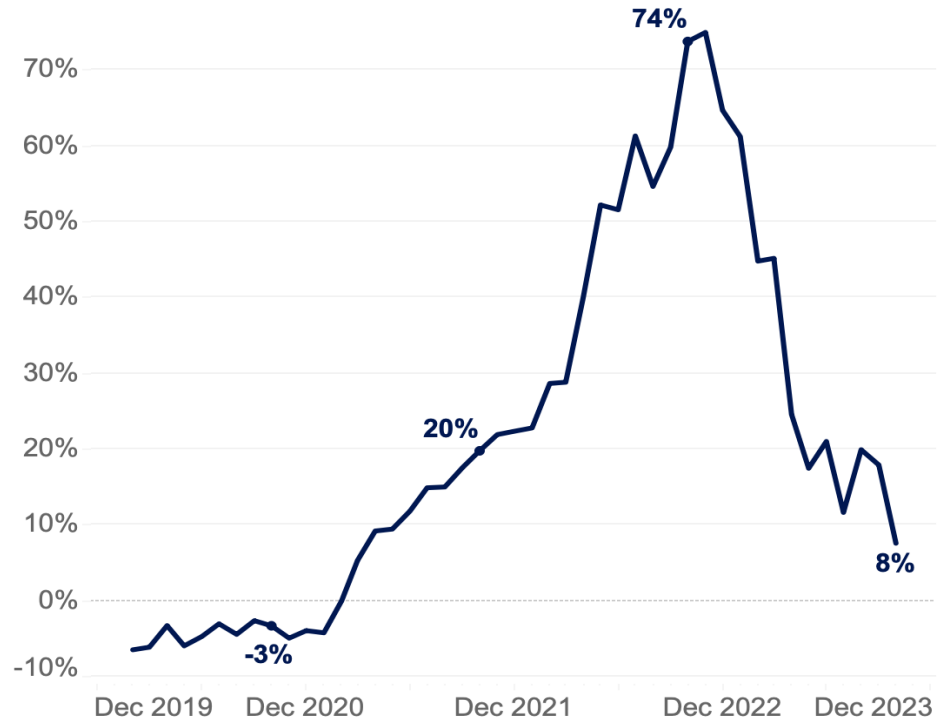
# Barriers Include Increasing Costs of Credit...

Monthly Mortgage Payments (20% down) | September 2023

LEVEL



YEAR-OVER-YEAR



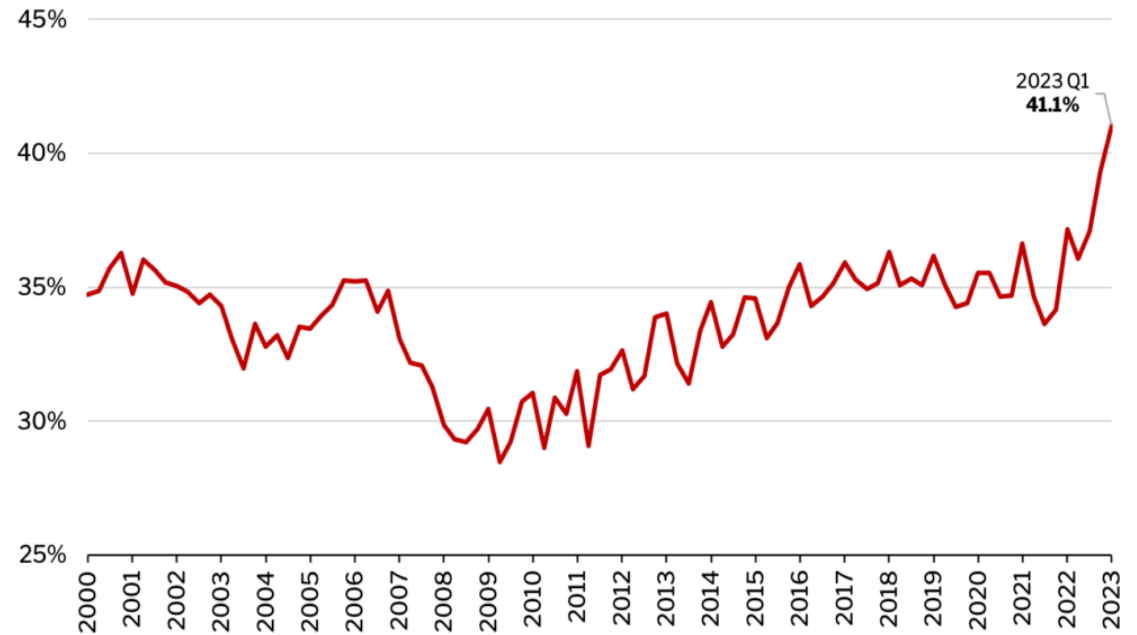
Zillow Economic Research



# ...and a Lack (Loss) of Inventory

- Due to “Rate lock” effect, fewer households are looking to sell their homes
- Investor share of buyers is above pre-pandemic rates, with investors buying approximately one-quarter of all low-priced homes

2 in 5 Homes Bought by Investors Are Starter Homes  
Homes with 1,400 or fewer square feet as share of investor purchases



Source: Redfin analysis of county records

**REDFIN**



# Addressing Homeownership Affordability Challenges Requires Concerted and Comprehensive Action

Federal  
State & Local  
Private

Expand & Preserve Inventory  
Increase Access to Credit





# Recent Federal Actions on Affordable Inventory

- HUD updated the HUD Code for manufactured housing.
- HUD will launch \$225M PRICE competitive grant program to “preserve and revitalize manufactured housing and eligible manufactured housing communities.” (FY23 appropriation).
- Treasury’s Homeowner Assistance Fund has assisted nearly 400,000 homeowners at risk of foreclosure.
- FHA, Fannie Mae, and Freddie Mac directed a greater share of the supply of defaulted asset dispositions to owner-occupants and mission-driven entities instead of large investors.



# Recent Federal Actions on Access to Credit

- FHA reduced the mortgage interest premium, which saves 850,000 FHA borrowers \$800 each year
- FHA allowed lenders to use positive rental history in determining creditworthiness, which has helped thousands of households qualify for FHA endorsements
- FHA enacted new policy to allow lenders to count income from ADUs when underwriting mortgages
- Ginnie Mae launched a “social bonds” label for SF forward mortgage-backed securities to promote broader access to mortgage financing for underserved communities.
- Exploring updates to the 203(k) Rehab. Mortgage Insurance Program and opportunities to increase availability of small dollar mortgages.



# State, Local and Private Sector Actions

## Affordable Inventory

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- Adopt zoning and land use reforms to address “missing middle” and allow development of “starter” homes.
- Buy and rehab older homes before investors can.
- Create community land trusts
- Help existing homeowners maintain and stay in their homes

## Access to Credit

---

- Create state and local downpayment and closing cost assistance programs
- State-HFA supported low-down payment lending
- Provide Homebuyer counseling





**PD&R**

**Thank you!**





# Session 1: The State of Housing Affordability



**Robert Dietz, Ph.D.**

Chief Economist and Senior  
Vice President for Economics  
and Housing, NAHB



**Solomon Greene**

Principal Deputy Assistant  
Secretary for Policy  
Development and Research,  
Dept. of Housing and Urban  
Development



**Chris Herbert, Ph.D.**

Managing Director, Joint  
Center for Housing Studies of  
Harvard University



**Brian Pallasch- Moderator**

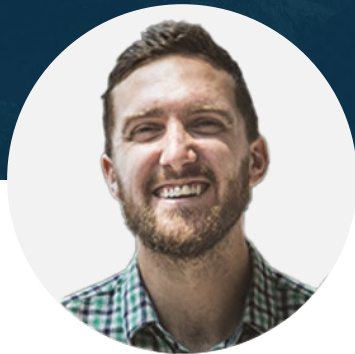
EVP & CEO, IIBEC  
Chair, NIBS Consultative  
Council



# Welcome to the Housing Affordability Hearing

Hosted by the NIBS Consultative Council

# Session 2: Examining Solutions- Innovation and Best Practices



**Tyler Pullen**

Senior Technical Advisor, Turner Center  
for Housing Innovation, UC Berkeley &  
The Housing Lab



**Eric Werling**

Building America National Director,  
Building Technologies Office, Dept. of  
Energy



**Vicki Worden- Moderator**

President & CEO, Green Building Initiative



U.S. DEPARTMENT OF  
**ENERGY**

Office of  
ENERGY EFFICIENCY &  
RENEWABLE ENERGY



# Energy & Housing Affordability

Eric Werling, U.S. Department of Energy, Building Technologies Office

November 6, 2023





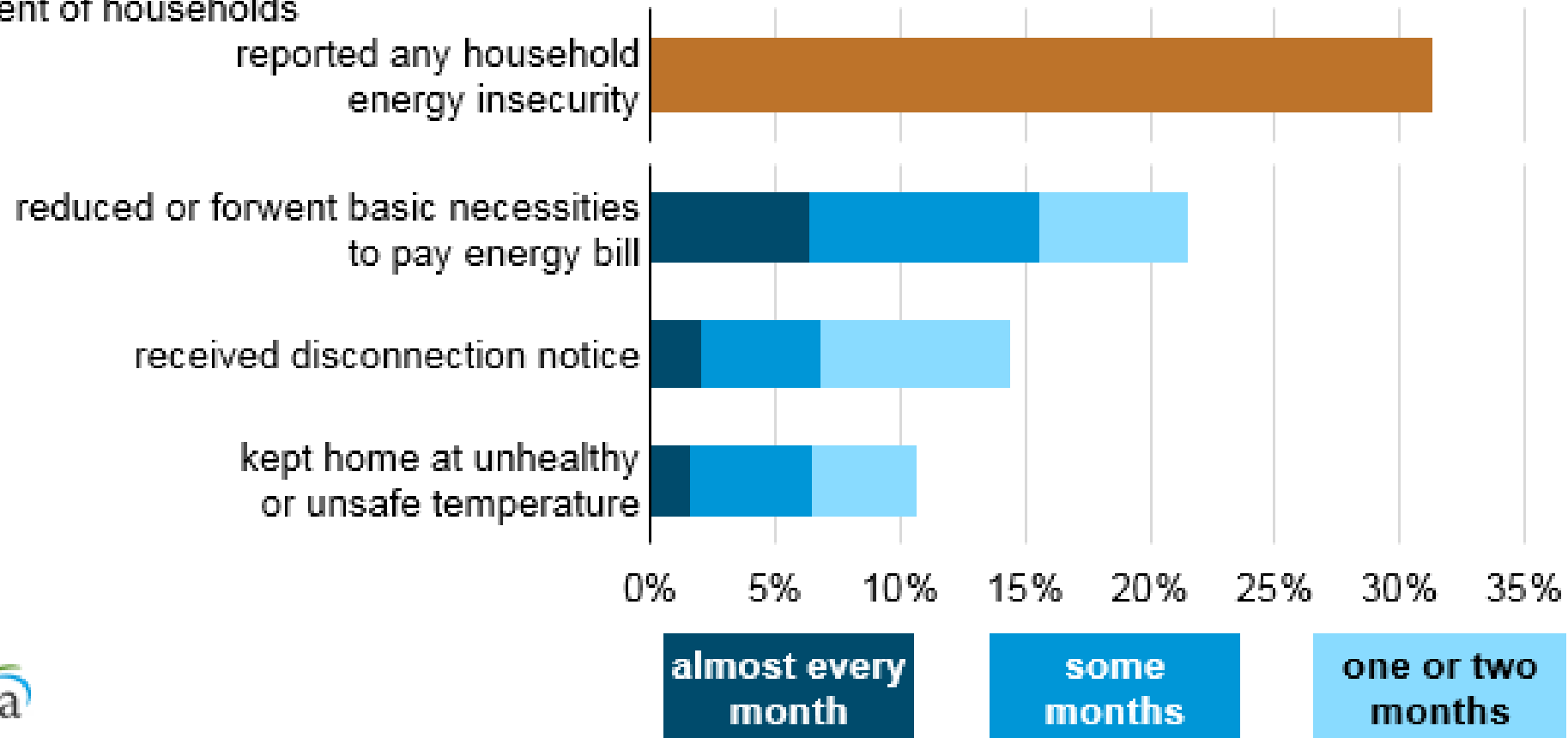
# For some Americans, paying the energy bill is a burden



Innovations in Energy Efficiency  
Webinar Series

November 29 - December 2, 2021

## Households that experienced energy insecure situations, 2015 percent of households



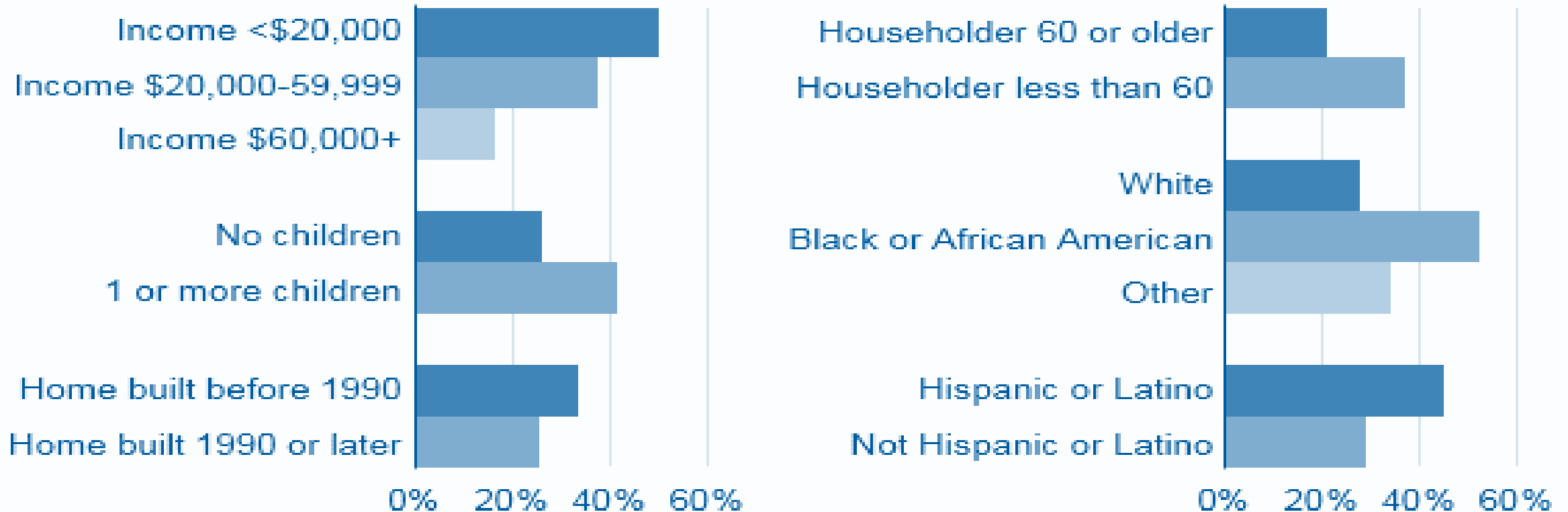
# Low-income, elderly, and people of color experience most energy burden



Innovations in Energy Efficiency  
Webinar Series

November 29 - December 2, 2021

Household energy insecurity by household characteristics, 2015  
percent of households



Improving energy efficiency is one strategy to address energy inequities

# **U.S. Department of Energy**

## **Affordable Home Energy Earthshot**

**Announced October 12, 2023**

# The Energy Affordability Challenge

Our imperative is to deliver equitable solutions to households with the highest energy burdens.



## High energy burdens

**1 in 4** households face high energy burdens (>6% of income spent on energy).



## Energy affordability challenges

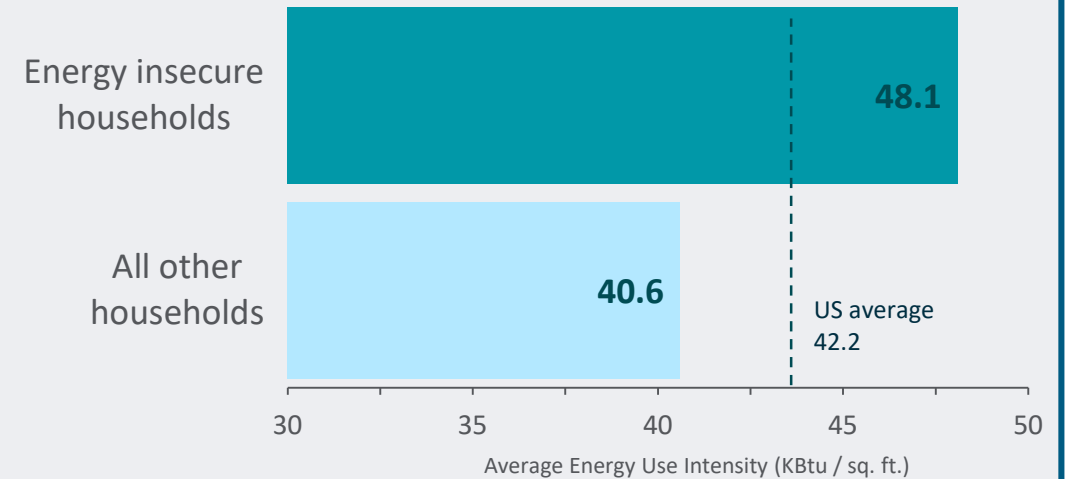
**1 in 5** households were unable to pay an energy bill in full in 2022.



## Adverse pollution & health impacts

Black children are nearly **twice as likely** to have asthma compared to the national average.

Households that experience energy insecurity live in **less efficient** homes.

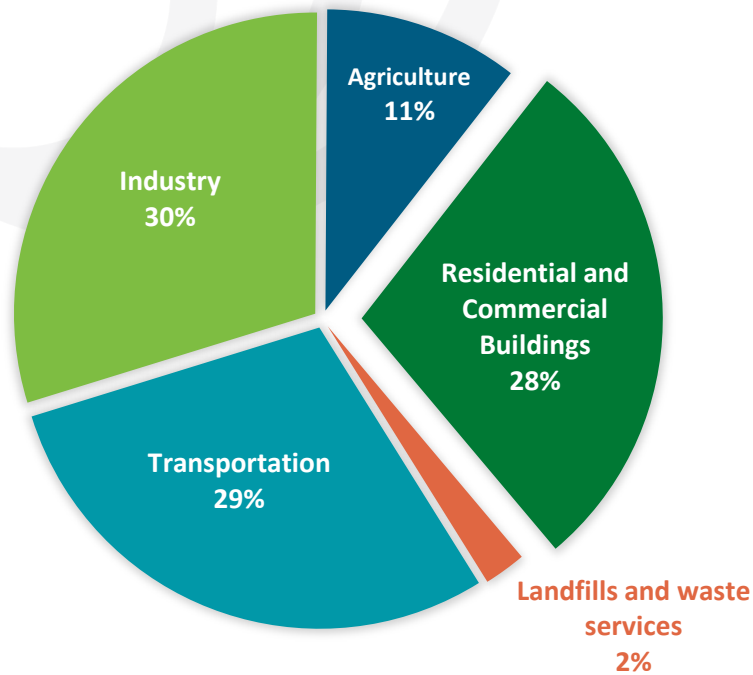


Source: US Energy Information Administration, 2020 Residential Energy Consumption survey



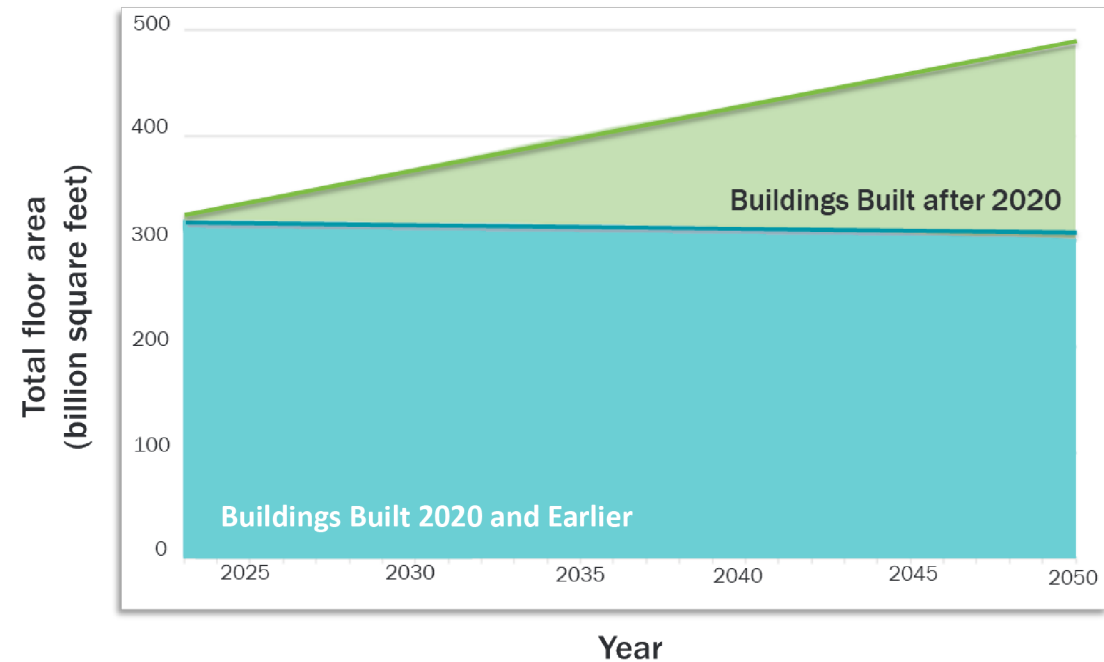
# The Building Decarbonization Challenge

Buildings are a **leading emitter of GHGs** in the United States



Total U.S. Greenhouse Gas Emissions by Sector with Electricity Distributed  
 Source: U.S. EPA, Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2021, 2021 data

**Retrofits are key:** The majority of buildings that will exist in 2050 have already been built today



Source: ACEEE calculations based on data in EIA AEO 2023; LBNL Building Performance Standards Overview graphics

# Earthshot Mission Enables Energy Affordability & Building Decarbonization

Energy Earthshots target the major innovation breakthroughs  
we must achieve to solve the climate crisis.

## Ambitious

Affordable housing is the most difficult-to-decarbonize portion of the building sector.

## Purposeful

Advancing clean, affordable technology solutions that address household energy needs.

## Leading the way

Acting first to lead the private sector to address the specific needs facing affordable housing.

# Approach to Affordable Housing\*

\*single-family, multifamily, and manufactured homes occupied by households earning <80% of the area median income

The Affordable Home Energy Earthshot focuses on the challenges facing the 50M homes that make up the U.S. affordable housing stock.



## Focus on multifamily and manufactured homes

Over 60% of multifamily and manufactured buildings serve as affordable housing and face unique decarbonization and affordability challenges.



## Create scalable solutions that minimize disruptions to renters

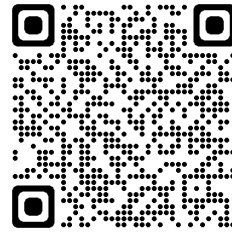
Over 58% of low-to-moderate income households are renters.



## Target design barriers specific to older buildings

Affordable housing is more likely to lack adequate insulation and central AC, as well as experience other non-energy hazards such as lead and mold.

# Affordable Home Energy Earthshot



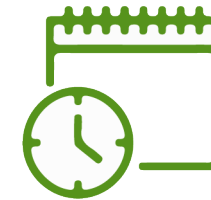
**GOAL: to reduce by 50%+ the cost of home retrofit packages needed to decarbonize affordable housing while lowering energy bills by 20% within a decade.**



50% lower  
upfront cost



20% lower  
energy bills



Within a decade



# **U.S. Department of Energy**

**Building Technologies Office (BTO)**

**program highlights focused on**

**Home Energy Affordability**

# Retrofit Field Validation & Demonstration

A new portfolio of field demonstration projects leading to de-risked, equitable, and scalable retrofit solutions in the existing U.S. housing stock



## Key Objectives:

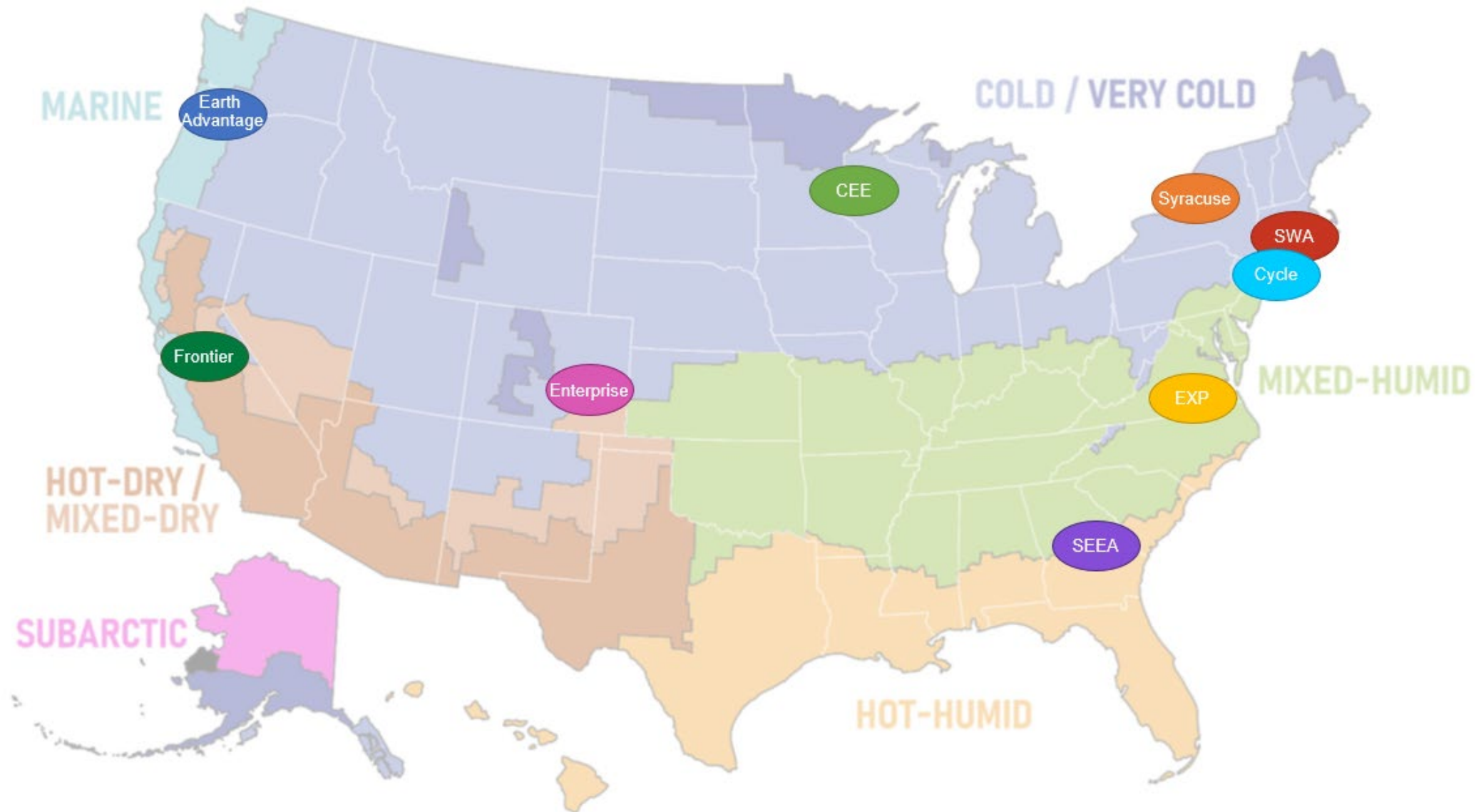
- Reduce risk of retrofits to end-users, utilities, contractors, financiers.
- Improve value proposition of retrofit improvements to end-users, utilities, regulators.
- Develop, disseminate, and promote use of best retrofit practices.
- Inform technology development to meet end-user/contractor needs.

Successful teams will develop and share best practices for de-risked, scalable, and equitable retrofit solutions to help decarbonize existing homes in their local community and the broader U.S. residential stock.

## Program Milestones

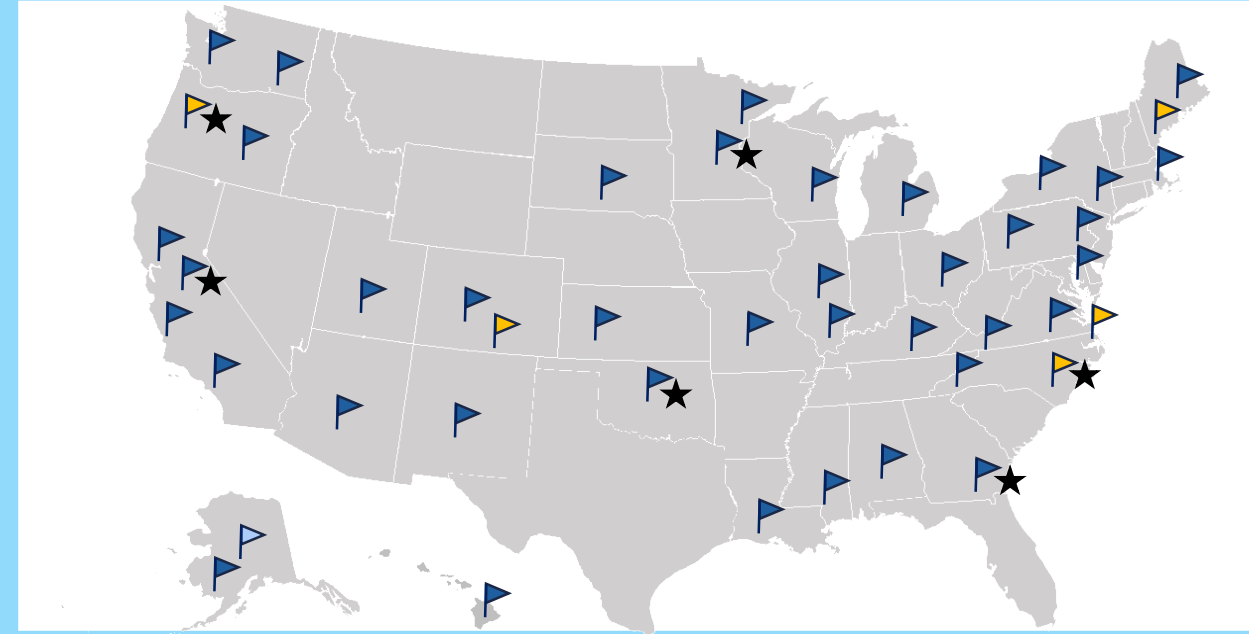
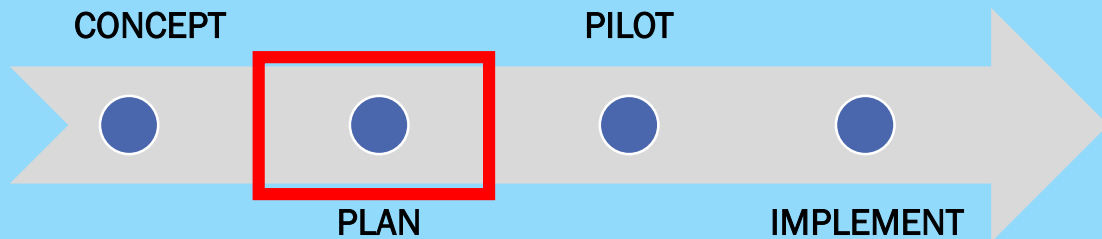


# Building America Retrofit Solutions Teams



# The Buildings Upgrade Prize (Buildings UP)

Buildings UP is designed to rapidly scale energy efficiency and efficient electrification building upgrades in communities across the country.



## Phase 2: PLAN

- 45 Phase 1 winning teams invited to Phase 2
- Phase 2 submissions open June 2024
- \$22M+ in cash prizes and Technical Assistance available to Phase 2 winning teams

Powered by ESG, 49 countries, Microsoft, Translart



# DOE Zero Energy Ready Home (ZERH) Program Overview

## What is the DOE ZERH Program?

- A nationally-recognized voluntary certification program focused on:



- Energy efficiency
- GHG reductions
- Indoor air quality
- Comfort
- Moisture management
- Renewable readiness
- Electric readiness (V2)

## What does the ZERH program do?

- **Recognizes “high performance”** new homes that meet rigorous criteria
- Encourages adoption of energy efficiency technology **innovations**
- Provides participating builders and programs with **resources** to promote benefits of high performance, low emission homes to homebuyers
- **Certification** system **for 45L tax credit**

# DOE ZERH Builds Upon EPA Certification Programs

## Companion federal programs recognize home performance beyond energy code minimums

Indoor airPLUS integrates a full set of indoor air quality measures

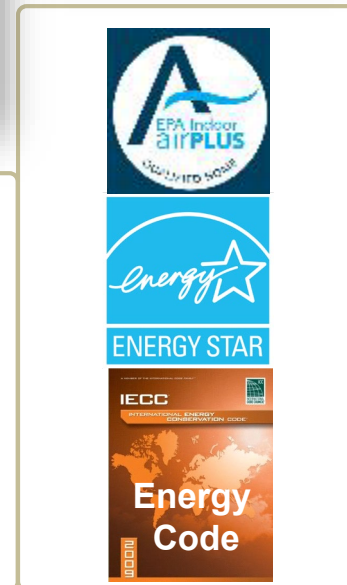
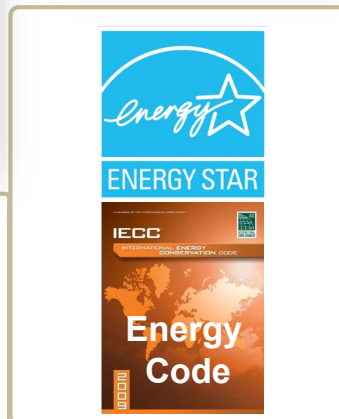
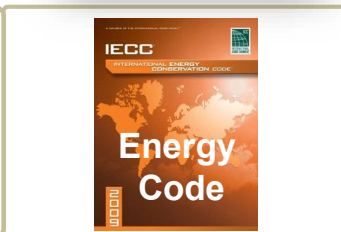
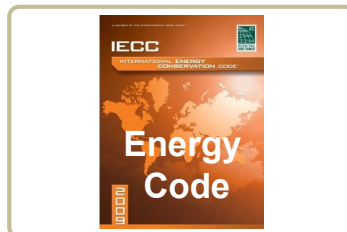


DOE's Zero Energy Ready Home Program establishes the highest performance levels of federal programs to advance efficiency in the housing industry. Requires ENERGY STAR Homes and Indoor airPLUS as prerequisites.

ENERGY STAR Homes increases efficiency requirements & adds building science "best practices"



The International Energy Conservation Code (IECC) is the model energy code, adopted at state/local level



All 3 federal programs use the **same certification infrastructure** (except IAP does not serve MH sector):

- HCO's/MRO's oversee verifiers (e.g., HERS)
- Verifiers certify homes using HCO approved software + onsite QA

# ZERH & State Low Income Housing Tax Credit (LIHTC) Programs

ZERH Multifamily Version 2 will be referenced (either required or incentivized) in numerous affordable housing programs.

## States with direct references:

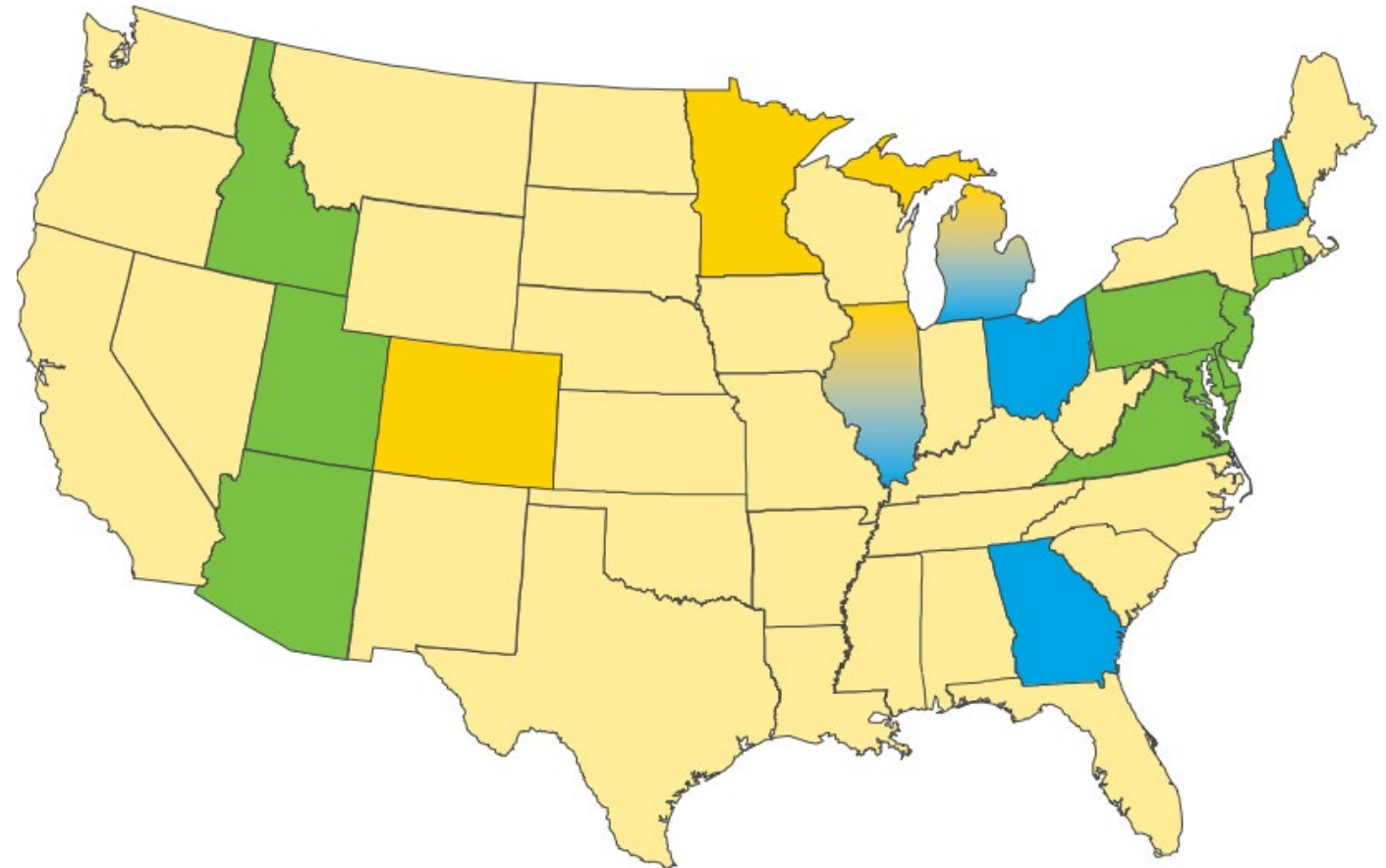
Arizona, Connecticut, Delaware, Idaho, Maryland, New Jersey, Pennsylvania, Rhode Island, Utah, Virginia

## States with reference via EGC Plus:

Colorado, Washington D.C., Illinois, Michigan, Minnesota

## States with ongoing engagement:

Michigan, Illinois, Georgia, New Hampshire, Ohio



# Affordable Housing Project is 2023 Grand Winner



**Affordable Housing Concepts**  
New Paltz, NY  
Project: Zer0 Place



## Off the Shelf

Efficient Installation

Shows what can be accomplished if advanced materials are widely adopted

## Blazing the Trail

Most advanced everything

Pushes the limit on performance in all categories

## Class is in Session

Research and publication of monitored data

## Decarbon Copy

Cold Climate Electrification – Extreme performance = cooling dominant design

Community Energy Monitoring + Solar

Transit Oriented Design

Minimal Operational Carbon

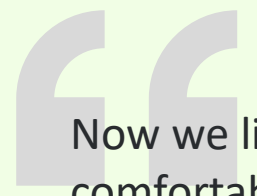




## Habitat for Humanity of Catawba Valley

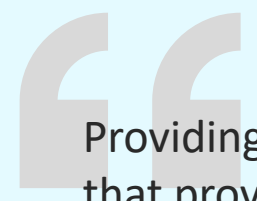
Hickory, NC  
Project: Northstone Bungalow

**HERS Score: 46**  
**Average Monthly Energy Bill: \$65**



Now we live in a Zero Energy Ready Home that is comfortable, with healthy air to breathe, and our energy bills have decreased.

— HOMEOWNER



Providing our residents with sustainable healthy homes that provide a safe and comfortable living environment for their families.

— BUILDER

**101**  
**Affordable Units**  
**Average Monthly Energy Bill: \$2**  
*Average across all units*



**Mutual Housing California**  
Sacramento, CA  
Project: Mutual Housing at Spring Lake

# DOE ZERH & the Federal Tax Credit for New Homes (45L)



45L Tax Credit available until **2032**



Different program versions for different years

Residential Building Types:	ENERGY STAR Homes	Zero Energy Ready Homes
Certified Single-Family Homes, Duplexes, Townhomes, & Manufactured Homes	\$2,500 each	\$5,000 each
Certified Units in Multifamily Buildings	\$500 each	\$1,000 each
Certified Units in Multifamily Buildings when prevailing wage requirements are met	\$2,500 each	\$5,000 each

IRS [Notice 2023-65](#) establishes that the ZERH program requirements under which homes must be certified are provided on the DOE Zero Energy Ready Home Program Requirements webpage:

<https://www.energy.gov/eere/buildings/doe-zero-energy-ready-home-zerh-program-requirements>

## DOE ZERH Program Home Page

### Zero Energy Ready Home Program

#### ZERO ENERGY READY HOME

- 45L and ZERH
- Partner Central
- **Program Requirements**
- DOE-Recognized ZERH Certification Organizations
- Program Resources
- Housing Innovation Awards
- FAQs



#### What is a DOE Zero Energy Ready Home?

A DOE Zero Energy Ready Home is a high-performance home that is so energy efficient that a renewable energy system could offset most or all the home's annual energy use. Each DOE Zero Energy Ready Home meets rigorous efficiency and performance criteria found in the DOE Zero Energy Ready Home National Program Requirements. Most types of new homes in the U.S. are eligible to participate in the DOE Zero Energy Ready Home program, and the homes are verified by a qualified third-party as part of the certification process.



The Section 45L Tax Credit for Energy Efficient New Homes has been updated and extended through 2032. Beginning 1/1/2023, it directly references the DOE Zero Energy Ready Home Program. See FAQs, guidance, and implementation timelines here.



**45L and ZERH**

Partner Locator

[Find a Zero Energy Ready Home Builder Near You!](#)

DOE Tour of Zero

[Take a Look Inside Zero Energy Ready Homes Across the Country!](#)

# **U.S. Department of Energy**

**State & Community Energy Program (SCEP)**

**IRA rebates focused on  
Home Energy Affordability**



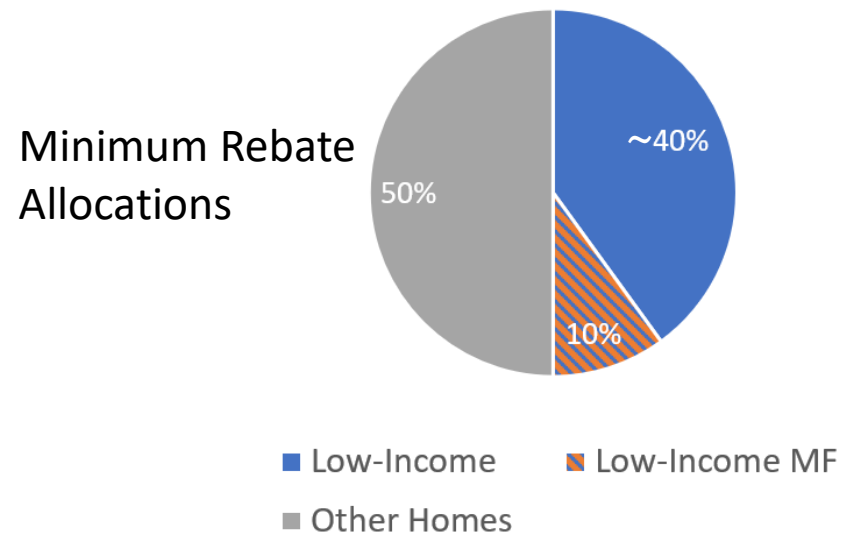
# Home Energy Rebates Program Design – Equity

- 50121 doubles rebate levels (up to 80% of project cost) for low-income homes, with option to increase max rebate levels for low-income homes at the request of the state
- 50122 only for low-income (80% AMI) and moderate-income (<150% AMI) homes
- States required to create a Community Benefits Plan with the following elements:
  - Plans for community engagement with CBOs, members of DACs, Labor, other stakeholders
  - Plans for how states will ensure workforce development for good jobs with DEIA considerations
  - Plans for how states will ensure direct benefits reach low-income households in DACs
    - 50121 requires \$200 incentive to contractor for serving DACs
    - 50122 can include up to \$200 incentive to contractor for serving DACs
- Tools to help states identify and target rebates for rural areas with expensive delivered heating fuels and other areas with energy poverty / high energy burden
- Opportunity for rebates to braid with other funding from HUD, EPA, USDA, BIA

# Low-Income and Low-Income Multifamily Set Asides

## Requirements will ensure rebates reach Low-Income and Low-Income Multifamily Households

- All states are required minimum allocation of ~50% for low-income households, including a 10% minimum allocation for low-income multifamily households
  - Justification in requirements document is based on statutory references to low-income and LI MF households and historic structural barriers that make achieving the statutory goals unlikely/impossible without a low-income set aside.
- States also required to create a Community Benefits Plan that covers community engagement, workforce development, DEIA for jobs for home energy retrofits, and a state's contributions to the Justice40 Initiative
- Applicable J40 benefits:
  - Decrease energy burden, increase in clean energy parity, increase in contracting, increase in energy jobs



# Housing Affordability: Innovations and Best Practices

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**Tyler Pullen**

Terner Labs and Terner Center

November 2023



# Housing Affordability: Innovations and Best Probably Good *Practices*

---

**Tyler Pullen**

Terner Labs and Terner Center

November 2023

TERNER  
CENTER  
FOR HOUSING  
INNOVATION  

---

UC BERKELEY



# Who are we?

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“Innovation”

The Buzz

---

TERNER  
CENTER  
FOR HOUSING  
INNOVATION  
UC BERKELEY

# “Innovation”: The Buzz

Can 3D printing become a solution to the housing shortage?

Feb 23, 2022 6:35 PM EDT

BUILDER FLOORPLANS HOME OF

CAL MATTERS

HOUSING

## Can factory-built apartments solve California's housing woes?

BY MATT LEVIN, OCTOBER 22, 2019 UPDATED MAY 24, 2023

BAY CURIOUS

## The Bay Area Has a Housing Crisis (Obviously.) Could Prefab Be the Answer?



By Katrina Schwartz Feb 4, 2021 Save Article



Modular Housing the Solution to the Housing Crisis

## How 3D printing can be the solution to the housing crisis

URBANLAND

Topics ▾ In

Urban Land > Planning & Design > Modular Construction Offers Solution to Affordable Housing Crisis

## Modular Construction Offers Solution to Affordable Housing Crisis

By Karen Jordan  
March 3, 2023

Text Size: A A A

rtf Rethinking The Future

RTF AWARDS' 22 ▾

ARTICLES BY RTF ▾

COURSES

DESIGNING FOR TYPOLOGIES

## Modular Housing as a Solution to the Affordable Housing Crisis

Affordable outcomes don't *necessarily* require  
new [technology, delivery models, etc.]

“Innovation”

The Bees

---

TERNER  
CENTER  
FOR HOUSING  
INNOVATION  
UC BERKELEY



# “Innovation”: The Bees

---

- Design (not just architects)
- Contracts
  - Integrated project delivery (IPD)
- Building code
  - Cross-jurisdictional alignment
  - Performance code
- Retrofits

# Terner's Housing Lab

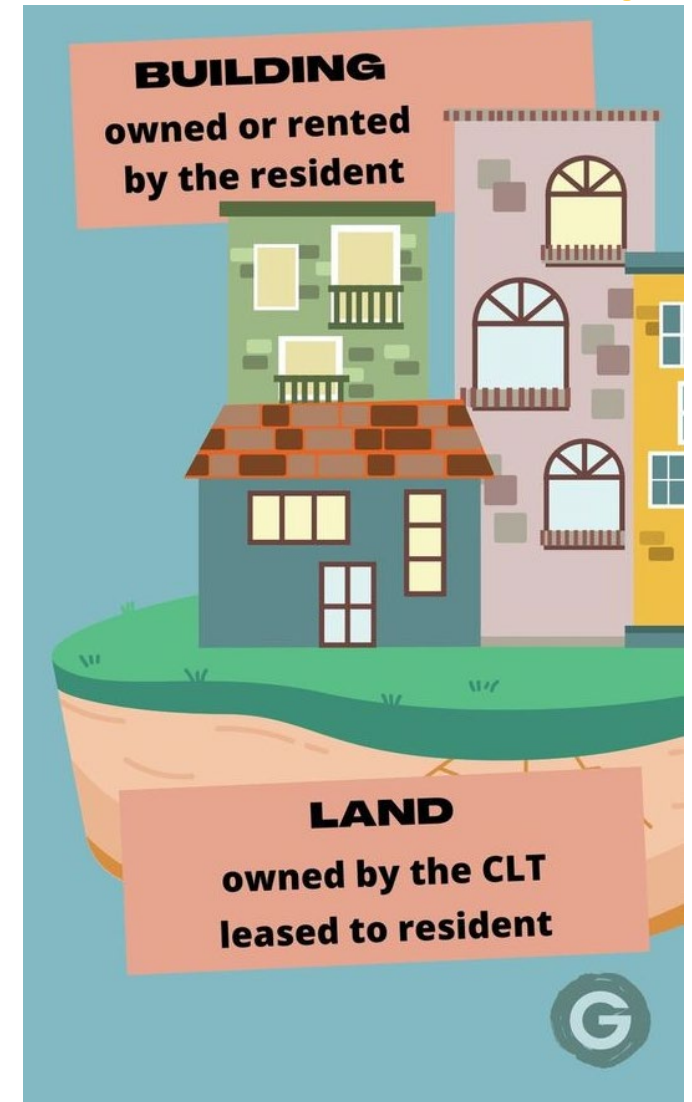
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- Catalyzes new firms with coaching, relationship building
- Company examples:
  - Parity (Baltimore)



# Turner's Housing Lab

- Catalyzes new firms with coaching, relationship building
- Company examples:
  - Parity (Baltimore)
  - The Guild (Atlanta)



# Turner's Housing Lab

---

- Catalyzes new firms with coaching, relationship building
- Company examples:
  - Parity (Baltimore)
  - The Guild (Atlanta)
  - Frolic Communities (Seattle)





# Terner's *Builders* Lab to Launch in 2024

---

- Supporting innovative and industrialized construction
  - Technical coaching, mentorship
  - International study tours





# Terner's *Builders* Lab to Launch in 2024

- Supporting innovative and industrialized construction
  - Technical coaching, mentorship
  - International study tours
- 2025: Physical site for prototyping, testing



“Innovation”

The Honey

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CENTER  
FOR HOUSING  
INNOVATION  

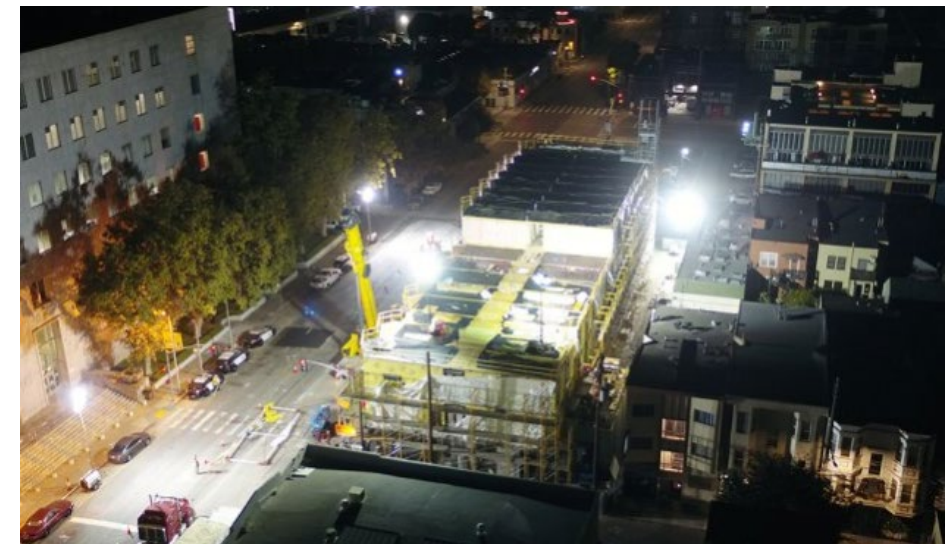
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UC BERKELEY



# Case Study: 833 Bryant (2022)

- Supportive housing project in San Francisco (145 units)
- *Complementary interventions*
  - a. Policy (state): Streamlined permitting
  - b. Nonprofit and local government: Flexible financing
  - c. Industry: Modular construction
- Outcomes: 30% time savings, **25% cost savings**





# Another Case: Parkside at Sabre City (2023)

- Single family rentals (44 units): 80% and 30% AMI
- *Complementary interventions*
  - a. Policy (state): Split lot + ADU
  - b. Local government and nonprofit: Soft debt (no LIHTC)
  - c. Industry: HUD-code homes (with EE improvements!)
- Outcomes: >50% time savings, replicable model



The challenges for innovation are the same  
challenges for housing writ large



# These Challenges Include:

---

- Uncertainty and inconsistency in housing development
- Familiarity/experience
- Industry fragmentation
- Workforce development/inclusion
- Risk aversion (culturally, financially)

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INNOVATION  
UC BERKELEY

# Open Questions

---

- What/who are the best leverage points, and how do we engage them *in tandem*?
  - Government(s)?
  - Industry associations?
  - Universities?
- How to change *culture*?

“Innovation”

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INNOVATION  
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Cross-Pollination

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# Thank you!

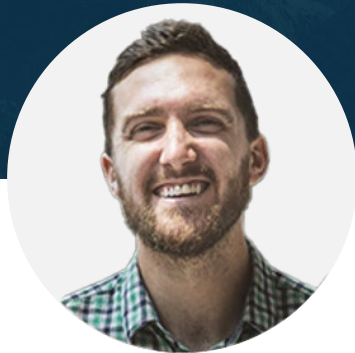
## To follow us or follow up:

[turnercenter.berkeley.edu](http://turnercenter.berkeley.edu)

[turnerlabs.org](http://turnerlabs.org)

[tpullen@berkeley.edu](mailto:tpullen@berkeley.edu)

# Session 2: Examining Solutions- Innovation and Best Practices



**Tyler Pullen**

Senior Technical Advisor, Turner Center  
for Housing Innovation, UC Berkeley &  
The Housing Lab



**Eric Werling**

Building America National Director,  
Building Technologies Office, Dept. of  
Energy



**Vicki Worden- Moderator**

President & CEO, Green Building Initiative



# Welcome to the Housing Affordability Hearing

Hosted by the NIBS Consultative Council

# Session 3: Examining Solutions- Means and Methods



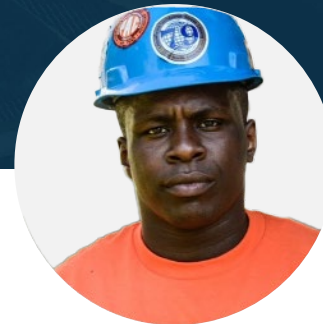
**Yonah Freemark, Ph.D.**

Senior Research Associate,  
Metropolitan Housing and  
Communities Policy Center,  
Urban Institute



**Ivan Rupnik, Ph.D.**

Founding Partner, MOD X &  
Assoc. Professor,  
Northeastern University



**Justice Favor**

Director of Strategic  
Partnerships, Greater New  
York Laborers-Employers  
Cooperation and Education  
Trust (GNY- LECET)



**Thomas W. Smith  
III, Moderator**

CEO, ASCE  
Vice Chair, NIBS Consultative  
Council



# Examining Solutions Means and Methods for *Framing* Offsite Construction

**Ivan Rupnik, Phd**  
Founding Partner, MOD X  
Associate Professor, Northeastern University





**Ryan E. Smith**  
Founding Partner, MOD X  
*Tucson, Arizona*

Professor of Architecture  
Director School of  
Architecture  
University of Arizona



**Ivan Rupnik, PhD**  
Founding Partner, MOD X  
*Boston / Zagreb, HR*

Associate Professor of  
Architecture  
Northeastern University  
MARCH, PhD, Harvard  
University



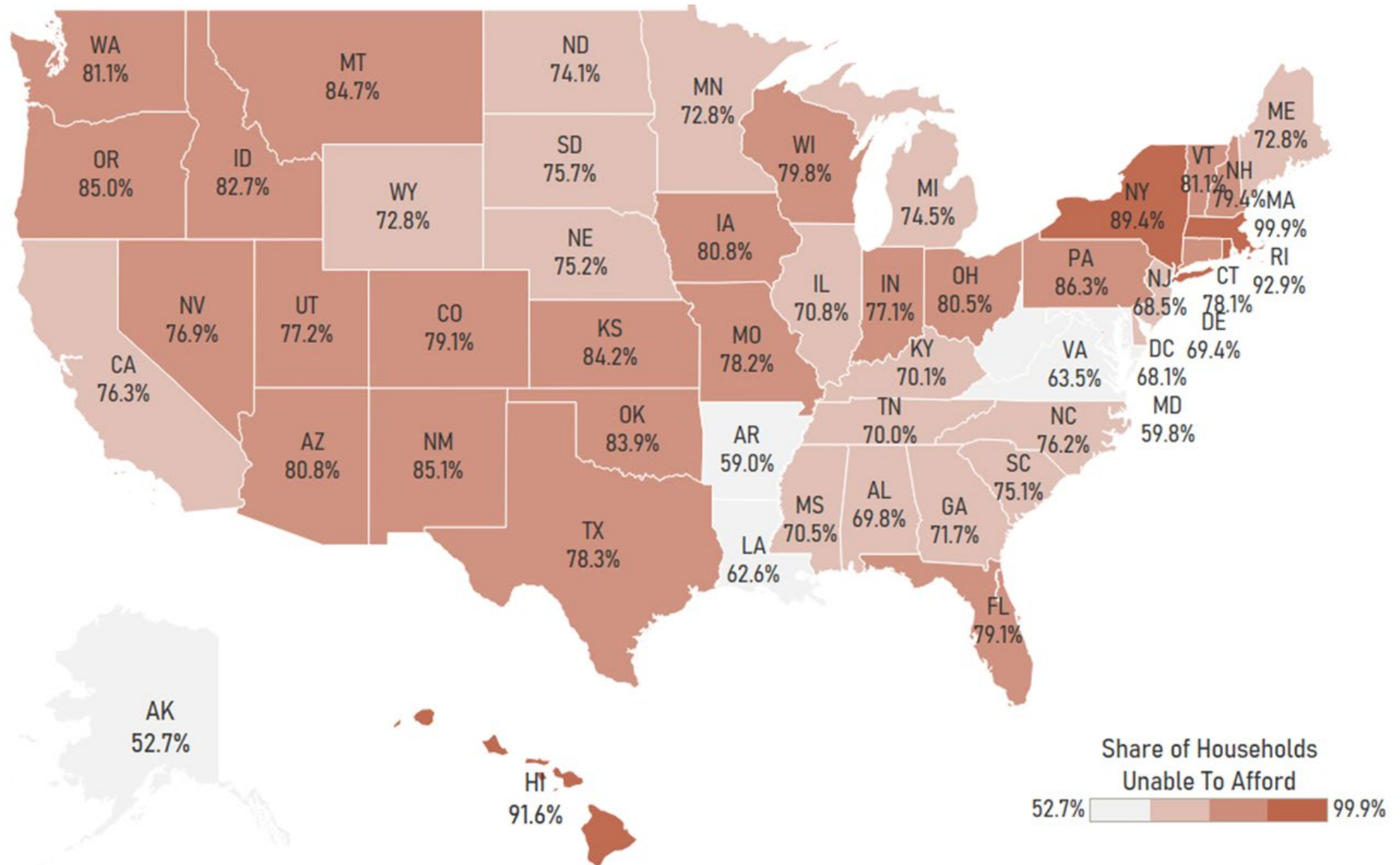
**Tyler Schmetterer**  
Managing Partner, MOD X  
*NYC / Geneva*

Offsite design-build-develop  
industry experience (20+ yrs)  
Global Advisory Boards in  
sustainable building,  
renewable energy, and  
impact capital industries

**MOD X is a research, education and advisory group focused on addressing societal challenges through the industrialization of construction.**

# Introduction

## National Housing Affordability Crisis (2023)





## Introduction

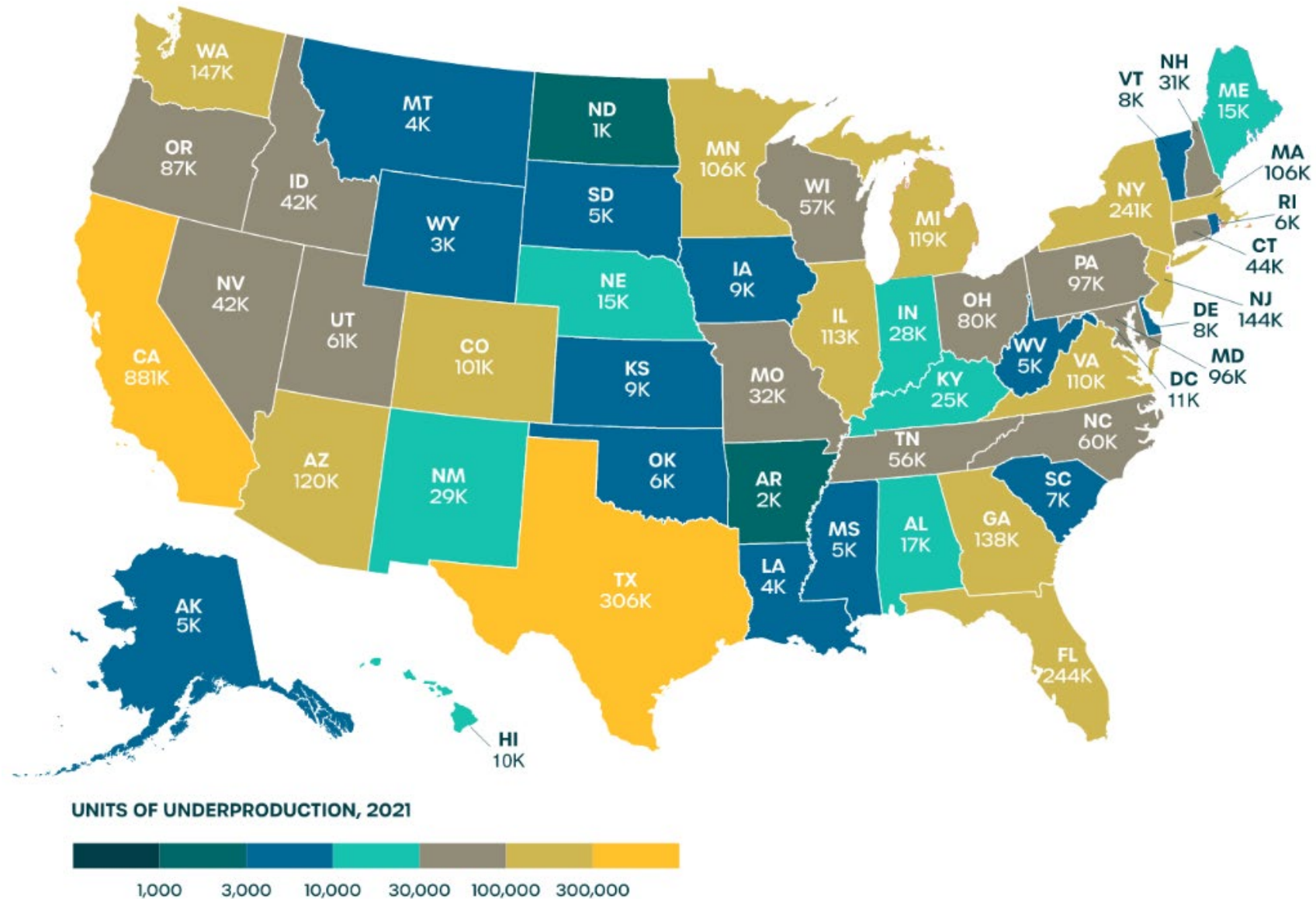
Can we offsite construction help housing affordability?



**Can offsite  
construction help  
increase  
housing  
affordability?**

# Introduction

## National Housing Undersupply (2021)



## Introduction

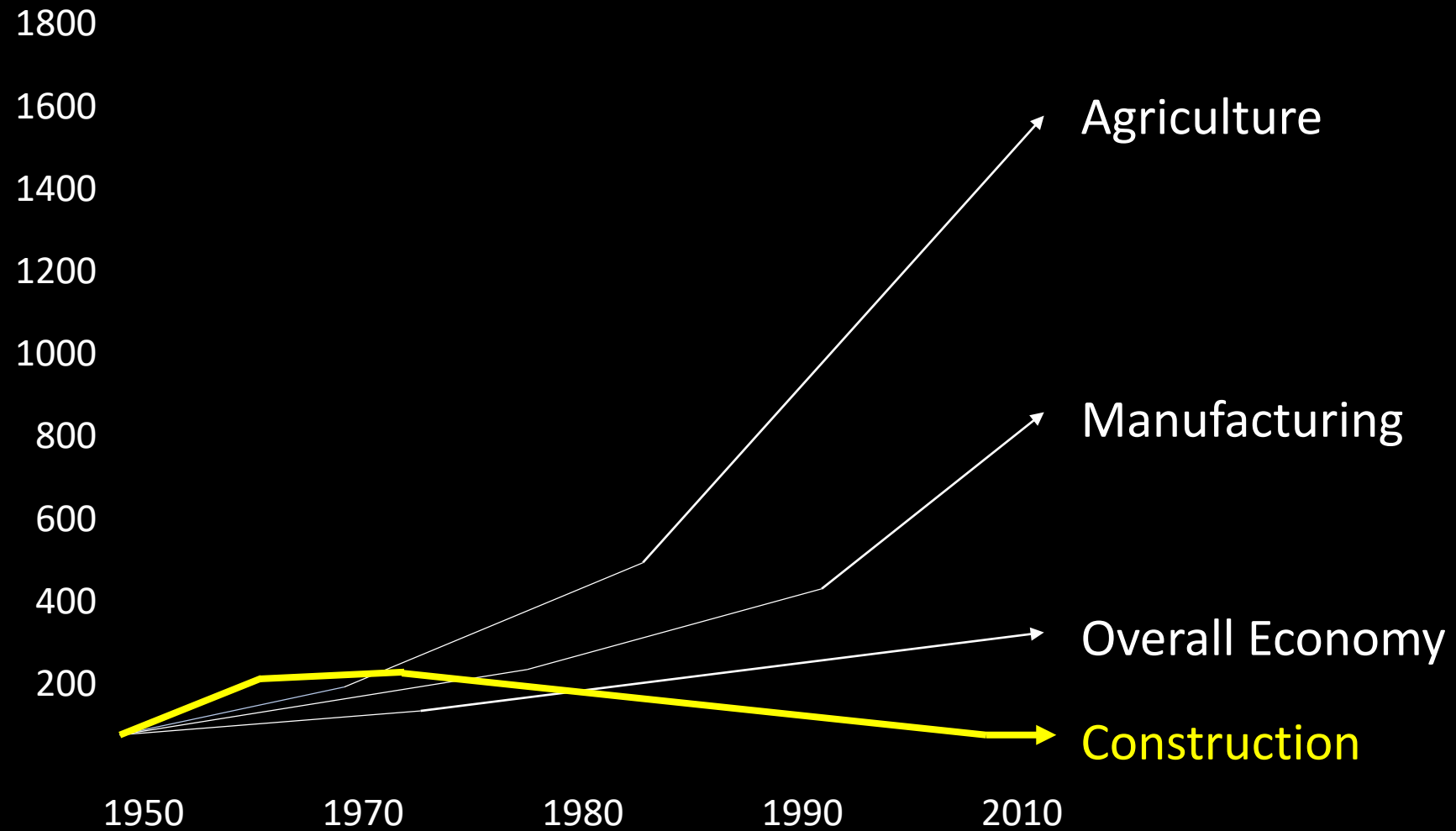
Can we increase housing availability?



**Can offsite  
construction help  
increase  
housing  
availability?**

# Decline in Construction Productivity in the US

## “Reinventing Construction: A Route To Higher Productivity”



## Introduction

Can we increase housing availability?



**Can offsite  
construction help  
increase  
housing  
productivity?**



# Improvements to Productivity: "Manufacturing Style Production"

McKinsey Global Institute



> 60%

Productivity boost  
(onsite)

- Reshape regulation
- Rewire contracts
- Rethink design
- Improve procurement and supply chain
- Improve onsite execution
- Infuse technology and innovation
- Reskill workers

> 10X

Productivity boost  
(offsite – onsite)



- Move to a manufacturing style production system

**Increasing Housing Affordability**  
> Different *Frames* For Offsite Construction



**USA            Fair Housing Act + Operation Breakthrough**

**Japan           Finance Agency + Pilot Program**

**Sweden        Million Homes Program + BBR94**

**UK                    MMC Framework**

**USA            Strategy: Innovation Framework for Offsite**

# Fair Housing Act

26 Million Homes in 10 Years



- US housing **productivity grew 2%** every year from 1946 until 1959, supporting adequate housing **supply**.



## Fair Housing Act

26 Million Homes in 10 Years



- **Mid 1960s: productivity stagnated, supply** became constrained, **housing affordability declined**, cost of delivering public housing began to increase.
- **1968 The Fair Housing Act** called on the delivery of **26 million homes in ten years**, to **exceed supply demand** in order to **increase housing affordability**.
- **1969**, HUD Secretary, George Romney responded with "Operation Breakthrough", a program designed to *break through* the **internal** and **external barriers** limiting US offsite construction, the only mode of housing delivery capable of meeting such an increase in housing supply.

## Operation Breakthrough

Breaking through “barriers” to industrialized home delivery



***Offsite construction  
could increase  
housing supply and  
ultimately increase  
affordability***



## Operation Breakthrough

Breaking through “barriers” to industrialized home delivery



- HUD’s assessment of the barriers **Operation Breakthrough** would *break through* were as follows:

**INTERNAL BARRIERS** preventing the construction sector shifting to a R&D-centric business model needed for higher productivity and industrialization

**EXTERNAL BARRIERS** : a fragmented regulatory framework consisting of prescriptive building codes based on onsite conventions and a high degree of local authority over interpretation of that framework > a lack of incentive to overcome internal barriers

## Operation Breakthrough

Breaking through “institutional constraints” to industrialized home delivery



**PHASE 1. Identified 22 companies** in the US and abroad and helped them defray R&D costs for **developing building systems** using **performance based specification** developed by the National Bureau of Standards and HUD.

**PHASE 2. Utilized 9 sites** across US to **refine Phase 1 systems** and to **further test solutions to breaking through a variety of external barriers to industrialization and offsite construction.**

**PHASE 3.** Planned to help companies **scale** by guaranteeing a **multi-year project pipeline** of affordable housing projects, after which the companies would be expected to operate in the free market.

## Operation Breakthrough

Breaking through “institutional constraints” to industrialized home delivery



**PHASE 1.** was **generally successful**, especially those companies who were already practicing many of the principles of industrialization, but who needed help navigating a fragmented regulatory framework.

**PHASE 2.** was **less successful**, with the fragmented regulatory framework and local authority proving more difficult to navigate than expected, creating significant delays and cost overruns.

**PHASE 3.** was **prematurely cut short**, with companies **lacking a stable pipeline** of affordable housing projects to amortize their significant investments in R&D, people and equipment during a major recession.

## Operation Breakthrough

Impacting Today's US Offsite Sector



Two key **OB outcomes** that impact US today:

- In order to run Operation Breakthrough, HUD championed the creation of “**industrialized building programs**” in **35 States**. Today, those programs provide a key framework for permitting and inspection of factories and offsite projects.
- Unable to transform the entire housing sector, HUD turned to **transforming the mobile home industry into the safer and higher quality manufactured home industry** through the 1976 **HUD Code**. Since that time 9 million + homes have been produced, at as much as a 50% savings when compared to conventional construction.



**HUD Code reframed  
offsite construction  
to achieve housing  
affordability.**

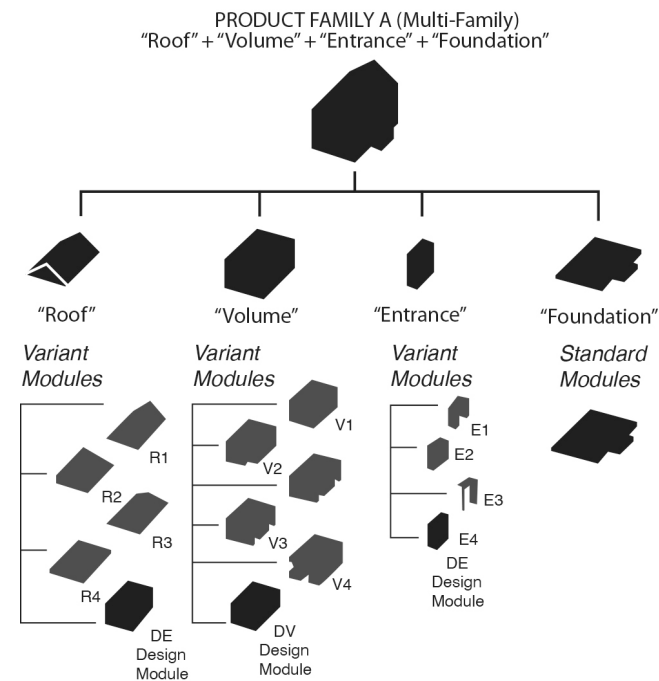
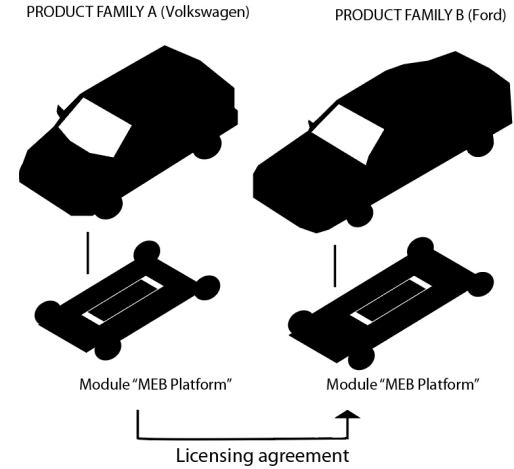
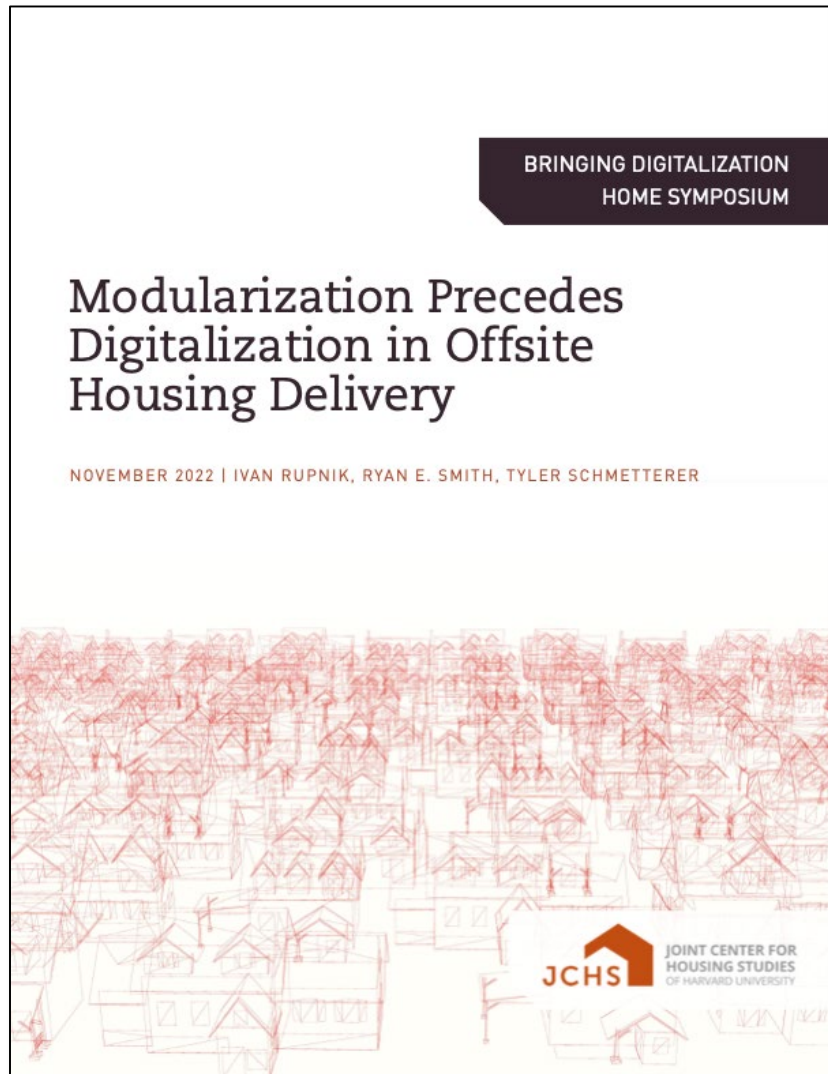






# Internal Barriers

## Lack of Widespread Manufacturing Mindset

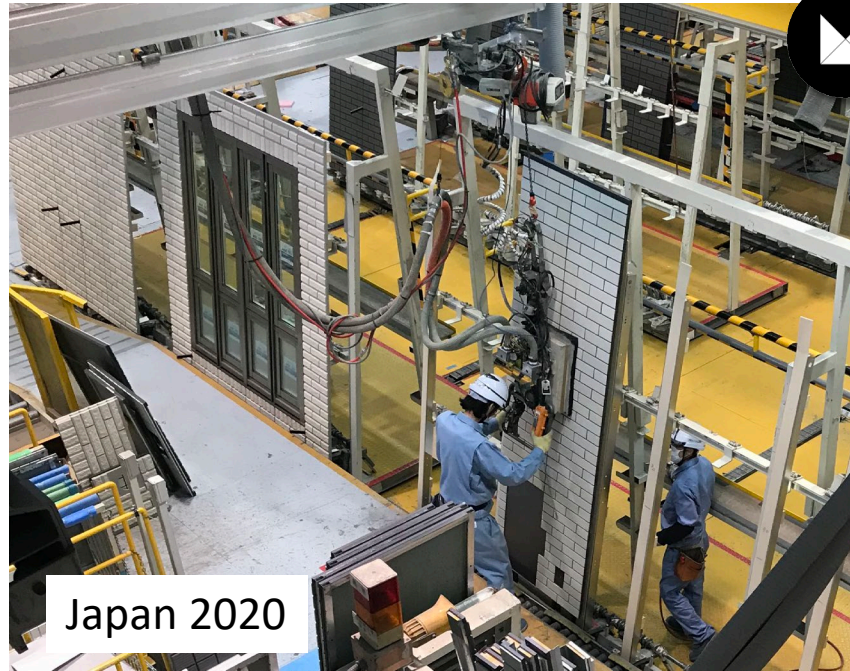




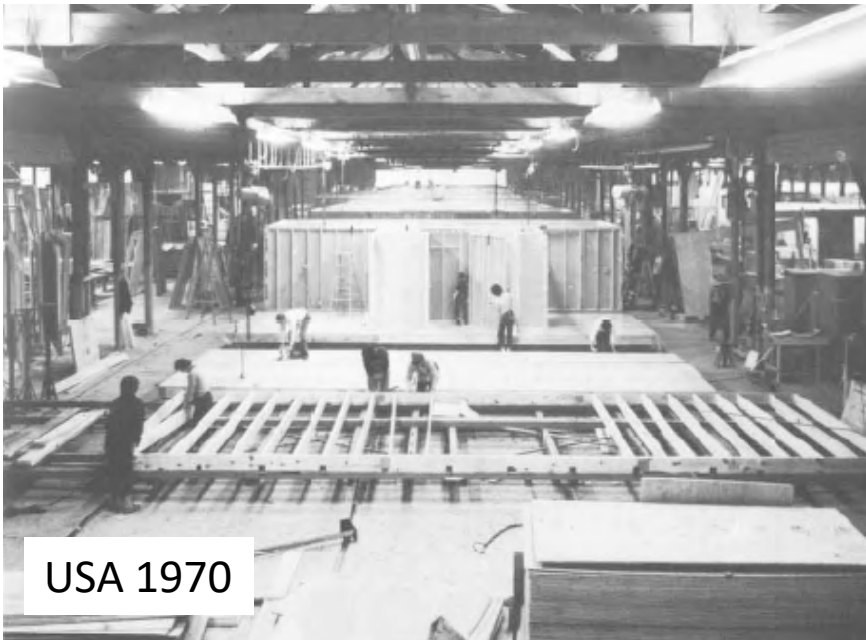
# US / International Comparison Operation Breakthrough Innovation



USA 1970



Japan 2020



USA 1970

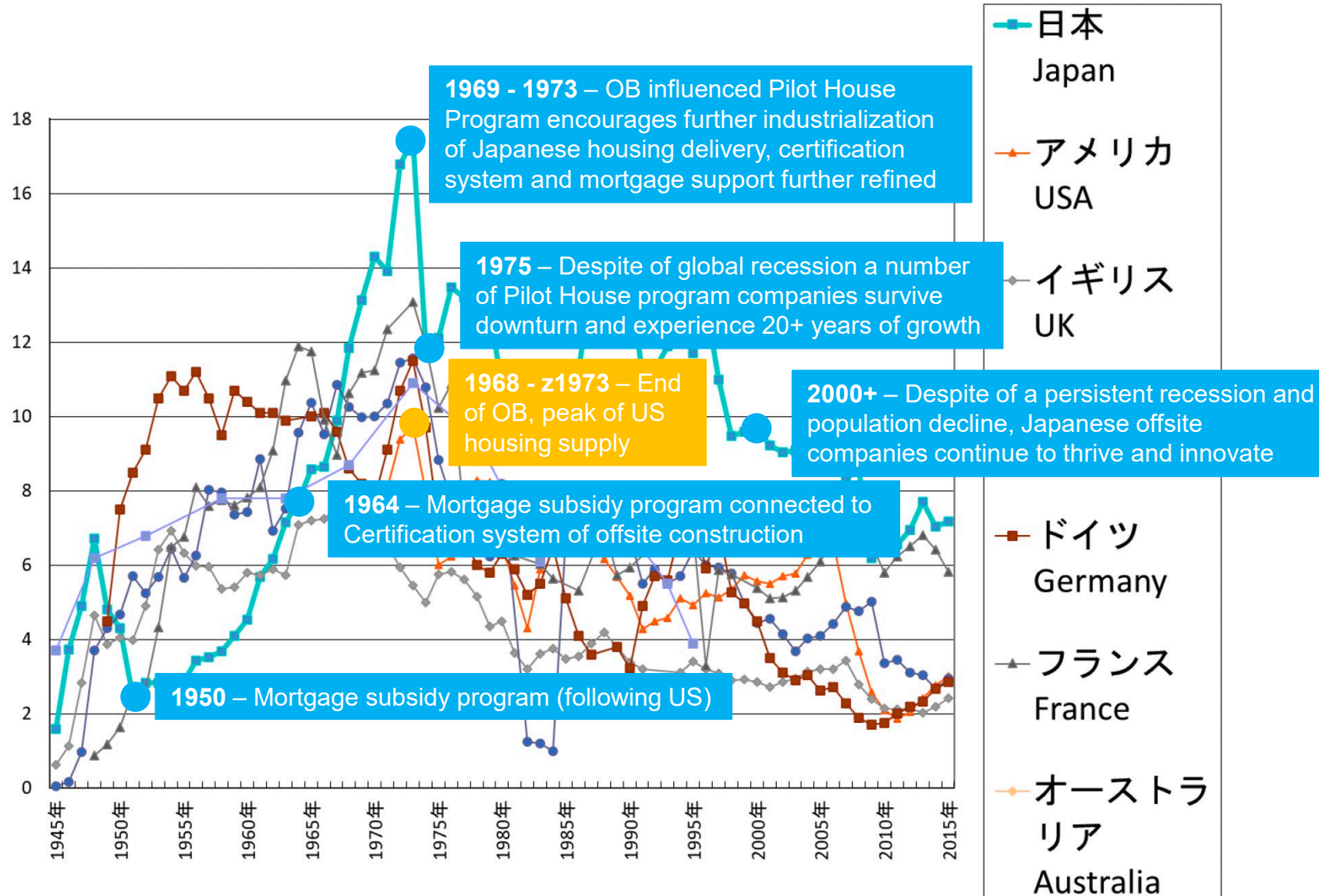


Sweden 2020



# Japan Offsite Construction Sector and Framework

## Newly Built Housing Units Per Thousand Inhabitants





# Japan Offsite Construction Sector and Framework

True mass customization

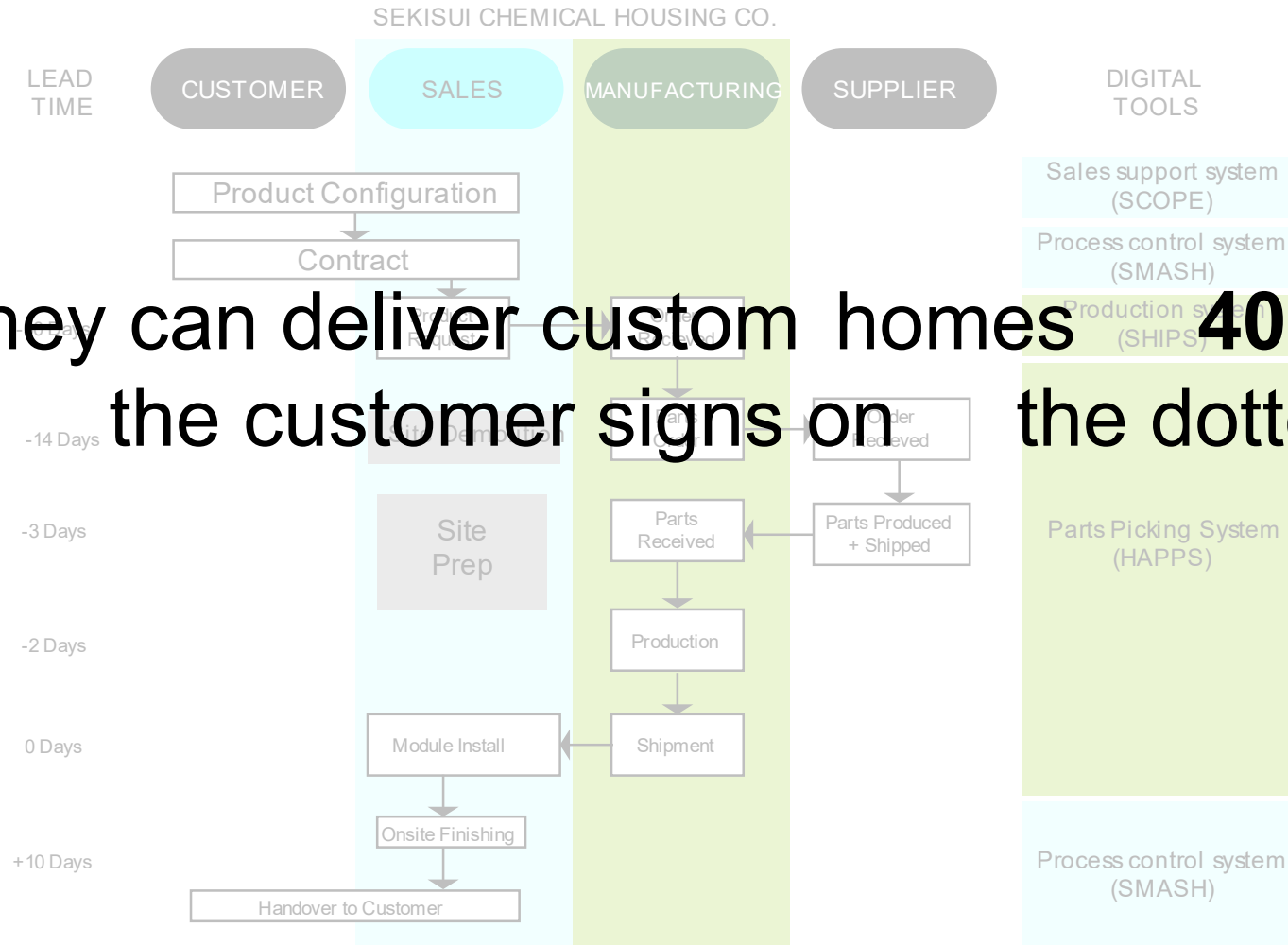


Japanese offsite companies are able to balance standardization and customization at scale, using sophisticated product platforms.



# Japan Offsite Construction Sector and Framework

## Dependable Delivery As Key Market Advantage



They can deliver custom homes **40 days** after the customer signs on the dotted line.



## Japan Offsite Construction Sector and Framework Onsite Industrialization



They are able to assemble highly finished components on site in a matter of hours.





# Japan Offsite Construction Sector and Framework

## Offsite Efficiency

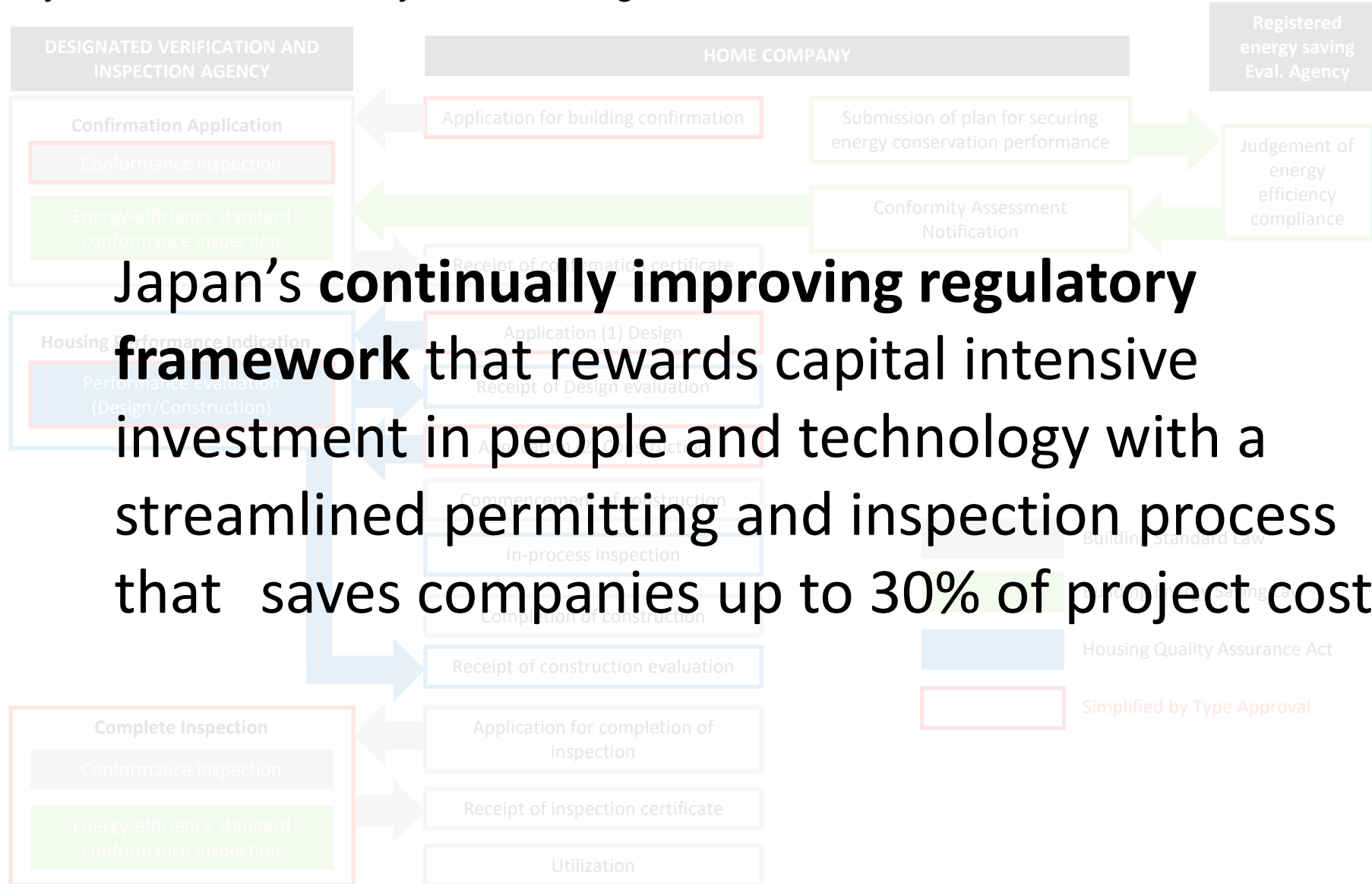


Modules move from station to station on the factory floor in a matter of minutes.



# Japan Offsite Construction Sector and Framework

## System Certification Key To Delivering On Promise of Offsite Construction



**Japan's continually improving regulatory framework that rewards capital intensive investment in people and technology with a streamlined permitting and inspection process that saves companies up to 30% of project cost.**



# Japan Offsite Construction Sector and Framework

## New Societal Goals Are Easily Added to the Existing System



Recycled home through unit home reuse system

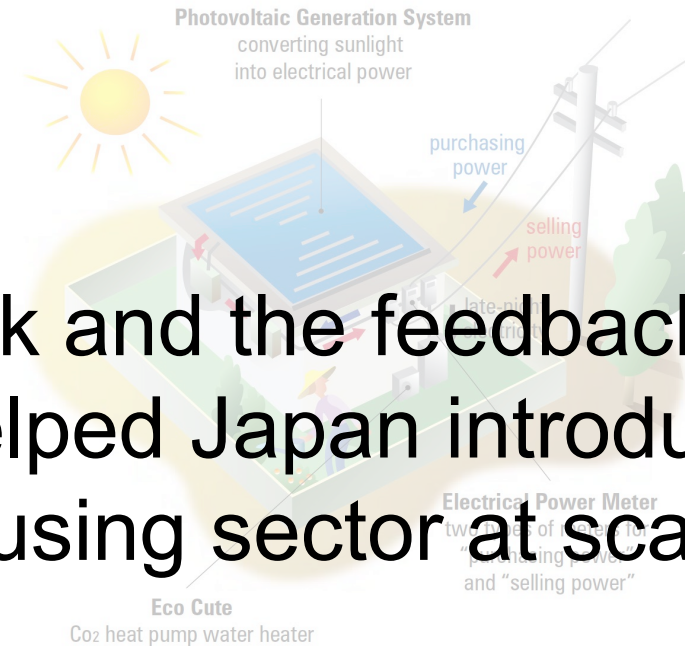


"Recycled home"

Installation at site

Inspection / renewal

That innovation framework and the feedback loop it affords has also helped Japan introduce **circular and net-zero** housing sector at scale with relative ease.



> **100%** Japanese builders responsible for all construction waste since **2000**

> **20%** of Net Sales at Sekisui Heim comes from “Life Business”, refurbishment and additions

> **100%** of new housing to be **Net Zero** by **2030**

> **95%** of Sekisui Heim homes Net Zero

> **65%** of Pre-Certified Systems Net Zero



## **Consistent Financing Strategy**

**Japan Finance Agency** has supported offsite construction by creating a **stable pipeline** through specific mortgage rate reductions since 1964

## **Rigorous Certification of Systems and Manufacturers**

Mortgage deductions have been closely tied to a system of certification of building systems and their related manufacturing processes which streamline permitting, inspection and appraisal.

## **Flexible Framework**

The same finance/certification system has also been used to encourage increased construction waste recycling, resilience, energy performance and accessibility since 2000

## Sweden Offsite Construction Sector and Framework

Increasing Housing Affordability > Increase Supply > Offsite Construction



- **1965** Sweden launches the **Million Homes Program** to **deliver a million homes in ten years to increase housing affordability for all citizens** (when adjusted for population, comparable to the US goal of 26 million)
- A **variety of financial tools** directed at home owners, renters as well as building companies created a **stable pipeline** to assist the building industry to **industrialize onsite construction as well as to move activities offsite**
- **1970** as a result of the program, **increased supply** stabilizes **housing affordability** for the next two decades

## Sweden

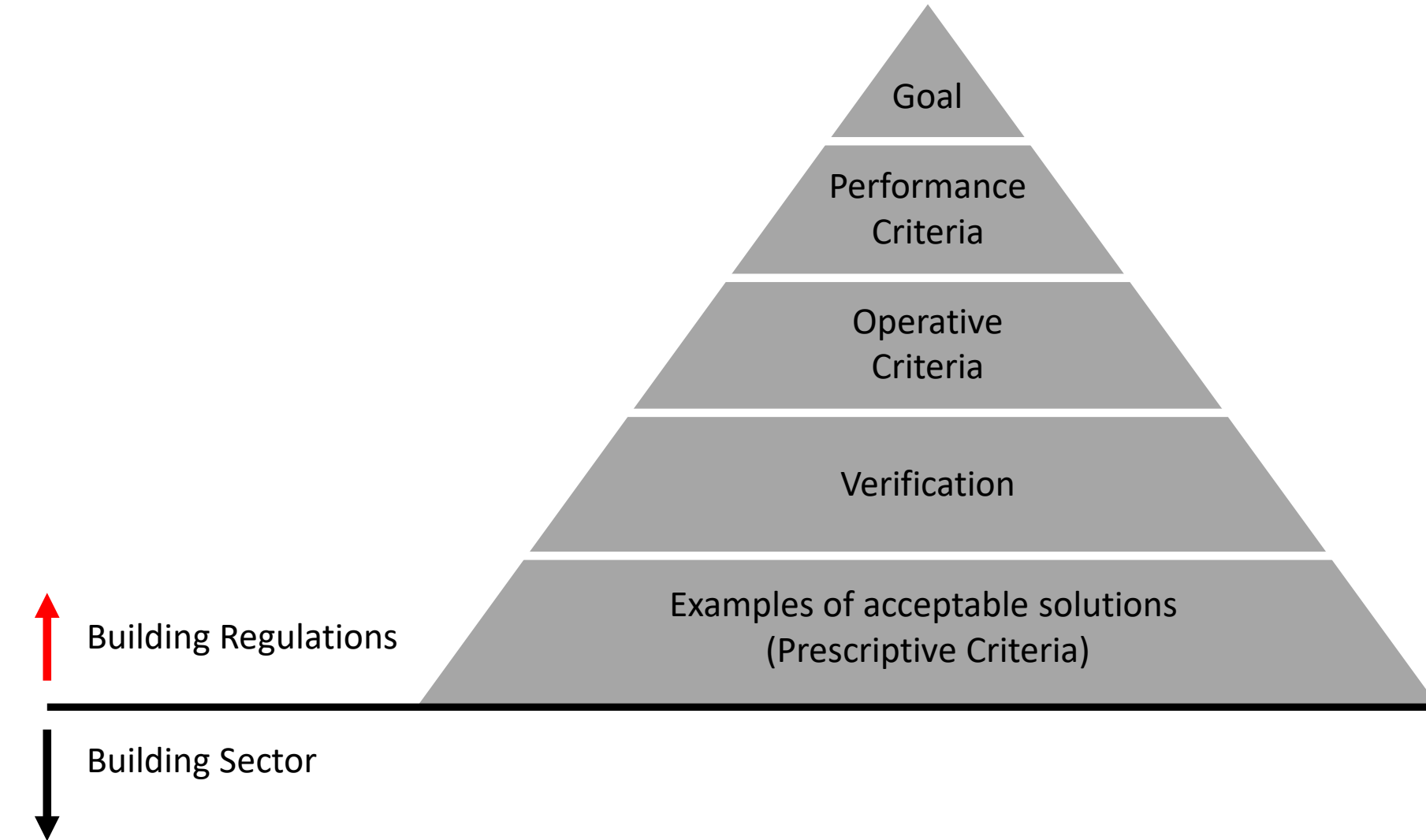
Increasing Housing Affordability > Increase Supply > Offsite Construction



- **1990s**, Sweden faced a new housing affordability crisis
- **1994** Sweden transformed from a **localized prescriptive building code** to an EU-wide **performance code (Eurocode)**
- Sweden's **forestry sector built upon this regulatory change to fund the development of new building standards** to increase the safety, quality and affordability of industrialized wood-based construction

# Sweden

Past: Prescriptive Code

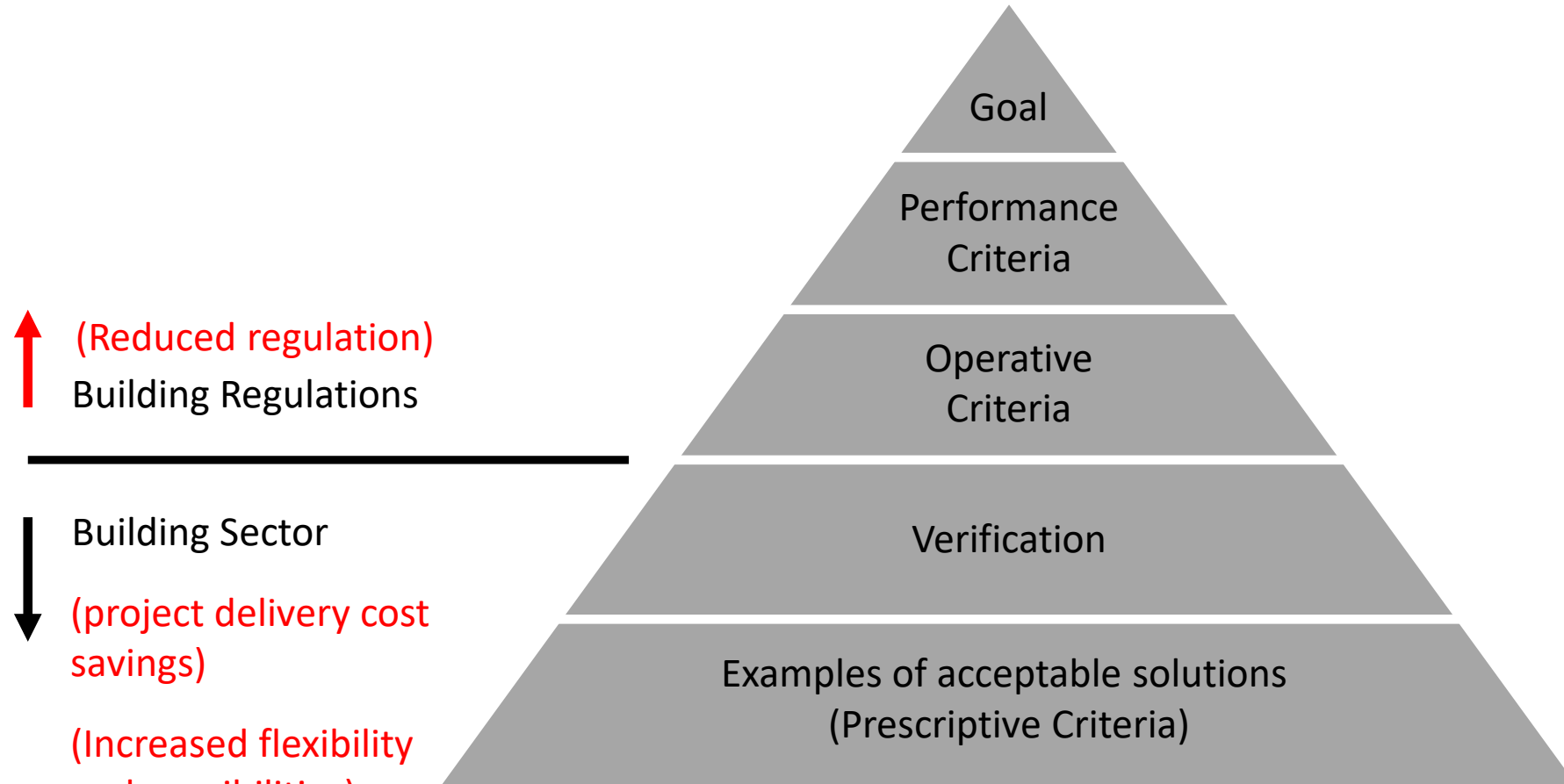


Source: Boverket



# Sweden

Future: Eurocode 2.0 Anticipation



↑ (Reduced regulation)  
Building Regulations

↓ Building Sector  
(project delivery cost savings)  
(Increased flexibility and possibilities)  
(Increased R&D)

Goal

Performance  
Criteria

Operative  
Criteria

Verification

Examples of acceptable solutions  
(Prescriptive Criteria)

## Pre-Certified Design Companies

- > Can check design provisions and technical requirements
- > Replaces municipal check for start notification
- > Are focused on Housing

**Sweden**  
Offsite Construction



Today, 90% of Sweden's detached homes are fabricated offsite.







**Sweden**  
Offsite Construction

A 2023 national wide survey, the first of its kind, was able to demonstrate that industrialized home builders fabricated buildings offsite were **10%** more productive on average than conventional builders.



**Sweden**  
Offsite Construction



In 1993, prescriptive code banned wood construction above two stories. Since 1994, industrialized wood based construction for multi-family has grown from 0% to 20% market share, and is still growing.



**Sweden**

Increasing Housing Affordability > Increase Supply > Offsite Construction



***Can offsite  
construction lower  
the carbon footprint  
of housing delivery?***



# Innovation Framework Case Study: EU > Sweden

## Increasing Housing Supply + Decreasing Carbon



Lindbacks: Current Carbon Footprint 22

Lindbacks: Future Carbon Footprint 22 = 1



## **Consistent Financing Strategy**

**Sweden's Million Homes Program** utilized a variety of financial instruments for owners, renters and builders to create a stable pipeline for the country's nascent offsite construction sector

## **Shift From Prescriptive to Performance Code**

Sweden's early adoption of Eurocode encouraged the existing offsite construction sector to invest in R&D and to diversify into new market segments (multi-family).

## **Flexible Framework**

The same performance code is also being utilized to now set clear carbon targets at the company and project scale



The Parliamentary Under-Secretary of State,  
Department for Levelling Up, Housing & Communities

... the Government are committed to increasing the number of homes built using modern methods of construction—MMC—across all housing tenures. MMC offers a range of benefits, such as delivering high-quality energy-efficient homes more quickly, and the Government are supporting the sector with our **£1.5 billion** levelling up home building fund and providing funding for up to **40,000 MMC homes** through the affordable homes programme to help deliver these benefits at scale.



# United Kingdom

## Early Phase of Offsite Construction Program





# United Kingdom

## Early Phase of Offsite Construction Program







### **Clear Terminology:**

**MMC** Modern Methods of Construction

A more holistic term used to describe a complete application of manufacturing principles to construction

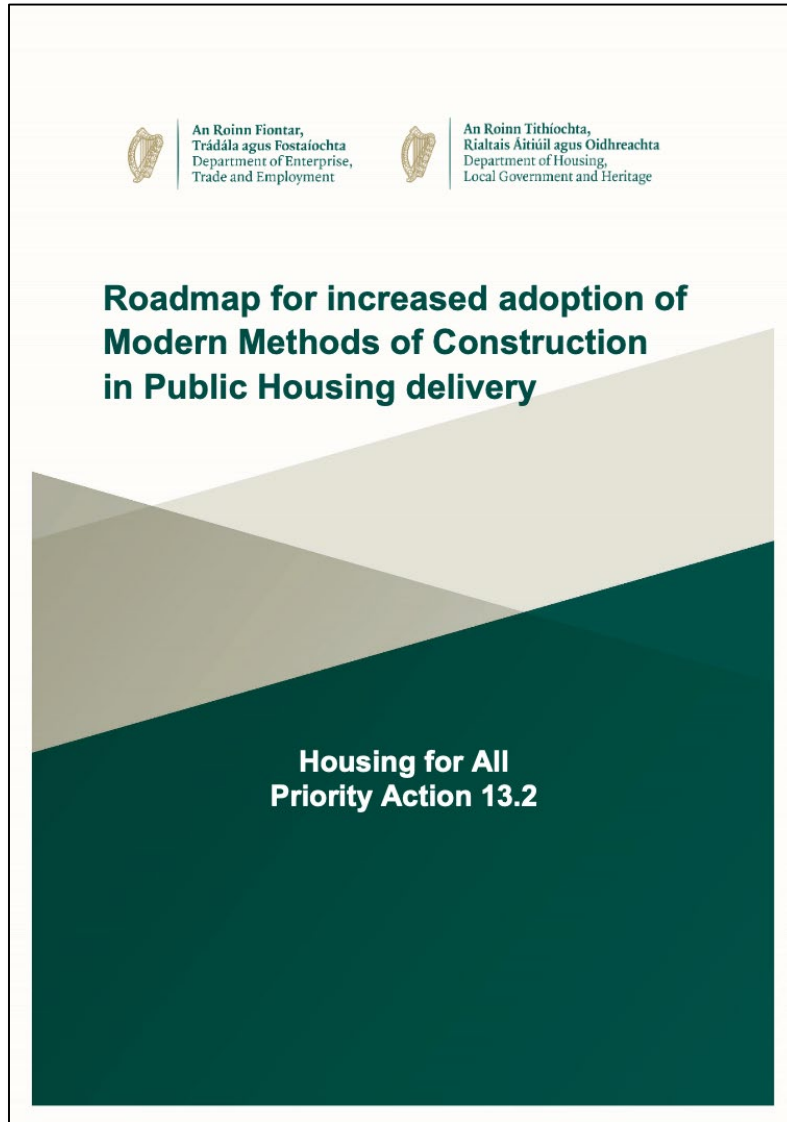
### **Clear System Value Assessment:**

**PMV** Premanufacture Value, 7 categories of MMC

A consistent way to measure the value add produced away from the construction site

### **Direct MMC Financing:**

**HOMES ENGLAND**, “an executive non-departmental public body, sponsored by the Department for Levelling Up, Housing and Communities” was founded in 2018 to direct strategic funding for the the MMC sector.



### Roadmap and Strategic Plan

1. Development and further roll out of procurement approaches to enable MMC
2. Regulation and Standards
3. Capital, Finance, and Insurance
4. MMC Skills Development
5. Industry Competitiveness and Capacity
6. Effective Policy Execution and Communication

Simon Coveney TD

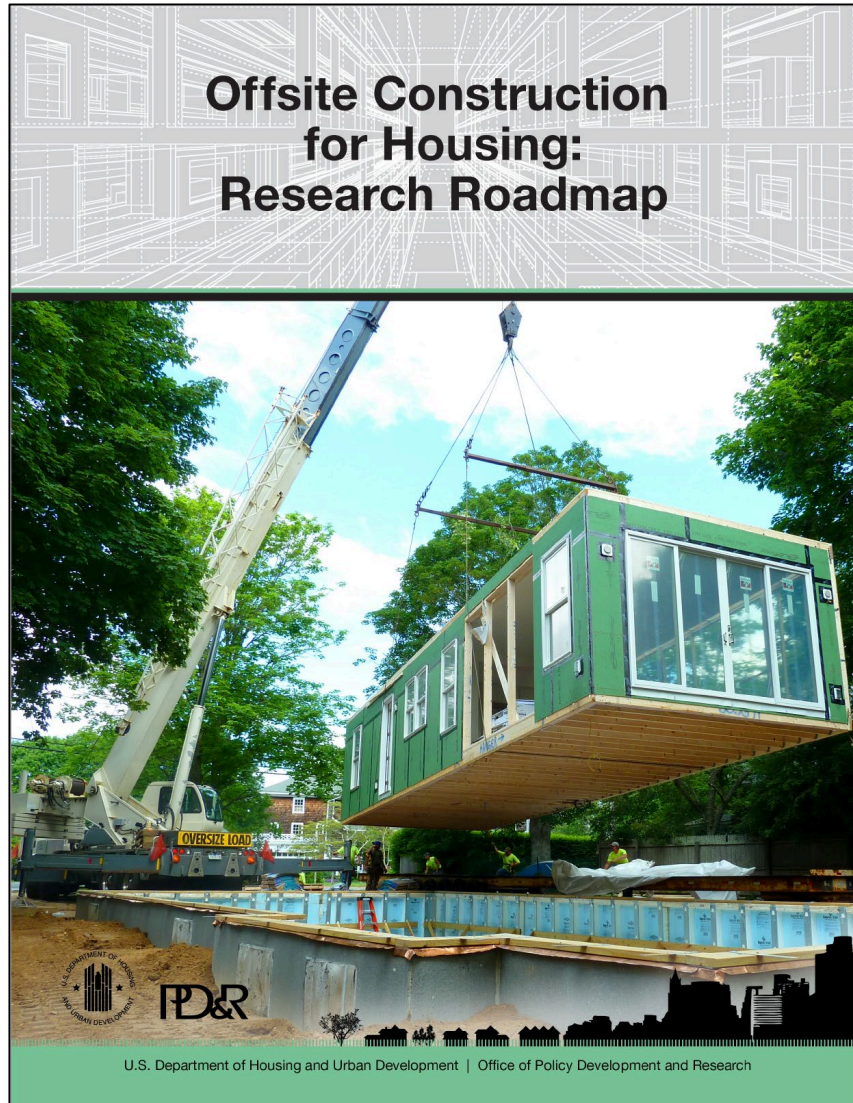
Minister for Enterprise, Trade  
and Employment

Darragh O' Brien TD

Minister for Housing, Local Government  
and Heritage

# Offsite Construction for Housing: Research Roadmap

MOD X with PTC and NIBS for US HUD, 2021



Research Topic 1:  
**Regulatory Framework**



Research Topic 2:  
**Standards and System Performance**



Research Topic 3:  
**Capital, Finance, and Insurance**



Research Topic 4:  
**Project Delivery and Contracts**



Research Topic 5:  
**Labor and Workforce Training  
and Management**



Research Topic 6:  
**Business Models  
and Economic Performance**

# HUD's Current and Future Role in US Industrialized Construction (IC)

MOD X with NIBS for US HUD, 2022-2024



**US  
Development  
+  
Current State**

## **Current US Sector and Framework**

- US HUD's Role in shaping the US IC Sector and Framework
- Mapping US IC Sector and Framework

**Global  
Best  
Practices**

## **International IC Sectors and Frameworks**

- United Kingdom (Ireland, Australia, New Zealand)
- Sweden (European Union)
- Japan

**US  
Future**

## **US Federal Action Plan for Offsite Construction**

- Working with HUD and Key Partners to articulate a **US Federal Action Plan for Offsite Construction** that will support a *national innovation framework* for *industrialized housing delivery*



*An innovation framework is a foundational set of practices and tools that helps organizations generate ideas, evaluate those ideas and turn the best ideas into a value-add for the organization.*

**In our research of the US, Japan, Sweden and the UK, MOD X has found that the full benefits of offsite construction require **innovation frameworks** at the scale of companies AND at the scale of the sector to increase productivity AND address new societal challenges.**



# Improvements to Productivity: "Manufacturing Style Production"

McKinsey Global Institute



> 60%

Productivity boost  
(onsite)

- Reshape regulation
- Rewire contracts
- Rethink design
- Improve procurement and supply chain
- Improve onsite execution
- Infuse technology and innovation
- Reskill workers

> 10X

Productivity boost  
(offsite – onsite)



- Move to a manufacturing style production system

# Improvements to McKinsey's Assessment

## MOD X + HUD



> 10% +  
Productivity boost

- Regulatory Framework
- Standards and System Performance
- Capital Finance and Insurance
- Project Delivery and Contracts
- Labor and Workforce Training and Management
- Business Models and Economic Performance
- *Sustainability and Resilience*



- + a move to a manufacturing style production system

**The MOD X Approach**  
*Offsite Framed*



**Macro Innovation Framework**  
**(Sector)**



Technology

**Micro Innovation Framework**  
**(Company)**

# The MOD X Approach

Offsite *Framed*



**Product platforms** provide the flexibility to accommodate inputs from many different project scenarios through a **set of common modules**. These modules in turn **adapt and evolve over time** through the aggregation and synthesis of multiple customer and contextual inputs.



Technology

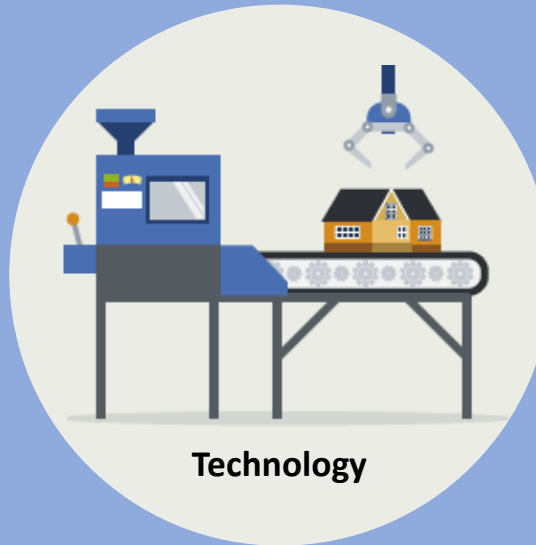
Product Platform

**Micro Innovation Framework**  
**(Company)**



# Macro Innovation Framework (Sector)

**Product platforms** thrive in **performance based regulatory frameworks**. Performance codes specify the outcomes or goals of a building, as opposed to **prescriptive codes** which specify the exact methods and/or materials. **Performance based frameworks** encourages and rewards data-driven **R&D culture** in companies.

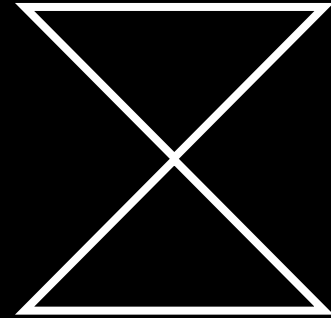
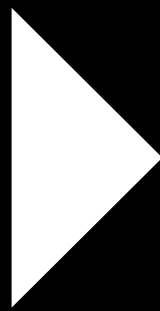
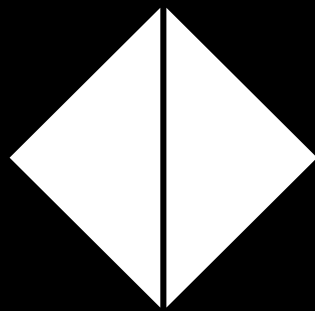
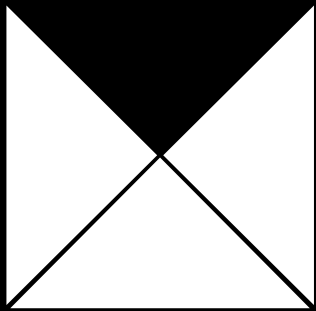


Technology

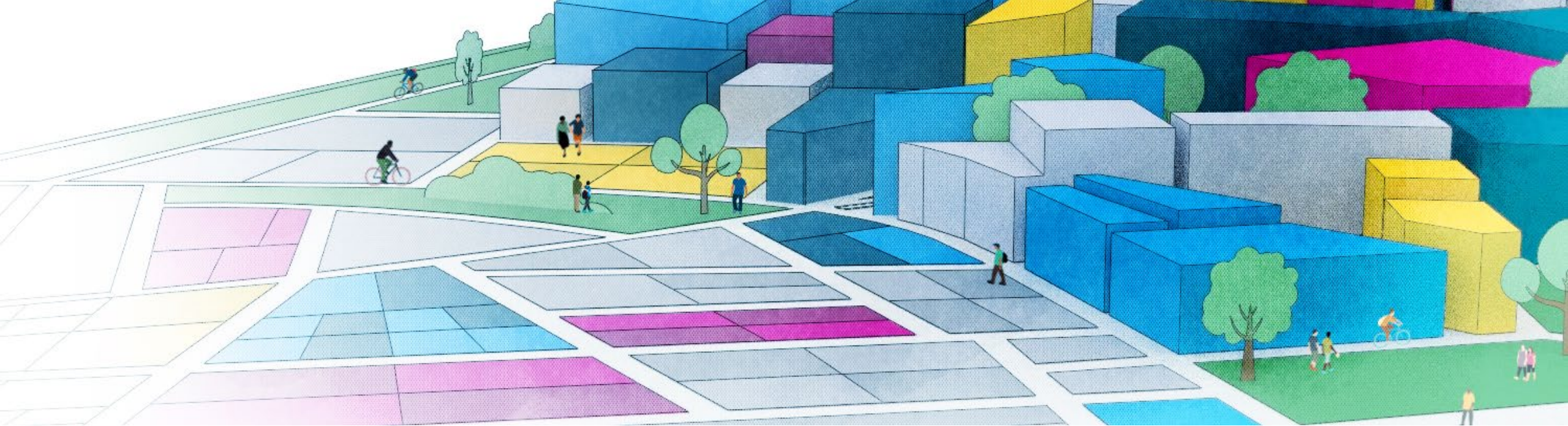
Product  
Platform

Performance  
Code





**Thank you!**



November 6, 2023 / National Institute of Building Sciences / Housing Affordability Hearing

# Unlocking Zoning: Leveraging Local Land-Use Regulations for Housing Affordability



Metropolitan Housing and Communities Policy Center

# About the Urban Institute

- The Urban Institute is the trusted source for unbiased, authoritative insights that inform consequential choices about **the well-being of people and places** in the United States. We are a nonprofit research organization that believes decisions shaped by facts, rather than ideology, have the power to improve public policy and practice, strengthen communities, and transform people's lives for the better.

---

**OUR MISSION IS TO OPEN MINDS,  
SHAPE DECISIONS, AND OFFER  
SOLUTIONS THROUGH ECONOMIC  
AND SOCIAL POLICY RESEARCH.**

---

# Agenda

- The Elements of Zoning
- Zoning in Context
- Zoning History  
(with a racial equity and housing affordability lens)
- Action Steps

# The bottom line

- Zoning goes beyond rules about what can be built where “as of right.” It also includes people and processes!
- Zoning has impacts on housing construction, but housing is a complex system with many more inputs.
- There is no silver bullet that will fix rising housing prices or segregation.



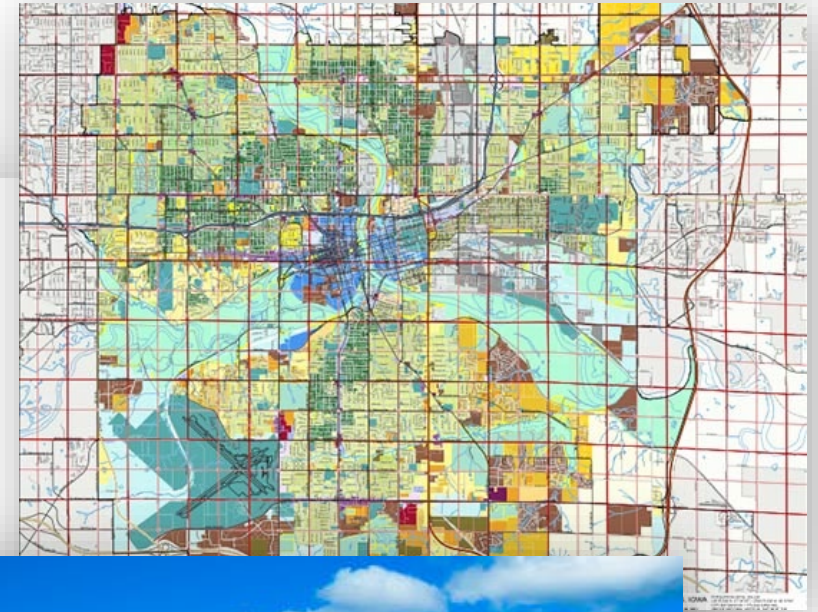
**Zoning is...**

# Zoning is...

a set of laws  
governments  
use to regulate  
land use and  
building  
form...

## Chapter 134. Zoning ARTICLE 2. DISTRICTS

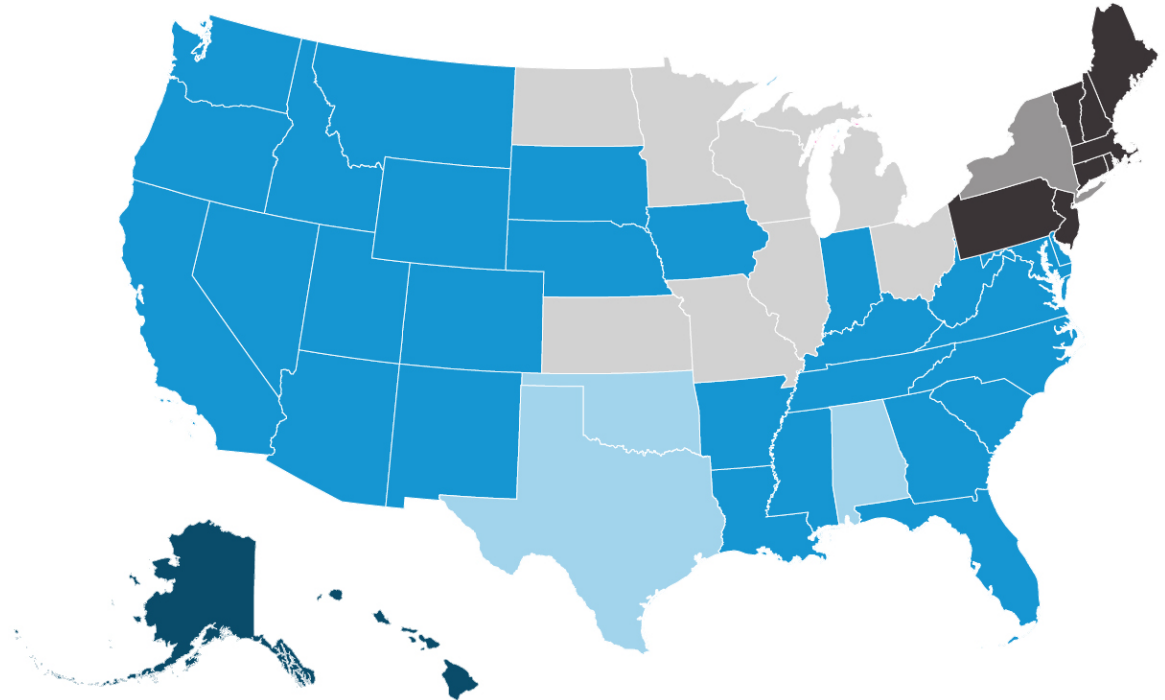
134-2.1	GENERAL.....	134-2-2
2.1.1	Intent .....	134-2-2
2.1.2	Applicability .....	134-2-2
134-2.2	ESTABLISHMENT OF DISTRICTS .....	134-2-2
2.2.1	Downtown (DX) Districts .....	134-2-2
2.2.2	Mixed-Use (X) Districts .....	134-2-2
2.2.3	Industrial (I) District .....	134-2-3
2.2.4	Public, Civic, and Institutional (P) Districts .....	134-2-3
2.2.5	Neighborhood (N) Districts .....	134-2-3
2.2.6	Number of Household Units in N Districts .....	134-2-3
2.2.7	Neighborhood Mix (NX) Districts .....	134-2-4
2.2.8	Agriculture (A) and Flood (F) Districts .....	134-2-4
2.2.9	PUD, Planned Unit Development (Legacy) District .....	134-2-4
2.2.10	Vehicle Sales and Rental Display Limitation .....	134-2-4



# Zoning is typically controlled by local governments, but it depends on the state

## Zoning Authority Arrangements by State

- Counties or boroughs zone all land unless they cede power to municipalities.
- Counties zone unincorporated areas. Municipalities zone their own land.
- Counties can't zone or must meet requirements to zone. Municipalities zone their own land.
- Townships (equivalent to municipalities) zone all land. There is no unincorporated land.
- Townships zone all unincorporated land. Municipalities zone their own land.
- Counties and/or townships zone unincorporated land. Municipalities zone their own land.



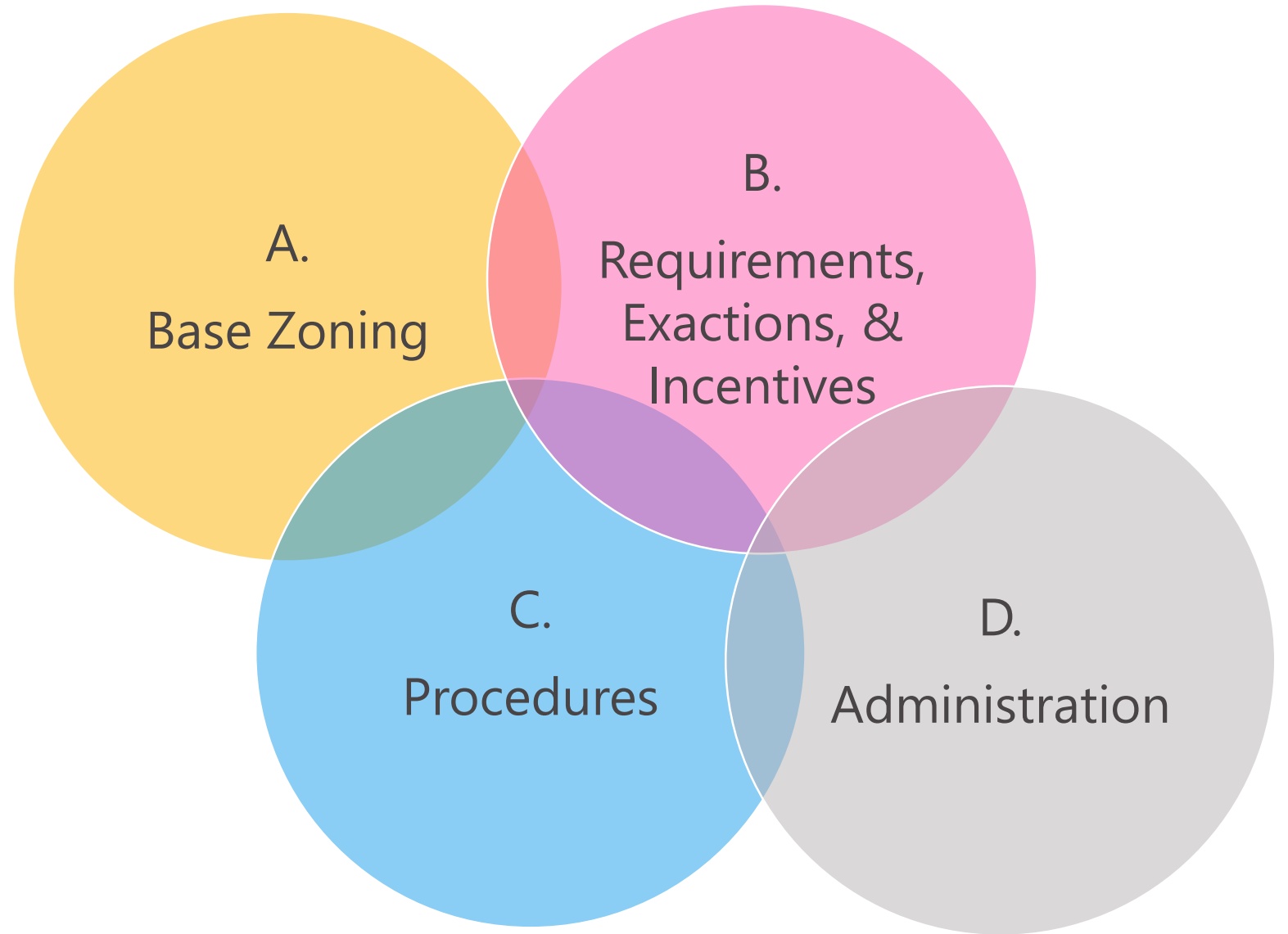
Source: Author's analysis of state government statutes and secondary research.

Note: Townships are referred to as towns in New York and New England. A township is a jurisdiction smaller than a county that provides general government services for a defined area.

But zoning is also a lot more than that!

**Zoning is a *structure of laws, values, institutions, and people* that produces the built environment.**

# Zoning might best be characterized as an ensemble of elements







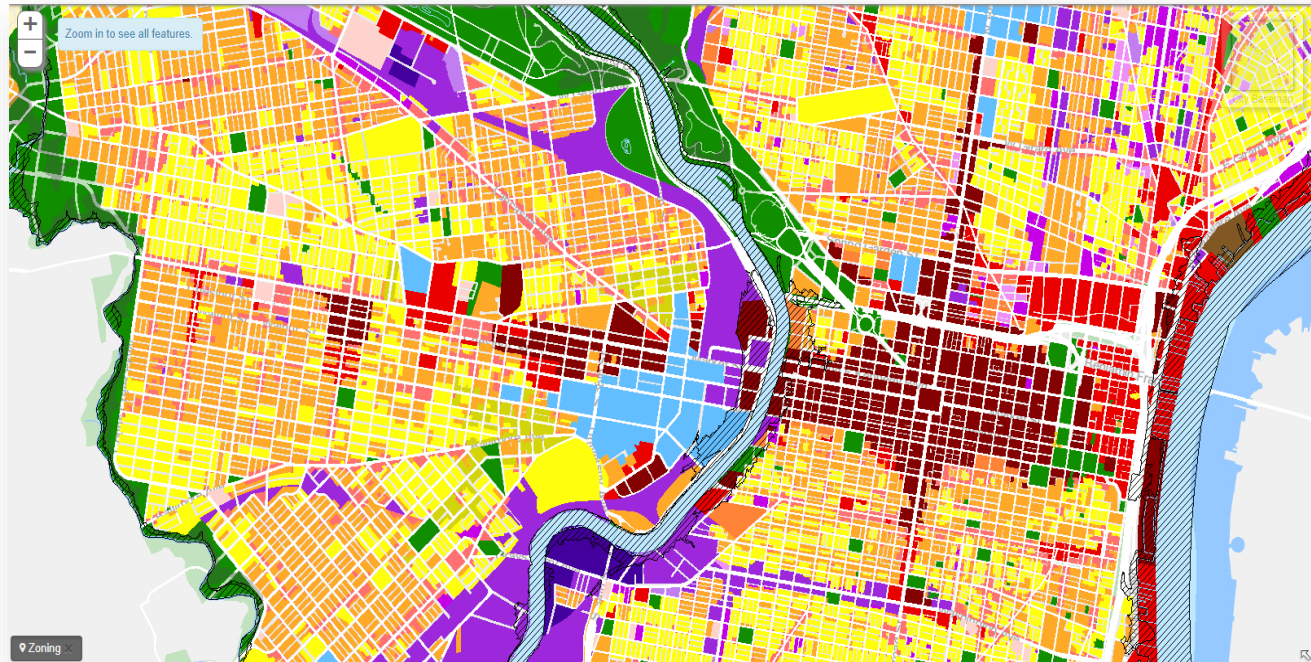
# Base Zoning

## Zoning text

TABLE 6-E: PERMITTED AND CONDITIONAL USES IN INDUSTRIAL & AIRPORT ZONES

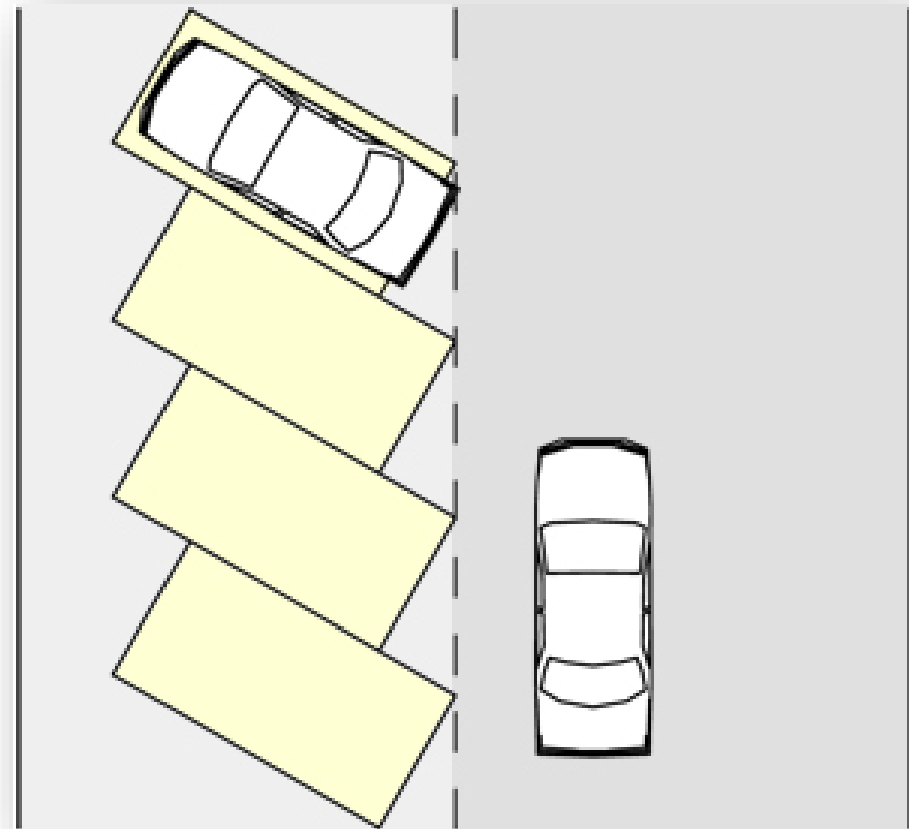
	I-L/I-Lb	I-M/I-Mb	I-H/I-Hb	A-B <sup>2</sup>	Use Standards
<b>Institutional</b>					
Airports				• <sup>1</sup>	
Preschool facilities	•	•			
Emergency shelters	•	•	•		6.5.6(B)
Intermediate care facilities		• <sup>4</sup>			
Places of assembly (<10,000 SF)	•				
Bars				•	
General offices (<5,000 SF)	• <sup>1</sup>	•			
General offices (>5,000 SF)	• <sup>1</sup>	•			
General services (<5,000 SF)				•	
General services (>5,000 SF)				•	
Hotels				•	
<b>Commercial/Services</b>					
Recreation and amusement centers	•	•			
Repair services	•	•	•		
Restaurants				•	
Animal-related services	• <sup>2</sup>				
Construction & engineering services	•	•	•		
Dairies	•	•	•		
Fish waste processing			•		
Food & seafood processing, packing, and distribution		•	•		
High-impact industrial uses			•		
Intermodal transportation facilities	•	•	•		
Laboratory and research facilities	•	•	•		
Low-impact industrial	•	•	•		
Lumber yards	•	•	•		
Marijuana cultivation facility (<2,000 SF plant canopy)	•	•	•		
Marijuana cultivation facility (2,000-7,000 SF plant canopy)					

## Zoning map



# Requirements, Incentives, and Exactions

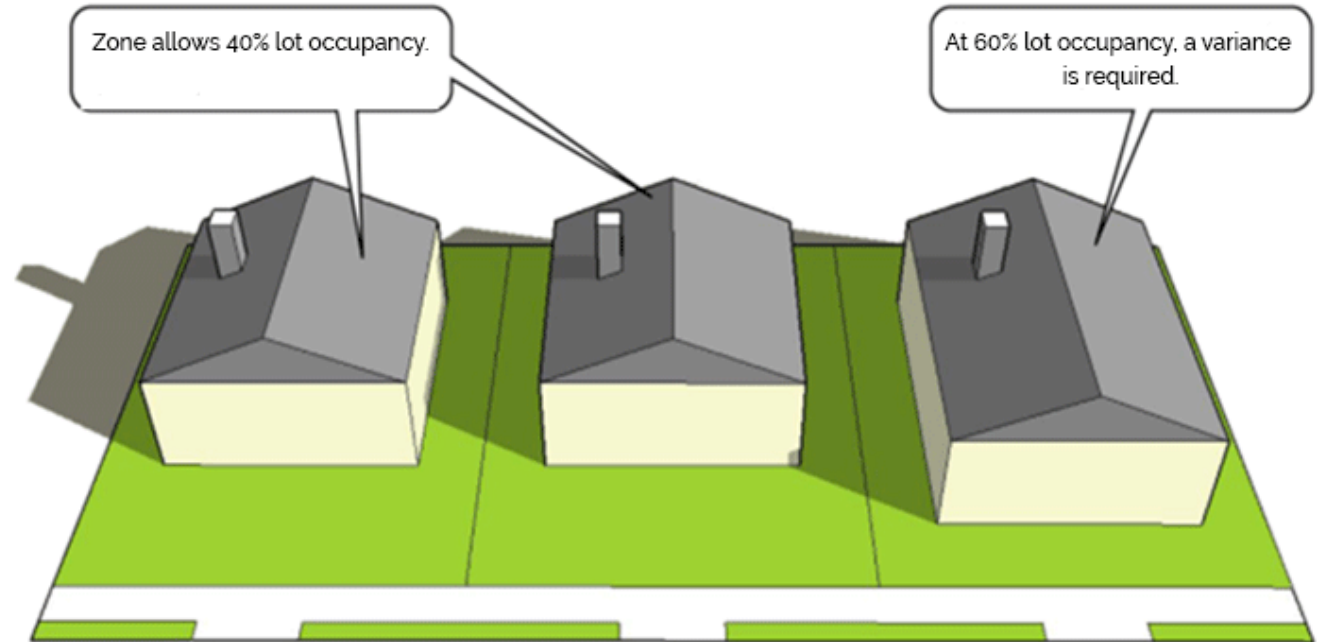
- Impact fees
- Development incentives
- Mandatory affordable housing requirements
- Exactions or minimums





# Procedures

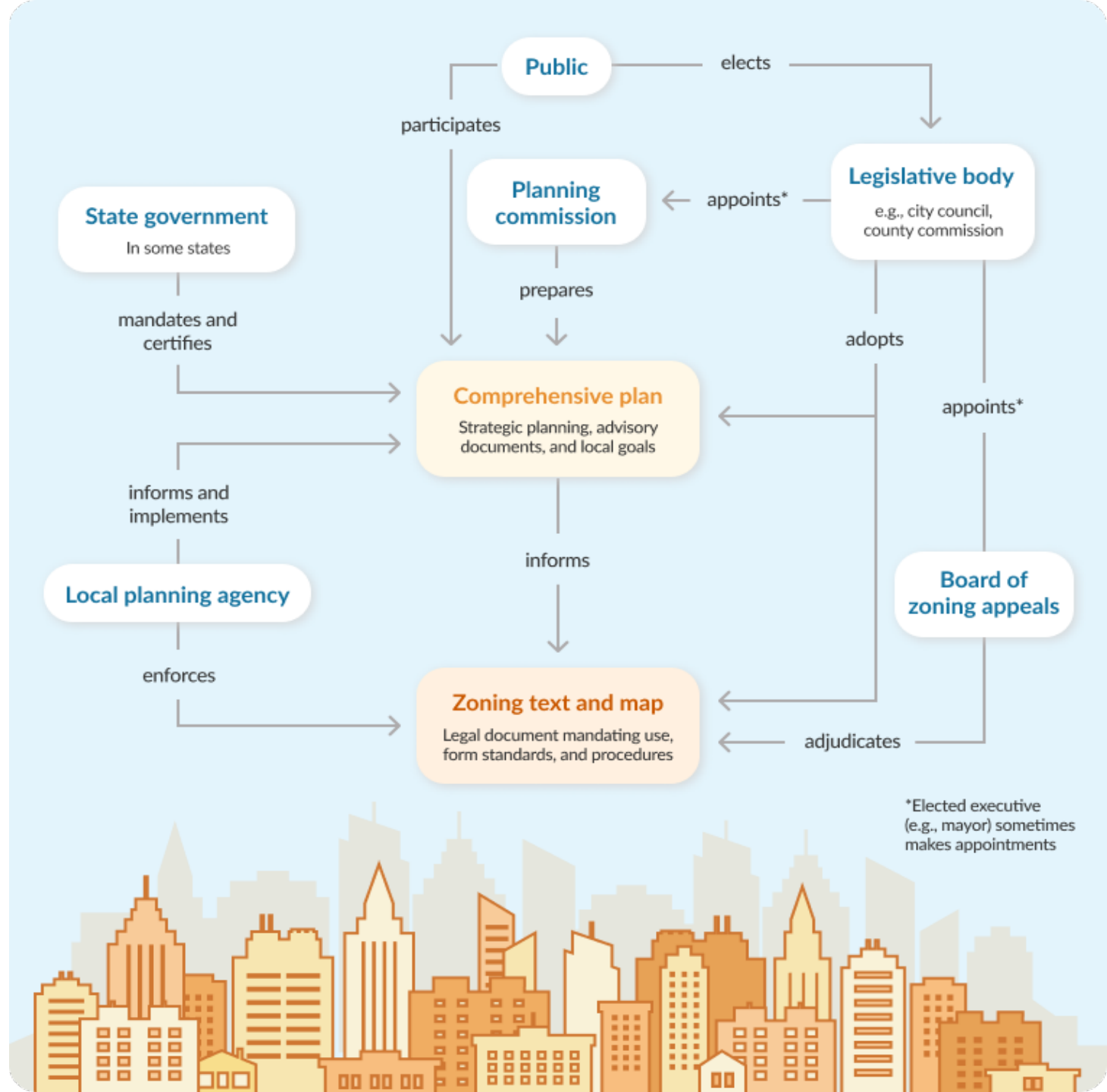
- Flexibility measures
- Review processes, including public participation
- Meta processes



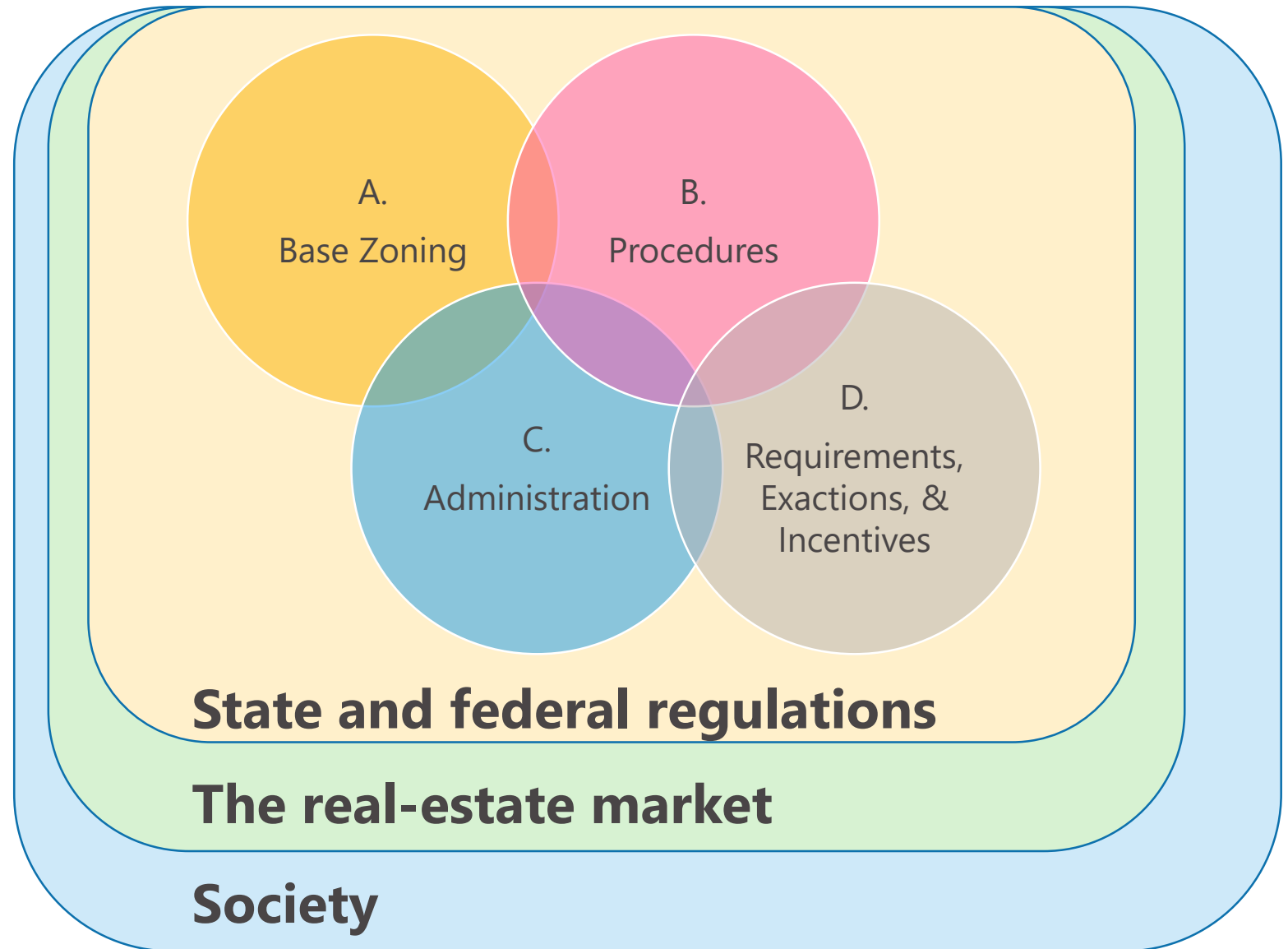


# Administration

- People
- Planning & zoning
- State government requirements



# Local zoning in context





# Zoning: A Condensed History

# Planning is an ancient tradition that formalized in the US about 150 years ago

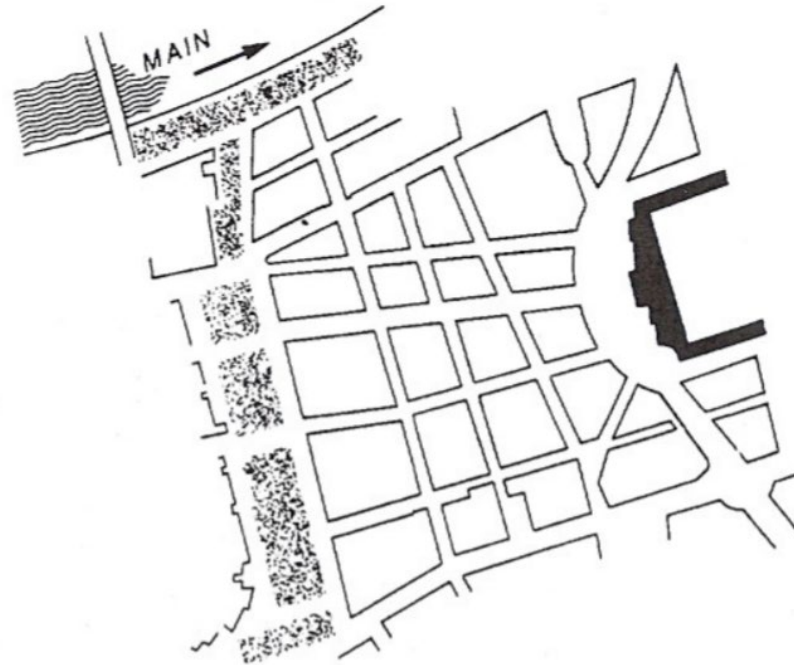
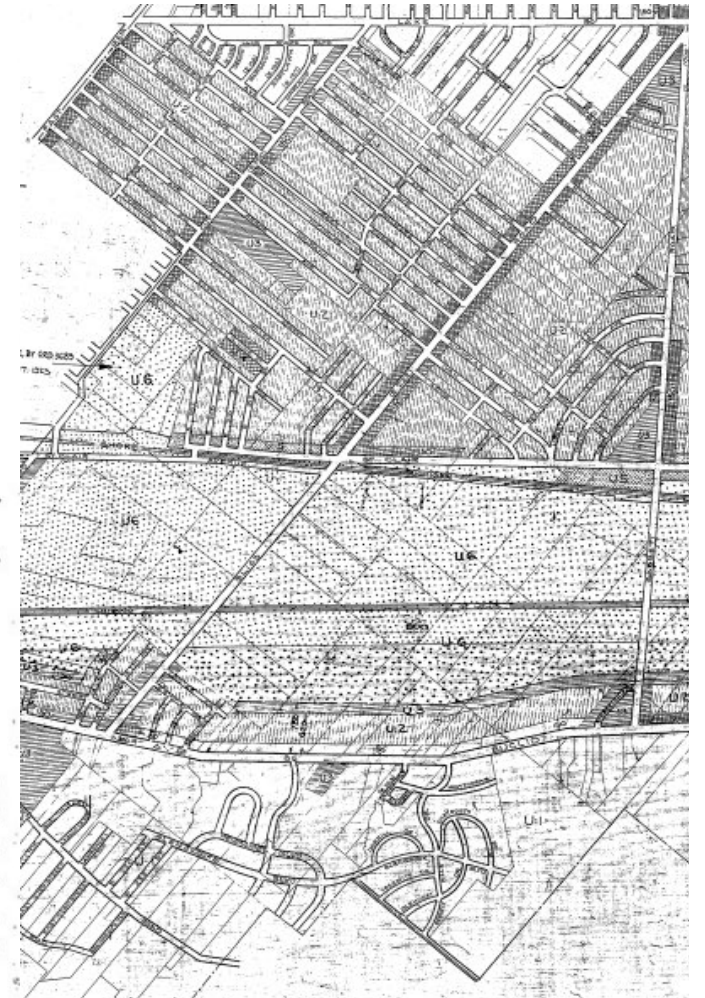


Plate One: *The Hauptbahnhof Quarter.* It was added to the city beginning in the late 1870's. A contrast can be made between the "pack donkey" street pattern of Medieval times and the geometric-regularist approach of the Baumeister-Stubben advocates of the last quarter of the nineteenth century.

**Frankfurt, 1870s**



**Euclid, OH, 1922**

# Why zoning?



## Crowding

- Address the perception that closely knit communities were bad for health



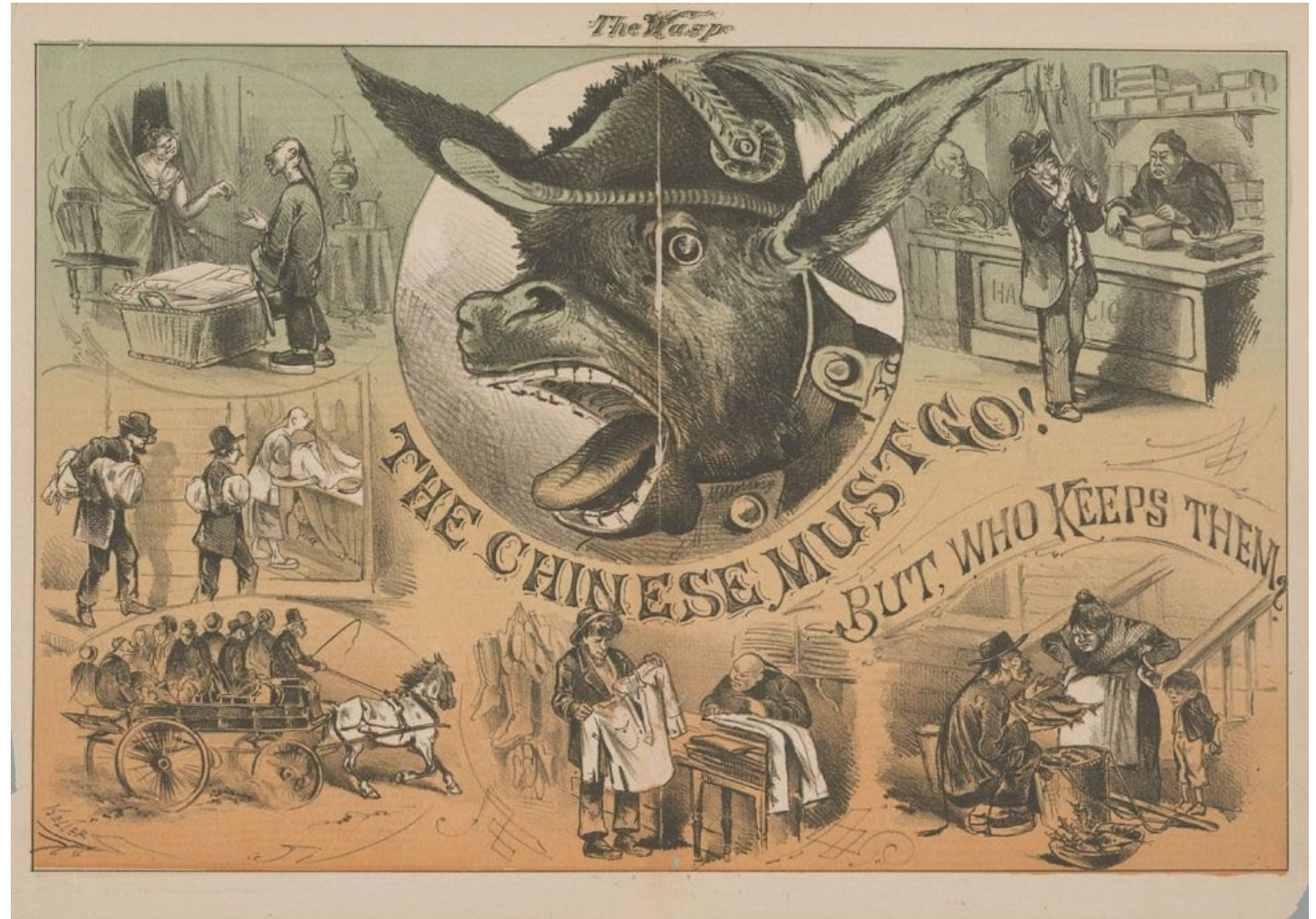
## Pollution

- Address the negative impacts of living near industrial uses



## Zoning Timeline: Early 1900s–1920

- Many early zoning codes were created with racist motivations
- Zoning out industrial uses was motivated by stopping integration
- Anti-density arguments come from inaccurate environmental determinism claims

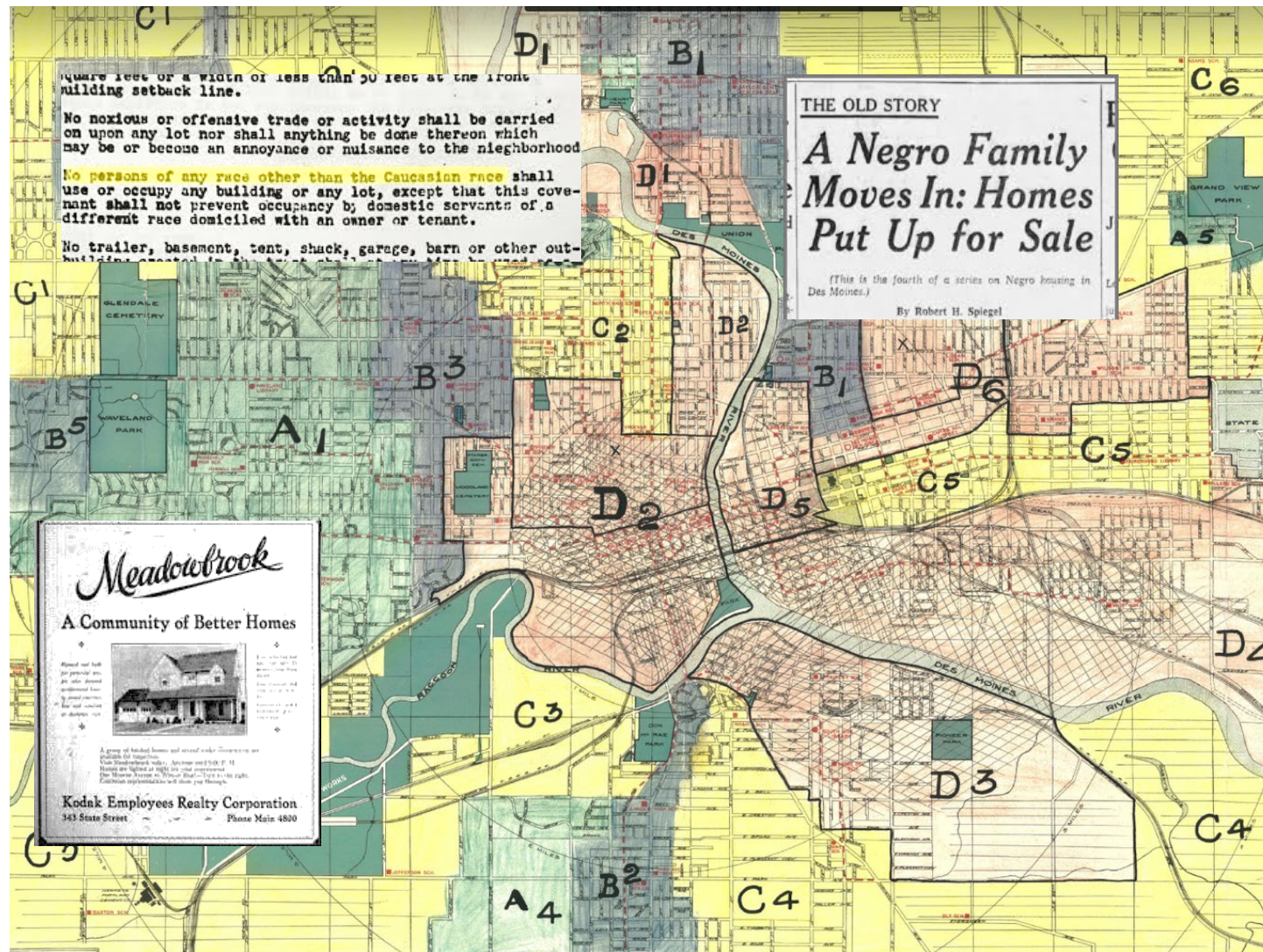


*An 1878 anti-Chinese cartoon in San Francisco*



# Zoning Timeline: 1920s–1970s

- The real-estate market and the public contributed to racist land use policy
- Landlords advocated for single-family zoning and used covenants to prevent people of color from living in certain neighborhoods
- Government officials and real-estate industry build racial-class gap



*Neighborhood ratings, Des Moines, IA, 1947*



# Zoning Timeline: 1970s–1990s

- Single family suburbs sprawled outward as white residents fled integration
- Restrictions on home forms increased
- State governments started to intervene

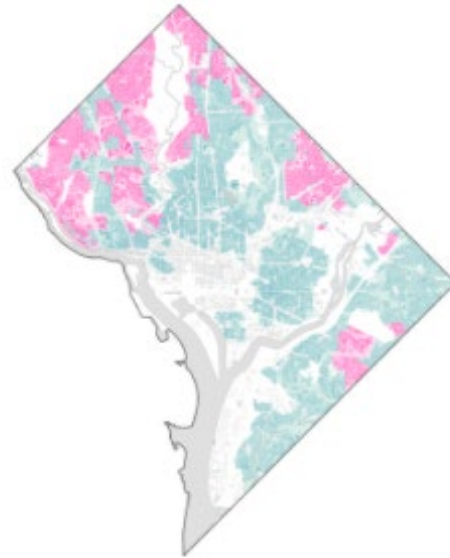


*Suburban single-family neighborhoods*

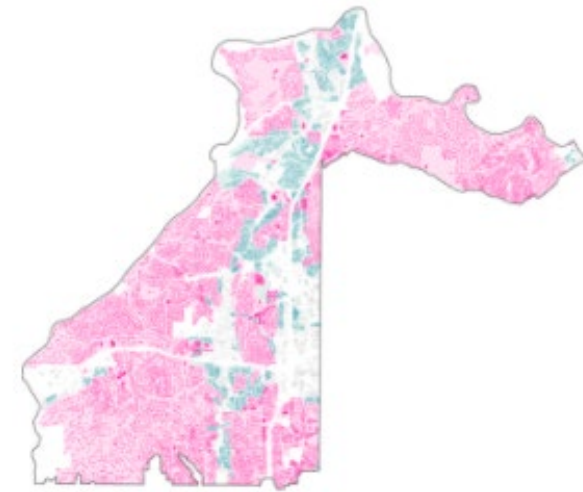
## Zoning History: 2000s – Present

- Most neighborhoods in cities nationwide continue to be zoned only for single-family homes

Residential land zoned for: ■ detached single-family homes ■ other housing



Washington **36%**



Sandy Springs, Ga. **85%**

*Single-family zoning in US cities*

**What are the consequences of zoning—particularly  
for racial equity?**



# Some problems with single-family home requirements

- Increase costs.
- Limit options.
- Exacerbate segregation.
- Encourage car use.
- Make alternatives difficult to build.



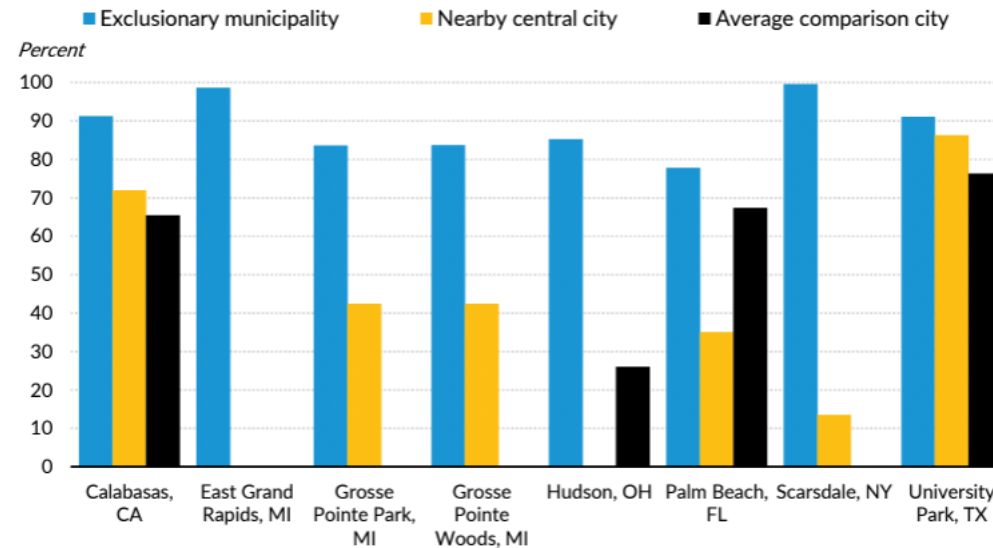
# Cities exclude new housing through zoning policy

- Exclusionary municipalities with limited housing production feature little room for multi-family housing

FIGURE 1

Exclusionary Cities Devote a Higher Share of Land to Single-Family Homes than Nearby Central Cities

Share of residential land allowing only single-family homes by right



Source: Authors' analysis of zoning data collected from each municipality's website.

Note: Nearby central cities are Los Angeles, California; Grand Rapids, Michigan; Detroit, Michigan; Akron, Ohio; Miami, Florida; New York, New York; and Dallas, Texas, respectively. Comparison cities are Anaheim, Huntington Beach, Long Beach, Riverside, and Santa Ana, California; Cleveland, Ohio; Fort Lauderdale, Florida; and Arlington, Fort Worth, and Garland, Texas, respectively. Comparison cities were not available for East Grand Rapids, Grosse Pointe Park, Grosse Pointe Woods, or Scarsdale. Residential land does not include planned development districts but does include commercial and mixed-use districts where housing is allowed by right.

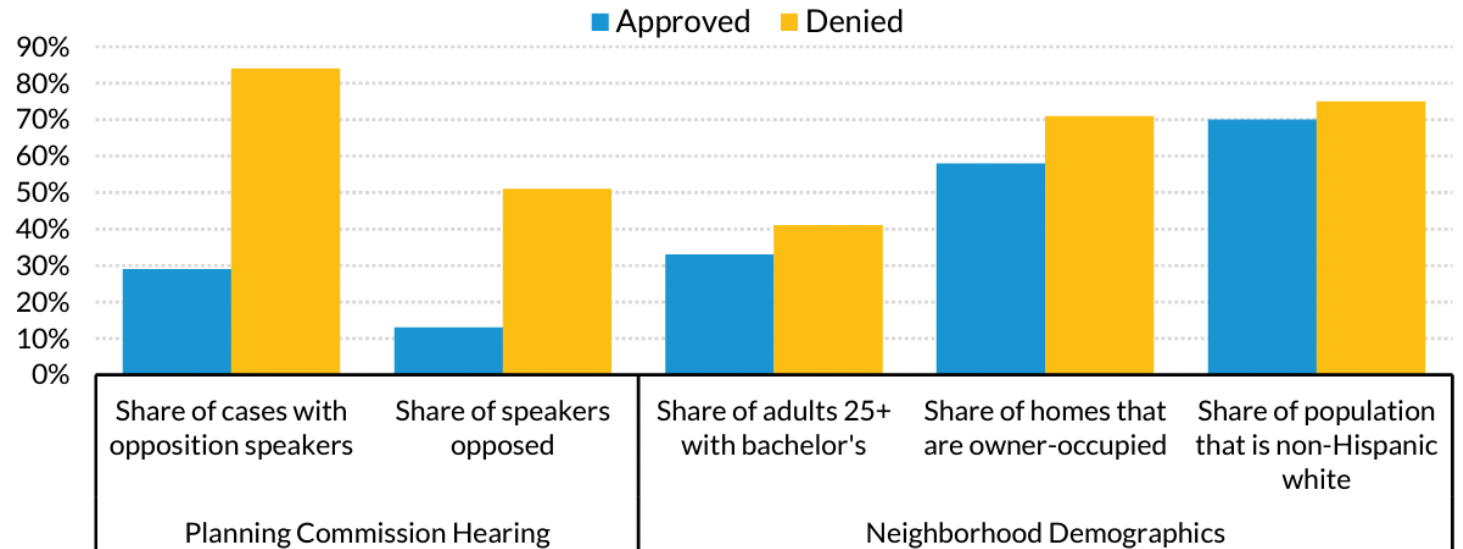


# Planning decisions are made based on demographics

- Land use approvals are influenced by the demographics of the location where the project is planned and who shows up to meetings

FIGURE 1

Approval Rates for Louisville Rezoning Cases Were Associated with Public Speaker Presence and Tenor



URBAN INSTITUTE

Source: Authors' analysis of Louisville rezoning dataset and 2016–20 American Community Survey data.

Note: Approved cases were in block groups with median household incomes of \$61,375, compared with \$69,249 for denied cases.

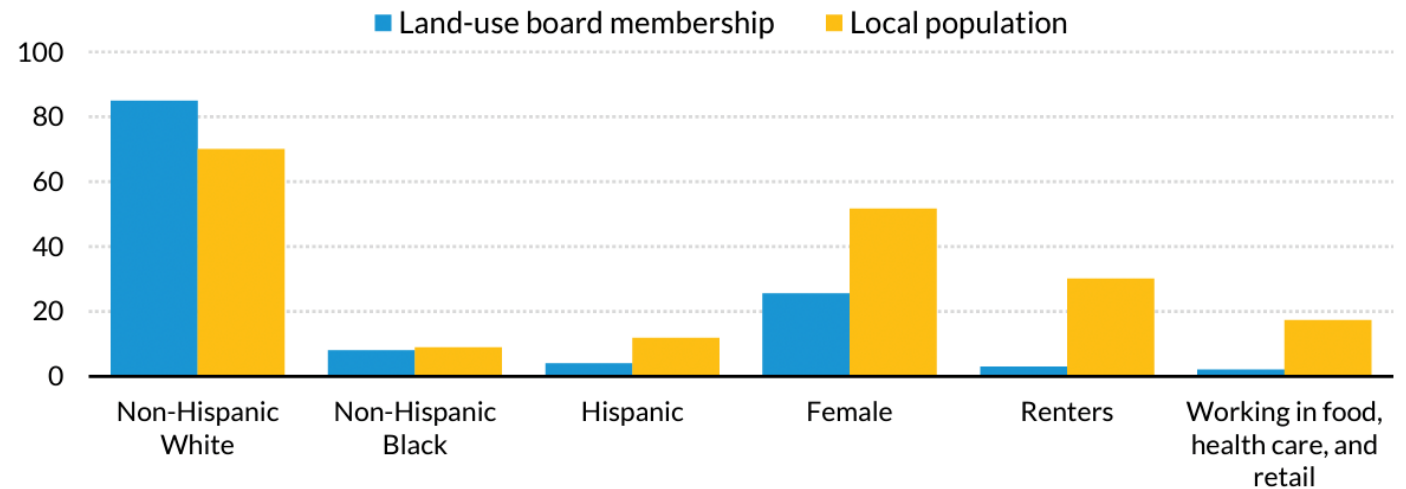
# Choices are made by unrepresentative decisionmakers

- Women, people of color, and renters are systematically underrepresented on land-use bodies

FIGURE 1

**Land-Use Boards Overrepresent White Residents while Underrepresenting Hispanics, Women, Renters, and People in Certain Occupations**

*Average share of land-use board membership and local jurisdictional population, by demographic group*

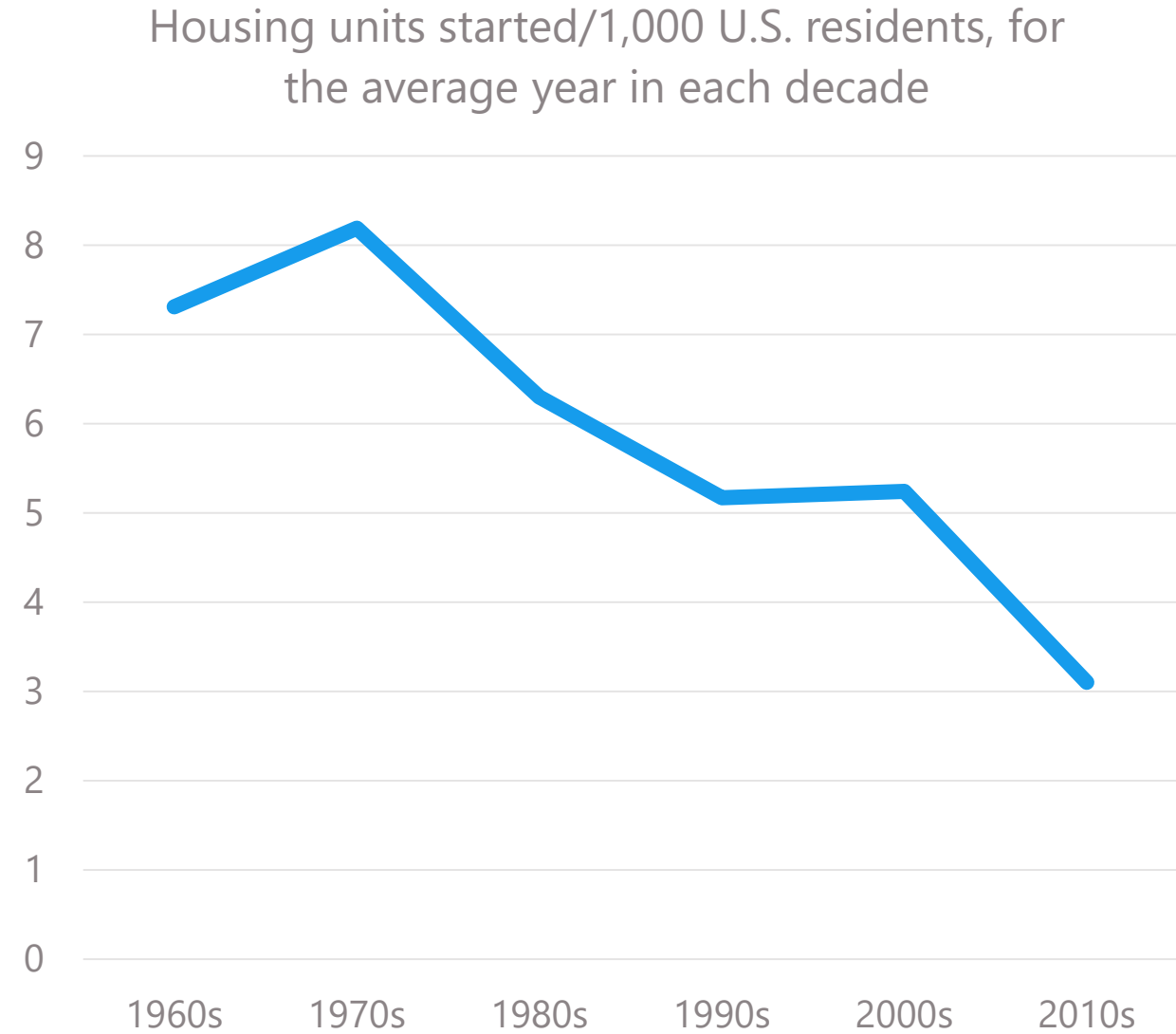


**Source:** Authors' mapping of 2022 Land Use Decisionmaking Board Composition Survey respondents.

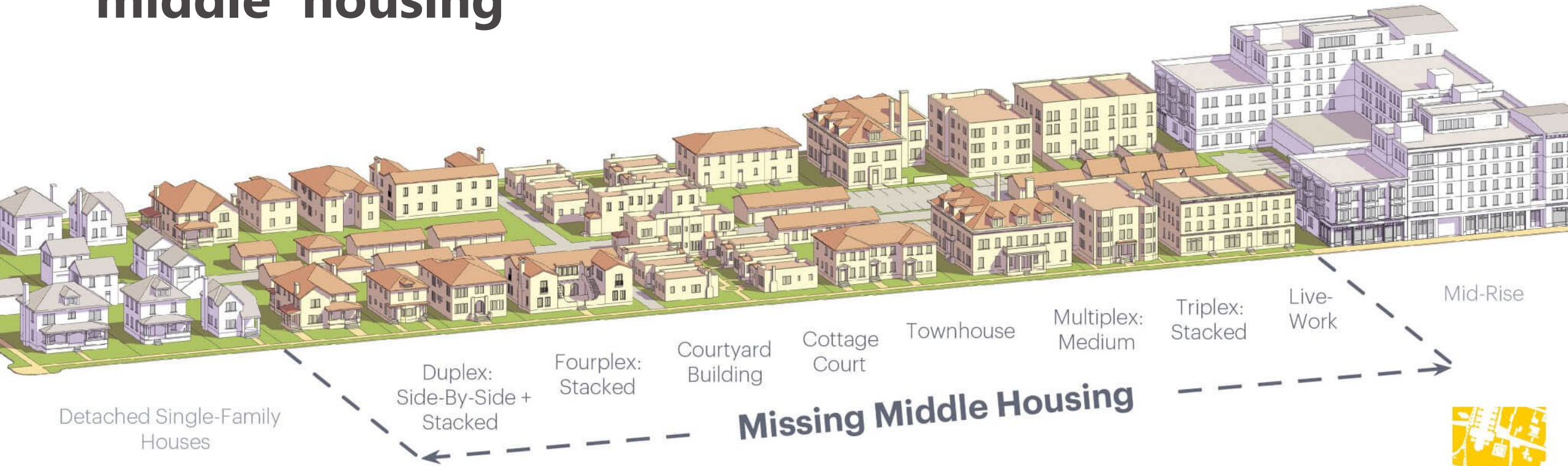
**Notes:** Data do not include legislative bodies or responses of "unknown" or "prefer not to answer."

# The US is not building enough housing

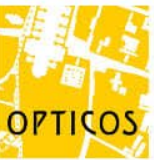
- The US built half as many units per capita in the 2010s as it did in the 1960s through 1980s



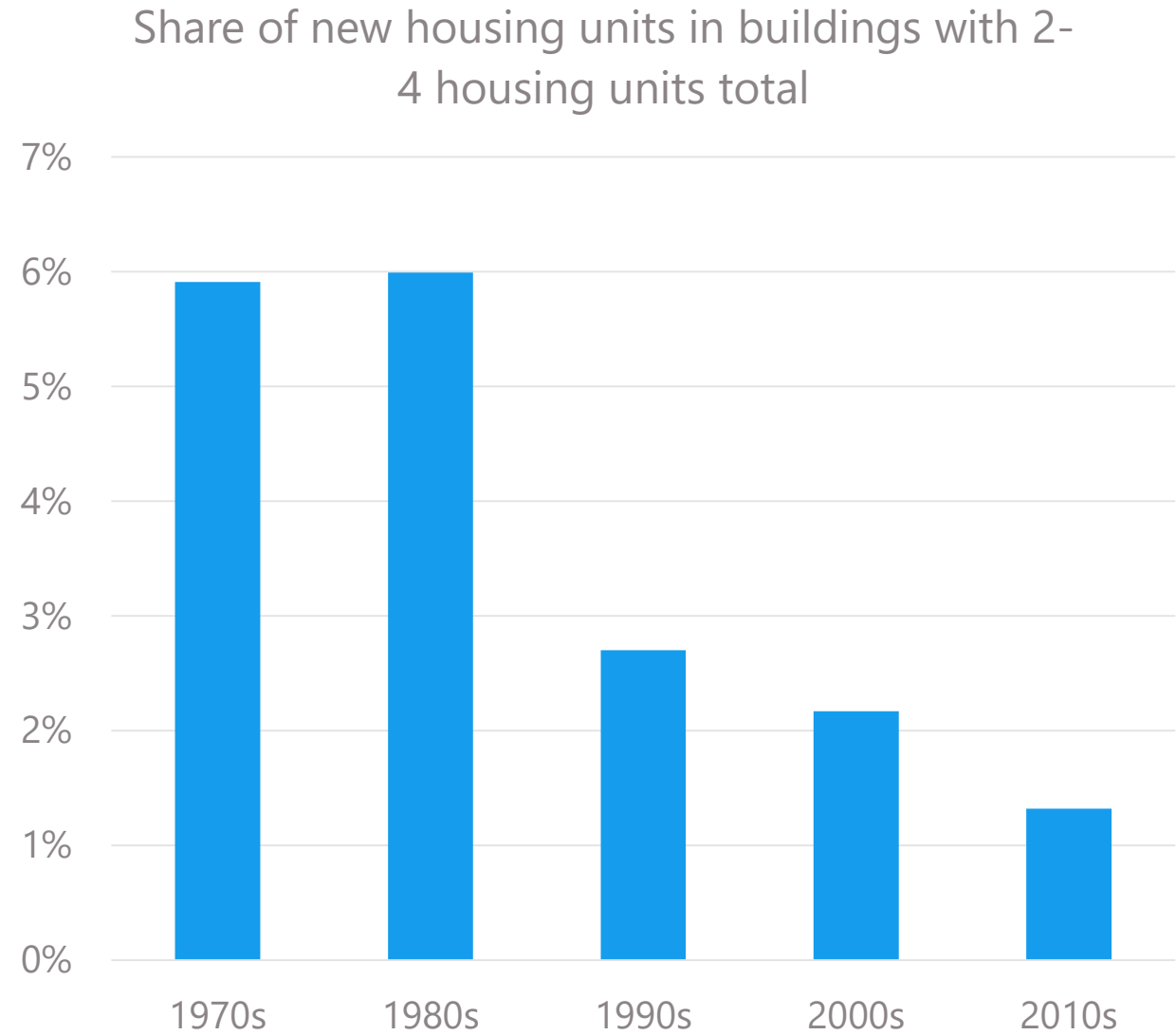
# The US has a big gap in 'missing middle' housing



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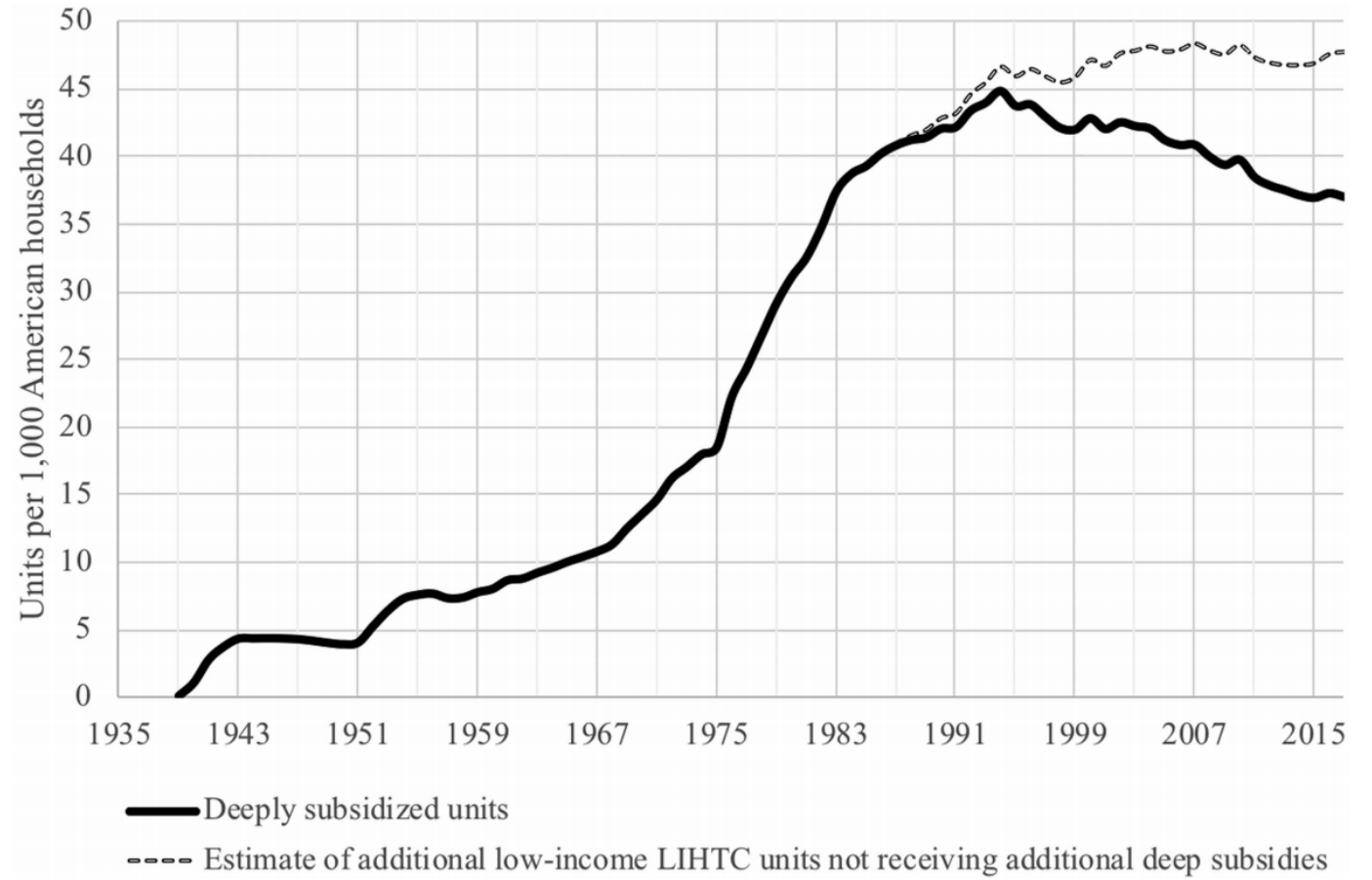


# The US has a big gap in 'missing middle' housing





# US affordable housing construction is declining



# People of color are disproportionately renters

## Share of Renters and Their Financial Status, by Race or Ethnicity

	White	Black	Hispanic	Asian
Renter share	27.8%	58.3%	52.5%	40.5%
Median income	\$43,000	\$30,000	\$39,000	\$58,500
Median liquid assets	\$9,000	\$1,600	\$2,808	\$9,300
Unemployment rate	4.1%	7.2%	4.4%	3.1%

## The combination of:

- Restrictive local zoning codes
- Low construction overall
- Limited investment in affordable housing
- Rising real estate prices...

Limits **access to opportunity**, making it difficult for low-income people, particularly people of color, to access public services, jobs, and other essential needs.

**Enabling low-income folks to move to or live in opportunity communities has significant positive impacts**

- **Better chances of rising up a class**
- **Increase in income**
- **Less incarceration**
- **More able to contribute to society**
- **Better mental and physical health outcomes**

**What can we do?**



# Encourage increased density & diversity while cutting red tape

- Streamline review
- Reduce discretion to mitigate power inequities
- Build bigger
- Build smaller
- Repurpose space



# Identify the means to boost affordability

- Invest directly in affordable housing, such as social housing
- Inclusionary zoning
- Density bonuses
- Eliminating parking requirements
- Disposition of public land, such as through new federal RRIF/TIFIA options



# Create regional accountability

- Equitably distribute the benefits and responsibilities of economic development.
- Encourage coordination around open space and housing, transit and natural habitats.
- Associate housing investments with meeting federal Affirmatively Furthering Fair Housing goals.

**Thank you!**



**Yonah Freemark**

*Lead, Practice Area on Fair Housing,  
Land Use, and Transportation*

*Urban Institute*

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## Ending the Exploitative and Unjust Treatment of Disenfranchised Construction Workers

Construction Justice NYC is a grassroots coalition of labor unions and community-based organizations committed to ending the exploitation and unjust treatment of New Yorkers employed in the construction industry.





# WE ARE DEMANDING JUSTICE

- Construction Justice NYC is a grassroots coalition of labor unions and community-based organizations. We're committed to ending the exploitation and unjust treatment of New Yorkers employed in the construction industry.
- Criminalization of Black, Brown, Justice impacted and immigrant communities has led to an ever-growing labor pool of vulnerable, disadvantaged and discriminated-against workers. Today we are moving closer to changing this reality by ensuring no construction worker is treated as disposable or a burden to our society- we build this city and we should be able to work in this city.
- These employers have immense power over justice-affected workers, effectively suppressing wages and safety standards. Justice-affected workers are treated as disposable and a burden to taxpayers, but there is great economic advantage for communities when these workers are connected with quality construction careers.
- Ambitious community hire goals, raising workers' wages and ensuring employer-paid benefits should be standard practice on City financed projects and today we celebrate a step closer to this reality.



# OUR COALITION





# WORKFORCE RECRUITMENT



- Apprenticeship / Pre-Apprenticeship Outreach
- P2A, NEW, Construction Skills, Helmets to Hardhats, Rebuilding Together, NYCHA Rees, Forward Connect NYC.
- Non-Union / Body Shops
- Re-Entry Population / Outreach
- Immigrant / Undocumented Population Outreach
- Public Housing Outreach

# Session 3: Examining Solutions- Means and Methods



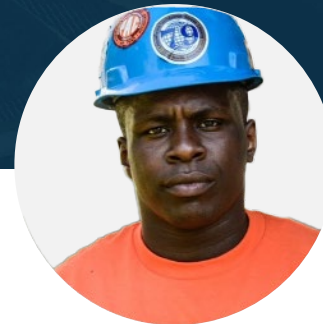
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**Ivan Rupnik, Ph.D.**

Founding Partner, MOD X &  
Assoc. Professor,  
Northeastern University



**Justice Favor**

Director of Strategic  
Partnerships, Greater New  
York Laborers-Employers  
Cooperation and Education  
Trust (GNY- LECET)



**Thomas W. Smith  
III, Moderator**

CEO, ASCE  
Vice Chair, NIBS Consultative  
Council

# Closing Remarks

Brian Pallasch, EVP & CEO, IIBEC  
*Chair, NIBS Consultative Council*





# Thank you all for attending!

Enjoy the reception!