

HOUSING UNDERPRODUCTION IN THE U.S.

Economic, Fiscal and Environmental Impacts of Enabling
Transit-Oriented Smart Growth to Address America's
Housing Affordability Challenge



WHO WE ARE



UP FOR GROWTH

— national coalition —

Up for Growth is a national 501(c)(6) organization that represents a vibrant, diverse and growing coalition of advocates urging and promoting federal and state policies that enable smart and modern residential development for working families with walkable access to public transportation.



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GOVERNMENT AFFAIRS

Holland Government Affairs is the public policy research and advocacy arm of Holland Partner Group (HPG). HPG is one of the largest developers of urban housing in the United States. Since 2011, HPG has both recently delivered and is actively developing more than 20,000 units of housing, representing investment approaching \$10 billion, in walkable urban infill and transit-oriented locations in the Western United States.

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ECONOMICS • FINANCE • PLANNING

ECONorthwest specializes in economics, finance, and planning. We work with public jurisdictions and developers throughout the United States on housing policy issues, including studies related to density bonuses and inclusionary zoning. Our work is used to inform City comprehensive planning, master planning, site-specific feasibility studies, as well as large-scale housing needs assessments. Our staff hold advanced degrees in economics, community and regional planning, and public administration

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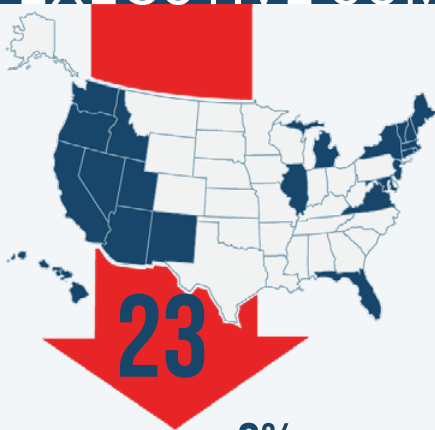
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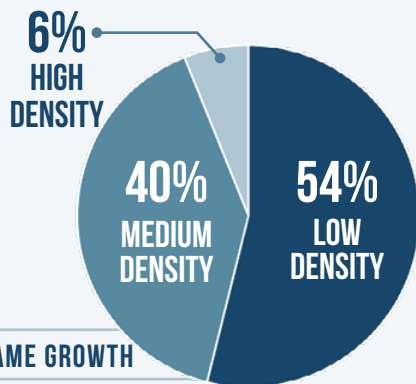
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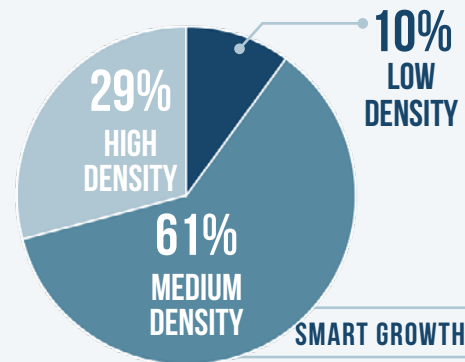
EXECUTIVE SUMMARY



From 2000 to 2015, 23 states under-produced housing to the tune of 7.3 million units, or roughly 5.4% of the total housing stock of the U.S., which has created a supply and demand imbalance that is reflected in today's home prices.

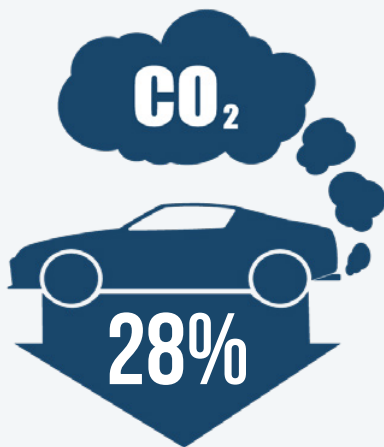


MORE OF THE SAME GROWTH



SMART GROWTH PATTERN

If housing development continues its current pattern with “More of the Same” growth, 54% of the 7.3 million new housing units would be single family homes, while 40% would be missing middle and medium density, and 6% would be towers, nationally. Our scenario-based investigation of growth potential across 23 states with housing shortfalls found that if housing development took on a “Smart Growth” pattern, leveraging existing infrastructure to achieve higher density inside transit corridors, 10% of the new 7.3 million units would be single family, while 61% would be in missing middle and medium density, and 29% would be in towers.



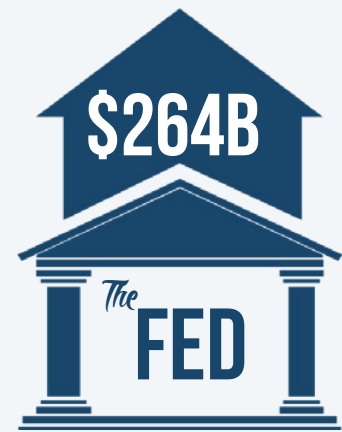
CLEAR SKIES AHEAD

Shifting from current development patterns (More of the Same) to the Smart Growth scenario, only 25% of the land is required to deliver the same number of units. Because these areas would be denser and transit adjacent, this would reduce vehicle miles traveled and cars on the road by as much as 28%.



GDP BOOST

Using a Smart Growth development pattern, cumulative GDP over a 20 year period would increase by \$400 billion compared to More of the Same – Smart Growth delivers \$2.3 trillion in cumulative GDP over the baseline forecast, which represents 2.4% of GDP growth over that period.



FEDERAL REVENUE HIKE

Smart Growth generates an additional \$66 billion in federal revenue over the 20-year growth period compared to More of the Same: federal payroll and income taxes increase \$264 billion with Smart Growth development compared to baseline forecast. In the peak year of production, the additional federal revenue generated would equal 6.2% of the current federal deficit.

Cities and metropolitan areas across this country — particularly in the Southwest and along the coasts — are experiencing a housing crisis. As people migrate toward cities in search of jobs, education and economic opportunities, the demand for housing in our most populous and economically productive regions has far outstripped the production of new housing units. Due to dramatic shifts in generational preferences and household demographic trends, migration to cities over the past decade are at highest level since World War II, while housing production has fallen to historic lows. This imbalance has led to rapidly rising housing prices, economic displacement of lower income families and communities of color, and increases in homelessness.

The current imbalance in supply and demand has been exacerbated by the 2008-2009 recession, but also continues a longer trend that housing markets have experienced for decades — restrictive local development and land-use policies that reflect opposition to high-density, multi-family, urban growth in favor of low-density, single-family, suburban sprawl. These policies include:

- Zoning restrictions, which create a shortage of zoned high-density sites;
- Escalating and misaligned fee structures, such as impact and linkage fees;
- Poorly calibrated inclusionary housing requirements;
- Lengthy review processes that invite gaming and abuse by growth opponents and can delay projects, create unpredictability, reduce incentives to invest and increase the per-unit of cost of development.

The result of this shift in policy is that land has been inefficiently used and an insufficient number of new units have been

constructed. This has impacted housing pricing and limited the choices families and individuals might make about household formation. Housing prices and household formation are closely linked. In many cities, housing prices have increased faster than incomes, which has slowed household formation. The number of households formed impacts housing prices, but the price of housing also impacts people's appetite for and financial capability to create new households. Millennials continue to live at home into their 30s at higher rates than any previous generation — and the high cost of housing directly influences this shift.

The conclusions in this report support the need to enact innovative public-private solutions that increase the supply and reduce the cost of new housing in our urban centers. Pervasive NIMBY sentiments that “all new housing is bad” have become conventional wisdom, stemming from the mistaken belief that new units overburden schools, strain city finances and make traffic worse. Overcoming this damaging narrative requires a public conversation that focuses on delivering units as cost effectively as possible.

The “Smart Growth” scenario in this report describes a path toward narrowing the gap between supply and demand that also leverages existing infrastructure, reduces the cost burden on local governments and changes current, unsustainable development patterns. Focusing on delivering medium density — missing middle and midrise products — to vacant and underutilized development sites in transit corridors can reduce transportation costs for households while creating net-positive fiscal revenue for local governments. It also adds density in single-family neighborhoods through ADUs, quads and garden-style apartments to increase density in walkable, high-value areas.



INTRODUCTION

Housing production that has not keep pace with population growth, incomes, and household formation has caused prices to rapidly escalate in certain areas of the country. Land-use policies that make it difficult to build and reduce the productivity of urban land also create hidden costs on the existing supply while increasing overall prices. This, in turn, restricts the accessibility and affordability of land and housing in high-demand markets; creates barriers to economic opportunities; and contributes to economic displacement. Those with the greatest impact are historically disadvantaged and vulnerable populations like low-income households and people of color. Furthermore, vacancy rates are at historic lows. Although the lack of affordable rental units may put some

additional pressure on ownership products, it disproportionately impacts renters as low vacancy rates put upward pressure on market rental rates.

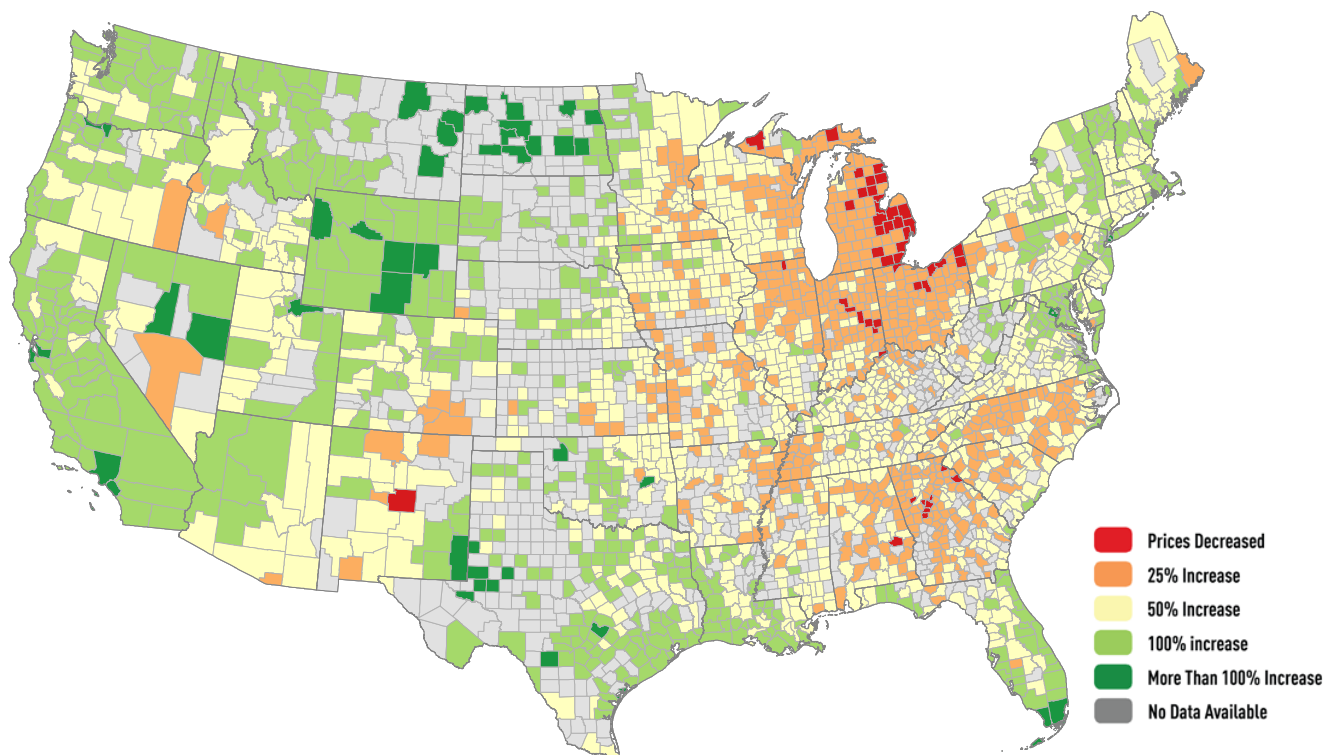
When viewed solely through the lens of household affordability and access to economic opportunity, the housing crisis should be among the most urgent and important social equity issues requiring our attention. The lack of housing production and associated price increases carries with it numerous other social, economic, fiscal and climate implications that, when properly analyzed and appreciated, has rightfully moved the issue of housing supply to the forefront of most local, state and federal policy agendas.

DEVELOPMENT CYCLES AND VARIED MARKET PERFORMANCE

The map below displays the varied rates of home price changes from 2000-2016 at the county level. This time frame encompasses the building boom of the early 2000s and the Great Recession of 2007. In many areas across the Midwest and South, home prices collapsed during the financial crisis, and by 2016 remained below the year 2000's prices (indicated in red). In contrast, many places in the West, Southwest and Northeast have seen home prices more than double since 2000 (indicated in green). It should be noted that housing values are one of the few economic indicators that are conventionally reported in nominal dollars. Reported home price changes over time do not account for inflation. As a point of reference, cumulative inflation from 2000 to 2016 was nearly 40%.



AVERAGE CHANGE IN HOME PRICES BY COUNTY 2000-2016



Source: St. Louis Federal Reserve GEOFRED

In addition to impacts on household affordability, our study seeks to understand the social, economic, fiscal and climate implications of underproduction by assessing housing production potential absent regulatory and other impediments. The study quantifies the economic and fiscal impacts of continued market underproduction through a national analysis of the number of housing units that were produced and the resulting price impact at the state level. The study does not address any complementary uses, such as office, industrial, or hospitality that would accompany an increase and redistribution of housing units. There are likely significant impacts associated with those related uses, however for the purpose of this study, the focus is on understanding the incremental impact related to housing, therefore other related impacts have been excluded.

It also explores the impact of underproduction on our economy, measured by GDP and job growth, as well as the fiscal impact

for state and federal tax revenues. As the current development cycle reaches its peak, fewer units of new housing are now being produced than at the lowest point of previous development cycles. Without a fundamental shift in policies to support growth and address the persistent underproduction of units, we should expect the rate of housing production to decrease further from current levels as we head into the next down cycle.

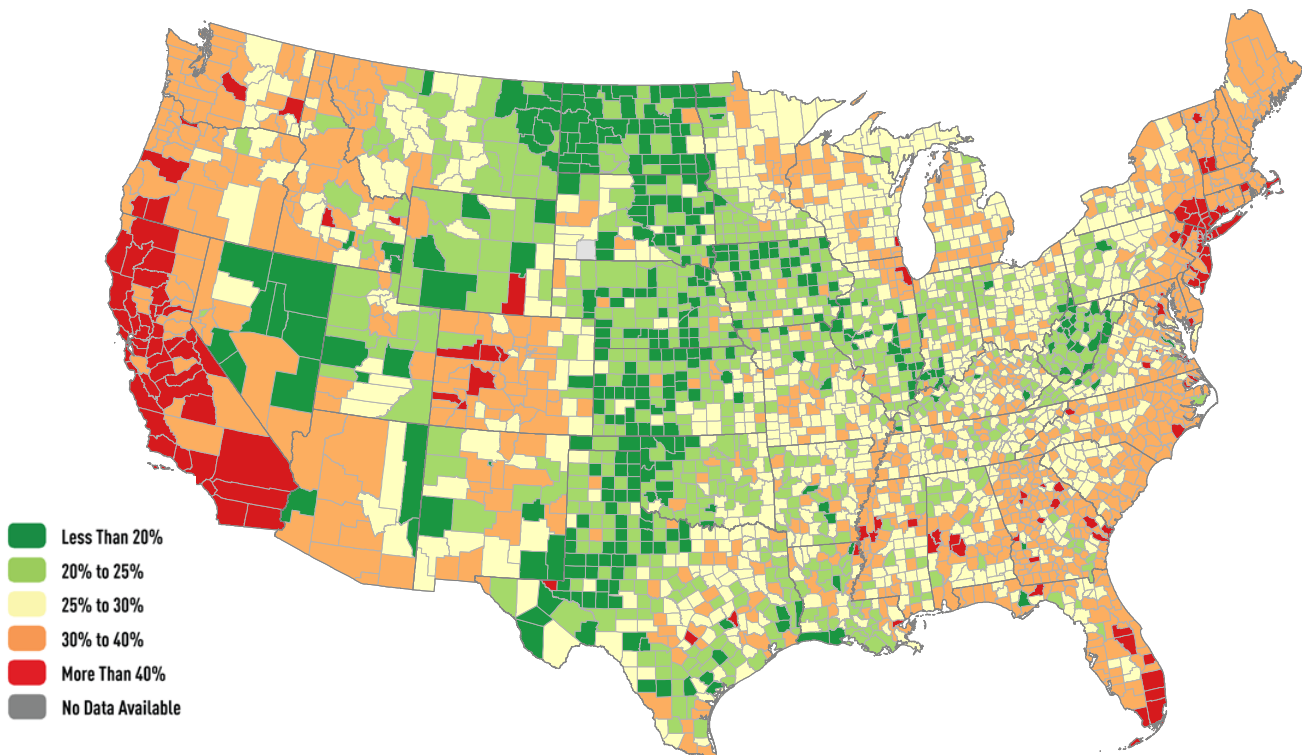
With quantifiable comparisons of these important public and private sector investments and policy changes, we expect the findings in this study will encourage housing leaders at all levels of government to implement policies that enable appropriate housing growth. Achieving “Smart Growth” development patterns while simultaneously increasing housing production will align prices with incomes, while minimizing public costs and environmental impacts and maximizing economic impact and job creation. ■

COST BURDENING

Households are considered “cost-burdened” when they spend more than 30% of their gross income on housing expenses (not including transportation costs); this threshold does not change for different income levels. While it is a commonly accepted measure of the maximum amount that should be spent on housing, it fails to account for the fact that low-income households have proportionately higher housing costs relative to lower monthly incomes.



PERCENT OF HOUSEHOLDS THAT SPEND MORE THAN 30% OF GROSS INCOME ON HOUSING, 2015

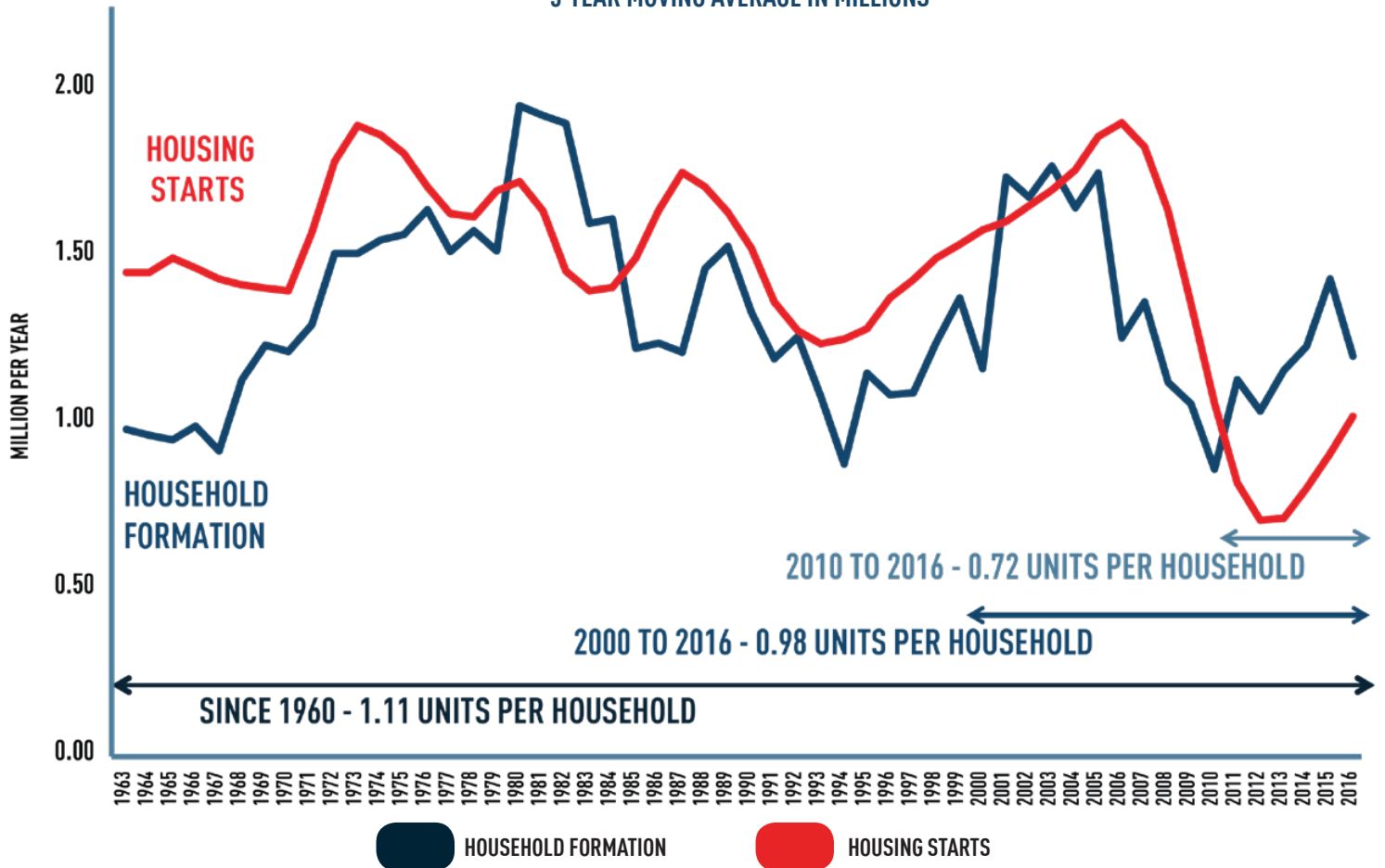


Source: St. Louis Federal Reserve GEOFRED

HOUSING STARTS HAVEN'T KEPT PACE WITH HOUSEHOLD FORMATION

U.S. HOUSEHOLD FORMATION VS. HOUSING STARTS

5-YEAR MOVING AVERAGE IN MILLIONS



Historically, the national housing market has produced more units of housing (housing starts) than the growth in the number of households created (household formation). Since 1960, there have been 11 units produced for every 10 new households formed — the additional production allows for vacancies and the demolition of units over time. However, from 2000 through 2016, this ratio dropped to slightly less than one new unit created per new household formed. More recently, since the end of the Great Recession — 2010 to 2016 — this ratio fell even further and only seven homes were built for every 10 new households formed.

Demographic forces, like household formation of the millennial generation and the empty-nest downsizing of the baby-boomer generation, are adding to the increased demand for housing in cities and metropolitan areas across the country. Another factor to consider is potential obsolescence of the existing stock — poor quality homes that were not constructed to last permanently — for example post-WWII stick-on-slab developments that had a short expected useful life and are still being used today. The need to replace these homes further increases the demand for construction of units, in addition to demand associated with household formation. ■

NUMBER OF HOUSING UNITS UNDERPRODUCED FROM 2000-2015

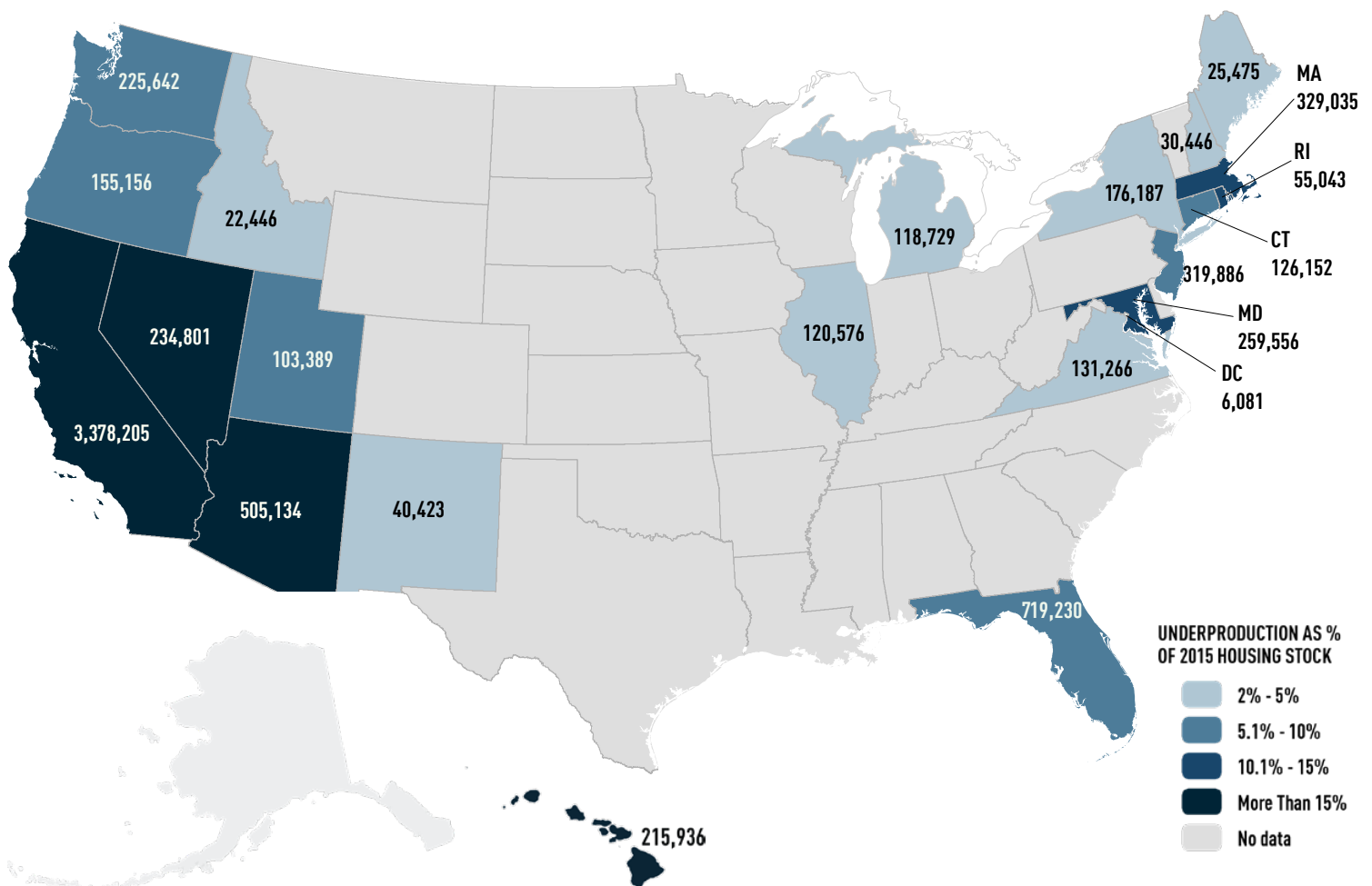
7.3 MILLION UNITS IN 23 STATES

To calculate the total number of units under-produced from 2000 to 2015, we estimated each state's historic relationship between the production of housing units (supply) and a host of demand-side indicators using an econometric statistical model. We then calculated each state's baseline housing production through 2000 and forecasted the number of units that would have been produced in 2015 if each market maintained its historic equilibrium. Then using the actual number of housing units in 2015, we calculated the total units that were under- or over-produced from 2000 to 2015 at the state level. The historic data needed for this calculation were not available for smaller geographies.

The map below shows which states under-produced housing during the 2000-2015 time period. States that produced housing at their long-run equilibrium rate are in grey. Nationally, 23 states under-produced housing to the tune of 7.3 million units, or roughly 5.4% of the total housing stock in the United States. ■

DATA INPUTS TO THE MODEL INCLUDE:

- Home Prices
- Population
- Income
- Housing Stock



Source: ECONorthwest estimates, Census Bureau ACS 1-year Estimates of housing Stock

DISTRIBUTING NEW GROWTH: THREE SCENARIOS

To simulate the building of new housing units and making up for the underproduction that occurred in the 2000-2015 timeframe, we created three growth scenarios to approximate different types of housing development. The total number of units developed in each state is the same for all growth scenarios, but each scenario creates different numbers of single-family homes, missing middle and medium density apartment buildings and residential apartment towers (See page 12 for details on the building prototypes).

To distribute this new housing development, we calculated the 2015 housing density in units per acre (UPA). We did this at the census “block group” level — defined as an area that generally has between 600 and 3,000 people, but can vary in size based on population density. To account for areas that cannot easily accommodate additional development (water, wetlands) and with a goal of preserving natural areas (forests and farmland), we adjusted the housing density using the 2011 National Land Coverage Database’s satellite imagery data and included only those areas considered to be “developed.”

Each growth scenario sees the same number of housing units built, with a threshold of one UPA where no additional housing is built. New development is not added in areas with density

below one UPA to take advantage of existing infrastructure and to avoid increasing the footprint of land required to accommodate additional units.

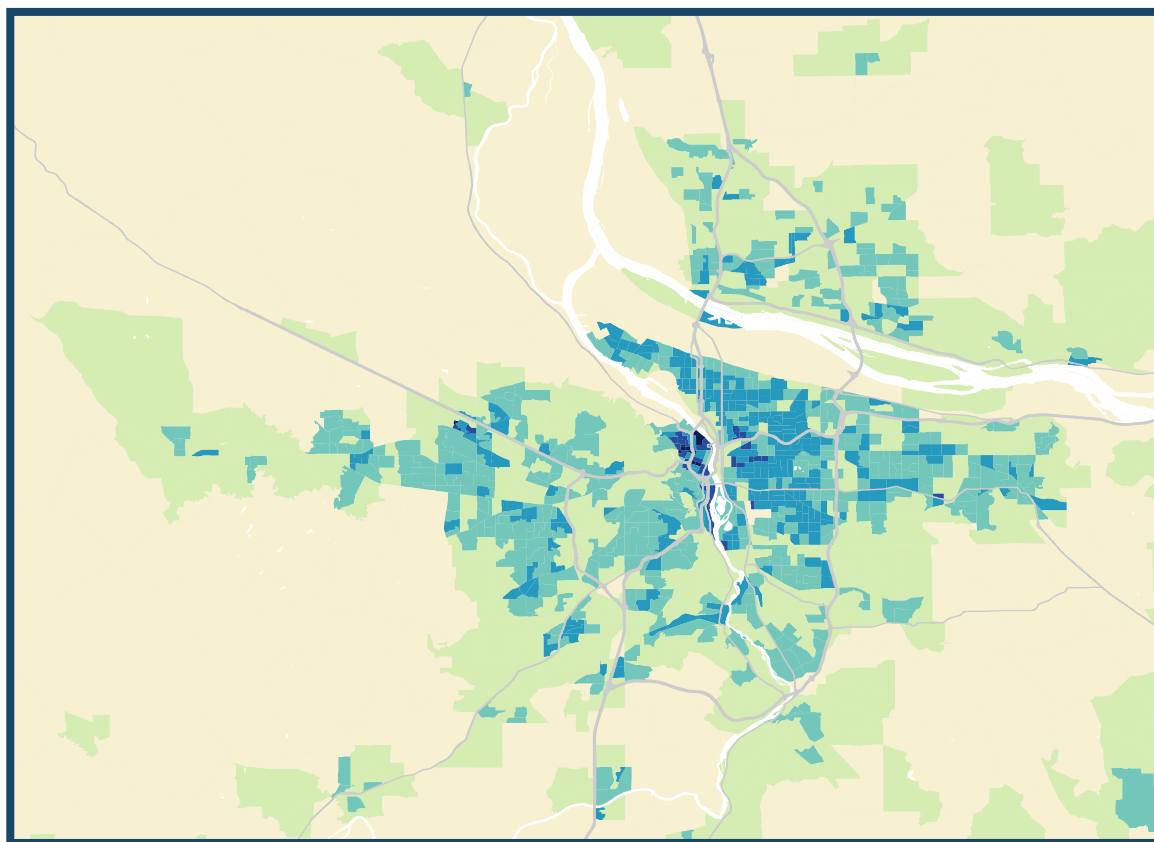
THE FIRST GROWTH SCENARIO IS “MORE OF THE SAME”. This scenario looks at the current share of single-family homes, missing middle and medium density, and towers in each state, and it assigns new growth proportionally above the threshold of one UPA. If a state has only 5% of dwelling units in high-rise towers, it will get 5% of new growth as high-rise towers. The map below displays the current housing density for the Portland, Oregon metro area. This region is a prime example to illustrate how regulation can limit where development is permitted. The impact of an urban growth boundary can be clearly seen on the map where density drops to below one unit per acre as you move away from the core.

THE SECOND GROWTH SCENARIO IS “MAX DENSITY”. It assigns additional housing units based on the existing density of a given census block group. This scenario is a top-down approach, which first adds density to the block groups with the highest existing density. The growth scenario then continues to move down the scale to focus on block groups with less-concentrated density, adding fewer additional units to less

ADJUSTED HOUSING DENSITY, PORTLAND METRO AREA



ADJUSTED DENSITY:



Source: NLCD 2011, U.S. Census

DISTRIBUTING NEW GROWTH: THREE SCENARIOS

dense block groups until all the units have been built. The rationale for this approach is that a new high-density urban form is best suited for areas that have similar densities, and will therefore be able to leverage the existing infrastructure. (See page 13 for prototype distribution rules). This scenario is meant to describe the most efficient distribution that utilizes infrastructure and infill development (vacant and underutilized sites) to achieve the highest possible density.

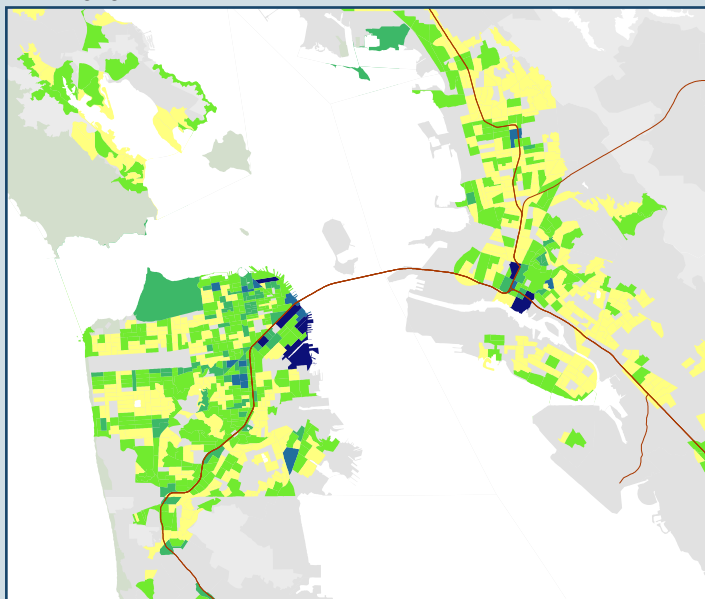
THE THIRD GROWTH SCENARIO IS “SMART GROWTH”.

It assigns new housing units based on a formula of existing density, distance to transit stops and the share of commuters in the census block group who drive their own vehicles to work. The goal of the “Smart Growth” scenario is to increase density in a way that conforms with the existing urban form, focusing on delivering lower-cost mid-rise units, and most importantly, locating units in transit corridors to reduce vehicle miles travelled (VMT) and the number of cars on the road. In order to achieve these goals, unit distribution was prioritized in locations within a quarter mile of existing transit stations, then in locations within a half mile of a station, and finally, in non-transit corridor locations with a low share of people using private transportation to commute to work. The majority of units (65%) were assigned within one mile of transit stations due to the low share of private vehicle commuters. Nationally 55% of units were within a half mile of stations, and in ten of the states, 100% of units were within a transit corridor. In order to achieve higher densities in priority areas, density was tripled within the first quarter mile (subject to a cap of 240 UPA) and doubled from a quarter mile to half mile (subject to a cap of 150 UPA).

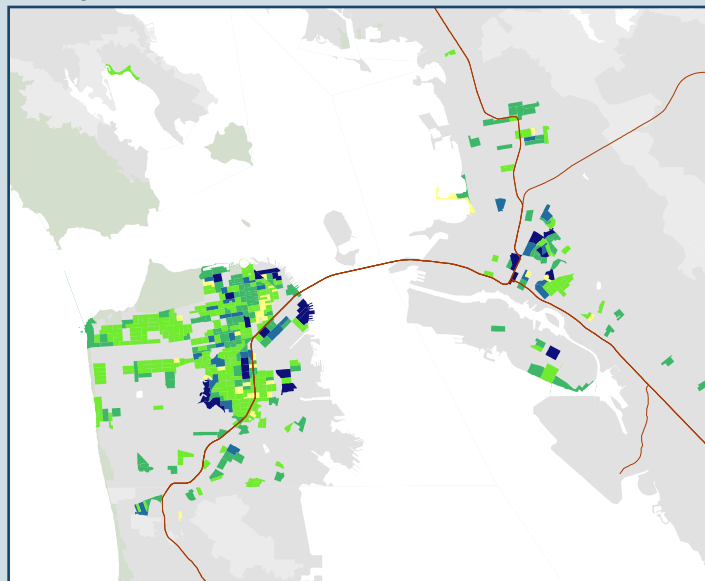
As these maps demonstrate, the land area required to accommodate the maximum growth scenario in the Bay Area is lower than the “Smart Growth” scenario. In the “Max Density” scenario, the majority of units are located in the actual city of San Francisco, with no units developed to the North in Marin County and very few units in the East Bay. Conversely, in the “Smart Growth” scenario, the new units are spread out throughout the region along existing transit corridors. ■

SMART GROWTH VERSUS MAXIMUM HOUSING DENSITY IN THE BAY AREA

SMART GROWTH



MAXIMUM DENSITY



MAXIMUM DENSITY:
167 units per acre for tower
75 units per acre for tower/medium
50 units per acre for medium

TOTAL UNITS ADDED:



SMART GROWTH

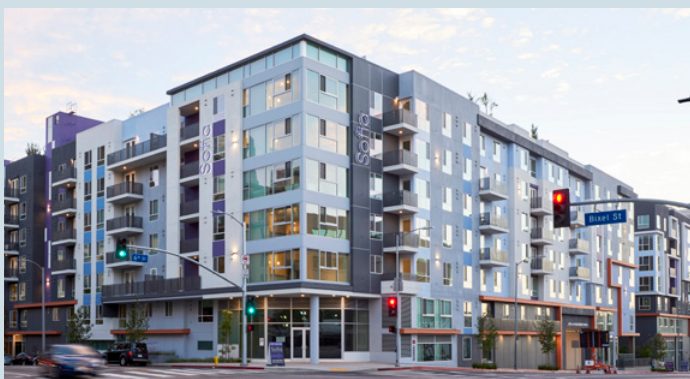
300% INCREASE IN DENSITY UP TO 240 UPA
WITHIN ¼ MILE OF TRANSIT STATIONS

200% INCREASE IN DENSITY UP TO 150 UPA
FROM ¼ TO ½ MILE OF TRANSIT STATIONS

COST ESTIMATES AND PROTOTYPE ASSUMPTIONS



SINGLE-FAMILY HOME (UP TO 3 STORIES): MAX 5 UNITS PER ACRE



MISSING MIDDLE & MEDIUM DENSITY (UP TO 5 STORIES): MAX 120 UNITS PER ACRE



TOWER HIGH-RISE (6+ STORIES): MAX 240 UNITS PER ACRE

Each growth scenario builds the same number of units but has different numbers of single-family homes, medium density units, and towers. Yet, each scenario achieves very different housing densities. This allows for comparison between the costs and outcomes of different types of housing policies and development strategies.

From an urban planning and design perspective, the additional units built in each block group match the existing housing prototypes observed in that block group. This avoids situations where adding new high-density housing units in block groups with mostly single-family homes drastically changes the neighborhood composition. Each block group is assigned a prototype distribution based on the existing density of that block group, which can be seen on the table on page 13. The cutoffs for the prototype bins were determined by looking at satellite imagery of block groups and attempting to find breakpoints that matched the existing distribution of prototypes.

The pictures on page 13 demonstrate the visual changes in housing density. The image on the left is the upper limit of density — showing a block group with 150 units per adjusted acre. Adjusted densities are gross and include right of ways, and other non-residential uses, therefore the achievable density on a residential parcel is higher than the total density for the block group. The picture on the right shows a block group with 30 units per adjusted acre. In the “Max Density” growth scenario, block groups with more than 30 units per acre will receive additional housing units until they look more like the picture on the left. Similarly, block groups with density between 12.5 and 30 units per acre (less dense than the photo on the right), would receive additional units until they reach 75 units per adjusted acre. The table on page 13 details this density distribution.

Though there is a different mix of single family homes, missing middle and medium density, and towers for each scenario, the total number of housing units built is the same. However, it’s important to note that each housing prototype has vastly different costs of construction and different infrastructure investment needs. For example, building a new tower downtown does not require new roads and may require minor infrastructure investment. However, building a new single-family home in a less developed area requires new infrastructure investments to accommodate the additional growth.

COST ESTIMATES AND PROTOTYPE ASSUMPTIONS



DENSITY DISTRIBUTION & PROTOTYPE MATRIX

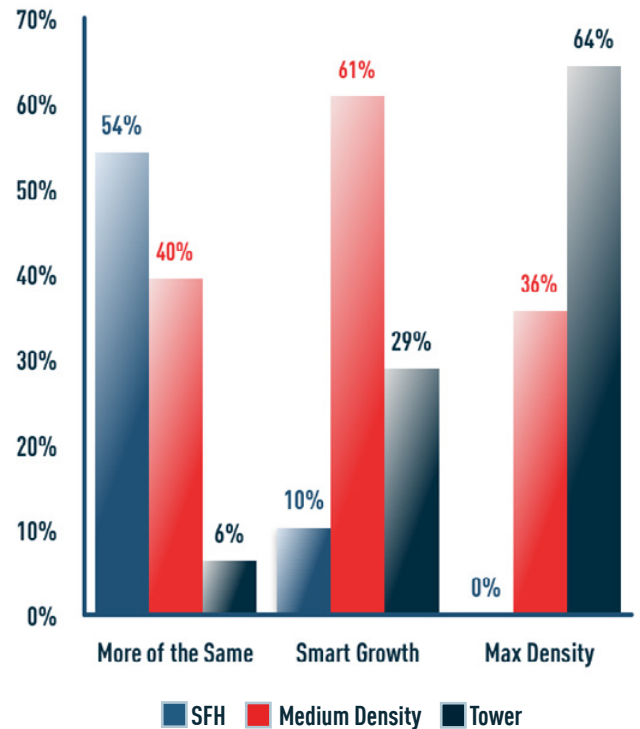
(SMART GROWTH AND SMARTER GROWTH)

CURRENT DENSITY	% TOWER	% MEDIUM	% SFH
30.0+ Units per acre	100%		
12.5-30 Units per acre	50%	50%	
5.0-12.5 Units per acre		100%	
3.0-5.0 Units per acre		25%	75%
1.0-3.0 Units per acre			100%
Less Than 1.0 UPA	Development Threshold — No Density Added		

The table above shows the prototype distribution for the “Max Density” and “Smart Growth” scenarios. These scenarios add new units beginning with the densest block groups. Block groups with more than 30 UPA see 100% of new units added in towers, until they reach the density threshold for that scenario. The scenario distribution then moves to the next-densest block group and adds units in a 50% tower/50% medium density mix. This continues further, adding additional medium density apartments and, finally, single-family units until the total number of units under-produced have been allocated.

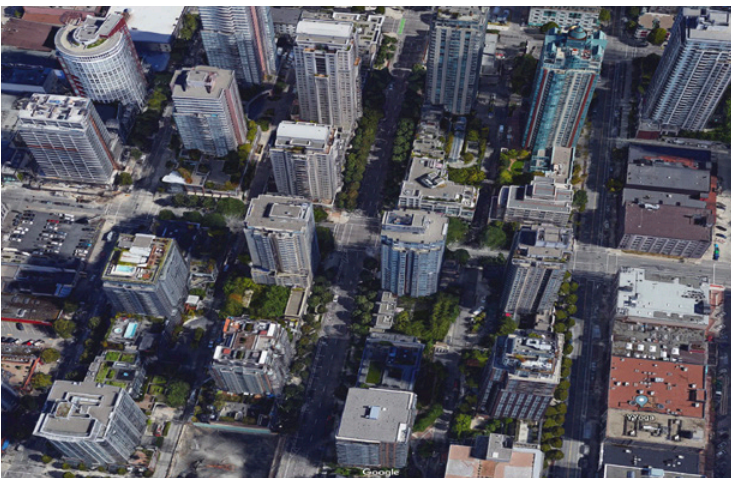
The chart demonstrates this distribution pattern, showing how many towers, medium density, and single-family homes are allocated in each growth scenario. The “Max Density” and “Smart

NATIONAL PROTOTYPE DISTRIBUTION BY GROWTH SCENARIO



Growth” scenarios follow the distribution in the table, while the “More of the Same” scenario increases each block group’s current mix of towers, medium density and single-family homes proportionally, until the total number of units has been allocated.

The photos below provide visual examples of block groups. The left has 150 units per acre and would see 100% of new housing built in towers. The right has 30 units per acre and would see new housing built in a mix of towers and missing middle/medium density.



DUA = 150 — 100% TOWER



DUA = 30 — 50% MEDIUM/50% TOWER

THE BENEFITS OF SMART GROWTH

The “Smart Growth” scenario targets areas of existing high density combined with low VMT in transit corridors as the priority in assigning unit growth. The goal of the “Smart Growth” scenario is to achieve improved economic and fiscal impacts while also delivering additional positive environmental impacts compared to the “More of the Same” scenario. At its most basic level, “Smart Growth” achieves higher density than current housing development patterns, and therefore requires less land to accommodate the same number of units. Nationally, “Smart Growth” requires just 25% of the land area required for the “More of the Same” scenario. Utilizing less land means higher economic efficiency for local jurisdiction service delivery, as well as environmental benefits such as storm water remediation and undisturbed room for forestry and farming.

In addition to land-use benefits, locating housing near public transportation reduces the burden of cars on the road. This important relationship is a focus for the “Smart Growth” scenario, which prioritizes housing in transit corridors with low VMTs.

To quantify the benefits of having housing units in transportation corridors, California is used as a case study because of the availability of statewide data on VMT. The study found a very strong relationship between VMT and the proportion of households who commute by car and truck (also known as “commute mode split”) as demonstrated by the scatterplots on page 15.

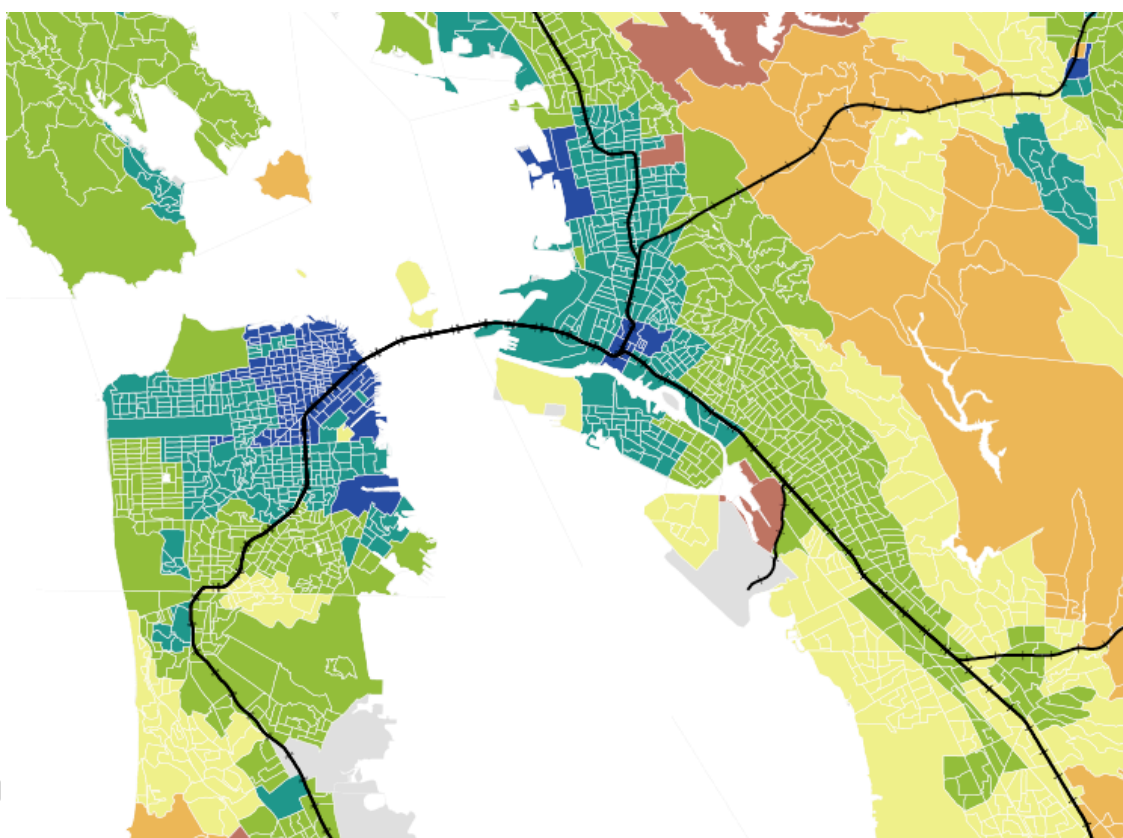
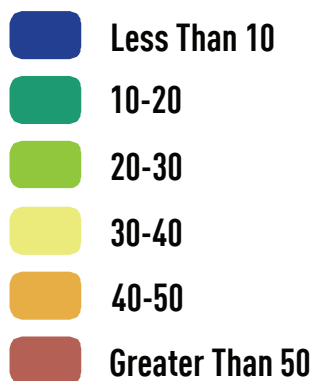
The map below shows commuting VMT for the Bay Area, with BART transit stations overlaid. The range of VMT is lower than 10 in some areas and more than 50 in others. The benefits of the “Smart Growth” scenario in California result in 38 million fewer miles travelled daily for commuters compared to the “More of the Same” scenario, a difference that is equivalent to 1.2 million fewer cars on the road annually. The study does not calculate reduction in VMT outside of California.



ENVIRONMENTAL IMPACT OF SMARTER GROWTH: LOWER VEHICLE MILES TRAVELED



HOME-BASED VMT PER HOUSING UNIT



THE BENEFITS OF SMART GROWTH

The “Smart Growth” approach would have the largest increase in transit corridor density of any of the growth scenarios. With the relationship between VMT and commute mode split clearly demonstrated, increasing density in transit corridors would be a valuable way to reduce VMT and leverage public infrastructure investments.

The scatterplots below compare housing density and daily commuting VMT for transit corridors (green dots) and non-transit corridors (red dots) in the Bay Area at the block-group level. These scatterplots demonstrate that commuting VMTs are lower in transit corridors than in non-transit corridors, with a median of 18 VMT and 28 VMT, respectively. They also show that the median transit corridor block group has a higher housing density than the median non-transit corridor block group, with 12 units per acre compared to five units per acre, respectively. In addition:

- Almost all the transit corridor block groups have VMT below 20 miles.
- Almost all the transit corridor block groups see low commute mode splits (under 50%).
- Almost all the highest density block groups are in transit corridors.
- There are few outliers in either scatterplot, indicating strong relationships between VMT and housing density, and between VMT and commute mode split.

Clearly, the “Smart Growth” strategy has numerous benefits beyond increasing GDP, jobs, tax revenues and housing density — all of which are explored in the next pages. The “Smart Growth” approach also delivers meaningful environmental benefits compared to other housing development patterns . ■

SMART GROWTH BENEFITS

3.3 MILLION UNITS PRODUCED IN CALIFORNIA

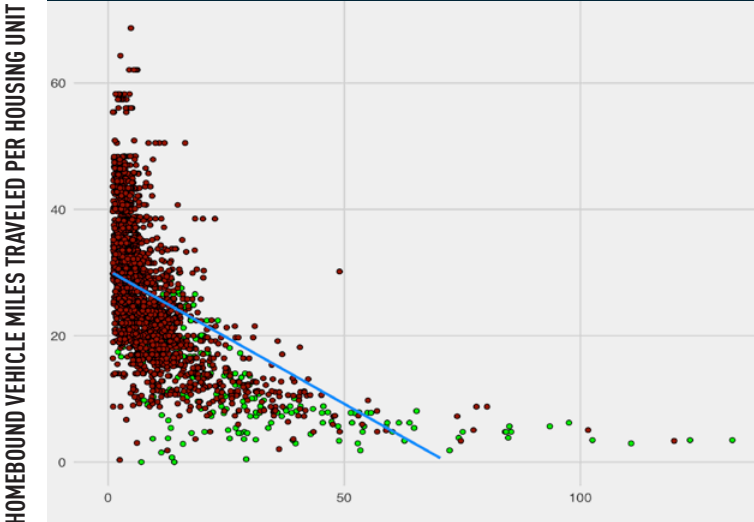
	VMT PER DAY	CARS PER YEAR
MORE OF THE SAME	110 MILLION	3.5 MILLION
SMART GROWTH	72 MILLION	2.3 MILLION
DIFFERENCE	38 MILLION (35% REDUCTION)	1.2 MILLION

IN THE BAY AREA

	MEDIAN HOUSING DENSITY	99TH % HOUSING DENSITY
TRANSIT CORRIDOR	12	125
NON-TRANSIT CORRIDOR	5	43

	MEDIAN VMT	99TH % VMT
TRANSIT CORRIDOR	18	44
NON-TRANSIT CORRIDOR	28	57

HOUSING DENSITY AND VEHICLE MILES TRAVELED IN THE BAY AREA

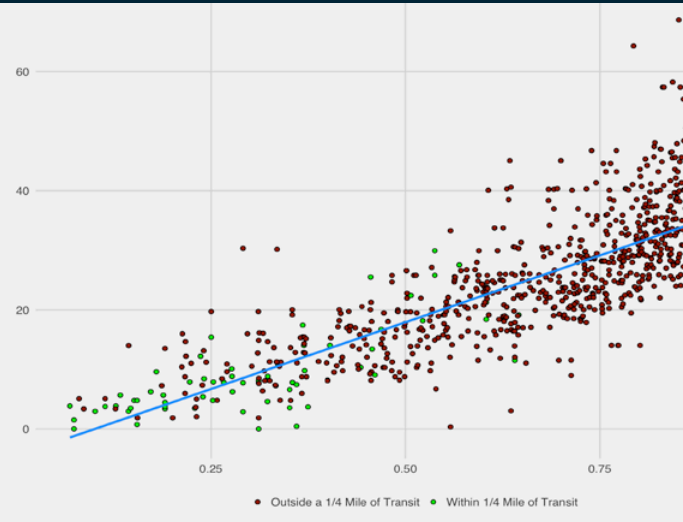


OUTSIDE A 1/4 MILE OF TRANSIT



WITHIN A 1/4 MILE OF TRANSIT

MODE SPLIT AND VEHICLE MILES TRAVELED IN THE BAY AREA



INFRASTRUCTURE SPENDING

As cities grew in the post-World War II era, high rates of new housing unit growth paid for costly infrastructure projects that were generally funded by local governments with federal- and state-level subsidies. More recently, as rates of growth have decreased, cities have struggled with funding new infrastructure to support growth. This forms a classic “Catch-22.”

FRAMING MORE OF THE SAME

Throughout the report, the “More of the Same” growth scenario is used to compare different, higher-density approaches to the current development patterns observed in states across the country. In reality, the current approach is not feasible to consider as a development strategy over a 20-year period in addition to the natural growth that will occur during that time. More than 600,000 acres of land would be required to build the 7.3 million units under-produced nationwide. Nationally, there is abundant available land. However, in the areas where underproduction has occurred, land is typically scarce, as land scarcity is one of the main drivers of underproduction. In addition to a land constraint, local jurisdictions would need to incur close to \$370 billion in debt to support this pattern of development. The remainder of the report describes the benefits that would accrue from building under this scenario. However, in reality it is not economically feasible to achieve this type of growth in addition to natural growth over a 20-year period.

Infrastructure is needed to make greenfield development possible, but the cost of infrastructure limits the ability to develop in said “green fields.” In most cities and metro areas around the country, the prime developable areas have already been consumed. The remaining areas available for development either require costly infrastructure upgrades or are far away from existing infrastructure. As a result, the cost-per-unit of infrastructure has increased over time as homes are built further and further away from urban cores.

The reaction of cities and local governments has been rational—raise fees to cover the higher costs of installing new infrastructure. However, this response ignores more difficult questions: Do the revenues generated by new units support the up-front costs? More importantly, do these revenues cover the continued operations and maintenance costs of this new infrastructure?

The short answer is no, and as a result, debt is used to fund the required infrastructure. However, adding new debt service limits the ability to properly maintain existing facilities, which leads to increased costs for deferred maintenance. In the long run, the existing property tax base cannot support deferred maintenance costs.

Continuing to build new housing units in this manner — away from the existing infrastructure in urban cores — not only fails to remedy the problem but also exacerbates it.

Remedying the problem requires cities and municipalities to compare the cost of new development infrastructure to the associated fee revenues that development produces. In the early stages of sprawl, new growth fueled the expansion, while long-term maintenance obligations had not yet been incurred, so net-negative infrastructure costs were still a minor issue.

This dynamic is changing. Cities now face unfunded liabilities that will require new units to be net positive for infrastructure costs, meaning they bring in more revenues than the costs of installing and operating the infrastructure. This profitability is necessary if there is hope to “right-size” municipal budget problems, and there are several ways to do this:

- Growth policies can target areas that already have existing infrastructure, thereby reducing the demand for increased infrastructure investment.
- Policies can also set impact and development fees on a per-acre or gross land, square-foot basis, rather than a per-unit basis to reflect the true infrastructure costs. ■

GROWTH SCENARIO	TOTAL ACRES REQUIRED	INFRASTRUCTURE INSTALLATION COST	INFRASTRUCTURE TOTAL O&M SPEND	TOTAL IMPACT FEES	PROPERTY TAX REVENUE	NET TAX REVENUE
MORE OF THE SAME	602,051 ¹	\$612,041,200,836	\$14,223,456,016	\$54,272,253,249	\$204,353,021,677	\$(367,639,381,926)
SMART GROWTH	148,442	\$84,741,386,954	\$3,506,937,451	\$39,904,589,077	\$225,193,796,354	\$176,850,061,026
MAX DENSITY	40,082	\$20,592,603,598	\$946,926,147	\$36,449,419,162	\$271,694,738,442	\$286,604,627,859

The table above summarizes the buildable land requirements and infrastructure spending impacts for each of the three development scenarios. In order to build the same number of units nationally, a “Smart Growth” scenario requires 75% less land than the “More of the Same” approach — 148,000 acres compared to 602,000 acres. The cost of infrastructure is seven times greater in the “More of the Same” scenario compared to the “Smart Growth” scenario — \$612 billion compared to \$84 billion. In an attempt to recover these higher upfront and ongoing costs, local jurisdictions charge higher impact fees. However, these higher impact fees do not fully cover the larger infrastructure costs. As a result, the burden of funding the installation and ongoing costs of operating and maintaining infrastructure falls on the public sector.

¹Given the unavailability of land and infrastructure this scenario is unattainable.

Using the construction and infrastructure costs of each growth scenario, it was possible to calculate the economic and fiscal impacts of the resulting development spending. A dynamic economic impact model was used to estimate changes to the economy over the 20-year period of increased housing production. The model has feedback loops to capture the cumulative impacts of development spending, as well as any time-based changes to the structure of the economy, such as migration, induced demand, lower costs, supply chain spending and tax effects, among others. Any change to one sector of the economy will cascade through the other sectors. This is beneficial, as the model is able to capture the relationships between different economic and demographic changes, such as migration, government spending, personal income, etc.

This study is the first to use the Regional Economic Model (REMI) to simulate large-scale housing development. REMI is a structural representation of a regional economy and uses publicly available data to build an economic forecast. Variables can be altered to reflect changes in public policy (e.g. lower taxes, new regulation or new consumer preferences). The model then simulates the economic impacts of such policy changes and produces a new forecast capturing these effects. By comparing the simulated forecast to the baseline forecast,

the economic impacts of the policies modeled can be quantified.

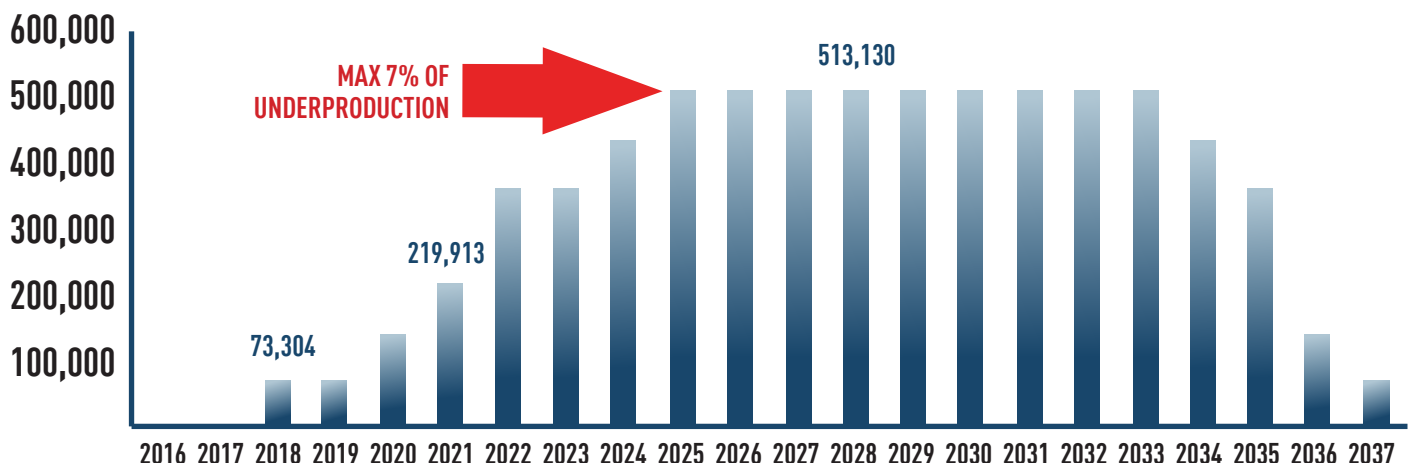
The “Smart Growth” scenario produces robust economic growth: A housing expansion under this scenario would produce a \$2.3 billion cumulative increase in U.S. GDP through 2037 compared to the baseline economic forecast.

ASSUMPTIONS

- **HARD CONSTRUCTION COSTS:** Calculated based on industry standards for the three different prototypes and varied across each state.
- **SOFT CONSTRUCTION COSTS:** Primarily architecture, engineering, and legal costs (excluding financial costs), assumed as a percentage of hard costs.
- **INFRASTRUCTURE COSTS:** Includes installation costs and on-going operations and maintenance costs. Paid for by impact fees estimated by state. Assumes government sector pays for infrastructure not covered by impact fees, through bond issuance. (Provided by Arup Engineering based on real data from developments in California, adjusted regionally)



ADDITIONAL HOUSING PRODUCTION PER YEAR



Our model phases in new housing development over a 20-year period. It is not feasible to assume the housing construction industry could immediately start producing new units on this scale. The industry — including producers up the supply chain — needs time to recruit and train new employees and to increase supplies of raw materials.

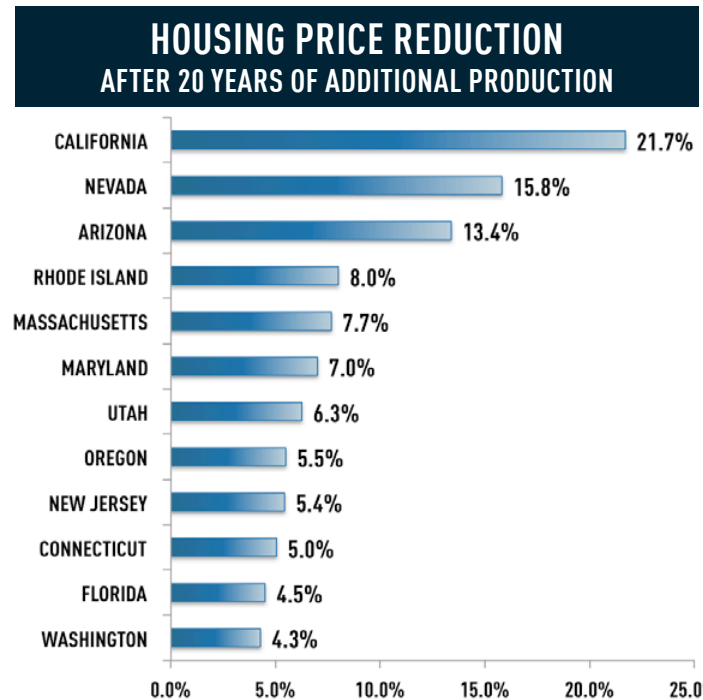
Source: ECONorthwest estimates

REMI MODEL: ECONOMIC IMPACTS

The greatest economic benefits come from the “Max Density” scenario, which sees the most development in tower prototypes that have the largest amount of construction spending. High-density developments also utilize more of the existing infrastructure, thus placing a smaller burden on governments and developers to both build and maintain new infrastructure.

Although the “Max Density” growth scenario produces the greatest economic benefits, it is the least politically feasible in terms of a policy solution. This scenario would require a radical restructuring of existing land-use and zoning policies. This growth scenario was designed to showcase the theoretical benefits that could accrue from such a massive, concentrated development effort.

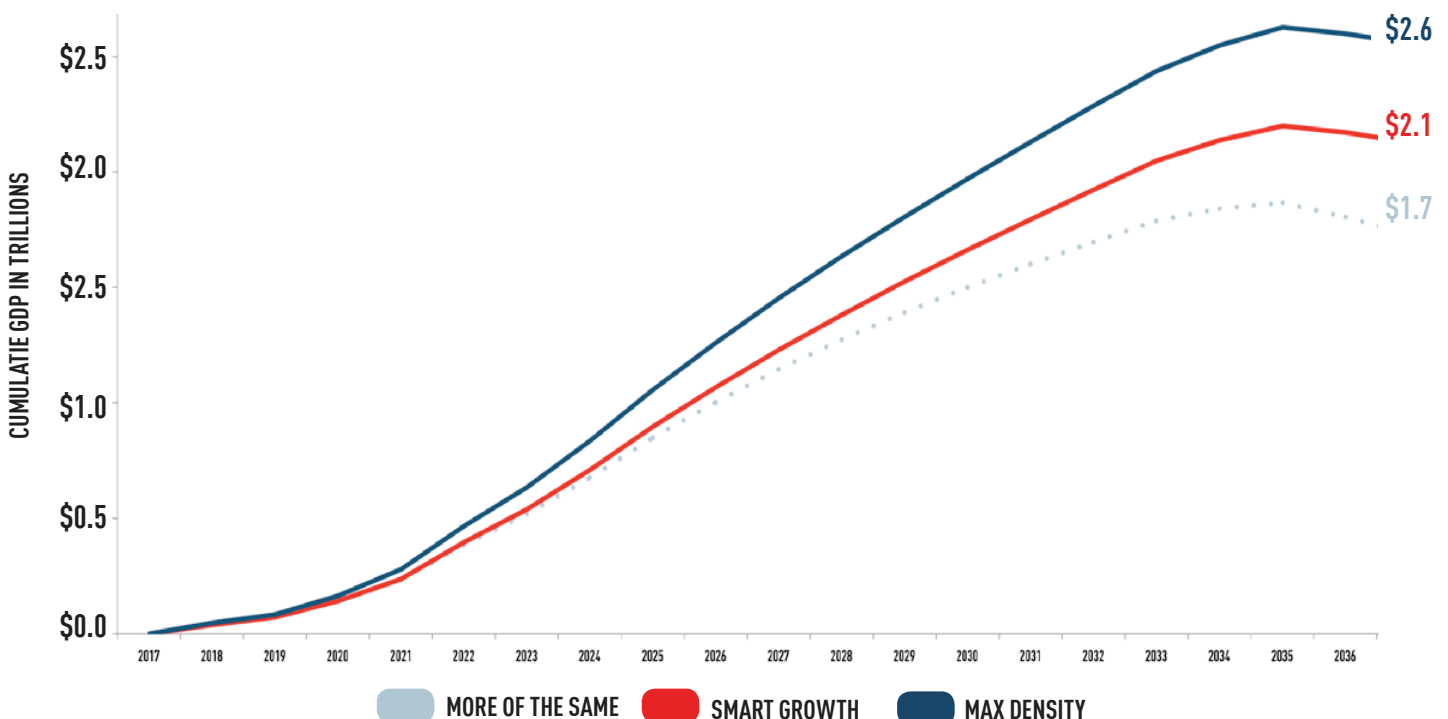
A more realistic outcome would be to design housing policies to support a “Smart Growth” approach, instead of continuing with “More of the Same” development patterns. Over the simulated 20-year period of housing production, the “Smart Growth” scenario generates \$400 million of additional GDP compared to “More of the Same.” With lower up-front infrastructure costs and reduced operating and maintenance costs associated with development, this scenario deploys capital more efficiently and produces higher economic output.



The chart above displays the states with the largest price reductions associated with the additional production of units. For example, if 3.3 million units are built in California during the next 20 years, prices would be 21.7% lower than they would have been without the additional production of units. This does not mean that prices are reduced from their current level, but are lower in the future than they would have been due to the increase in the number of housing units.



U.S. CUMULATIVE GDP BY SCENARIO 20-YEAR PRODUCTION PERIOD COMPARED TO BASELINE



This chart demonstrates the cumulative GDP achieved in each of the growth scenarios. The growth in GDP is measured against the REMI model’s baseline growth projections.

REMI MODEL: ECONOMIC IMPACTS

The “Smart Growth” scenario produces greater economic benefits than the “More of the Same” approach. This scenario targets development in transit corridors: areas with existing transportation infrastructure and a large number of households commuting by public transit. Jobs are added to the economy in each year compared to the baseline over the 20-year production period for all three scenarios. Jobs should not be thought of as cumulative impacts. It’s not uncommon for one individual to be employed by the same company for several years, so it’s difficult to trace the number of individuals employed year by year. Looking at employment impacts, however, we can see in a given year how many more jobs are supported compared to the baseline scenario. For example, at the peak job year, “Smart Growth” creates 2.1 million more jobs than the REMI baseline projection, and “Max Density” creates 400,000 more than “Smart Growth”, reaching 2.5 million jobs in 2025.

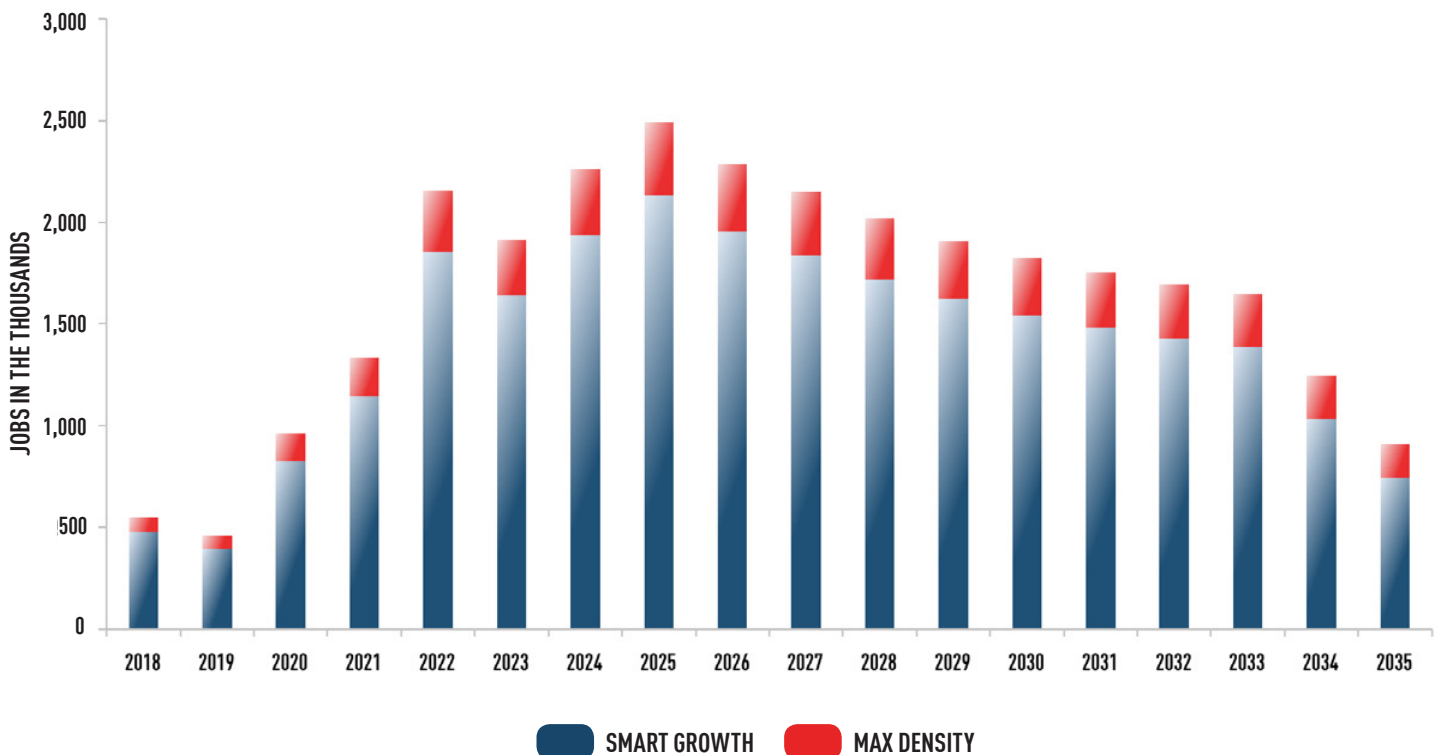
To summarize, all three growth scenarios lead to large economic benefits for the U.S. economy. Producing 7.3 million housing units (in addition to expected development over the

next 20 years) provides a boost to the national economy, as well as at the state and local levels of government. However, there is opportunity for greater economic growth, fiscal health and environmental impacts by implementing a growth scenario that concentrates growth in areas of existing density and transportation infrastructure. ■

Increased housing production reduces housing prices, which increases personal income and spending, which increases GDP, which creates more jobs.



ANNUAL U.S. JOBS BY SCENARIO 20-YEAR PRODUCTION PERIOD COMPARED TO BASELINE



This chart demonstrates the increase in “job years” above the REMI model baseline projections resulting from the “Max Density” and “Smart Growth” scenarios. Job years are an economic measure representing one year’s worth of full-time work. One job year could be one person working full time for one year, or two people working half time for one year. The increases in jobs correlate with the 20-year development time frame and span every sector.

FISCAL IMPACTS

The higher proportion of development occurring in towers and medium density means that the “Smart Growth” scenario produces higher-value units compared to “More of the Same,” contributing more to local and state revenues through higher property taxes.

Throughout more than 20 years of additional housing production, “Smart Growth” generates \$225 billion of cumulative property tax revenue, compared to \$204 billion with “More of the Same.” This is an important finding because the ongoing operations and maintenance costs associated with infrastructure improvements are far greater for the “More of the Same” growth scenario, while producing lower property tax revenues compared to the “Smart Growth” strategy. ■



CUMULATIVE FEDERAL FISCAL REVENUE

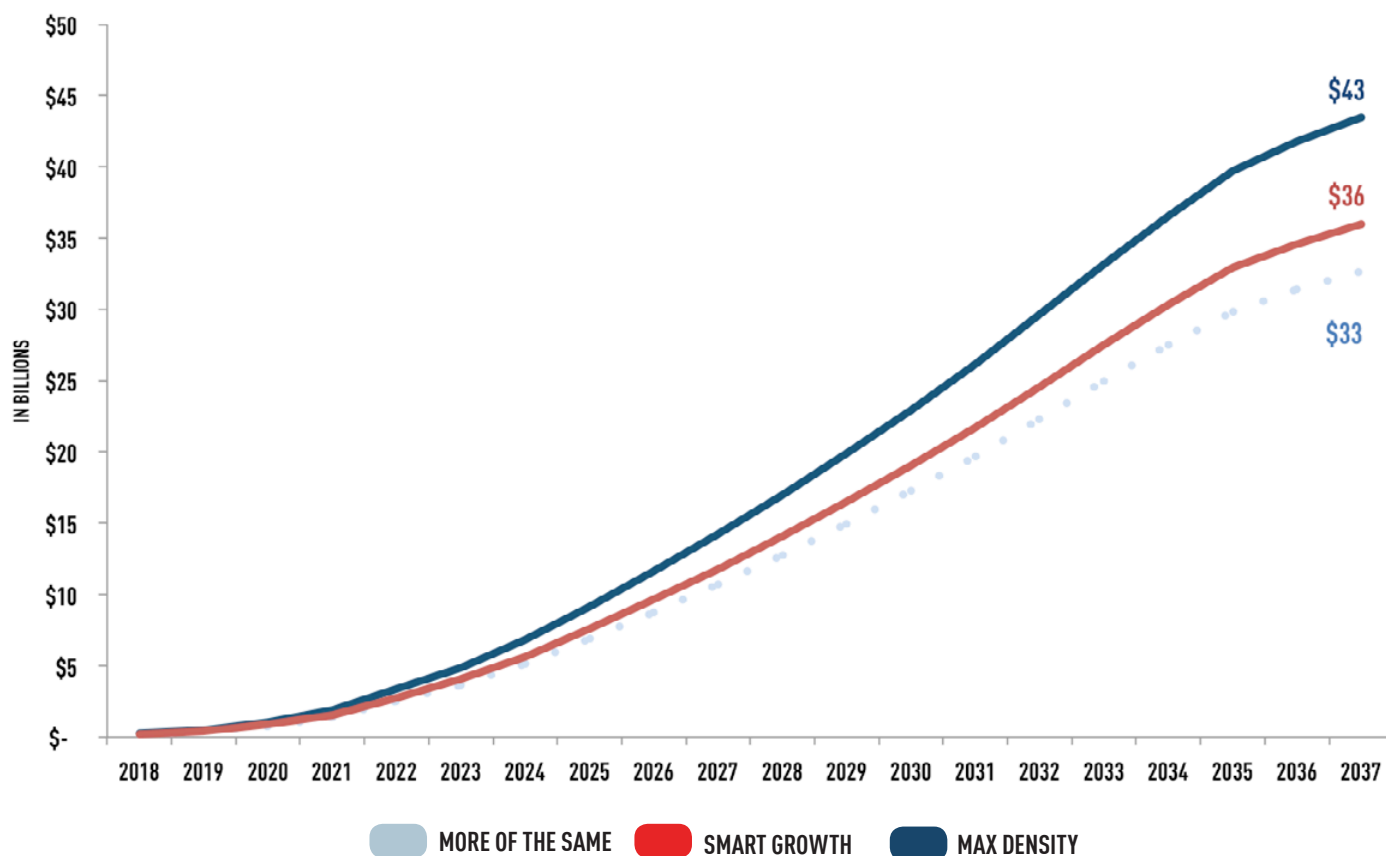
20-YEAR PRODUCTION PERIOD BY SCENARIO

MAX DENSITY	\$418 B	\$497 B	\$915 B
SMART GROWTH	\$349 B	\$419 B	\$768 B
MORE OF THE SAME	\$274 B	\$366 B	\$640 B

The blue area represents cumulative payroll tax, and the brown area represents personal income taxes. Corporate taxes and other federal revenue sources are not shown in these calculations.



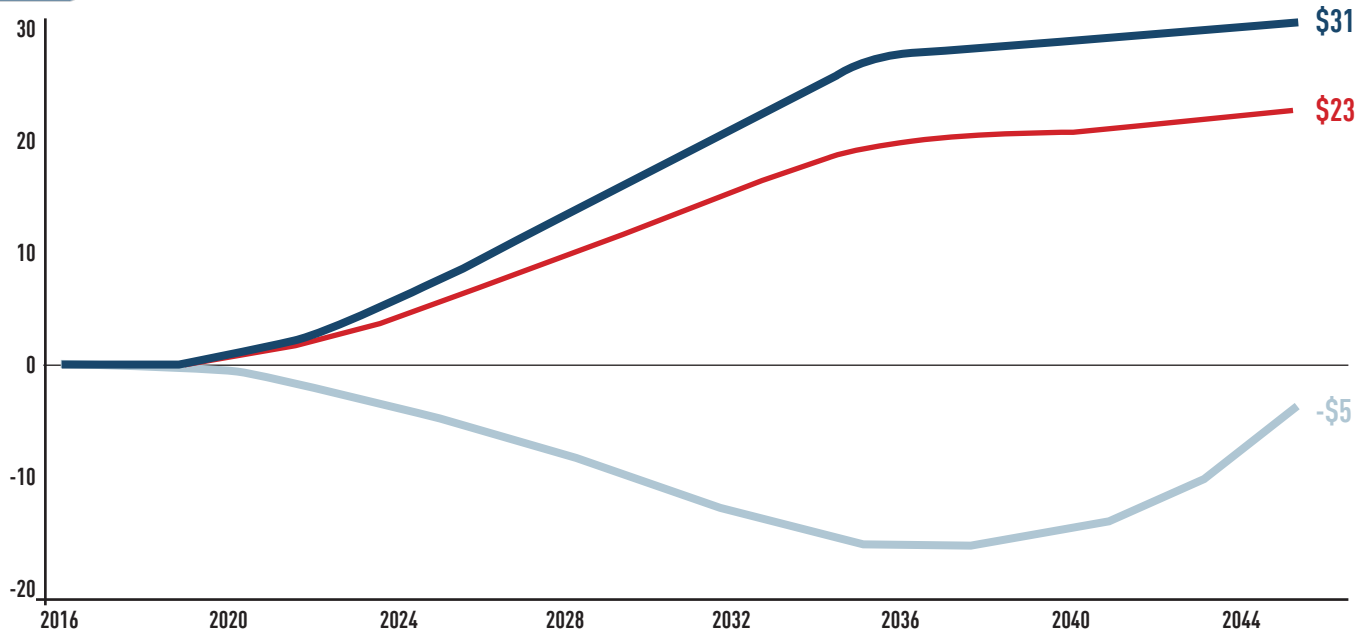
U.S. ANNUAL PROPERTY TAX REVENUE (2017, IN BILLIONS)



Property tax revenues are calculated in each state in constant 2017 dollars. The chart above displays the sum of all the states, representing the total property taxes generated nationally on an annual basis through the 20-year production period. Revenue increases annually as more units are built and as the assessed value of the existing units increases.



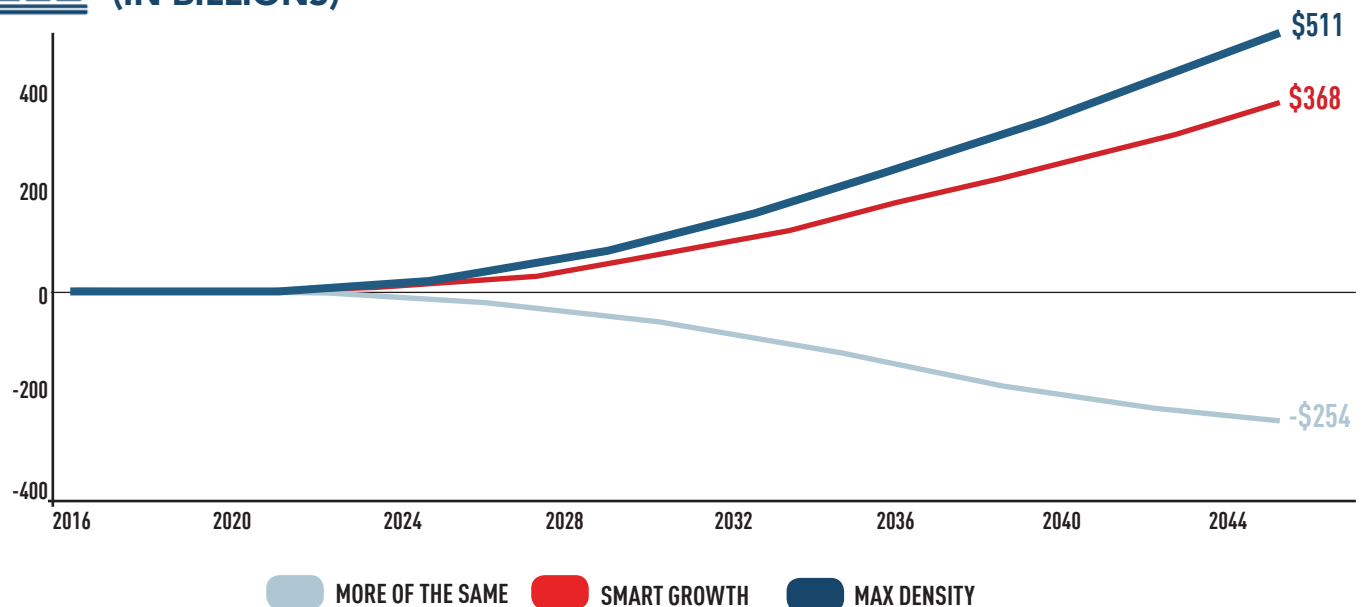
NET FISCAL REVENUE (IN BILLIONS)



Net fiscal revenues are reported in constant 2017 dollars, where the total property taxes generated from the new units represents the total revenue. The cost of constructing the required infrastructure and the ongoing operations and maintenance is subtracted from the total revenue to equal the net revenue. As units are built in the “More of the Same” scenario, revenue is negative in every year through the production period, continuing beyond 2045 as displayed on the chart. The long period of net negative revenue associated with each incremental unit is problematic when added to the natural production of units (which presumably also have net negative revenue). Conversely, each incremental unit of the “Smart Growth” and “Max Density” scenarios generates positive revenue, so it is possible to cross-subsidize existing deferred maintenance and move towards a sustainable development pattern.



CUMULATIVE FISCAL REVENUE (IN BILLIONS)



The cumulative revenue adds together the net revenue from each year of the chart above to reflect the sum of the impacts through 2045. In the “More of the Same” scenario, each year has negative revenue; therefore the cumulative impacts increase annually, totaling \$254 billion nationally through 2045. In the “Smart Growth” and “Max Density” scenarios, each year has positive net revenue, which means cumulative revenues increase annually. Through 2045, the “Smart Growth” approach generates \$367 billion in revenue nationally, while “Max Density” generates \$510 billion.

POLICY DISCUSSIONS AND CONCLUSIONS

The findings supported in this study demonstrate the clear and compelling need to enact innovative public-private solutions that will bring down inflated development costs of new housing in our urban centers. The most viable method for reducing the cost of housing is to make more of it available. Effective solutions must be incentive-driven and market-based.

Building the right product in the right location to maximize the built environment and leverage existing infrastructure is the most efficient pathway forward to

build the necessary units to keep up with household creation. Over the past 30 years, for example, the federal government has invested \$324 billion in transit and \$1.4 trillion in roads. By marrying housing policy with transportation policy, we can ensure that investments in one sector reinforce goals in the other.

Following is a four-pronged policy prescription for achieving higher densities and more housing units, through smarter growth in transit corridors and urban infill development. ■



1



BY-RIGHT APPROVAL

Establish “by-right” high-density residential development in a half-mile radius around a transit station (roughly 5 percent of a metropolitan region’s land area).

2



IMPACT FEE RECALIBRATION

Recalibrate impact fees to reflect actual costs of infrastructure service for high-density development.

3



PROPERTY TAX ABATEMENT

Use property tax abatement as a gap financing tool to enable denser and more affordable housing production.

4



VALUE CAPTURE

Establish mechanisms to capture value created through up-zones and tax abatement investments to be used as dedicated funding for a range of housing programs.



UP FOR GROWTH

- national coalition -