Virginia Coalition of Housing and Economic Development Researchers

Addressing the Impact of Housing for Virginia's Economy

A REPORT FOR VIRGINIA'S HOUSING POLICY ADVISORY COUNCIL|
NOVEMBER 2017

Executive Order 32—Advancing Virginia's Housing Policy

In October 2014, Governor McAuliffe issued Executive Order (EO) 32, "Advancing Virginia's Housing Policy," to "identify and implement actions to enable quality, affordable housing, which will strengthen families and communities and foster economic growth." The Housing Policy Advisory Council (HPAC) was thus established under the leadership of the Secretary of Commerce and Trade to help guide the development and implementation of Virginia's housing policy.

A key directive of EO 32 was identifying the links between housing and economic and community development. To this end, the HPAC commissioned a study from a consortium of researchers at Virginia Tech, George Mason University, The College of William and Mary, and Virginia Commonwealth University, with the premise that successful housing policy must be based on independent analytic findings and best practices. The collaborative research of the four universities provides key information on the Commonwealth housing sector, focusing on the economic impact of housing, future scenarios impacting housing needs, and links between housing and other key policy sectors.

This report summarizes the research conducted by the four universities and the implications for Virginia's housing policy development. The report is designed to assist stakeholders and policymakers think more creatively and collaborate more intensely at the state, regional, and local levels as Virginia strives to build on the successes of the past and meet the pressing housing challenges facing the commonwealth. The entirety of the research is included in nine papers available online at www.vchr.vt.edu/VirginiaHousingEconomicLinkages.

Executive Summary

Key Findings

1. **Virginia has a shortage of housing affordable to a substantial share of households.** All regions of the state are experiencing significant shortages of affordable housing, as evidenced by the large share of households experiencing housing cost burdens across urban, suburban, and rural areas. Statewide, one in three households is cost burdened, spending more than 30 percent of their income for housing.
2. **Failure to address affordable housing needs adequately has significantly affected key priorities of state policy, including economic and workforce development, transportation, education, and health.**
3. **Virginia needs to produce substantial new affordable housing to accommodate anticipated workforce growth.** Virginia will need to house over 350,000 new workers in the next 10 years. The retirement of Baby Boomers and the entry of millennials into the workforce implies that a large share of new workers will be young with relatively low incomes and in need of affordable rental and homeownership units.
4. **The homebuilding industry faces major challenges in meeting affordable housing needs.** Nationally and in Virginia, the homebuilding industry faces challenges in affordable housing production for the following reasons:
    a. Developable residential site shortages and high land costs near major employment centers
    b. Construction labor supply constraints (especially in skilled trades)
    c. Limited means for reducing rapid increases in development costs
5. **Regions with lower combined housing and transportation costs have experienced better economic performance.**
6. **Virginia can no longer rely on the federal government to address critical housing needs.** Federal housing appropriations are severely constrained, and fiscal stress is expected to further reduce federal housing expenditures and increase the likelihood of devolution of housing assistance responsibilities to the states.

Virginia can avoid a housing crisis if the state and localities are proactive

Some of the nation's largest cities and housing markets face a housing crisis—their workers can no longer afford available housing. Facing these challenges, workers leave, bear greater cost burdens, or experience personal crises such as foreclosure, displacement, or homelessness. Virginians have not been exempt from such challenges, but Virginia's housing challenges are still manageable if we act now.

Housing can help attract talent and businesses

Virginia has the opportunity to address growing housing challenges and make housing a comparative advantage in economic development. As housing costs increase faster than incomes and the federal government reduces funding for affordable housing, nationwide housing problems will become more prominent. States and places that proactively address this growing challenge will be more attractive to both workers and businesses.

This research addresses Virginia's housing-related challenges that influence economic development. The findings discussed in this report underscore the importance of housing to individuals, families, communities, and our state economy, as well as the effects of housing on the Commonwealth's economic growth. The information bulleted below provides a snapshot of the research discussed in the executive summary, the full report and the nine topic-based reports that are included as appendices.

Report Snapshot

Housing and the Economy

- The housing industry is the Commonwealth's sixth-largest private sector industry.
- High housing and transportation costs are negatively correlated with economic growth indicators.

Housing and Economic Development

- Over the next 10 years, Virginia can add 357,800 net new jobs if affordable and appropriate housing is available for potential employees.
- There are places across the state where representatives say that their housing stock helps their region attract workers and businesses.
- Other representatives have noted that high housing costs both deter workers and businesses and thwart business expansion.

Housing and Economic Opportunity

- In 2015, nearly 1 in 3 Virginia households were burdened by housing costs and more than 1 in 10 were severely burdened, paying more than 50 percent of their household income for housing.
- Housing cost burdens negatively affect economic opportunity for individuals, families, and children.
- Unaffordable, unstable, or otherwise inappropriate housing negatively affects residents' health and children's educational attainment, which in turn negatively affects the performance of current and future workers.

The Way Forward

- Proactive and decisive planning and policy that supports workforce housing and embraces technology will make housing a competitive advantage for the state.
- Training and educating people in the residential housing industry is the best way to introduce changes needed in the industry.

Housing and the Economy

The housing industry is Virginia's 6th largest private sector industry and support 8 percent of jobs

In 2015, the Virginia housing industry generated $47.8 billion in economic activity, making it the Commonwealth's sixth-largest private-sector industry. Housing-related businesses generate over 314,000 jobs that pay more than $14 billion in annual wages, salaries, and benefits. The housing industry supports about 8 percent of Virginia's jobs.

The housing industry contributes to Virginia's current economic success, but more importantly our ability to attract and retain people to sustain this economic success highly depends on housing characteristics—location, quality, cost, and availability. Some Virginia regions face serious affordable housing shortages that may already limit their economic growth. Transportation costs can exacerbate these challenges in areas with poor transportation networks, but efficient planning in some areas has reduced transportation costs and made these areas more affordable despite high housing costs.

Location of housing plays a critical role in economic efficiency

High housing and transportation cost burdens have serious consequences for both local and state economies. A region's housing and transportation structure and development patterns are a primary determinant of its economic efficiency[i], which is passed onto households, businesses, and government entities as cost savings[ii]. In Virginia, there is a statistically significant and negative correlation between combined housing and transportation cost burdens and economic indicators, such as number of businesses, number of jobs, and payroll.

Housing and Economic Development

Virginia will need new, desirable housing to attract workers

As municipalities and regions compete for businesses and talent, housing can be an advantage or a limiting factor. Virginia has the potential to add 357,800 net new jobs over the next 10 years, and a sufficient supply of housing must be available to ensure that such employment growth can occur. New housing units must be available in the right locations, of the right types, and at affordable prices and rents. New workers will also use transportation infrastructure and, in some localities, additional use will necessitate new transportation capacity. This increased workforce demand adds to existing housing supply challenges that already strain municipal infrastructures and leave some households to struggle with housing cost burdens or otherwise inappropriate housing.

Regional wages, economic vitality, and commuting costs affect local housing affordability, which, in turn, informs household moving decisions[iii]. Housing costs are among the top five factors affecting where households choose to live and work and where businesses choose to locate[iv]. In a national survey of more than 300 companies, two-thirds of respondents believed that a shortage of accessible affordable housing has "a negative impact on retaining qualified entry-level and mid-level employees" and more than half attributed long commutes to some level of employee turnover[v].

Virginia localities demonstrate that housing can attract or discourage business location and expansion

Representatives from regions across Virginia have said that their housing stock helps their region attract workers and businesses. For example, Roanoke revitalized its downtown buildings, adding high-quality housing that is attractive and affordable for young professionals. Housing has now become part of the Roanoke region's "sales pitch" to prospective companies. In other places, housing costs and locations present business challenges. For example, in Northern Virginia and Hampton Roads, the high cost of housing is particularly challenging for young professionals and lower-wage workers. A representative from the Charlottesville region explained that the high cost of housing might be one reason that growing companies expand out of the region, and sometimes the state, when they are ready to expand manufacturing activities. Furthermore, workers in manufacturing occupations may find more cost-effective housing outside of the region.

Housing and Economic Opportunity

Housing affordability affects children, the future workforce

Housing plays a large role in personal economic opportunity. Research has shown that housing affordability, stability, quality, tenure, and location affects child development and economic opportunities for individuals and households. Housing is the foundation of a family's well-being[vi]. Housing unaffordability is often the reason individuals and families experience instability in housing, accept substandard housing or sacrifice other important needs such as child enrichment, medical attention, or food. Thus, strained finances and substandard or unstable housing may negatively affect both individuals and households.

One in three households in Virginia need more affordable housing

In 2015, nearly one in three Virginia households (over 960,000 households) were housing cost burdened. Furthermore, more than 1 in 10 households were severely cost burdened, where housing expenditures accounted for over 50 percent of household income. Cost-burdened households often must choose between housing and other necessities, generating stress and sometimes requiring sacrifices that affect future economic opportunities.

Unaffordable housing diminishes children's economic potential

Housing cost burdens can directly affect a child's development and educational achievement. Several studies have demonstrated that increases in a family's disposable income significantly improve children's test scores[vii]. Newman and Holupka (2014) found that families without housing cost burdens are more likely to spend a portion of their income on child enrichment, which positively affects children's cognitive achievement. By contrast, households with greater cost burden spend less on child enrichment. Additional research has indicated that unaffordable housing can contribute directly to poor school attendance and performance[viii], and family and child stress can affect a student's future career success. Stress during the early childhood years, such as that induced by parental unemployment or demanding jobs, can diminish children's subsequent academic and labor-market accomplishments[ix].

Housing affects opportunities for the existing workforce

The location, tenure, and type of housing can affect a household's economic opportunities. For example, Kleit (2002) found evidence that households living in areas with more income diversity have more diverse job-search networks. White and Saegert (1997) showed evidence that co-op ownership of low-income housing is associated with increased skills and self-confidence as well as wider job networks among tenants. A number of studies have shown that homeownership provides considerable access to opportunity. The simplest connection between homeownership and opportunity is the ability to build wealth and use home equity. Homeowners can elect to borrow against the equity they have built on their home through a home equity line of credit (HELOC). HELOCs can act as a financial buffer against unexpected expenses, smooth consumption over time, or allow households to invest in education, job training or a small business[x].

The Way Forward

The literature reviewed for this study and the research conducted by the study team suggest a number of broad actions that will make housing a competitive advantage for Virginia:

1. Enacting policies to support workforce housing in the face of federal devolution
2. Encouraging location-efficient development
3. Establishing policies and housing production costs for local markets
4. Embracing housing production technology

Reduced federal funding will necessitate an increase in public–private partnerships

Substantial federal devolution is expected in the 2020s. Therefore, state and local governments—in partnership with private enterprise and non-governmental organizations (NGOs)—will be increasingly responsible for providing social and assistance programs. Concurrently, many Virginia workers struggle to find affordable

housing. If state and local governments do not actively take responsibility for increasing development efficiency through planning, policy, and technology, Virginia will become less attractive to workers, and, by extension, businesses. However, if Virginia's state and local governments are decisive in enacting policies that promote affordable workforce housing (e.g., approving statewide standards for factory-built modules and housing units built in Virginia or enacting tax credits for Virginia production), Virginia can make housing a competitive advantage for the state.

The state and localities will need to encourage location-efficient development

As cities and regions continue to grow, changing where and how they expand is their best opportunity to lower housing and transportation costs[xi]. More accessible (location-efficient) land-use patterns are expected to increase employment, economic productivity, land values, and tax revenues owing to the combined effects of improved accessibility, reduced transportation costs, agglomeration efficiencies (i.e., increased productivity from proximity of activities), public services efficiencies. Carruthers and Ulfarsson (2008) find that the density of developed land reduces local government spending. Further, cost savings from improved location efficiencies benefit households, businesses, and governmental entities. Sarzynski and Levy (2010) note that regions that coordinate activity around existing infrastructure can reduce transportation costs for businesses, workers, and residents.

Individual local markets can support production of affordable housing

Establishing policies and land and labor costs for individualized, local markets is key to the future of housing production and affordable housing in Virginia. For example, demand for housing in Northern Virginia has continued to increase in the wake of the Great Recession along with land costs, local regulations, and fees, but housing production employment remains at relatively low levels. These factors have converged to increase the cost of housing despite relative income stagnation, making housing less affordable. Housing density has increased in response to land costs, but even dense housing remains unaffordable to many. Educating and growing a localized labor force and establishing the value of careers in housing are key factors to local market success.

Housing production technology offers time and cost savings

Embracing technology is key to the future of affordable housing. Prefabrication and housing industrialization offers cost and time savings as well as building quality improvements. These new processes require stakeholder education as well as a shift in policies and business practices that embrace technological, market, organizational, and transportation requirements.

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About the study

This work identifies and describes the important links between housing and its effects on economic development. The team analyzed the economic impact of Virginia's housing industry quantitatively and reviewed housing supply and demand in the Commonwealth. The study included three major phases and comprised three formats: quantitative (where existing data provide detailed evidence), qualitative (where data was collected by the team), and descriptive (where data were not readily available).

Phase 1 comprised a standard economic impact study of the recent impact of housing in Virginia's economy. Phase 2 examined the current state of housing in terms of supply and demand, transportation, health, education, and redevelopment and revitalization. Certain study topics within Phase 2 did not have available data and required in-depth qualitative research. Therefore, our work supported quantitative analysis through qualitative and descriptive analyses (i.e., a literature review and interviews of key stakeholders) for topics such as community vitality and household well-being. Phase 3 considered multiple future scenarios of the housing industry and its economic effects at various stages over time using data analysis from Phases 1 and 2. During the study, we considered differences among 1) statewide needs and opportunities; 2) large metropolitan area needs and opportunities; 3) small metropolitan needs and opportunities; and 4) rural area needs and opportunities.

The Study Team

In the spirit of collaboration, key university stakeholders across Virginia formed the Virginia Coalition of Housing and Economic Development Researchers, a project team that could best provide answers to the work required by the Housing Policy Advisory Council (HPAC). The research aimed to determine the relative importance of housing in the Virginia economy and to analyze and articulate the linkages between housing and economic development.

The collaborative team provided HPAC with extraordinary depth of knowledge and experience in housing research, the housing market, housing economics, economic development, and economic impact analysis. The team included faculty and students from Virginia Tech (VT), George Mason University (GMU), William and Mary (W&M), and Virginia Commonwealth University (VCU). Details about specific team members are provided in an appendix of the main report.

Important Methodological Notes

Methodologies used throughout this work included an Economic Impact Analysis, Stakeholder Involvement, Statistical Analysis, Indexing, Spatial Analysis, Regional Economic Analysis, and a Literature Review. We concurrently conducted much of the literature review, data compilation, and data analysis for Phase 2 to ensure efficiency and effectiveness. Furthermore, qualitative and quantitative data collection were used to formulate future scenarios and conduct stakeholder engagement.

The economic impact analysis is based on an input–output approach using the IMPLAN model. The analysis provides estimates of the direct, indirect, and induced effects of industry spending in sectors of the Virginia economy that were identified in consultation with HPAC members. The team took a conservative approach to estimating economic impacts by, for instance, adjusting model input data in each sector to reflect only those activities related to the provision of goods and services to residential units. For example, according to the IBIS World database, about 68 percent of all pest control services are for residences. Given the interactions among the industries included in this analysis, outputs from the IMPLAN model were adjusted to prevent double counting of economic activity associated with the housing industry.

This study used American Community Survey data for much of the quantitative analysis. During data gathering, the latest data available were from 2015. Thus, the demand analysis and workforce demand forecasts are based on 2015 data.

Projections of new housing demand to support regional employment growth group employment by major industry sector and include only payroll jobs. Job forecasts are further distinguished by worker age to better estimate income levels, people per household, and expected housing tenure (rent/own). Three regions—Southwest, South Central, and the Northern Neck—were forecast to have no job growth between 2014 and 2024 and therefore did not impact workforce demand projections. Housing needs in these regions will likely be tied to factors other than job growth.

A follow-up analysis using more recent data for household transportation and housing costs (HUD LAI) as well as economic activity (business patterns) may be useful for verifying the statistical relationships found using the 2008–2013 data, as this period represents a time of financial recovery and may indicate dynamics that differ from more financially stable periods. Extending the analysis to 2013–2018 may help clarify the relationship between household cost burdens and statewide economic activity. Furthermore, the causal direction of economic growth and changes to household cost burdens can be determined by analyzing data from a longer period.

The three scenarios determined for the future of housing in Virginia are not forecasts but plausible alternative paths to 2030. They are based on extrapolating existing demographic and economic trends, on projecting rates of diffusion and market penetration for newly developed technologies, and on credible differences in the timing and nature of federal and state government policy decisions.

Additional methodological details can be found in the full topic-based reports included in the appendices.

1 Introduction: The Importance of Housing

Housing affects the economic success of the state, localities, businesses, and individuals

Housing has an enormous sphere of influence. As an industry, housing is an important economic engine that fuels growth and creates jobs. Homes affect our health, well-being, and economic opportunities. As part of our communities, cities, counties, and regions, housing bridles our potential for economic success with the ability to either limit employment growth or attract and retain talent. Thus, this study considered the economic impacts of housing, the effects of housing on economic development, and the association between our homes and our health, well-being, and economic opportunities.

1.1 Importance of Housing to the State

The housing industry is a major contributor the state economy

The housing industry is one of the largest contributors to Virginia's economy, generating $47.8 billion in economic activity in 2015. This activity supports over 314,000 jobs that collectively pay more than $14 billion in annual wages, salaries, and benefits. Approximately eight percent of all jobs in Virginia (including agricultural and government employment) are related to private-sector housing activities, contributing $23.3 billion to gross state product. The business activities and transactions supporting the housing industry contribute to state and local tax jurisdictions, with revenues approaching $1.7 billion in 2015. Therefore, an efficient housing market that can supply housing products to all Virginia residents is essential for economic development efforts and the vitality of all Virginia communities.

Table 1. Economic Impacts of Virginia's Housing Industry, 2015

Description	Impact
Output (transactions)	$ 47,814,092,000
Value Added (gross state product)	$ 23,269,525,000
Labor Income (salaries, wages, benefits)	$ 14,197,085,000
State and Local Taxes	$ 1,665,701,000
Jobs	314,299

The housing industry is Virginia's sixth-largest private-sector industry by direct output and Non-Residential Construction is the fifth-largest, driven in part by resident-induced demand for infrastructure. Retail and

Wholesale Trade, Healthcare Services, and Transportation and Warehousing are also among the largest sectors, reflecting the importance of the state's transportation assets and the traditional food production and tobacco industries.

By number of jobs, a different ranking of state industries emerges. There are roughly 160,000 direct jobs in Virginia's housing sector but more than 340,000 jobs in personal healthcare and over 400,000 retail jobs (although many retail jobs are part-time). Some sectors, such as Food and Beverage Product Manufacturing and Tobacco Product Manufacturing at 35,000 jobs and 2,000 jobs, respectively, generate substantial output with relatively few workers.

Table 2. Virginia's Largest Private-Sector Industries, 2015

Industry	Direct Output
1. Federal Procurement Spending (FY15)	$ 100.4 billion
Defense Spending	$ 65.0 billion
2. Healthcare Services	$ 44.3 billion
3. Retail	$ 36.6 billion
4. Wholesale	$ 30.3 billion
5. Non-Residential Construction	$ 30.1 billion
6. Housing (construction, real-estate services, household services)	**$ 28.1 billion**
7. Transportation and Warehousing	$ 24.6 billion
8. Food and Beverage Product Manufacturing	$ 16.9 billion
9. Tobacco	$ 11.7 billion

1.2 Importance of Housing to Households

Housing affects family health, well-being, and economic success

Research has established housing as the foundation for family well-being[xii]. People living in high-quality housing are less depressed, more energetic, and more peaceful than those living in low-quality housing[xiii]. Housing stability and freedom from housing-related stress supports child development. Furthermore, Newman and Holupka (2013) find that families who are not cost burdened are more likely to spend a portion of their income on child enrichment, benefitting children's cognitive achievement. Development and educational achievement of children in early life affect their potential for economic success as the future workforce. In addition, the

location of housing offers opportunities for households. Kleit (2002) found evidence that households living in areas with more income diversity have more diverse job-search networks. Access to amenities is also theorized to provide better quality of life, health benefits, and wage growth[xiv].

Housing unaffordability and instability have negative consequences for the workforce

Housing unaffordability is often why individuals and families experience housing instability, accept substandard housing, or sacrifice other important needs like child enrichment, medical attention, or food. Substandard housing can result in psychological detriment, causing stress and low self-esteem and hindering family self-sufficiency[xv]. Housing cost-burdened adults are also less likely to fill prescriptions, follow healthcare treatments, or purchase health insurance because of the cost.

Housing is particularly important for child development and future economic success

Housing has the greatest impact on our future through our children. Although positive outcomes can be achieved with housing stability, affordability, and location, unaffordable or otherwise inappropriate housing has severe consequences for children. Negative effects stem from housing unaffordability and instability as well as stress and home health hazards. For example, the likelihood of grade retention increases among children of all ages as housing affordability decreases[xvi]. Residential instability in a child's early life is associated with significant reductions in behavioral school readiness at age 5[xvii]. Studies have also found that the health and stress levels of parents and caregivers—especially those of pregnant mothers—affect children's development, ability to learn, and educational attainment[xviii].

1.3 Importance of Housing to Economic Development

A shortage of affordable housing can constrain economic growth

A region's housing stock can help attract and retain workers or limit growth. Housing costs are among the top five factors affecting where households choose to live and work[xix]. Although high housing prices often reflect local amenities and economic opportunities in the area[xx], research has suggested that high housing prices and few affordable options may constrain economic growth. Saks (2008) argues that when the supply of affordable housing is restricted (often by land use controls), labor migration patterns change, resulting in lower employment growth[xxi]. Slowed, stalled, or negative employment growth can, in turn, hurt businesses and communities.

Poorly located housing decreases productivity

Regional housing and transportation development patterns are a primary determinant of regional economic efficiency[xxii]. How and where we build homes determines the need for and costs associated with transportation. Sprawling development increases infrastructure costs, congestion causes greater levels of pollution, and long commutes negatively impact businesses through lost productivity, greater levels of absenteeism and tardiness, and, ultimately, turnover when a worker leaves in search of a shorter commute[xxiii]. High-quality public transit can increase labor participation, and improving transport system diversity increases productivity and economic development[xxiv]. In high-income cities, the availability of affordable rental housing in locations served by fast and frequent public transportation provides low-income households with greater access to employment opportunities without the costs of owning and operating automobiles[xxv].

Shorter commutes are attractive to prospective workers

An area's location efficiency plays a large factor in attracting employees and talent to a region. Location affordability factors, including regional wages and economic vitality, costs of commuting to employment opportunities, and overall housing affordability inform a household's decision to move[xxvi]. Studies have shown that increasing access to employment centers throughout a region leads to better employment opportunities and increased earnings[xxvii]. The availability of affordable commuting options improves workers' ability to overcome the distance between home and work and increases short- and long-term earnings[xxviii].

Long commutes make it more difficult and expensive to retain workers

Household location decisions influence labor supply and wages demanded by workers to compensate for their commuting costs, negatively affecting businesses and decreasing an individual's personal welfare. A spatial mismatch of jobs and household locations may result in longer travel times, increasing the costs of production for firms and decreasing available leisure and labor time for individuals, constraining economic growth[xxix]. In a national survey of over 300 companies, two-thirds of respondents believed that a shortage of accessible affordable housing has "a negative impact on retaining qualified entry-level and mid-level employees," and more than half attribute some level of employee turnover to the resulting long commutes[xxx]. Long daily commutes owing to a lack of accessible affordable housing may also contribute to traffic congestion[xxxi]. Congested roads can reduce the profitability of local businesses by increasing operating costs and by shrinking the area from which businesses can expect to draw both customers and workers[xxxii]. Cities that fail to address congested roads "may find their competitive edges slipping away to more favorable locations"[xxxiii].

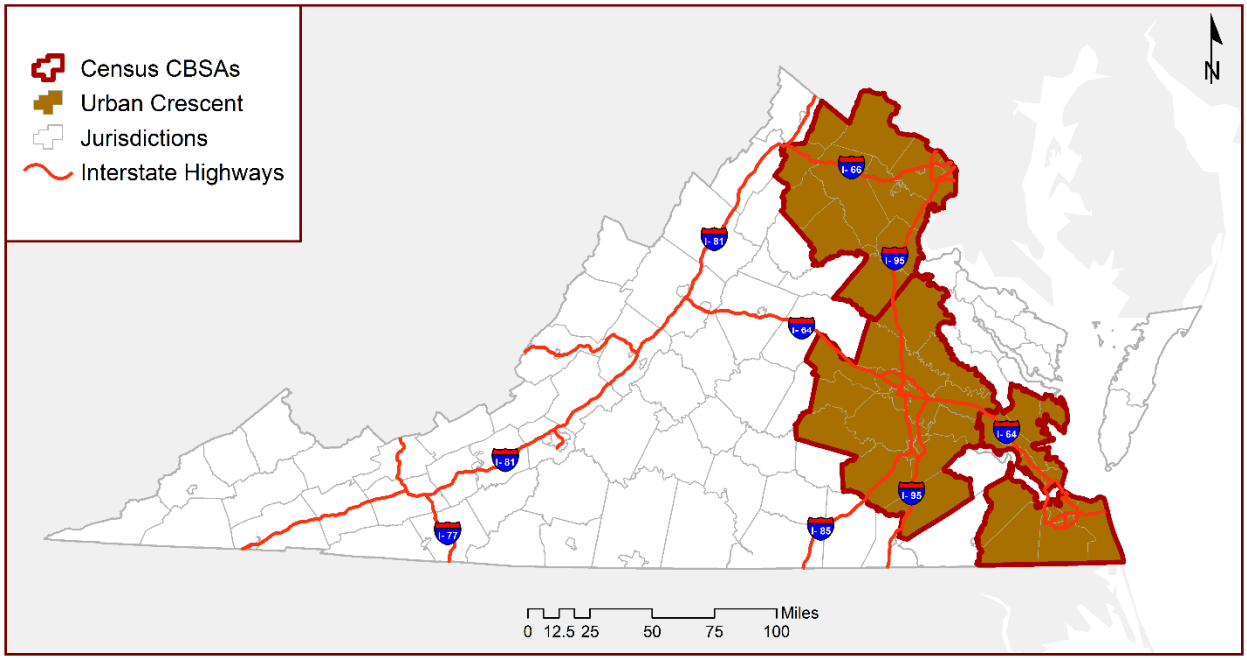
2 Housing in Virginia

Virginia's built environment, industries, and economies vary across the state and are influenced by history, transportation, geography, natural resources, and a host of other factors. Therefore, housing demand and associated challenges vary across the state. To address these differences, the study team considered housing regional supply and demand and provided market-specific examples. Although details of housing challenges and solutions are often specific to individual markets (and sometimes jurisdictions), the team found commonalities among markets in four regions and geographic categories: the Urban Crescent, the Reverse Crescent, rural areas, and micropolitian areas outside the two crescents. The report details each region/geography and summarizes the key findings for each region.

2.1 Urban Crescent

The Urban Crescent encompasses the jurisdictions included in the Virginia portions of three contiguous metropolitan statistical areas (MSAs): the Washington–Arlington–Alexandria MSA, the Richmond MSA, and the Virginia Beach–Norfolk–Newport News MSA. Nearly six million people live in more than two million households in the Urban Crescent: approximately 737,700 renter households and 1,246,800 owner households. Average household income in the Urban Crescent is $80,206, and more than 700,000 households are cost-burdened, paying more than 30 percent of their income for housing.

Map 1. The Urban Crescent



Key Findings: URBAN CRESCENT

- High housing costs make living in the Urban Crescent difficult for households earning low and moderate incomes.
- A shortage of affordable housing, particularly rental housing, makes the Urban Crescent less attractive to millennials.
- Dense development and efficient transportation increases the affordability of some places in the Urban Crescent, but a shortage of these places leaves many with long commutes.
- Unequal access to quality schools strains municipalities with the best schools and perpetuates lower-performing schools in other jurisdictions.

Stakeholder interviews revealed that the availability of affordable housing is a key challenge facing this part of the Commonwealth and that the connection between housing, transportation, and jobs is underappreciated. Many areas within the Urban Crescent struggle with traffic congestion related to long commutes, but the region includes some of the most location-efficient places. Some workers must commute long distances to obtain appropriate, affordable housing, whereas others are able to secure housing and other amenities close to their jobs. Lower transportation costs help offset high housing costs, resulting in a relatively low combined cost burden of housing and transportation. Unequal access to quality K–12 education as a major housing-related challenge, particularly in the Richmond and Hampton Roads regions.

For households throughout the region, obtaining affordable housing may be difficult. In Northern Virginia and the Hampton Roads regions, most households with incomes less than 80 percent of area median income (AMI)[1] are cost-burdened, and nearly half of moderate-income households with incomes between 80 and 100 percent of the AMI are cost-burdened. High housing costs bring Northern Virginia closer to housing crisis and may already threaten the area's economic development potential. In a recent report, Stephen Fuller cited high housing costs, particularly rental housing costs, as contributor to the Washington region's "declining economic brand"[xxxiv].

In 2015, 44 percent of renters in Northern Virginia were cost-burdened, but affordable rental housing is scarcer in the Richmond and Hampton Roads regions. In the Richmond MSA, 47 percent of renters are cost burdened, and 52 percent of renters are cost burdened in the Virginia Beach–Norfolk–Newport News MSA. Affordable housing problems are most acute in Hampton Roads, where high costs of housing are compounded by high transportation costs. Lower wages, higher rates of poverty, and high housing costs are among the factors making

[1] AMI and percentages thereof are defined using regional income limits defined by the U.S. Department of Housing and Urban Developments.

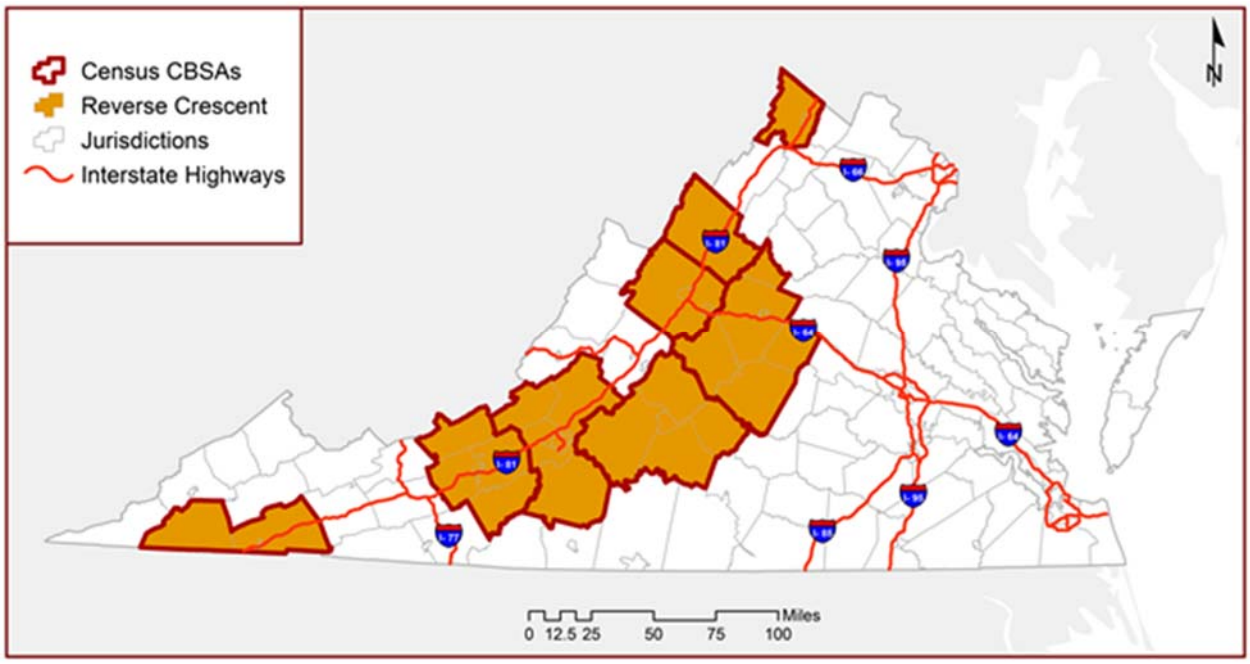
the Virginia Beach–Norfolk–Newport News MSA the most cost-burdened MSA in Virginia and the 37th-most cost-burdened MSA in the country.

The Richmond MSA is relatively affordable compared to Northern Virginia and Hampton Roads, but the region still struggles with high levels of cost burden. Regional representatives mentioned several housing-related challenges that manifest in each of the MSAs, including school quality disparity and homelessness. Representative from both Richmond and Hampton Roads mentioned unequal access to high-quality schools in the region and indicated that such inequity places stress on school districts. Locations with high-quality schools struggle to serve students that may not reside in the jurisdiction, and those with low-quality schools struggle to improve because their funding is derived from real-estate taxes from home values that remain low because of the low school quality.

2.2 Reverse Crescent

The Reverse Crescent includes the jurisdictions in the Virginia portions of Metropolitan and Micropolitan Statistical Areas in relative proximity to the I-81 corridor: Winchester, Harrisonburg, Staunton–Waynesboro, Charlottesville, Lynchburg, Roanoke, Blacksburg–Christiansburg–Radford, and Kingsport–Bristol. Although the Charlottesville and Lynchburg MSAs are not linked geographically to I-81, their housing challenges and opportunities resemble those of the MSAs in the I-81 corridor more than those of the more densely populated Urban Crescent.

Map 2, Reverse Crescent



Key Findings: REVERSE CRESCENT

- Relatively lower housing costs make housing a comparative advantage for many regions in the Reverse Crescent.
- Lower-income households and young professionals have access to home ownership opportunities, except in the tightest markets.
- In some jurisdictions, high transportation costs negate savings from relatively affordable housing.

The Reverse Crescent is home to over 1.4 million people and approximately 556,000 households. There are approximately 180,500 renting households and more than 375,000 owner households. Average household income is $50,673, and 162,000 households pay more than 30 percent of their income for housing.

Many stakeholders in the Reverse Crescent described housing as an advantage because of affordability relative to other locales. Apart from tight housing markets like Charlottesville, low-income working households generally have access to affordable housing and homeownership opportunities. Still, the lowest income households, that is, those earning less than 30 percent of the AMI, struggle to find housing without sacrificing other necessities.

Some interviewees mentioned that housing built for workers in the 1940s and 1950s retains its appeal. Places with this type of housing are often older industrial areas where housing was built close to downtowns with excellent transportation options, making them very affordable. That said, several places in the Reverse Crescent have transportation costs that negate the savings from relatively affordable housing. For instance, several areas around Harrisonburg have among the highest rates of combined housing and transportation cost burden in the Commonwealth.

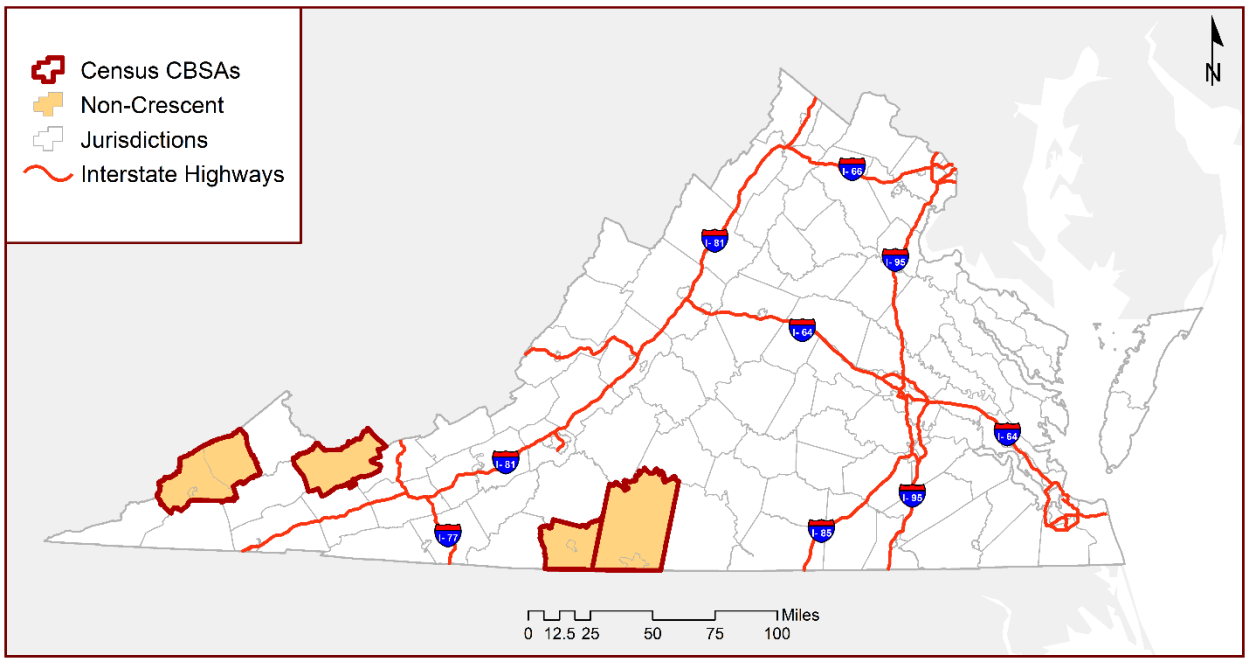
2.3 Micropolitan Areas Outside of the Crescents

Micropolitan areas exist outside the Urban and Reverse Crescents: Bluefield, Big Stone Gap, Danville, and Martinsville. These micropolitan areas are home to 275,000 people comprising 114,000 households: 34,000 renter households and 80,000 owners with average household income of $36,458. Approximately 30,000 households are cost-burdened. Each of these areas has experienced population decreases and has struggled to revitalize after losing large numbers of manufacturing and coal jobs.

Key Findings: MICRO-POLITIAN AREAS

- Each of these regions has struggled with effects of population decline—shuttered commercial businesses and few amenities to attract new residents.
- In the coal fields, a lack of appropriate, desirable housing deters workers from living near their jobs and thwarts community development efforts.
- The Martinsville and Danville micropolitan areas struggle with housing blight—deteriorating and vacant housing.
- Both Martinsville and Danville have benefited from renovating historic buildings to provide desirable downtown living.

Map 3. Micropolitan Areas Outside of the Crescents



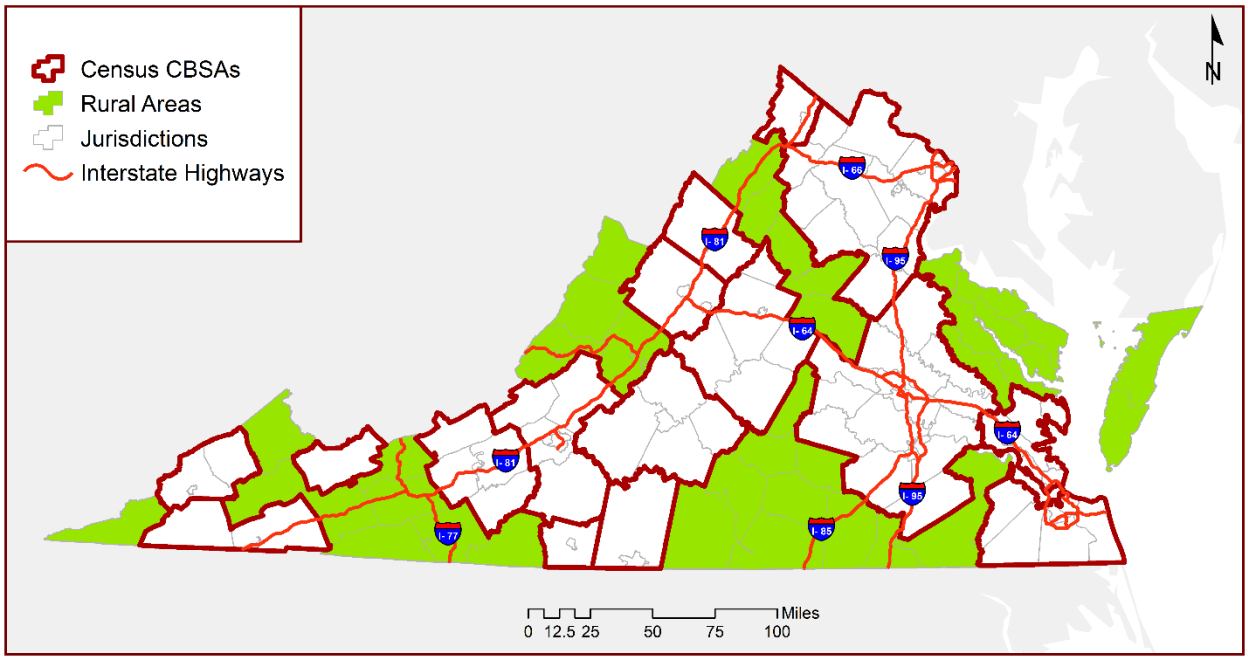
According to regional representatives, coal and timber companies own most of the developable land in the coalfields, presenting a barrier to housing development. The Bluefield and Big Stone Gap micropolitan areas struggle with many of the same issues that the surrounding counties face. Many lack amenities to attract young people and report that workers commute from cities and towns with more amenities, such as Abingdon, Lebanon, Bristol, and Pikeville, KY. Regional representatives explained that housing deters workers from living nearby and that developers are reluctant to invest in the area.

In the Danville and Martinsville micropolitian areas, neighborhoods struggle with abandoned or otherwise deteriorating housing that contributes to blight. Many housing-related projects focus on blight removal—demolition, redevelopment, and rehabilitation as well as preservation of affordable housing for low- and moderate-income households. In addition to neighborhood-based projects, both Danville and Martinsville have benefited from renovation and transformation of historic downtown buildings into housing. The conversion of old tobacco warehouses in Danville's River District have been particularly successful. The new housing has attracted thousands to live downtown, catalyzing the establishment and growth of downtown business and supporting River District community development efforts.

2.4 Rural Areas

More than 785,000 people (308,000 households) live outside of Virginia's Metro and Micropolitan areas. There are also jurisdictions within Metro and Micropolitan areas that have a substantially rural character and pride themselves in its preservation. Most non-metro, non-micropolitan households (225,000) own their own home. There are approximately 83,000 renting households, but rural area representatives consistently mentioned a shortage of quality, affordable rental housing. Average household income is $56,114, and approximately 86,000 households are cost burdened. Further, some of these rural jurisdictions, particularly rural independent cities have some of the highest rates of cost burden in the state.

Map 4. Rural Areas



Key Findings: RURAL AREAS

- Demand for housing in towns is an opportunity for revitalization.
- Second-home markets can drive up housing costs and make communities unaffordable for low-wage working households.
- Housing with incomplete facilities remains a problem in some rural communities and maintaining older housing stock is a growing challenge.
- Vacant, abandoned housing can contribute to negative stereotypes and present health and safety hazards.

Rural areas face many housing challenges but have found opportunities for revitalization as demand for housing in towns and small cities increases, marking a shift from "away from it all" rural living to demand for housing in small towns. Regional representatives consistently mentioned the opportunity to capitalize on demand for

downtown living in rural towns. However, some communities in the far southwest noted that low populations and few amenities make it difficult to attract residents and that workers commute from more populous towns and counties.

Some representative in rural areas noted that homes without indoor plumbing and other major housing problems remain an issue. Another growing concern is maintaining older housing stock. In less-active markets throughout the state—not only rural areas—homes have not been upgraded or maintained because of less opportunity for return on investment upon sale. Therefore, communities struggle to encourage owners to preserve their properties and avoid neighborhood decline.

Another challenge in many rural jurisdictions is vacancy, which is often evidence that a large part of the housing stock is no longer desirable or appropriate. Both in the mountains and on the coast, vacation destination communities struggle to provide housing that is affordable to workers earning low and moderate incomes. The second-home market has driven up land values, so employees working low- and moderate-wage jobs have either inherited their home or commute to the region. Second homes represent more than 10 percent of the housing in some rural areas. Flooding and wetland conditions that make homes more expensive to build and maintain challenge rural coastal areas.

The Virginia Center for Housing Research at Virginia Tech has documented challenges with pre-HUD code mobile homes in southwestern Virginia. There are more than 17,000 pre HUD code mobile homes in the Appalachian counties of Virginia, representing 21 percent of the mobile and manufactured home stock. Furthermore, there are more than 7,000 vacant mobile homes that are likely to negatively impact property values, pose health and safety concerns, or contribute to negative stigmas associated with mobile and manufactured homes[xxxv].

3 Study Findings

Section 3 details the study team's findings. This section is organized into five subsections, with key findings highlighted at the beginning of each subsection. Section 3.1 discusses future demand from Virginia's growing workforce and existing, unmet demand for more affordable or appropriate housing. Section 3.2 addresses the ability of Virginia's housing industry to supply the housing required to meet the demand described in Section 3.1. Section 3.3 addresses the revitalization role of housing in areas where communities have simultaneously responded to economic shifts and changes in housing preferences. Section 3.4 addresses the importance of housing supply by discussing the connections between housing and health, housing and education, and, consequently, housing and the quality of the Virginia workforce.

3.1 Housing the Workforce

New, affordable, and appropriate housing will be required to support job growth

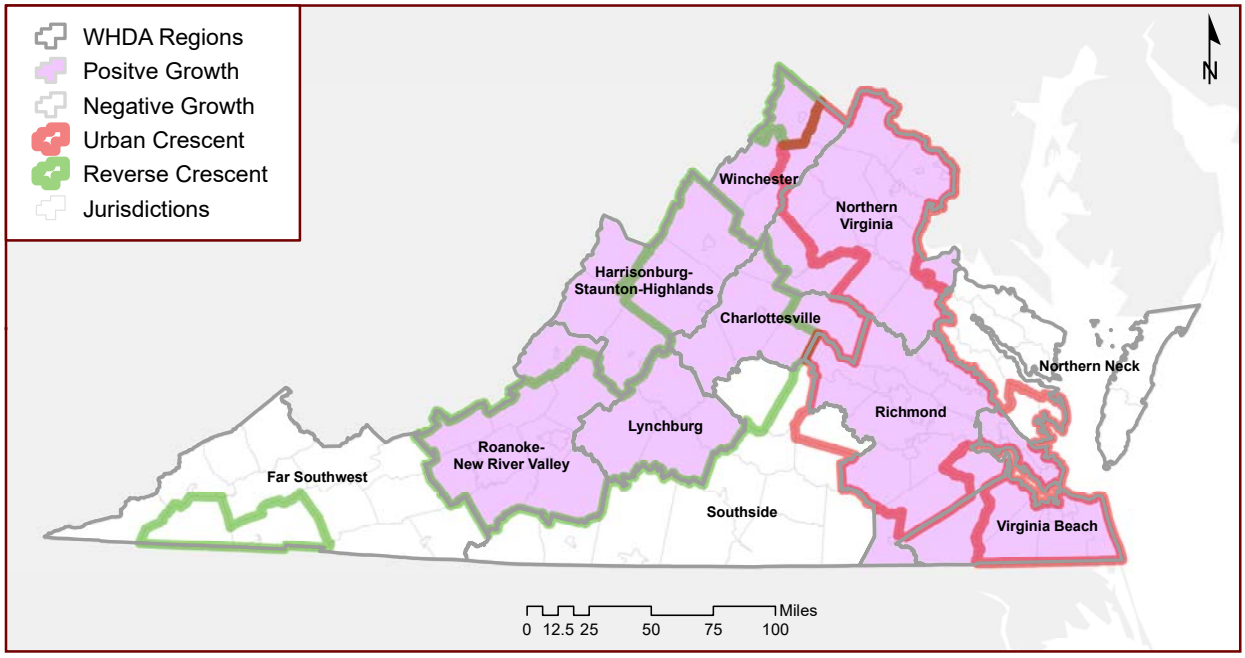
Virginia can add 357,800 net new jobs over the next 10 years, and the Commonwealth will need to produce sufficient housing to meet the needs of the workers who will fill these jobs. Job growth can drive increased demand for housing, although it is important to note that these new housing units will be needed in the right locations, of the right types, and available at affordable prices and rents. New workers will also use the transportation infrastructure and in some localities, this will necessitate new transportation capacity. This workforce demand will add to existing housing supply challenges that already strain municipal infrastructures and leave some households struggling with housing cost burdens or otherwise inappropriate housing. Despite these challenges, Virginia can turn housing into a comparative advantage that promotes economic growth and development throughout the state.

Key Findings:
HOUSING
THE
WORKFORCE

- Virginia will need 225,600 net new housing units to accommodate new employees.
- Nearly one in three households in Virginia need more affordable housing.
- Affordable, appropriate housing helps attract and retain employees and sustain employment growth as well as business attraction and expansion.
- High housing plus transportation cost burdens for households are negatively correlated with economic growth and performance metrics.

The Urban Crescent and the Reverse Crescent regions pictured in Map 5 are expected to generate net employment growth over the next decade if they can add 225,600 new homes to accommodate new employee demand. Three regions are forecast to have no job growth between 2014 and 2024: Southwest Virginia, South–Central, and the Northern Neck. The housing needs in these regions will be tied to factors other than net job growth and are detailed in Section 5.1.2.

Map 5. Job Growth Forecast by Region



The Urban Crescent will need almost 200,000 new housing units by 2024

Northern Virginia is forecast to have the highest increase in job count and growth (13.3 percent job growth between 2014 and 2024), and the 113,800 new homes needed in Northern Virginia account for half of the Commonwealth's projected need. The second-largest increase in jobs is in Hampton Roads followed closely by the Richmond region at 41,700 and 40,550 homes, respectively. Combined, these three regions account for about 87 percent of the increase in both the number of jobs and housing needed to accommodate new workers throughout the Commonwealth.

The Charlottesville and Winchester regions will see the fastest increase in needed housing

The Charlottesville region can expect the second-highest job growth rate after Northern Virginia (12.4 percent) and will have the greatest need for new housing units within the Reverse Crescent. Charlottesville and its surrounding counties will need to add 9,400 new housing units to realize the potential for 14,500 new workers. Furthermore, the Winchester region can expect a 10-percent increase in jobs, requiring 6,050 housing units to accommodate 9,400 new workers.

The Rest of the Reverse Crescent will need to add more than 14,000 units to accommodate workers

The remaining regions with job growth in the Reverse Crescent will see more moderate growth rates: the Lynchburg, Staunton–Harrisonburg, and Roanoke–Blacksburg regions can expect a respective 5.6, 5.2, and 3.8 percent increase in jobs, representing 5,900 net new jobs and 3,950 housing units, 6,700 new jobs and 4,050 housing units, and 9,400 new jobs and 6,100 housing units, respectively.

Table 3. Projected Job Growth and Net New Households, 2014–2024

Region	Net New Job Growth	Net New Households
Urban Crescent		
Northern Virginia	188,800	113,850
Richmond	62,500	40,550
Hampton Roads	63,800	41,700
Reverse Crescent		
Winchester	9,400	6,050
Staunton-Harrisonburg	6,700	4,050
Charlottesville	14,500	9,400
Lynchburg	5,900	3,950
Roanoke-Blacksburg	9,400	6,100

Details regarding job growth and forecast demand for new housing units are provided in the Appendix Report 2, "Housing the Commonwealth's Future Workforce.

New workers will be younger with lower incomes and different housing preferences

New workers who will fill these jobs will be younger, on average, than current workers, and their age drives the types of households they form as well as the types of housing that they will occupy. Because these households will be younger, they will have relatively lower incomes and different housing preferences. New trends in housing preferences will present challenges for some places and opportunities for others. These challenges generally relate to affordability, but some areas will need to undertake some redevelopment to attract and retain younger workers. Some jurisdictions are already capitalizing on the nexus between downtown revitalization and increasing demand for housing located near jobs, amenities, and social opportunities.

New workers will demand more multi-family rental housing

Compared to existing households, new households are more likely to be renters and somewhat more likely to live in multi-family units. Expected demand is for 60,600 new multi-family units, both ownership and rental, between 2014 and 2024. The demand for multi-family units will be greatest in the Northern Virginia, Hampton Roads, and Richmond regions.

The homeownership rate is expected to decrease

Consistent with demand for multi-family units from younger households with lower incomes, demand for rental units is increasing. The Commonwealth is projected to need 132,100 new ownership units and 93,500 rental units to meet new worker housing needs. Although most new households will be owners, homeownership rates of new households will be lower than that of existing residents. For regions experiencing net new job growth, the Hampton Roads (49.5 percent), Roanoke–Blacksburg (53.9 percent), and Staunton–Harrisonburg regions (54.5 percent) will experience the lowest rates of homeownership among new worker households.

Millennial Housing Preferences

Millennials look for convenience when choosing a home. For renters, covered parking is one of the most important amenities (Lachman and Brett, 2015). Both renters and homeowners believe that it is important to live near their friends and family because they want to be able to visit without traveling far distances (Lachman and Brett, 2015). Millennials have shown preference for mixed-use urban areas for their convenient walkability (Burbank and Keely, 2013; Logan, 2014). Most millennials prefer an ideal location over greater square footage (Logan, 2014).

Most demand will be for units priced less than $300,000 or with rents less than $1,300

Many new projected jobs will pay wages sufficiently high to allow Virginia workers to find appropriate, desirable housing. Demand for new housing priced at $400,000 and above or with gross rent greater than $1,300 per month is expected primarily in Northern Virginia. Demand for ownership units between $300,000 and $400,000 will be more common throughout the state. Most demand will be for units priced less than $300,000 (representing 55 percent of expected homebuyer demand) and for units with rents less than $1,314; 80 percent of that demand will come from new renters.

Workers in low-wage positions will need homes priced less than $100,000

Each region's projected employment growth includes low-wage jobs that often accompany higher-paying positions. For instance, businesses need administrative and other support staff, which are jobs that generally pay lower wages. New workers also demand retail, leisure, and health services, and Virginia projects 14,050 new homeowners earning less than $25,000 that can afford homes that cost less than $100,000. Potential buyers may struggle to find homes in this price range, particularly in the region's higher-cost localities.

Worker migration trends will reflect the availability of affordable housing

Lower-income households may need to make compromises like doubling or tripling up in units, commuting longer distances, or accepting substandard or otherwise inappropriate housing to access jobs where housing that is affordable is not available. Others may accept cost burdens, making it hard to afford other necessities and nearly impossible to save for future emergencies or a home down payment. If these households can find a job in a market where they do not have to make housing compromises, they are likely to take that job instead. Employers in regions with more limited housing options have greater difficulty finding lower-wage workers. Nationwide migration trends suggest that workers are migrating away from the highest-cost housing markets to more affordable housing[xxxvi].

Affordable rental housing for new workers may be scarce

Over the next decade, Virginia projects 23,500 new renter households earning less than $25,000. These households can afford rents up to $625 a month, but many regions will be unable to provide new rental apartments in this price range. An additional 33,800 new renter households are forecasted to earn between $25,000 and $49,999 and afford rents up to $1,250 a month. These households will have difficulty finding affordable housing in the Urban Crescent.

The location of new housing will influence productivity

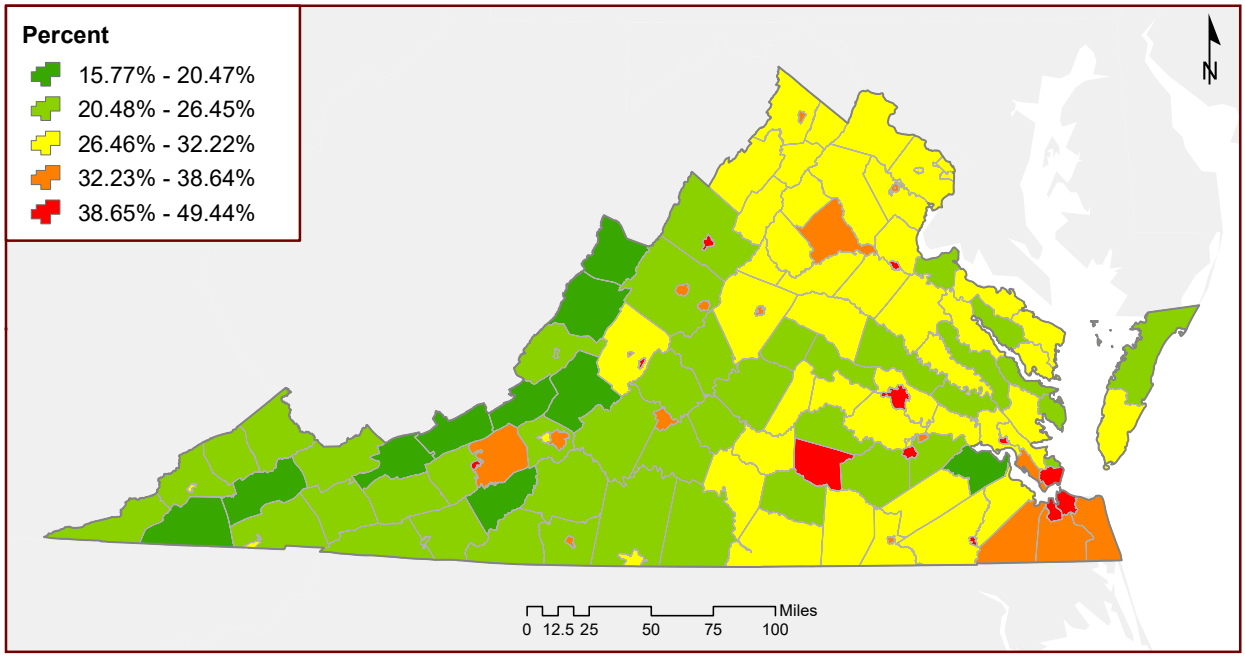
Where homes are built to accommodate new workers, particularly the location relative to their jobs, determines the need for transportation infrastructure and households and the public costs associated with transportation. Sprawling development increases infrastructure costs for cities, congestion increases pollution, and long commutes affect businesses through lost productivity, greater levels of absenteeism and tardiness, and, ultimately, turnover when a worker leaves in search of a better commute[xxxvii]. The built environment is enduring; therefore, the best chance that cities and regions have to lower housing and transportation costs is by changing where and how they grow[xxxviii]. Jewkes and Delgado (2012) state that "the growing dilemma for working families is that affordable housing and transit choices are limited and available jobs are often too far from affordable residential areas. This problem underscores the preservation and new development of transit-oriented housing" (p. 51). See Section 5.1.2 for further discussion of housing and transportation costs.

3.1.2 Existing Demand

One in three households must choose between housing and other important necessities

Housing demand from new workers will add to existing demand for housing units and will exacerbate the housing affordability challenges with which Virginia communities grapple already. As of 2015, Virginia had nearly one million cost-burdened households, or one in three. In addition, more than 1 in 10 households are severely cost burdened. For cost-burdened households, the best housing option they can achieve means bearing a significant financial burden and often sacrificing or choosing housing over other important necessities like medical care, child care, child educational enrichment, or food. Households that are severely cost-burdened make serious tradeoffs between housing and other needs (i.e., beyond budget cuts to achieve financial goals such as buying a home). Therefore, the number of cost-burdened households should be interpreted as the number of households that need (and demand) more affordable housing.

Map 6. Percent of households that need more affordable housing



There is not enough affordable rental housing to accommodate Virginians with low incomes

Every Virginia MSA has a shortage of rental units affordable to extremely low-income households, defined as those with incomes less than 30 percent of the regional AMI[2]. There are insufficient physical units to accommodate these households, and higher-income households occupy many of the market-rate units that are affordable to them. This shortage leaves many households with extremely low incomes unable to find an affordable unit. Nearly 140,000 households with extremely low incomes in Virginia's metro areas are cost-burdened.

In Northern Virginia and in the Winchester MSA, there are insufficient affordable rental units to accommodate households with incomes less than 50 percent of AMI. Furthermore, throughout the Urban Crescent, there is not enough owned or for-sale stock to accommodate homeowners with such incomes. Statewide, most extremely low and very-low-income households cannot access affordable housing. More than half of the households with incomes less that 50 percent of AMI are cost-burdened in each MSA. In addition to the shortage of physical units, households with higher incomes occupy many units that would be affordable to this group, further reducing the number of affordable units. These shortages force many households to accept cost burdens.

Crowding Out

Households often prefer to spend less than 30 percent of their income on housing. Therefore, if they can find an appealing home that costs less than they can afford, they'll take it. Higher-income households compete more effectively for housing because they are often more attractive to landlords and mortgage lenders. Households with higher monthly incomes, better credit scores, and longer rental histories are perceived to be lower-risk tenants and borrowers. Thus, the highest-income households get "first dibs" in the market and lower-income households are crowded out, forced to accept either housing cost-burdens (foregoing other needs) or substandard housing. Some crowding out can be relieved by building housing that is more appealing to households that could afford more; however, income-restricted units are usually needed to ensure that workers with the lowest incomes can obtain appropriate housing without sacrificing other needs or experiencing homelessness.

Low-income households have better access to homeownership in the Reverse Crescent

The Reverse Crescent offers better homeownership opportunities to households with incomes less than 50 percent of AMI, but there a significant crowding-out effect still exists. In the western MSAs, households with incomes greater than 50 percent of AMI occupy most units that are affordable for households with incomes

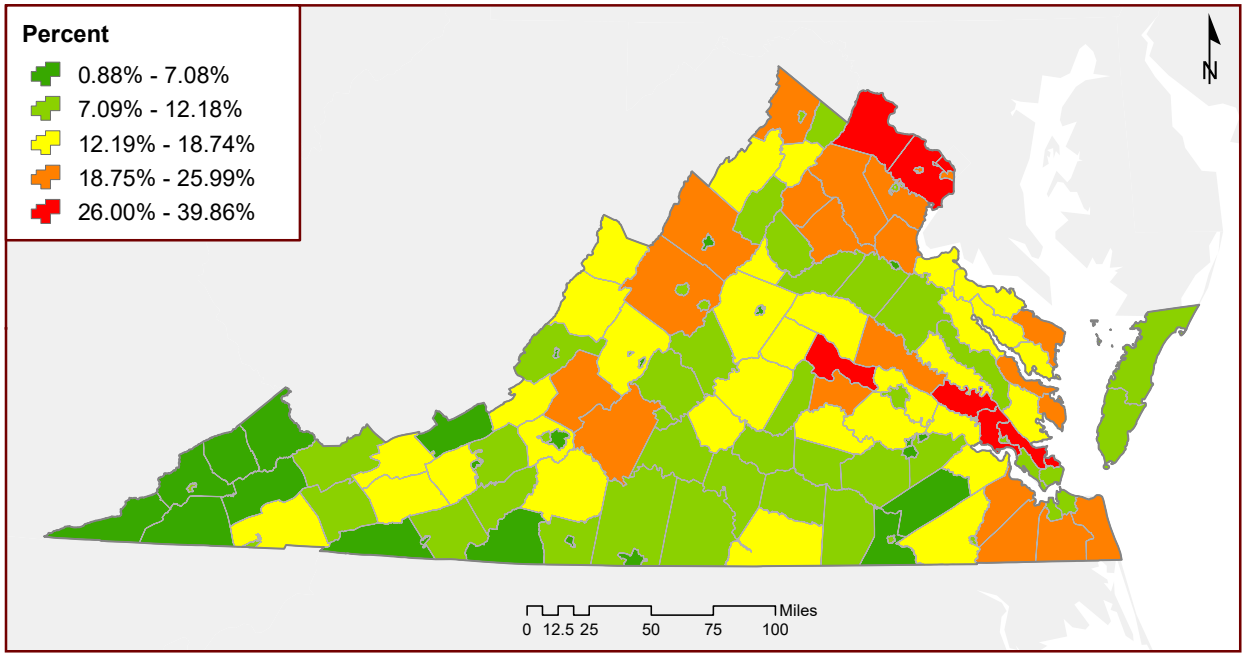
[2] AMI and percentages thereof are defined using regional income limits defined by the U.S. Department of Housing and Urban Developments.

less than 50 percent of AMI. For instance, in the Charlottesville MSA, there are fewer owned or for-sale units that are affordable to households with incomes less than 50 percent of AMI than households that need them.

Even moderate-income households struggle to find affordable housing

Housing affordability challenges are most acute in Northern Virginia and Hampton Roads, where most households making less than 80 percent of AMI are cost-burdened and nearly half of moderate-income households making between 80 and 100 percent of AMI are cost-burdened. In Northern Virginia and Hampton Roads, 33 and 38 percent of all households are cost burdened, respectively.

Map 7. Percent of cost-burdened household with income at or above the median



Location Affordability of Housing

Households make tradeoffs between residential location and other needs

Transportation costs compound the challenges experienced by cost-burdened households, and the combined housing and transportation burdens reflect the appropriateness of housing locations. For example, commuting costs in some Virginia localities can add nearly 400 dollars to household monthly expenses. Transportation is the second-largest expenditure category for households after housing, accounting for nearly 20 cents of every dollar spent annually. Combined, housing and transportation represent a substantial portion of local, state, and national economic activity. The primary economic connections between housing and transportation are related to the tradeoffs that households make in terms of residential location and their remaining household budget

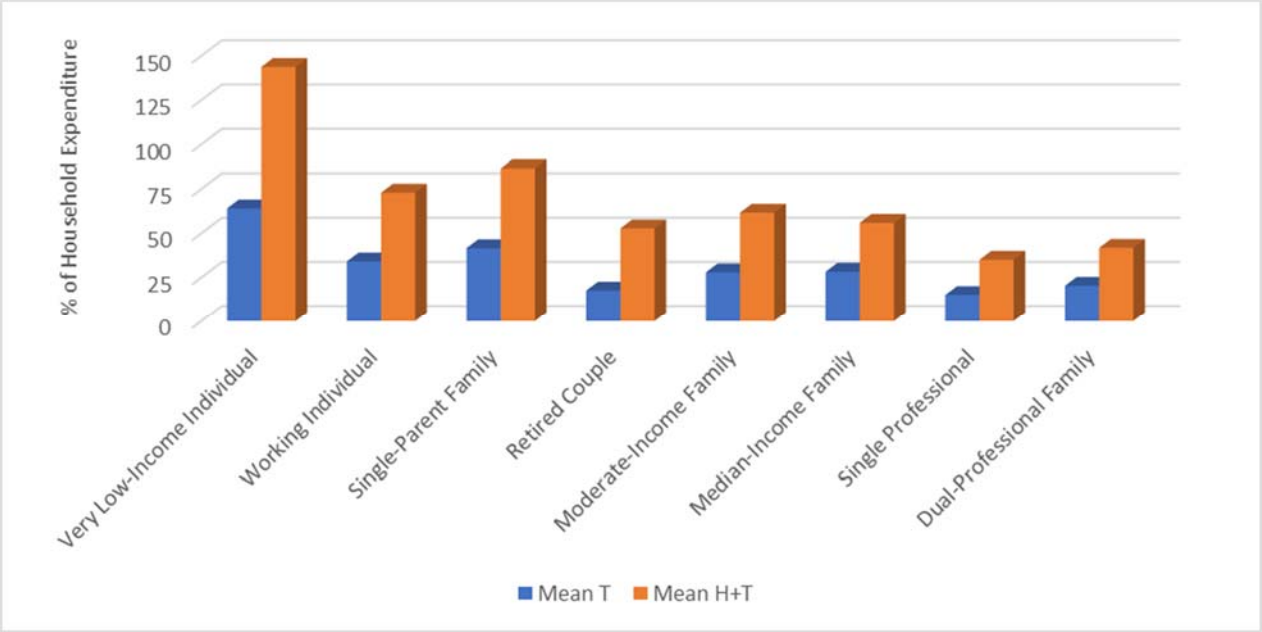
for other items. For example, as families are forced to spend thousands of dollars annually on owning and operating cars and trucks (which are rapidly depreciating assets), they have less money to invest in homeownership, hindering wealth creation and the ability to enjoy other benefits of home ownership.

The interaction between housing location and affordability depends on transportation; therefore, transportation costs affect the economic status of a household. Transportation to work, school or, shopping is among the most fundamental needs and household location matters when considering successful community and economic development strategies in both local and regional contexts[xxxix]. Lipman (2006), Haas (2006), Sanchez (2007), and Hickey and Haas (2012) all reach similar conclusions about neighborhood characteristics in relation to their housing and transportation cost burdens. The combined cost of housing and transportation increases with distance to employment centers, but the cost burden remains relatively constant because overall housing costs tend to decline for moves out of large metro areas whereas transportation costs increase, negating gains in housing affordability[xl]. In areas where families spend more on housing, they tend to spend less on transportation, and vice-versa[xli].

Household transportation costs are a major factor influencing housing affordability

We used the HUD Location Affordability Index (LAI) to examine trends in household cost burdens among the eight household types modeled by the LAI. Graph 1 shows the average housing cost burden and average combined housing and transportation cost burden for each household type. In the graph, the household types are ordered from lowest average household income to highest. Average household transportation costs (T) in Virginia range from 15 percent of household income for single professionals to 64 percent for very low-income individuals. Concurrently, average combined housing and transportation costs (H+T) range from 35 percent of household income for single professionals to over 100 percent for very low-income individuals.

Graph 1. Transportation and housing plus transportation cost burdens by household type



Lower income households are more burdened by transportation costs

Lower income households are particularly burdened by higher transportation costs, because these expenditures claim a higher percentage of their budgets even if they spend less absolute dollars[xlii]. Low-income persons unable to purchase an automobile often reside in locations that are not well-connected by public transit to employment concentrations and amenities[xliii]. Puentes (2008) finds that the working poor (defined as households with income less than twice their poverty threshold) are two-thirds more cost-burdened by commuting than other workers are.

Moderate-income households have the highest housing plus transportation burdens

Moderate-income and working-class households tend to have exceptionally high housing plus transportation cost burdens at 59 percent of their income, and those with mortgages spend an average of 72 percent of their income on combined housing and transportation costs[xliv]. High transportation costs are driven by long-distance commutes, where families leave employment centers and move to the suburbs in search of an affordable living situation. Working families who move far from work to find affordable housing end up spending their savings on transportation[xlv]. In the search for affordability, some working families may witness a rise in both their monetary expenses (e.g., commuting costs and extra childcare) and non-monetary expenses (e.g., opportunity cost of leisure and family time)[xlvi].

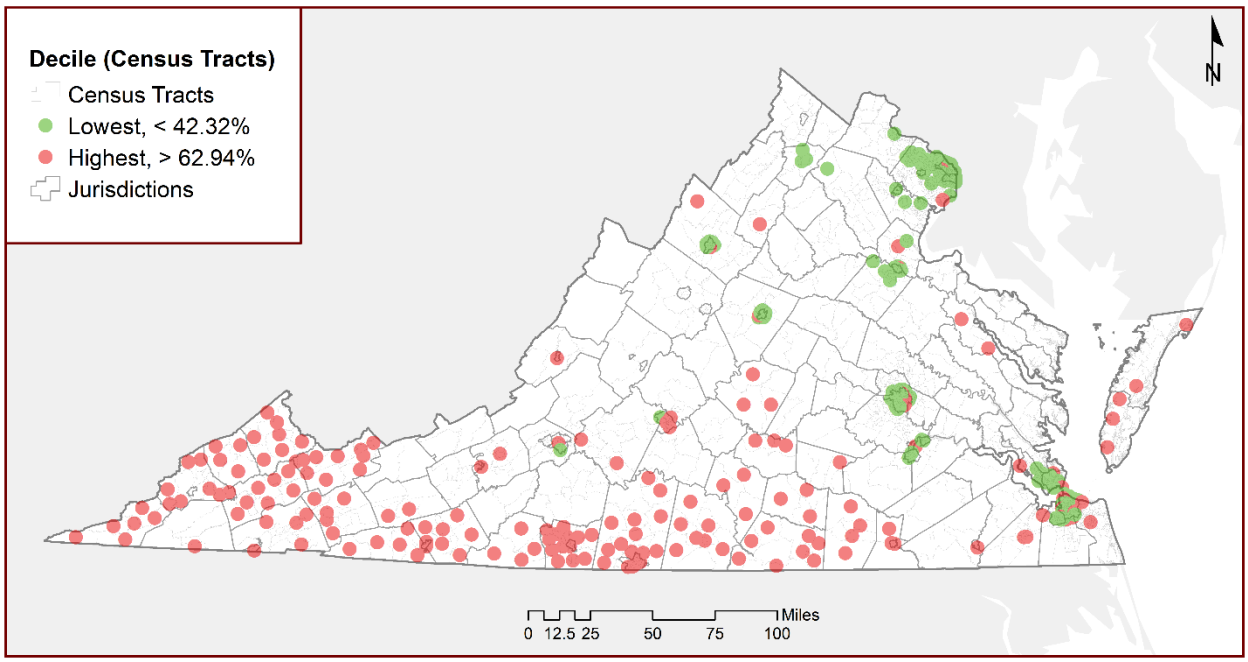
High-income households have the lowest transportation cost burdens

High-income households tend to locate either in wealthy suburbs or in urban areas near employment centers and alternative transportation options. This group tends to have the lowest transportation cost burdens and relatively higher housing costs than other groups do. Higher-income households spend a smaller portion of their total budget on transportation, and these lower expenditures may be offset with increased housing expenditures. Higher-income individuals who pay more for housing also tend to pay more for transportation[xlvii].

The estimated housing and transportation cost burdens for median-income households in Virginia counties and cities show a distinct pattern. The southern and western parts of Virginia experience the highest rates of housing plus transportation cost burden, and the northern and eastern parts experience the lowest. At this scale, household income levels are a likely determinant of cost burdens in direct relationship to economic indicators. Although commuting costs are highest in Northern Virginia, transportation costs in the southern and western parts of the state represent a greater burden as a percentage of income.

Analysis at the census tract level reflects that at the county and city levels. The increased granularity highlights variability within regions and counties, and the patterns better reflect areas with higher levels of job density, affordable housing options, and increasing transportation access. A comparison of the highest and lowest tract by decile group shows that high-cost locations are dispersed and mostly rural. Conversely, low cost-burdened locations are mostly urban in the northern counties and in independent cities of the State (see Appendix for the lists). Overall, 64 percent of low-cost tracts are in independent cities compared to 24 percent of high-cost tracts. Including Arlington County and Fairfax County tracts (which are both highly urbanized), cities encompass 94 percent of all low-cost tracts. These locations, while mostly urbanized, spend less on combined housing and transportation in relation to incomes. Henry County, Pittsylvania County, and Tazewell County include some of the most cost-burdened census tracts while suffering from particularly weak economic conditions since 2008.

Map 8. Census tracts with highest and lowest housing plus transportation cost burdens



High levels of cost burden is associated with slower job growth

Across all counties and independent cities, the housing and transportation cost burden for all LAI household types were negatively correlated with the change in number of establishments, number of jobs, and payroll, except for very low-income individuals. The households comprised of very-low income individuals appear unaffected by local or regional changes in employment changes or payrolls, implying that local and regional economic growth may benefit many households but not those with the lowest incomes. While we do not know the direction of these relationships (i.e., whether high household costs cause declines in economic activity or declining economic activity contributes to high household costs), the patterns are consistently negative across household types throughout Virginia. We can assume that very-low-income individuals were not significantly impacted by changes in economic activity primarily because their situations are among the most challenging (see Graph 1). Further research is needed to more closely examine the relationship between economic activity and cost burdens and determine the relevant factors influencing outcomes for different household types, such as educational attainment, job skills, and access to employment. In addition to the statewide analysis by county, we compared the 11 state regions used in the workforce housing demand analysis, pictured in Map 5. Like the county-level analysis, we found that regions with lower housing and transportation cost burdens experienced better economic performance or recovery.

Rural Housing Challenges

Housing cost burdens are less prominent in rural areas

Rural areas and other counties outside of Virginia metropolitan areas struggle with housing cost burdens, but rates of housing cost burden are generally lower than those in the metropolitan areas, particularly compared to metro areas in the Urban Crescent. In some areas, low housing costs are offset by high transportation costs.

Vacancy has a negative effect on communities

High levels of vacancy are prominent in rural areas but tend to manifest in two very different manners. Some rural jurisdictions struggle with long-term vacancies and abandoned homes, whereas others struggle with high numbers of "second homes" that are only used occasionally. These second homes are often high-priced, luxury vacation homes that drive up land and housing values making housing unaffordable for many workers who earn low and moderate wages. For example, a Bath County representative explained that only locals who have inherited their homes and therefore, have relatively low housing costs can work low- or moderate-wage jobs. In many rural counties, housing for seasonal, recreational or occasional use comprises between 10 and 20 percent of their housing stock. In a few rural counties, second homes that are occupied only occasionally comprise between 20 and 40 percent of the stock.

Some rural jurisdictions struggle with long-term vacancies and abandoned properties that represent more than 10 percent of their housing stock. These counties are generally do not also deal with challenges related to the second home market. Long-term vacancies are often symptoms of housing that is no longer desirable owing to location or condition. Furthermore, abandoned homes may pose health and safety threats and contribute to negative perceptions of rural areas.

3.2 Meeting Demand: Housing Production

Housing characteristics—location, quality, cost, and availability—are not the only factors affecting our ability to provide affordable housing options: producing homes using methods that balance economic pressures across all stakeholders of the supply chain is also critical, as current production costs render entry-level housing options unaffordable for potential homeowners and difficult for producers to capitalize on.

Key Findings: HOUSING PRODUCTION

- The residential construction industry in Virginia has consolidated in the wake of the Great Recession, with productivity increases driving growth and success in the industry.
- New housing is less affordable because residential building costs are increasing nationally and in Virginia.
- Trends in production costs make entry-level housing options difficult to produce at an affordable rate.
- Training and educating people both inside and outside the industry is the best way to drive needed change and technology adoption through the industry and for meeting future demand.
- Tracking clear, accurate, and reliable data allows us to measure success, adjust goals, and educate key stakeholders.

3.2.1 National Housing Production: Past versus Present

Producing buildings is expensive

Across the United States, the average cost of construction increased five times from 1908 to 1960 and nine times from 1960 to 1990. From 1990 to 2014, the cost of materials alone increased 1.8 times and the direct costs of homebuilding more than doubled. Furthermore, construction productivity has been negative or substantially negative since 1968. In contrast, manufacturing productivity has increased over the same period, accomplished mostly through adoption of innovative methods.

The nature of the industry has changed substantially over the last 30 years. Thirty years ago, the national homebuilding market was comprised of small firms that produced a few homes using their own crews or subcontractors. Now, large homebuilders dominate the industry and many publicly traded housing firms number among the current top 100 home producers (in terms of volume).

Innovation in homebuilding faces resistance because of the vast supply chains and subcontractor networks

The residential construction industry is vast and far-reaching in terms of its contribution to employment and national spending, including the number of related occupations and economic stakeholders. Residential construction requires a vast array of firms and employees across a large supply chain before construction begins. There is also uncertainty and risk that is unique to the production of a home stemming from the concentration of suppliers and trades, their supply chains, and their subcontractor networks. Moreover, each stakeholder along the residential construction supply chain has a different perspective and endorses or vetoes new processes, products, or services, resulting in resistance to innovations that may improve productivity and reduce costs.

Productivity is driving growth in the industry

Since the great recession, productivity has driven growth. The top 100 builder firms produced almost 22 percent of total housing starts in 2015. In some metro markets, production builder firms constitute over 30 percent and up to 70 percent of housing starts. As a result, smaller homebuilders and trades contractors that were driven out of the market during the recession cannot re-enter. Furthermore, the costs of producing a new residential unit are often not competitive with prices and options of existing units.

Demand and therefore production is more diversified

Today's demand for housing is diverse; therefore, the industry has diversified accordingly. Today's firms that produce housing range from affordable housing non-profits to speculative developers of multimillion-dollar luxury mansions, from units with a small footprint to commercial residential high rises, and from offering sophisticated financial investments to smart technology and work-from-home capabilities.

Producing houses remains expensive

National data from the National Association of Homebuilders (NAHB) showed that total costs associated with building a single-family dwelling unit (indirect, direct, and soft costs) increased until the Great Recession, after which they decreased until 2011 and then rebounded. As of 2015, the average national cost for producing a house is two percent higher than in 2007 (at the height of the market before the recession) and more than double that in 1998.

Houses produced today are not necessarily affordable

Households interested in buying an average house that can obtain a conventional 30-year mortgage at a four-percent interest rate make monthly payments of $2,148. Thus, a household must make $85,920 after taxes to if this payment is 30 percent of their household income, a household would need to make $85,920 after taxes.

This income is far exceeds the national HUD four-person household median income of $54,100 in 2015 ($78,400 in Virginia).

Costs of home construction are increasing

The construction industry lacks sophistication in many ways. The industry needs to improve its collection, analysis, and use of data to understand and respond to the market. Housing production costs that affect housing affordability are as follows:

- "Finished lot costs" and "total construction costs," that is, "direct costs," represent the largest proportion of costs and have increased significantly since 1998. The largest growth areas of direct costs have been exterior and the interior finishes. Although data on specific finishes are not available, updated building code insulation values and green building standards may be driving the increase in exterior costs.
- All homebuilding direct costs have increased since the Great Recession except "marketing costs." Therefore, the stock of affordable houses, especially entry-level units, are constantly threatened by rising prices.
- Within direct costs, "foundations," "framing," "exterior finishes," "major systems rough-ins," and "interior finishes" have increased significantly since 2011. Advances in building codes have led to many of these increases, possibly reducing affordability.
- Indirect costs, such as "overhead and general expenses," "sales commissions," "profits," and "soft costs" have increased significantly since 2011, reducing affordable options.
- "Financing costs" have increased slightly since 2013. That is, financing is available, but the cost of borrowing reduces housing affordability.

3.2.2. Housing Production in Virginia

Since the recession, productivity has driven growth. In Virginia, the number of establishments and employees in the residential building construction industry has decreased significantly while wages have increased significantly. These trends imply a smaller, more productive workforce with higher wages. Higher wages and fewer job options increase the difficulty of producing a home at an affordable rate. Production difficulty further increases for localities without a diverse supply of labor across trades.

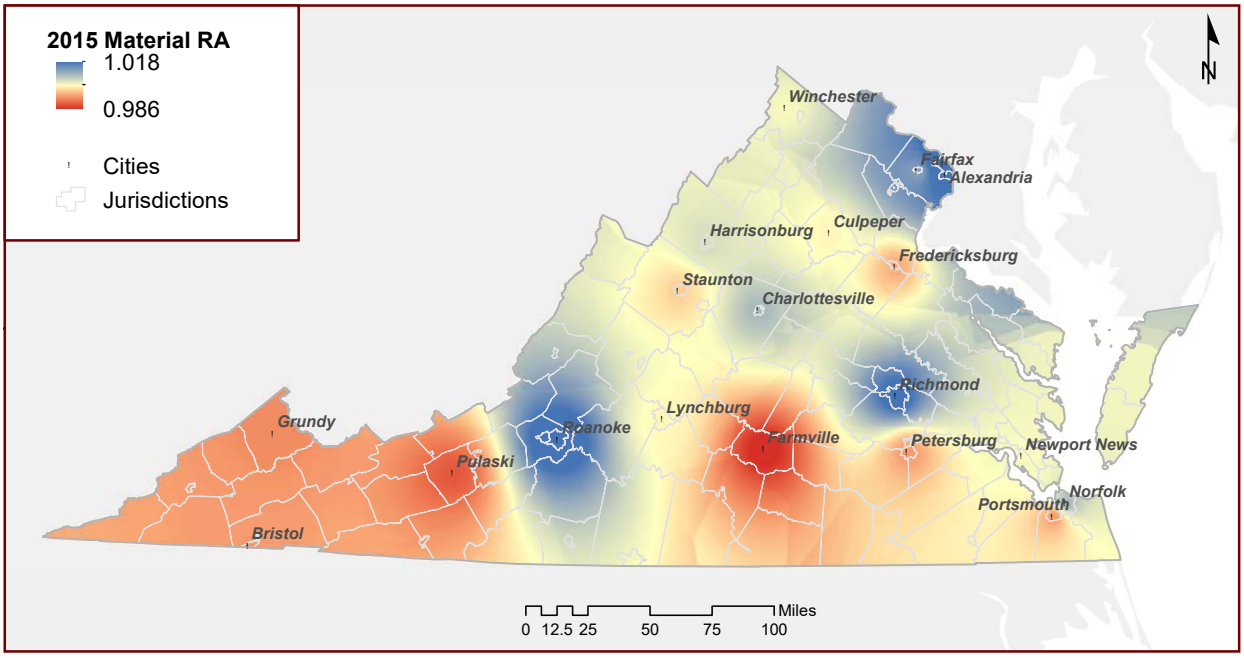
Housing starts have decreased since 2006

The nature of the industry has changed in Virginia as well. Since 2006, the number of single-unit housing starts has decreased by almost half, from 38,977 to 19,865. Housing starts with two, three, or four units comprised less than one percent of the total starts. Starts with five or more units are the only type of dwelling being built at a higher rate than that before the Great Recession. Costs of single-unit housing starts cannot compete with existing housing options because of higher production costs, making entry-level housing the most vulnerable in terms of affordability.

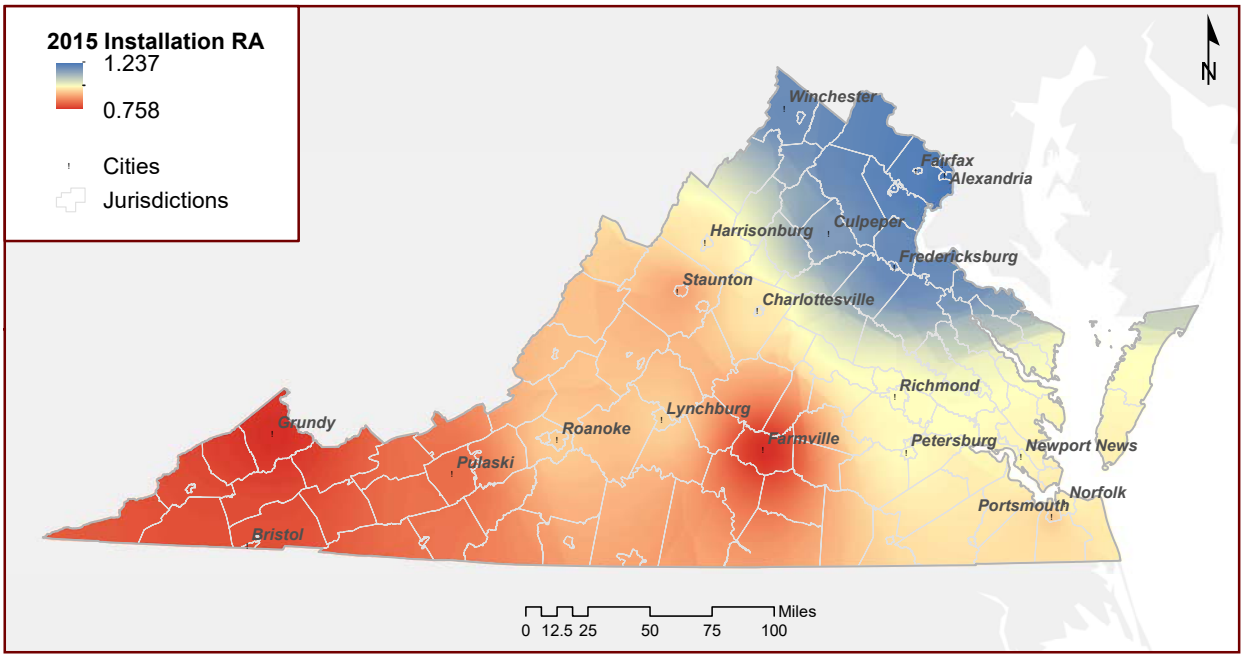
Building costs in the Commonwealth are comparable to national housing costs. This research compared a survey of the Virginia Chapter of the National Association of Homebuilders (HBAV) to public data. Direct cost trends in the Commonwealth of Virginia are as follows:

- Virginia survey responses indicated a 2.5 percent lower direct costs in Virginia, or an average of $10,254 less in direct costs compared to national survey data. Survey data reported that the costs of foundations, framing, and exterior finishes are equivalent to national costs, whereas the costs of systems are higher and interior finishes are lower.
- The number of establishments and employees in all trades has decreased significantly and employee wages have increased significantly. Central Virginia had the highest increase in number of establishments and employees as well as the highest increase in pay, although Virginia Beach saw the highest increase in salaries for electrical trades. Moderate growth in the number of establishments and employees was seen in western parts of Northern Virginia (i.e., Winchester).
- Northern Virginia, in general, had the greatest decreases in number of residential construction establishments and employees. The largest wage decreases occurred Lynchburg to Harrisonburg–Stanton–Highlands, the Northern Neck, and Virginia Beach.
- The far southwest region, Southside, the peninsula and Northern Neck regions had the most advantages in materials pricing, whereas urban centers had the least advantage.
- The far southwest region, Southside, Central Virginia, and parts of the Hampton Roads region had a labor pricing advantage, whereas urban centers had the least advantage (with the exception of urban centers in rural areas).
- Rural areas like the far southwest region experienced the largest annual workforce fluctuation. High volatility may increase building production risks and costs over time or for specific types of projects (i.e., specialty trades or projects where labor must be imported).

Map 9. Relative Advantage in Material Pricing



Map 10. Relative Advantage in Installation Pricing



Trends in indirect costs are as follows:

- Survey responses indicated 1.5 percent lower indirect costs in Virginia or an average of $7,818 less in indirect costs compared to 2015 national survey data.
- Local taxes and fees and land costs were the highest and second-highest indirect costs. Local fees, taxes, and land values have increased across the state, supporting these findings. The cost of land and regulatory fees reduce competitiveness for new housing against existing housing in financial and economic terms.
- Almost all site trades have decreased significantly in the number of establishments and employees while significantly increasing in wages. Only utility contractor employment has remained steady with little change.
- Northern Virginia, Harrisonburg–Stanton–Highlands, and Richmond were most expensive in terms of site development and employment, whereas Southside, Lynchburg, and Winchester are the least expensive.

Trends in soft costs are as follows:

- Virginia has 4 percent higher soft costs than the rest of the country (2015 data) for an average of $19,409 more in soft costs.
- The cost of financing a building project has remained historically low since the Great Recession but financing costs are on the rise, reducing affordability of new housing.
- Realtor and marketing services have remained steady since the Great Recession, and realtors are not reporting volume discounts.

Overall, the cost to build in Virginia is approximately 13 percent below the national average. The states of New Jersey and Texas have the highest national cost of construction in our sample. Compared to our neighbors, it is more expensive to build in Virginia than in North and South Carolina but less expensive than in West Virginia, Washington D.C., Maryland, and Pennsylvania. This difference may be because of wages and other local factors influencing the cost of housing production that cannot be discerned in the granularity of the data.

3.2.3 Challenges for Housing Production

Entry to the residential construction industry has been challenging since the Great Recession

Within the residential construction industry, new construction has seen significantly reduced ease of entry since the Great Recession. Much of the qualified labor left the industry entirely after the Great Recession, and those who remained were forced to adjust to increasing levels of local regulation, fees, building codes, and proffers. Therefore, industry survivors have become nimble, able to change quickly and work across multiple markets. Niche construction with a small crew no longer seems feasible, and qualifying for a typical new home construction project is more difficult.

Increasing productivity is the only way to increase profit

Increased labor productivity is one of the few ways to profit from direct costs, as the price of the house leaves little for other areas of profit. In addition, indirect and soft costs are rising, leaving less room for direct costs. Stakeholders (manufacturers, distributors) along the supply chain are unable to respond except by demanding more out of the existing workforce, which demands high wages for high quality. The system is strained.

The market favors developer-builders that profit from volume

There has been a general trend toward developer-builders that can derive profit from volume. Small builders, who derive profit only from direct (hard) costs cannot compete as well. Those with large land banks continue to be able to provide more affordable housing. Nevertheless, land prices are increasing, and the ability to move further from urban centers (where land is less expensive) is difficult owing to the cost of transportation or lack of public transit.

The residential construction industry has been successful in keeping housing reasonably affordable while adapting to new requirements and the costs of those requirements. As a result, we have continued to pack more features into each unit (e.g., high-quality finishes, smart appliances, and energy efficiency). However, new requirements in house production will eventually counteract this trend, as our slow housing recovery indicates.

The industry needs to develop its workforce through education

Finally, until American society understands that a career in the trades is a worthwhile and profitable profession, developing the next generation of workers and leaders who can provide affordable housing and grow the impact of housing on our economy will be difficult. Parents and those who influence younger generations have an inaccurate perception that the industry is not an appropriate career path. Starting from the bottom is a great way to develop innovation and change in an industry starved of leadership. The industry needs to focus on training and educating people in and about the industry. Education is the only method by which we can

introduce needed changes and innovation into the industry. Partnerships with associations, trade groups, K–12 schools, community colleges, and universities can help educate and alleviate this perception issue.

Furthermore, the industry must collect and maintain clear, accurate, and reliable data across the market and agree on the best ways to use the data. Until the industry moves in this direction, understanding why the industry can or cannot recover from housing bubbles and adjusting appropriately will be difficult.

3.3 Housing and Community Revitalization

Communities throughout Virginia have included housing in their redevelopment plans and have used housing as an element of revitalization efforts. Generally, communities include housing in redevelopment and revitalization plans to promote improvements: physical revitalization, attracting or retaining workers, reducing transportation challenges, and increasing access to jobs and amenities. Academic research has documented successful redevelopment and revitalization efforts throughout the country. Successful cases cited often involve projects that are tailored to local conditions, seek to build a stronger sense of place, and seek to integrate new residents with long-term residents. Initiatives that are less successful simultaneously cannot overcome broader market conditions and substantial costs.

Key Findings:
HOUSING AND COMMUNITY REVITALIZATION

- Virginia communities have found a nexus between increased demand for downtown housing, downtown revitalization, and using historic tax credits to preserve historic buildings as housing.
- Downtown revitalization and infill offers opportunities to increase location efficiency and ameliorate transportation and traffic challenges.
- Revitalization projects that include housing are often attractive to young professionals, helping localities attract new talent.
- Rural areas use revitalization projects to capitalize on demand for housing in towns.

Incorporating housing into the rehabilitation of historic buildings has been successful

Housing has been a central component of revitalization efforts that include the rehabilitation of historic buildings. Including housing in the rehabilitation and repurposing of historic buildings is a natural synergy that makes revitalization projects successful. Revitalization of historic buildings often builds a stronger sense of place. The inclusion of housing in these projects is an opportunity to integrate new residents with long-term residents or introduce residences to places previously without residential vitality. Simultaneously, communities have used these projects to attract and retain workers. Many developers, in partnership with localities, have used historic and low-income housing tax credits as catalysts for these efforts.

Preservation of historic downtown buildings as housing helps communities attract young professionals

Virginia communities have found a nexus between increased demand for downtown housing, downtown revitalization, and the preservation of historic buildings as housing. Interviewees consistently described the revitalization of large, vacant, historic buildings—schools, warehouses, mills, and manufacturing plants—as

opportunities for downtown living or success stories about bring housing downtown. In most cases, these historic renovations have attracted young professionals to previously less-desirable downtowns. Some examples in Virginia demonstrate the success of this approach. In Lynchburg, "grand old buildings" have been preserved and converted to downtown lofts along the James River. These downtown residences have added a new type of housing to Lynchburg's stock and attracted young people, retirees, and students. The conversion of old warehouse buildings into apartments in Petersburg has bolstered the revitalization of Old Town and attracted young workers (p.89). In the last 10 years, Roanoke has used historic buildings as an opportunity to transform the downtown into a residential area with high-quality housing, including condos and apartments that are relatively affordable and attract young professionals. The Roanoke regional partnership described the region's housing as part of their "sales pitch" to prospective companies, particularly housing costs in the region compared to other places (p.25). The dramatic increase in Roanoke's downtown housing, which is especially attractive to the 18–34 demographic (millennials), has been a "key piece" of the talent-attraction strategy for the region.

Redevelopment can reduce transportation challenges and increase access to opportunity

Some redevelopment efforts have focused on increasing access to jobs and reducing transportation challenges. For example, Charlottesville has included housing as a key component in the planned redevelopment of a 330-acre area south and east of downtown. The area is a gateway to downtown and includes pedestrian connections to the Downtown Mall area. The plan encourages and guides redevelopment and investment in the area, and includes improvements to existing public and assisted housing, construction of new housing, improved transportation connections throughout the area, and recommended strategies for expanding employment opportunities. The plan aims to build foundations for economically viable neighborhoods of opportunity and choice within one of the city's most distressed areas by promoting employment growth and mixed-income residential development without displacement. The area plan tackles many of the interconnected challenges discussed in this report: housing, health and safety, educational opportunities, transportation, and economic opportunities for youth and adults.

The Hampton Roads region is also making efforts to co-locate housing with jobs to reduce traffic congestion. For example, Virginia Beach has designated Strategic Growth Areas where the city will encourage denser, transit-oriented development that connects housing and jobs. These areas will contain most of the city's future growth, preserving single-family neighborhoods and rural areas while allowing for growth and economic development.

Towns are takings advantage of demand for walkable, downtown housing

Rural areas are experiencing a shift in housing demand. Interviewees observed that people used to want to live "away from it all" to enjoy the "peace and quiet," and residents would drive into town as needed. These areas are observing a new demand for housing in towns. A regional downtown study is underway in the Southside Planning District to find ways to develop towns as residences and as centers of activity.

Where large buildings are not available, towns have passed ordinances to allow or encourage apartments to be built above historic buildings. For example, Blacksburg recently passed an ordinance that offers a residential density bonus in exchange for preservation of the town's historic, contributing structures. As a result, the long-vacant National Bank building is being renovated as a commercial space and housing units are being added behind and above the historic Art Deco bank building.

3.4 Housing and Economic Opportunity/Workforce Development

Housing affordability, quality and appropriateness affects economic potential for households and communities through its influence on the existing and future workforce. When individuals and households struggle to afford housing, they may accept substandard or otherwise inappropriate housing in order to afford housing at all. To secure housing or higher-quality housing, others may accept cost burdens that threaten household stability. Substandard and inappropriate housing presents direct threats to the wellbeing of occupants. Academic research has thoroughly documented aspects of inappropriate, low quality or substandard housing and their effect on the health and wellbeing of occupants.

Key Findings:
HOUSING & ECONOMIC OPPORTUNITY

- Children, our future workforce, can only reach their full potential if they have stable, safe and appropriate housing.
- Housing stability and quality positively impact educational attainment which has positive implication for individual economic achievement and community economic growth.
- High-quality, stable housing promotes physical and mental health of residents.

3.4.1 Housing & Economic Opportunity

Housing influences economic opportunity for individuals and families

The location and tenure of housing directly affect a household's economic opportunities. Kleit (2002) found evidence that households living in areas with more income diversity have more diverse job-search networks. Studies have shown that homeownership provides considerable access to opportunity. White and Saegert (1997) showed evidence that co-op ownership of low-income housing is associated with increased skills and self-confidence as well as wider job networks among tenants. The simplest connection between homeownership and opportunity is the ability to build wealth and use home equity. Homeowners can elect to borrow against the equity they have built in their home through a home equity line of credit (HELOC). Home equity lines can act as a financial buffer against unexpected expenses, smooth consumption over time, and allow households to invest in education, job training, or a small business[xlviii].

Housing particularly affect children's future economic opportunities

Children, our future workforce, can only reach their full potential if they have stable, safe, and appropriate housing. Housing instability or substandard housing have health, behavioral, and developmental consequences for children. Unaffordable housing contributes to children's poor attendance and performance in school[xlix]. Gagne and Ferrer (2006) find that houses in need of major repairs and short length of residence have negative effects on children's math scores. Newman and Holupka (2013) find that families that are not cost-burdened are more likely to spend a portion of their income on child enrichment, which affects child cognitive achievement. Furthermore, increased housing cost burdens reduce the amount that households are likely to spend on child enrichment.

Virginia children experiencing cost burdens and/or overcrowding

More than 575,000 children in Virginia live in cost-burdened households (320,000 households). Nearly 43 percent of those households are severely cost burdened, paying more than 50 percent of their income for housing. Overcrowded conditions impact more than 120,000 of Virginia's children in approximately 50,000 households.

Parents that are forced to work multiple stressful jobs to afford their housing costs may not be able to be as involved in and supportive of their children as parents with better access to affordable homes[l]. Yeung, Linver, and Brooks-Gunn (2002) reviewed an array of empirical studies and concluded that "economic hardship diminishes parental abilities to provide warm, responsive parenting" (p.1862). Parents constrained by residential instability may not be able to prioritize helping children with their homework or be involved in school activities[li]. Higher-earning and higher-educated parents spend more time engaging with their children, actively caring, teaching, and playing with them[lii]. Moreover, the health and stress levels of parents and caregivers—especially those of pregnant mothers—affect children's development, ability to learn, and educational attainment.[liii]

Housing problems can threaten children's health

Children are particularly susceptible to harm from housing-related safety hazards. Health threats from lead arise from lead paint and lead pipes in homes. Children with elevated lead levels have poorer school performance (especially in reading and math), attention and behavioral problems, higher rates of juvenile delinquency, and increased likelihood of dropping out of highschool[liv]. Housing constructed prior to 1960 contains more lead-based paint than any other vintage. According to the U.S. Census Bureau, as of 2015, 21.8 percent of Virginia homes were built prior to 1960[lv]. In addition to threats from lead poisoning, rates of childhood asthma and bronchitis are highest for those living in homes with mold, allergens, secondhand tobacco smoke, pest infestations, and poor ventilation[lvi]. Schuler (2006) showed in a study that 30 percent of all asthma cases are caused by environmental factors rather than genetic inheritance, suggesting that substandard housing conditions

may be a contributing factor. The rate of asthma varies between home environments. Quinn et al. (2010) found that exposure to housing stressors, such as loss of utility service or going without furniture, are associated with decreased respiratory health in the form of asthma in children. Chenoweth, Estes, and Lee (2009) found that children in poor-quality housing are more susceptible to head injuries, broken bones, and burns from scalding water.

Cohen and Wardrip (2011) found that low-income families occupying substandard homes moved more often than middle- and high-income families did, often owing to problems associated with high housing costs and changes in income. Frequent moves negatively impact family life, increasing stress both for parents and their children. Immense health effects within vulnerable groups of children can originate from housing instability. Parental stress over housing quality and choice is potentially transferred to children through the child's perceptiveness to psychological distress[lvii]. Children under the age of 3 who have moved two or more times in a year generally have lower bodyweight than those who have not moved[lviii]. Fowler et al. (2011) found that substandard and unstable housing ultimately impacts children throughout their development into adulthood.

3.4.2 Housing, Health, and the Workforce

Substandard housing has a negative impact on mental health

Many aspects of substandard housing affect the mental health of residents. Poor housing quality often induces stress and inhibits one's home from providing a peaceful or restorative space. Jones-Rounds et al. (2014) found that psychological well-being correlated with housing quality. People in high-quality housing were less depressed and more energetic and peaceful than those living in low-quality housing[lix]. Substandard housing represents a potential psychological detriment by causing low self-esteem and hindering family self-sufficiency[lx]. Residents of low-quality housing worry about the integrity of the home's structural components. Housing-related stress or anxiety has been shown to lead to depression and stress-related mental illness[lxi].

Negative health outcomes are association with housing problems

Healthcare costs associated with substandard housing equate to billions of dollars annually[lxii]. Children in low-income families that receive housing subsidies are more likely to be classified as having "good" or "excellent" health than children in low-income families who are on the waiting list for assistance[lxiii]. Adults who are housing cost-burdened are also less likely to fill a prescription, follow healthcare treatments, or purchase health insurance because of the costs. Direct medical costs associated with substandard housing conditions include those for doctor visits, medications, and inpatient medical treatment, medication, facilities, and supplies. Indirect nonmedical costs include lost school days, costs of home and auto modifications (for physical impairments), developmental services (for cognitive impairments), lost parental and lifetime wages, and premature death[lxiv].

These costs have negative social and economic impacts beyond the given patient, as the burden of some medical bills may eventually fall on taxpayers[lxv].

Housing-related health problems can decrease productivity and burden the public

Health problems, when persistent, present significant employment and productivity problems. Workers may commute long distances to access more affordable housing. Meerding et al. (2005) surveyed a sample of construction and industrial workers, finding that over half reported musculoskeletal complaints in the past six months and approximately 15 percent reported chronic conditions. About 10 percent of the population sample reported reduced work productivity equating to a mean loss of 2 hours per day. Living close to the workplace eliminates the stressor of congested commutes and frees up time for exercise or family[lxvi]. Gates et al. (2008) simultaneously found that moderately or extremely obese manufacturing workers have a 4.2 percent health-related loss in productivity ($506 annually). Both neighborhood layout and substandard housing can impact the condition of workers, and, thus, their productivity. Health conditions also pose a barrier for those who are currently unemployed and can lead to both temporary and permanent medically induced unemployment (i.e., the inability to work owing to a medical condition)[lxvii].

Businesses impacted by poor employee health may experience high rates of turnover that manifest unfilled positions, lower productivity, and lost profits. Employee turnover generates costs related to finding replacement workers, temporarily covering vacancies, training replacements, and loss of knowledge and skills. In total, the costs of turnover can be upwards of 30 percent of annual salary for lower-level employees and up to 250 percent of annual salary for highly skilled employees[lxviii].

3.4.3 Housing, Education, and Economic Development

Developmental and educational consequences associated with student mobility and inadequate housing may have economic implications for individuals and a community's workforce. Many studies have shown that educational attainment—the number of school years completed—closely correlates with both individual earnings and economic growth rates[lxix]. More education is typically associated with higher individual earnings. Studies within and across nations have found that an additional year of schooling translates into an approximately 10-percent increase in annual individual earnings[lxx].

Beyond this individual benefit, there is further evidence that additional years of schooling provide social benefits in the form of improved health, higher levels of civic participation, lower crime rates, and—most importantly for this analysis— greater economic growth[lxxi]. Educational attainment increases human capital, resulting in the enhanced productivity of a nation's workforce, an increase in the rate of technological innovation, and the diffusion and adoption of new production processes and technologies, all of which help boost economic

growth[lxxii]. Each additional year of schooling within a population is also associated with greater long-run economic growth[lxxiii]. Equal access to high-quality schools provides a brighter economic outlook. Because schools and neighborhoods are so closely interconnected, providing equitable and affordable housing opportunities across a jurisdiction can provide more equitable educational opportunities[lxxiv], leading to greater and more sustainable economic growth[lxxv]. Increasing skills for low-income individuals improves economic growth more than it does for those with high incomes, as measured by GDP and tax revenue growth, suggesting that educational opportunities should be improved for low-income individuals[lxxvi]. Furthermore, closing educational achievement gaps may reduce income inequality by increasing the lifetime earnings of the poorest 75 percent of children more than they increase the lifetime earnings of the richest 25 percent of children. Lynch (2015) concluded that improving the education of all future workers "accelerates economic growth and can promote more equal opportunity over the long run resulting in stronger, more broadly shared economic growth, which in turn raises national income and increases government revenue, providing the means by which to invest in improving our economic future"[lxxvii].

4 The Future of Housing in Virginia

The study team used scenario planning to imagine three possible futures in the Commonwealth and to offer insight into which future Virginia is heading toward. In the first scenario, "surfing," through decisive actions, Virginia's economy is growing strong and far above the U.S. growth rate. In the second scenario, "struggling," owing to adaptation that is too deliberate and reactive, Virginia's growth rate is slower than that of the United States. In the third scenario, "strolling," because of a lack of innovative action, Virginia is pacing at the same economic growth rate as the United States. Depending on the actions the state takes, each future is possible.

Key Findings: FUTURE OF HOUSING

- In a high-growth, highly competitive future, Virginia may need to add more than 700,000 housing units by 2030.
- State and local governments will increasingly need to partner with private enterprise and NGOs to carry out programs and functions formerly administered by the federal government.
- Proactive, decisive planning and policy that offsets federal devolution will make Virginia housing programs a competitive advantage.

Scenarios are coherent and credible stories describing how the future may unfold. They involve a multi-disciplinary and cross-impact approach, weaving together possible developments in demography, economy, government, environment, society, and technology (DEGEST). Scenarios are not forecasts, but the three here are plausible paths to 2030. These alternative paths allow one to imagine and then develop strategies for meeting the housing needs of alternative futures.

The three plausible scenarios will help the Commonwealth plan for future housing needs

There are an infinite number of possible future scenarios. The selected scenarios must fit the intended audience, that is, Virginians whose focus is meeting the Commonwealth's future housing needs. Therefore, we emphasize possible situations in Virginia that drive interstate migration relative to the rest of the nation, impacting the demand for housing. We also avoid wildcards—high-impact events with low probabilities—which would have effects mainly beyond the normal range of responsibilities of Virginia housing providers, such as a national epidemic (where health services and emergency crews would be the decision makers). There are Virginia differences in the distribution of incomes, jobs, and age distribution differences in the three scenarios, as well as social and lifestyle differences. The scenarios focus on the number of housing units needed, their uses, and their production. Therefore, our three hypothetical scenarios are more quantitative than most and include

projected demographic, employment, and housing numbers for 2030. Again, these are not specific forecasts, but three plausible scenarios to describe housing and its use as a home in Virginia up to 2030.

SCENARIOS AT A GLANCE

SURFING: 3% Virginia Growth Rate

- Virginia adjusts aggressively to federal devolution to the states in the 2020s, organizing public–private partnerships and regional operating responsibility for housing and social assistance programs.
- Virginia's real economic growth rate is larger than that of the United States (3 percent to 2.4 percent, respectively).
- In-migration results in faster population growth and a larger workforce.
- A 19.5 percent increase in population requires more than 700,000 net new housing units.
- To meet demand and to respond to changing housing preferences, the housing industry adopts technology that substantially changes the design, content, and structural features of new and existing housing units.
- Above-average growth and more-efficient construction decrease the percent of households requiring housing assistance, but the number of needy households is larger than that in 2015 owing to the larger population.

STRUGGLING: 2.1% Virginia Growth Rate

- Virginia's adjustments to federal cutbacks and devolution are delayed and incongruent.
- Virginia real economic growth of 2.1 percent is 0.4 percent below the 2.5 percent national average.
- Out-migration increases as many skilled workers and entrepreneurs migrate to innovation centers in other states.
- Two reasons for below-average growth are the defense buildup starting in 2018 that plateaus in the 2020s owing to budget constraints and the state's lack of leadership of significant emerging industries.
- With Virginia's slower growth and only moderate increase in housing demand, the trend toward modular construction is less pronounced. Rehabilitated or upgraded housing units are valued similarly to new ones.

- The lower level of new residential construction in Virginia, which is below the national level, constricts the filter-down process of providing affordable housing.
- A rising percentage of low-income households, especially among the 19 percent of the population 65 and over, feel more socially isolated.

STROLLING: 1.9% Virginia Growth Rate

- Virginia and the nation grow at 1.9 percent.
- Workers everywhere stay in place, valuing work security.
- Slow economic growth and fluctuating unemployment rates make asset accumulation harder for most households, generating a stronger desire for security through property ownership.
- The main emphasis in Virginia construction is renovation and updating of the over three million older housing units and their neighborhood surroundings to match housing desires and needs in 2030.
- Below-average economic growth, a lower percentage of middle-income jobs, and aging increase the number of needy households. Virginia's government takes over much of the responsibility of providing housing assistance for low-income households, but a substantial gap remains in meeting the housing needs of low- to middle-income seniors.

To construct the scenarios, we reviewed current and emerging trends and conducted a meta-analysis of futures studies in the United States and abroad. Some key drivers of change that will shape Virginia housing are as follows:

- Slow national economic growth
- The baby boomers (1946–1964) reaching retirement age through 2030
- Advances and diffusion of digital technology
- Scale-up and commercialization of emerging technologies, such as synthetic biology, additive manufacturing (i.e., 3D printing), and the Internet of Things (loT).
- Artificial intelligence (Al) and robotic technology that will increasingly substitute repetitive labor tasks, placing downward pressure on average wages and widening income disparities despite the creation of new types of jobs
- The increasingly untenable federal fiscal imbalance between revenues and spending that is increasing the federal debt total and as a percent of GDP. In 2017, gross federal debt was over $20 trillion, or 104

percent of GDP. Under 2017 laws, the Congressional Budget Office (CBO) projects that debt will rise to nearly $24 trillion in 2021, or 106 percent of forecast GDP, and continue rising as a percent of GDP unless major reductions are made in federal spending.

- Achieving an average of 3 percent real GDP growth for 2018–2021 by implementing expansionary fiscal policies in 2018 may stabilize the debt-to-GDP ratio temporarily. However, federal deficits are very likely to be approximately 3 percent of GDP in each of those years, with gross federal debt passing $24 trillion in 2021. With moderating GDP growth after 2021, fiscal imbalance would accelerate again.

Interactions among these drivers indicate commonalities

- **Devolution of federal programs to the states will occur.** Unsustainable federal deficits and a rising debt-to-GDP ratio will force major changes in federal fiscal policy in the 2020s related to spending reductions over tax and fee increases (the CBO has evaluated 115 deficit reduction options: 43 proposed revenue enhancements and 72 spending reductions). Politically, mandated entitlement programs are difficult to change, especially rapidly, whereas discretionary programs covered in annual appropriations bills are easier to curtail. Civilian discretionary programs currently account for 16 percent of federal spending, and 91 percent of federal spending on housing programs is discretionary.

- **Public-private sharing of responsibilities will predominate.** State and local governments will increasingly need to partner with private enterprise and NGOs to conduct programs and functions formerly administered by the federal government.

- **Virginia must understand the implications of changing net migration on housing.** At the state level, in- and outmigration are significantly affected by the difference between and levels of state and national real economic growth rates. These differences need to be explicitly incorporated into projections and decision-making.

- **Early adopters have a long-term edge.** With an increasing rate of change, states with cutting-edge operations in emerging industries generally keep their edge even as others try to follow and the technologies become mainstream.

- **Housing must meet a wide range of needs.** Advances in digital technology will make the home a more intensely multifunctional place for living, socializing, entertaining, learning, and working. The benefits from integrating these advances into housing units will change the cost-benefit ratio of owning or renting for many households.

- **The gig economy is not a fad.** As the "gig" economy expands, a growing percent of the labor force will work virtually from a home office, many as independent contractors. Such work is well suited for the 65-and-over population still actively in the workforce (often by necessity) and can be a meaningful source of income.
- **The housing environment will be viewed differently.** Both physical and digital communities are becoming more valued, especially among maturing millennials.

Telecommuting and Home Businesses
Nationwide, 24 percent of employed people did some or all of their work at home in 2015. (BLS, July 08, 2016) The U.S. percentages are reported by occupations. Applying the national occupational percentages for persons working at home to the Virginia number of employees by occupation implies 20 percent of employed Virginians did some or all of their work at home in 2015.

We developed three scenarios incorporating these drivers and themes. The underlying numerical projections are shown in Table 4. Summary descriptions and tables of numerical and qualitative features are shown here. The full scenario stories are in the online supplementary materials.

Table 4. Virginia 2030 with Varying 2015–2030 Real Growth Rates (CAR)

		Surfing	Struggling	Strolling
2015–2030 Real Growth Rates (CAR)		Va 3%, US 2.4%	Va 2.1%, US 2.5%	Va 1.9%, US 1.9%
Change in Real Gross State Product		55.8%	36.6%	32.6%
	2015 Actual	2030 Scenario (Percent Change from 2015 to 2030)		
Demographics				
Total Population	8,382,993	10,019,221 (19.5%)	9,231,476 (10.1%)	9,496,559 (13.3%)
20 to 64	5,101,257	5,868,642 (15.0%)	5,340,803 (4.7%)	5,371,768 (5.3%)
65 and Over	1,188,393	1,798,399 (51.3%)	1,759,639 (48.1%)	1,776,177 (49.5%)
Labor Force	4,229,420	5,201,403 (23.0%)	4,729,263 (11.8%)	4,770,701 (12.8%)
Resident Employment	4,042,769	4,972,541 (23.0%)	4,511,717 (11.6%)	4,536,937 (12.2%)
Unemployed	186,651	228,862 (22.6%)	217,546 (16.6%)	233,764 (25.2%)
Unemployment Rate	4.4%	4.4%	4.6%	4.9%
Housing				
Housing Units	**3,468,829**	**4,174,675 (20.3%)**	**3,924,198 (13.1%)**	**3,928,287 (13.2%)**
Change in Units		**705,846**	**455,369**	**459,458**
+ Loss of 2015 stock		**104,065**	**104,065**	**104,065**
= Total Housing Construction		**809,911**	**559,434**	**563,523**

4.1 "Surfing" Superior Growth Scenario

Virginia is a growth and policy star among states

Virginia rides the waves of emerging industries going mainstream, achieving a compound annual rate (CAR) of real economic growth of 3.0 percent for 2015–2030, which is 0.6 percent above the 2.4 percent national average. Virginia gross state product in 2030 is up 56 percent from the 2015 level, sustaining a 23 percent increase in employment accompanied by a population gain of 20 percent with substantial in-migration. Housing units reach 4,174,675 in 2030, a net increase of 705,846 (over 20 percent). Virginia adjusts aggressively to federal devolution to the states in the 2020s, organizing public–private partnerships and regional operating responsibility for housing and social assistance programs. Above-average economic growth yields above-average gains in state and local government revenue as well as private income, facilitating the adjustment to federal devolution.

Startups building on emerging industries are widespread

High-speed additive manufacturing using materials such as living cells, nylon, and high-temperature metals has made small-scale customized production cost-effective. It has spawned small- to medium-sized new manufacturing establishments with specialized products and job skills, reminiscent of cottage industries. Startups building on emerging industries such as synthetic biology, additive manufacturing, and IoT, are widespread both in the eastern and western crescent (down the Highway 81 and 29 corridors), clustering near universities and colleges and creating a more balanced demand for new housing units across the Commonwealth. Worker in-migration lowers the average age of the workforce, but the dynamism of Virginia's public sector also attracts in-migration of retirees. Therefore, the average age of the population increases modestly.

Many workers require a home that can serve as a place of work and for external communication

On-demand corporations and government agencies, combined with digital technology advances in speed and availability at decreasing costs, have increased the percentage of on-demand, contract, or contingent workers. On-demand workers and many full-time payroll employees require a home effectively configured as a place for work and external communication. Both owners and renters desire personalized modern attributes, demanding flexible, multi-use units, external access to shared spaces, and proximity to service providers. Compact, energy efficient housing units with built-in modern technology and appliances are preferred by households of all ages, who exhibit a desire to customize and personalize new units as well as to upgrade existing units. This modular approach to construction is adopted for about a third of Virginia housing by 2025 and is part of most housing construction in 2030. Multifunctional housing and the increased reliance on system-built housing substantially change the design, content, and structural features of housing units and for households of all ages, both in new construction and in updating the functionality of existing housing.

The percent of households that require housing assistance decreases while the number increases

Above-average growth and more efficient construction reduce the percentage of households who require assistance to access affordable housing, but the number of needy households is larger in 2030 than in 2015 owing to a larger population. The Virginia government assumes the responsibility of providing housing assistance for employable households through programs such as housing choice vouchers partly funded with federal block grants for housing assistance. Commonwealth and local government agencies implement shared ownership affordable housing programs, where the agency sells shares in the unit to the household (usually at least 25 percent but less than 75 percent), and the household pays rent on the remaining share. Affordable housing units are often built on public land acquired by the government agency, especially as localities work to rehabilitate substandard neighborhoods. Private non-profit organizations also fund affordable housing using a

variety of approaches such as shared equity mortgages (SEM) and shared appreciation mortgages (SAM). The Commonwealth and NGOs partner to expand the supportive housing facilities for the homeless and very-low-income individuals, especially those with physical or mental impairments, nearly eliminating homelessness.

"Surfing" signals and signposts

- U.S. real output reaches effective capacity in 2019 and bottlenecks and overheating begin in 2020, demonstrating that the United States cannot outgrow the federal deficit and debt imbalances.
- Moderate changes in Social Security and Medicare are passed in 2021 for implementation over the next decade but are insufficient to stop the accelerating ratio of debt to GDP.
- Standard and Poor's downgrades the federal credit rating to AA.
- The federal government expands devolution of non-defense discretionary programs to the states, funded with federal block grants subject to growth limits over time.
- When the Highway and Mass Transit Trust Fund reaches zero in 2021, Congress limits future spending to the annual revenues received.
- In 2019 and 2020, GO Virginia regional initiatives attract rapidly increasing venture capital inflows funding innovative startups and new technology applications, especially in biotech and synthetic biology in the reverse (western) crescent GO Virginia Regions 9, 8, 2, and 1.
- The Virginia government forms a partnership with a space company to provide wireless internet coverage for every Virginia resident using low-earth-orbit CubeSats.
- ACS combined data show (with a lag) the increasing total in-migration of people working in Virginia who lived in other states the year prior.
- Virginia is decisive in achieving approval of statewide standards for factory-built modules and housing units built in Virginia and passes tax credits for Virginia production.

4.2 "Struggling" Lagging Growth and Policy Scenario

Virginia adapts too deliberately

Adjusting to federal cutbacks and devolution dominates Virginia government and industry activities, but strategies and programs are delayed and incongruent. Decision-makers are more risk-averse and focus on proven markets. Virginia real economic growth for 2015–2030 offers a CAR of 2.1 percent, or 0.4 percent below the 2.5 percent national average. Two reasons for below-average growth are the defense buildup starting in 2018 and plateauing in the 2020s owing to budget constraints, and the state not achieving a leading role in significant emerging industries. In addition, the federal deficits and burgeoning national debt, exacerbated by

political deadlock, force the federal government increasingly to defer to the states after 2021. Private investment in Virginia is below the national pace. Much of the investment is in intelligent software and equipment to conduct repetitive tasks in professional and business services jobs to cut costs and remain competitive with out-of-state providers, limiting Virginia's growth in a range of middle-income jobs. Net in-migration is low, as many skilled workers and entrepreneurs migrate to innovation centers in other states.

Virginia experience slower growth and only moderate growth in housing demand

Virginia gross state product in 2030 is up 37 percent from the 2015 level and employment up 12 percent, with a population gain of 10 percent. Growth is geographically fragmented and predominantly infill in the eastern crescent. Housing units reach 3,924,198 in 2030, a net increase of 455,369, or 13 percent. Households have more traditional lifestyles, with fewer early adopters of innovations. In choosing housing, rehabilitated or upgraded units are valued as well as new ones. System-built housing units are in demand primarily for their cost savings in construction, particularly multi-family units and modular components used for renovating existing structures. With Virginia's slower growth and only moderate growth in housing demand, trends toward modular construction are less pronounced than in the first scenario, constrained by the investment needed by builders in equipment and facilities. Considering all the features embedded in housing units, the modular housing trend is increasing productivity in housing construction, making new housing relatively more affordable. However, the main emphasis in Virginia construction is renovation and updating of over three million older houses and their neighborhood surroundings and amenities to match housing requirements and desires in 2030.

The over-65 population increases much more rapidly than the 20–64 age group does

In 2015, the over-65 population is 14 percent of the total, rising to 19 percent in 2030, a considerably more rapid increase than that in the 20–64 age group (by 570,000 compared to 240,000, respectively). Consequently, meeting the housing needs of seniors are a major concern in new construction and in remodeling existing units. Installing sensor networks in senior housing to monitor and interactively track an individual's health and activities has been effective in enabling more seniors to age in place. The high number and large percentage of seniors has led to a declining household size and demand for less square footage despite a somewhat larger number of multigenerational units. With relatively slow growth and a declining percent of middle-income jobs, there are large differences in neighborhoods based more on average household incomes than on age as most neighborhoods have a core of seniors who chose, or were forced by lack of resources, to age in place.

A substantial gap remains in meeting the housing needs of low to middle-income seniors

Below-average economic growth and population aging has increased the number of needy households beyond that in 2015. The Commonwealth and NGOs partner to expand supportive housing facilities for the homeless and very-low-income individuals, especially those with physical or mental impairments. However, a substantial gap remains in meeting the housing and assistance needs of low- to middle-income seniors.

The lower level of new residential construction, which is also below the national growth rate, constricts the filter-down process of providing affordable housing. Furthermore, below-average funds available for investment in renovation of older units to include digital and energy technology reduces the percentage of affordable housing where households can share the home and neighborhood attributes utilized by most households. A rising percent of low-income households, especially among those 65 and over, feel more socially isolated.

"Struggling" signals and signposts

- Indecisive federal budget policies in 2021 leave states uncertain about future federal regulations and funding, result in state deadlock and inaction on policies.
- The nine GO Virginia regions predominantly adopt projects expanding existing proven markets and not higher-risk possibilities.
- Data on venture capital flow show below-average flows into Virginia.
- With Virginia tax revenues growing less than federal revenues, total Commonwealth funding for social and income security programs falls relative to the levels in other states, generating more outmigration of all ages.

4.3 "Strolling" Lockstep Scenario

Growth is volatile around a norm of 1.9 percent

Congressional failure to balance revenue growth with spending growth creates periods of accelerating demand and inflation along with burgeoning federal debt, followed by periods of forced fiscal constraint and anti-inflation monetary tightness. The net effect for 2015–2030 is 1.9 percent real GDP CAR of growth, with real government spending growing at only 1.0 percent CAR. By the mid-2020s, Congress responds by mandating that states take primary responsibility for an increasing number of public programs while periodically reducing block grant funding. Real private investment spending fluctuates widely, averaging a moderate 2.4 percent CAR, primarily in equipment and labor-saving AI systems and robotics. Businesses and governments find it increasingly cost-effective to replace repetitive business, financial, and analytical tasks with AI systems in jobs

that were paying $40,000–$90,000 annually in 2015, reducing the number of low to moderate-income households. Economic volatility and low real GDP growth reduce venture capital funding available for startups in emerging industries such as synthetic biology, postponing when many new technologies reach mainstream market levels. In 2030, the U.S. population is up only 10.9% from 2015 owing to lower foreign immigration, but the over-65 population climbs 54 percent as the population ages. The labor force increases 11.6 percent to 175 million, but the unemployment rate is 4.9 percent. Income disparity increases as a result of below-average growth coupled with an increased number of contract and "gig" economy workers and use of AI systems and robotics in services and manufacturing.

Slow growth generates a stronger desire for security through property ownership

Federal fiscal drag particularly impacts Virginia, which matches the nation's 1.9 percent CAR growth. Economic volatility and low real GDP growth nationally and in Virginia reduce venture capital funding available for innovative startups, shifting the business focus to low-risk goods and services. Workers everywhere avoid moving, as they value work security. Domestic migration consists mainly of seniors who do not need full-time work, but overall domestic migration is low. Virginia population's reaches 9,496,559 in 2030, an increase of 1,113,566 (13.3 percent). Slow economic growth and fluctuating unemployment rates make asset accumulation more difficult for most households, generating a stronger desire for security through property ownership and security features in the home and neighborhood.

An increase in multi-generational households contributes to lower demand

A population increase of over 1.1 million in Virginia creates the need for more housing. In 2015, there were an estimated 3,468,829 housing units of all types in the state. By 2030, demand reaches 3,928,287 housing units for an increase of 459,458, or 13.2 percent. With net scrappage[3] of approximately 104,000 residential units over the years 2015–2030, total new residential construction is an estimated 564,000 units at an average of over 37,500 new housing units demanded annually. However, the number and percent growth of new housing units is less than that in 2000–2015. One significant factor is an increase in multi-generational households, especially low-income households, which keeps average household size at 2.42 despite the very large increase in the number of seniors (587,784).

[3] Scrappage is abandonment or demolition, where a unit is no longer fit or available for habitation beyond casualties such as losses from a fire. Housing units that are scrapped are "rejected or discarded and useful only as material for reprocessing," for example, the components, foundation, or lot.

The home becomes a virtual office for one-third of workers

Housing usage changes in many ways. Steady advances and broadening diffusion of digital technology imply that the home is used more often for entertainment, learning, and work. By 2025, homes are used as virtual offices for one-third of workers. Most at-home workers are full-time employees, but a substantial percentage provide on-demand services as independent contractors as the gig economy matures. For retirees, the digital divide is much narrower: those over 65 in 2030 were 50 or younger in 2015. Therefore, differences in digital immersion are less related to age than to cost of equipment and access.

System-built housing trends make new housing relatively more affordable

The system-built approach to construction is adopted for about a quarter of nationwide housing construction by 2027, mainly because of time and money savings. System-built housing increases construction productivity, making new housing relatively more affordable in 2030 considering all the features embedded in housing units despite a substantial increase in the cost of finished urban lots. However, the main emphasis in Virginia construction is on renovation and updating of more than three million older housing units and their neighborhood surroundings to match today's housing desires as well as needs.

A substantial gap remains in meeting the housing needs of low- to middle-income seniors

Below-average economic growth, a lower percentage of middle-income jobs, and aging increase the number of needy households in 2030 compared to 2015. The Virginia government assumes much of the responsibility of providing housing assistance for low-income households. State public–private boards administer health, housing, and social assistance, with increased operational responsibility at the local level. Commonwealth and local government agencies adopt innovations such as shared-ownership affordable housing programs. However, state revenues fall significantly short of offsetting federal cuts, so nonprofits and neighborhoods must assume a larger role in social assistance. Private non-profit organizations funding affordable housing also adopt a variety of approaches, including SEM and SAM. The Commonwealth and NGOS partner to prioritize supportive housing facilities for the homeless and very-low-income individuals, especially those with physical or mental impairments. However, a substantial gap remains in meeting the housing and assistance needs of low- to middle-income seniors.

"Strolling" signal and signposts

- U.S. real output reaches effective capacity by 2020 and bottlenecks and overheating begin, demonstrating that the United States cannot outgrow the federal deficit and debt imbalances.
- Political deadlock prevents changes to the mandated Social Security and Medicare programs until the mid-2020s, when modest caps are legislated to be imposed over a 7-year period.

- Federal budget constraints are set by extending the Balanced Budget of 2011, but the higher budget caps lead Standard & Poor's to downgrade the federal credit rating.
- Even with the higher budget caps, federal budget results periodically trigger the updated sequestration penalty, reducing federal spending inefficiently and by fiat. Discretionary spending programs are again disproportionately reduced.
- By 2025, the federal government aggressively expands the devolution of non-defense discretionary programs to the states, funded with federal block grants subject to growth limits over time.
- Virginia is decisive in achieving approval of statewide standards for factory-built modules and housing units built in Virginia and passes tax credits for local production. Lower (relative) housing costs increase the availability of affordable housing.

5 Conclusions

Virginia has enormous growth potential but must overcome significant housing challenges to realize growth in jobs and gross state product. To attract and house Virginia's future workers, the housing industry must overcome production challenges and the state must proactively support the development of housing that is affordable to the workforce. If state and local policymakers in partnership with the housing industry—both non-profit housing providers and for-profit developers and builders—are successful, Virginia's housing, quality of life, and economic opportunity will attract talent and business and help the Commonwealth maintain economic success.

Virginia faces serious housing challenges. Housing costs have risen faster than incomes, and nearly one million households need more affordable housing. This shortage of affordable housing reduces productivity, poses challenges for both the current and future workforce, and threatens our economic future. Furthermore, producing new housing continues to be expensive and is therefore unaffordable to many.

Research conducted as part of this study has identified opportunities to address these challenges and make housing a comparative advantage for Virginia. The state, its regions, and localities must decisively support workforce housing through policy and partnership. Efforts to decrease transportation costs and increase accessibility of housing to jobs and amenities will make Virginia's housing more affordable and more attractive. Many Virginia localities have approached this effort in conjunction with revitalization and historic preservation efforts by rehabilitating historic downtown buildings as housing. These projects have successfully attracted new residents, often young professionals.

The housing industry must also do its part by seeking and embracing technology that can reduce costs for households. Advances in production processes promise cost-savings and economic gains, particularly if pre-fabrication and modular buildings are deployed not only in Virginia but also produced in the state. Furthermore, the residential construction industry must foster a culture of innovation by proactively educating and training its future workforce to advance and become more efficient.

Virginia has the opportunity to avoid a housing crisis, but communities throughout the state may face economic decline if we do not act to support workforce housing. In the short term, families will experience crisis as they struggle with the costs of housing and the associated sacrifices. In the long term, workers will leave to seek places with better opportunities, businesses will not be able to attract the best talent, and our economy will struggle to maintain adequate growth. Therefore, we hope that policymakers and stakeholders will utilize this research to approach these current and future challenges boldly and embrace the spirit of innovation and collaboration.

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