Regional Growth Impact Analysis for Central Ohio

Steering Committee Meeting #3 16 July 2014

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STRATEGICECONOMICS

Scenario Questions

1. How much will Central Ohio grow over the next decades?

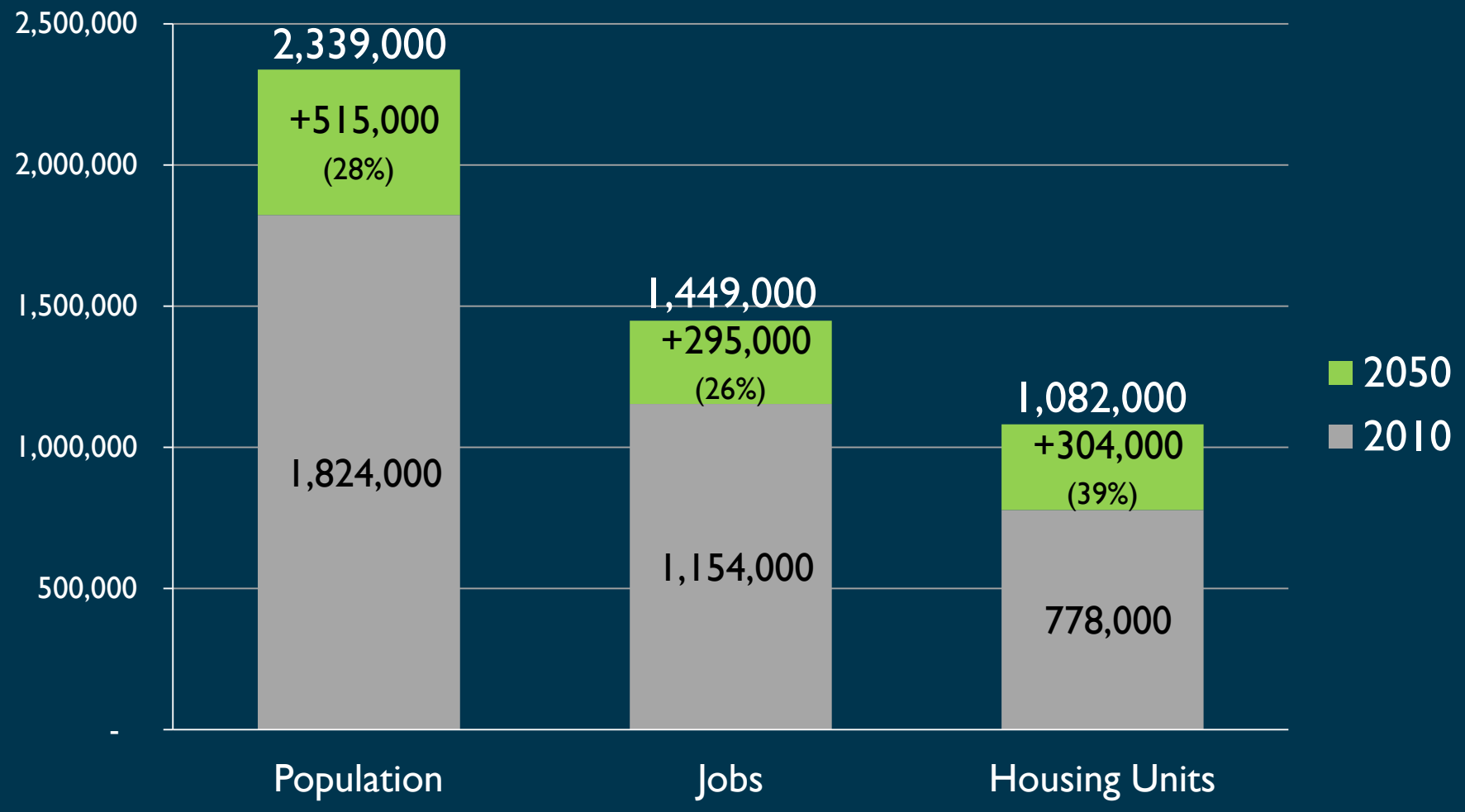
2. What kind of growth should the region be planning for?
   - Demographics and preference shifts
   - Housing mix and community form
   - Infill/Redevelopment vs. greenfield growth
   - Relationship to transport infrastructure

3. What are the impacts of our growth choices?
   - Fiscal, Environmental, Mobility, and Health Impacts

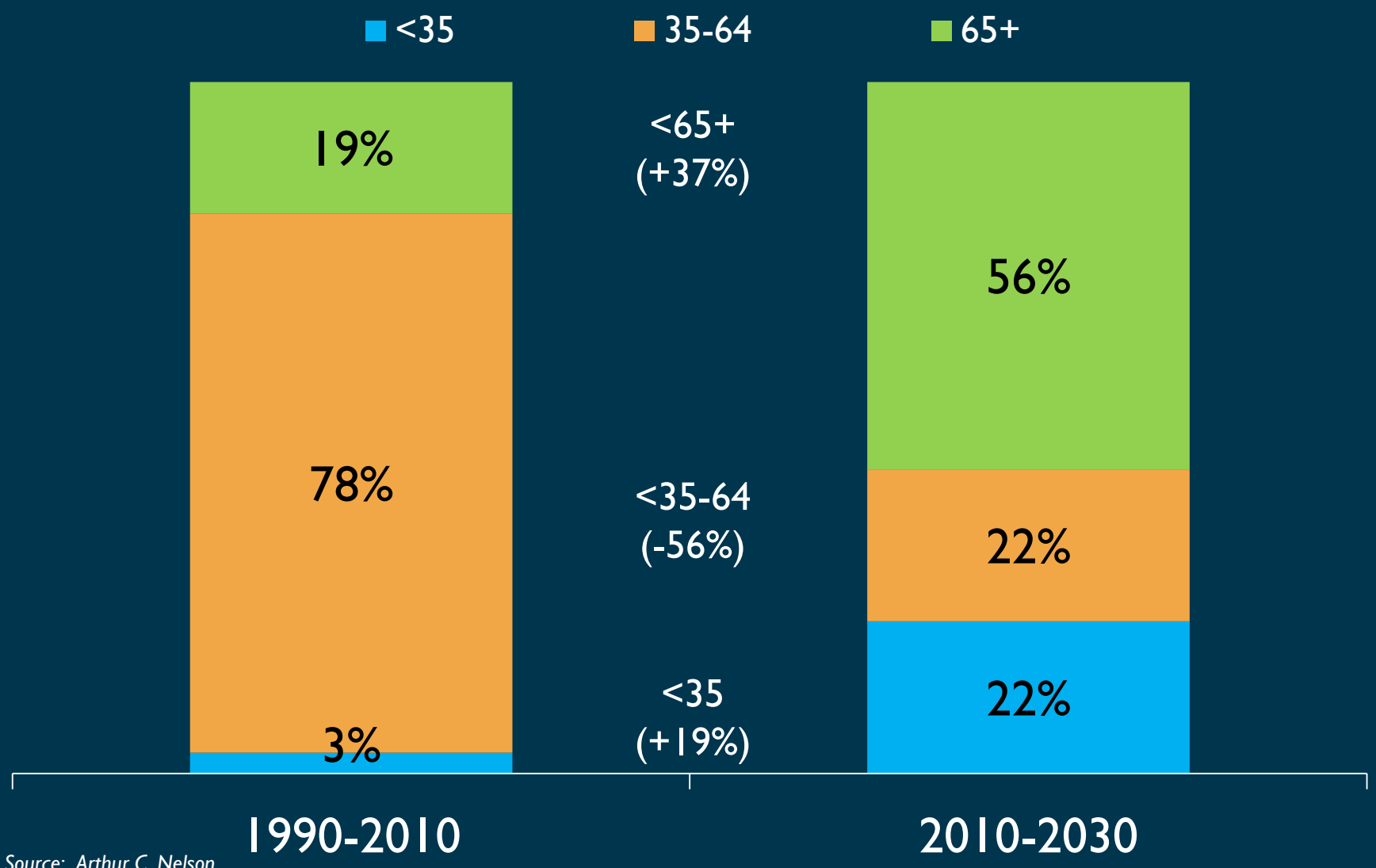
How much growth?

Columbus Region Projections to 2050

Nearly 40% growth in housing units – ~304,000 new homes

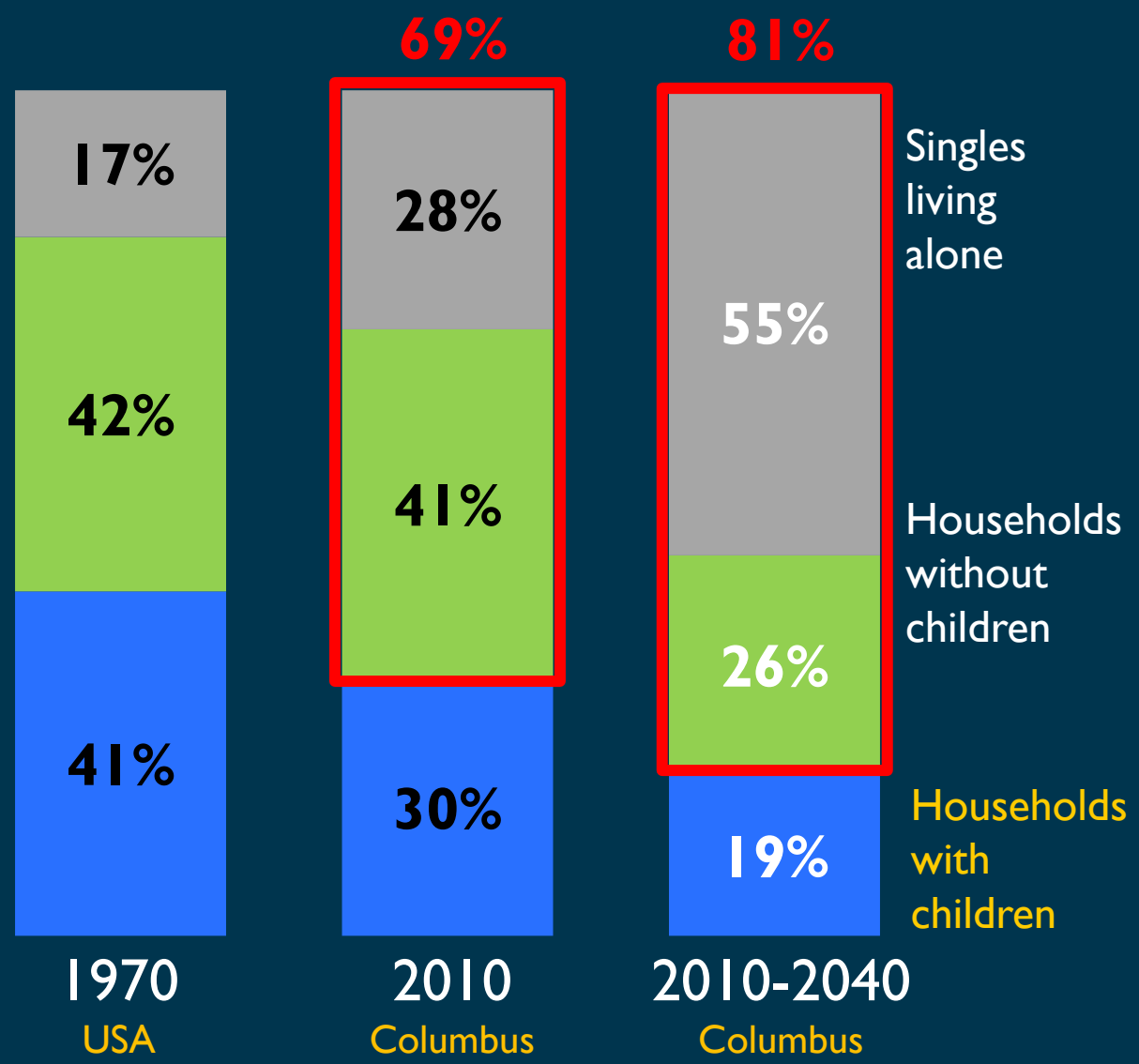


A Changing Population



Source: Arthur C. Nelson

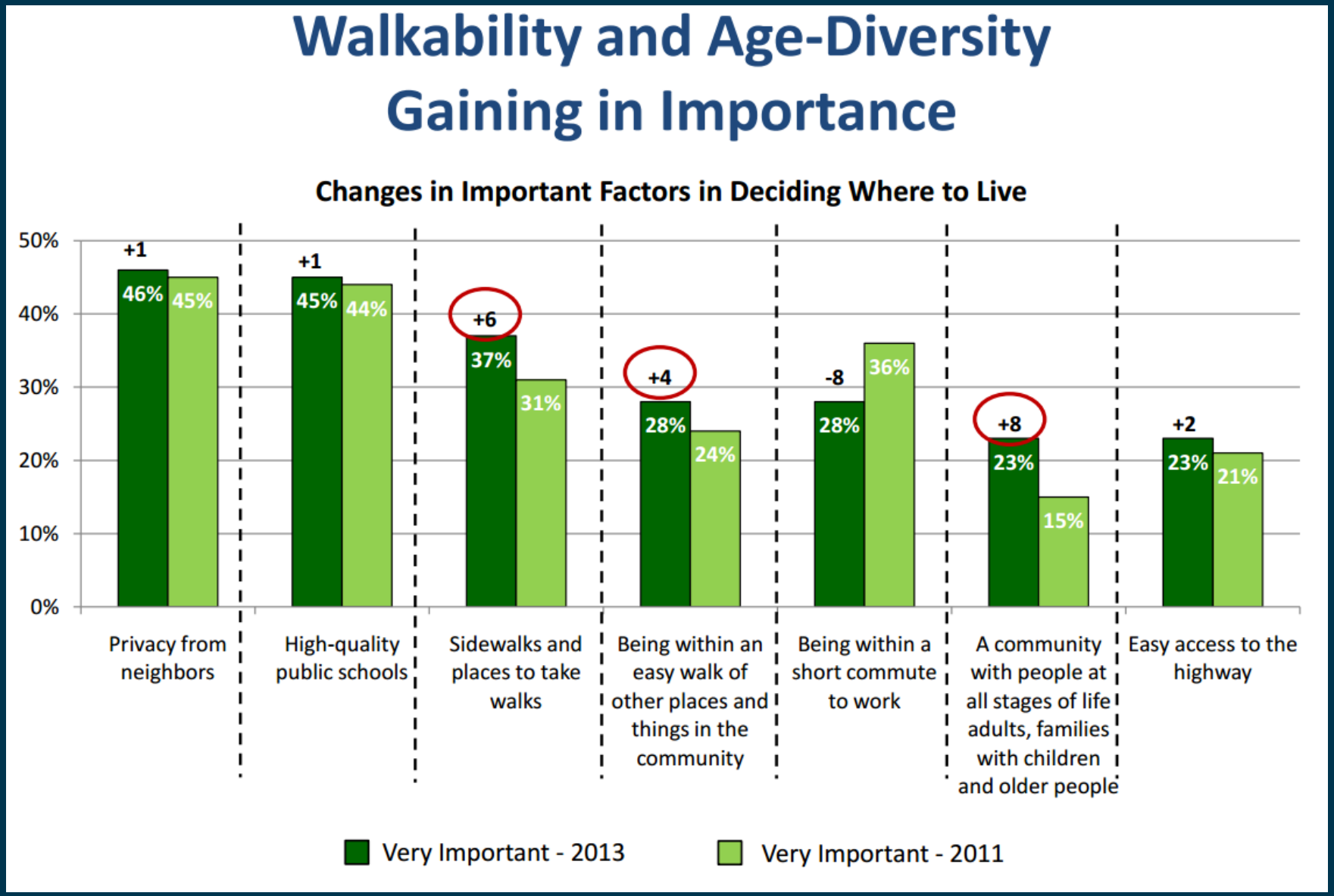
Who We Are (Really)



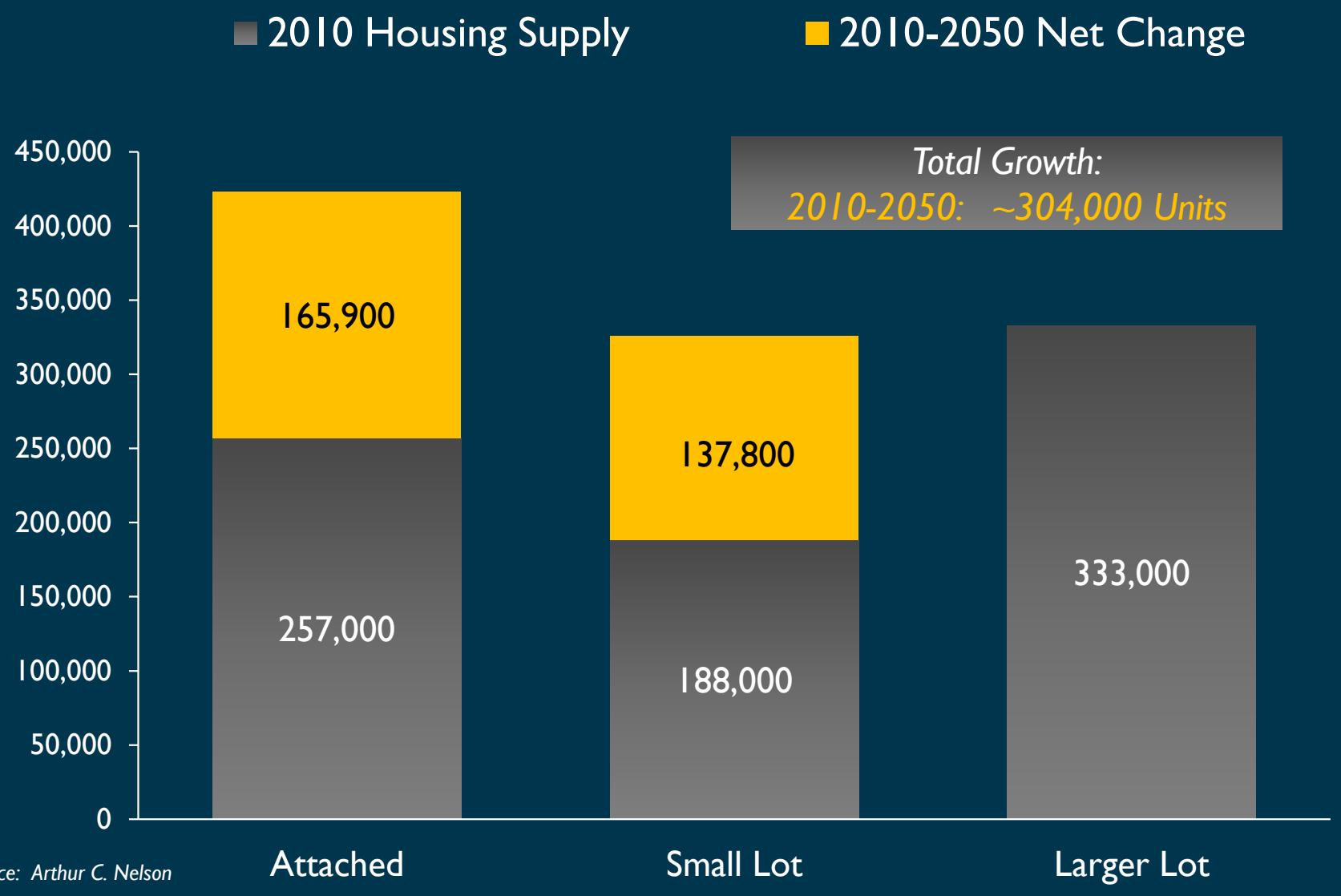
Source: US Census Bureau, American Community Survey 2012

What kind of growth?

Shifting Preferences



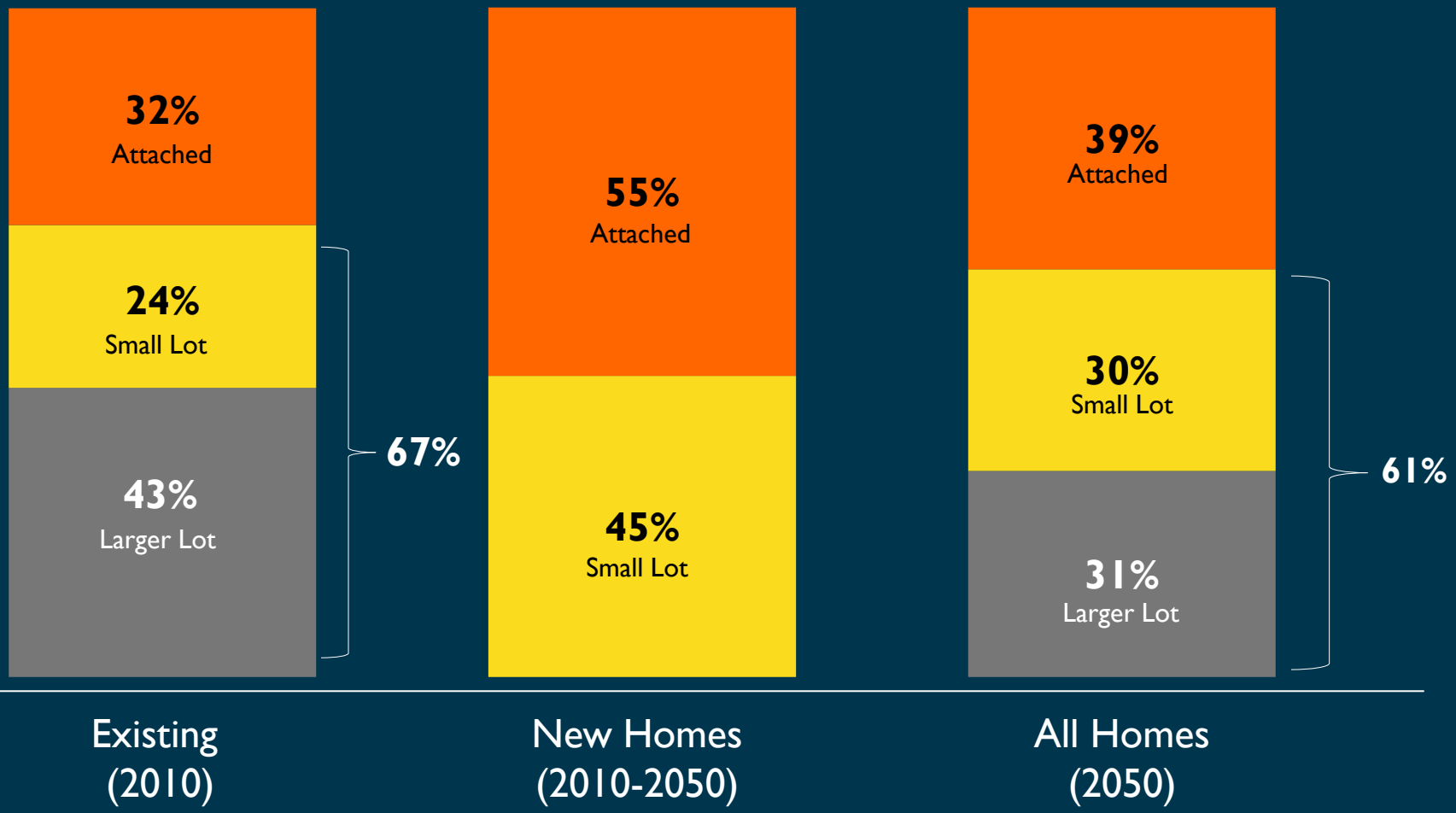
Columbus Region Supply & Demand



Source: Arthur C. Nelson

Impact of 'Pure' Demand Forecast

Growth Increment (2010-2050)



Source: Arthur C. Nelson

Place Types

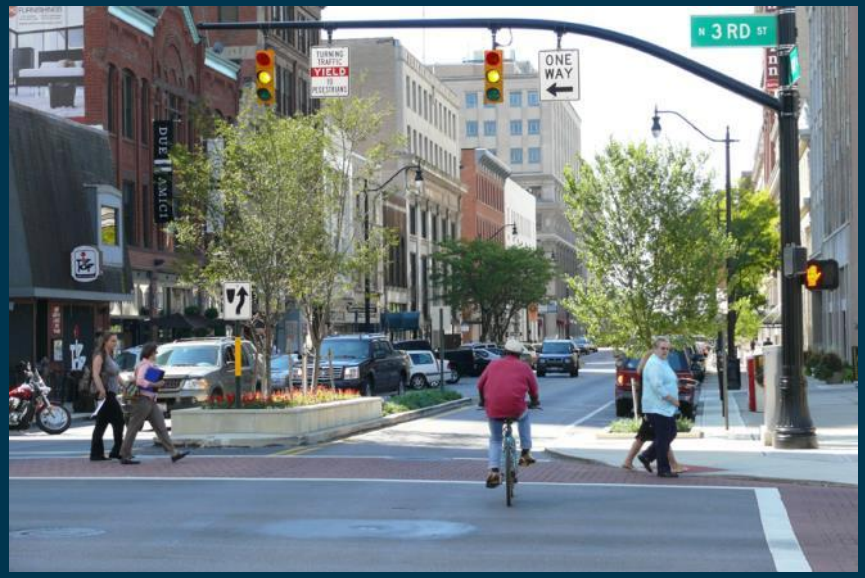
Standard ← → Compact ← → Urban

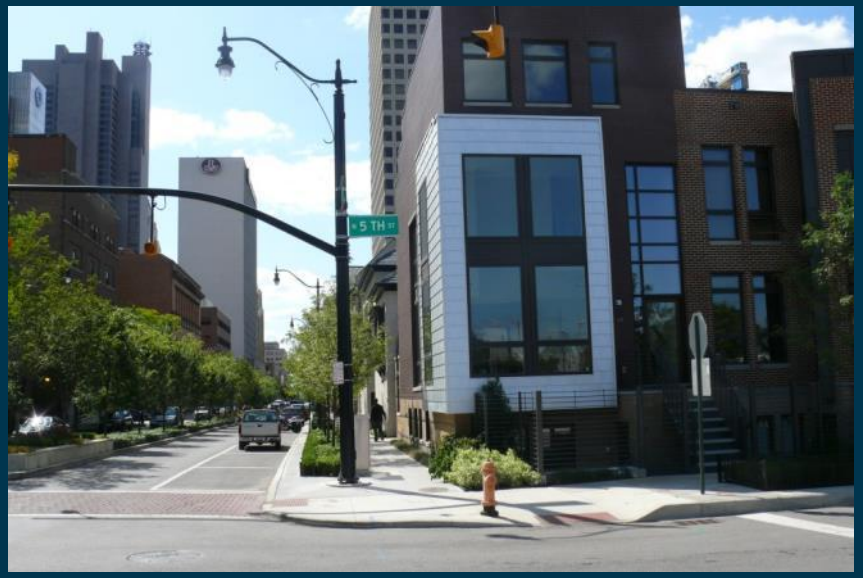
Density ← →

Mix of Uses ← →

Street Connectivity ← →

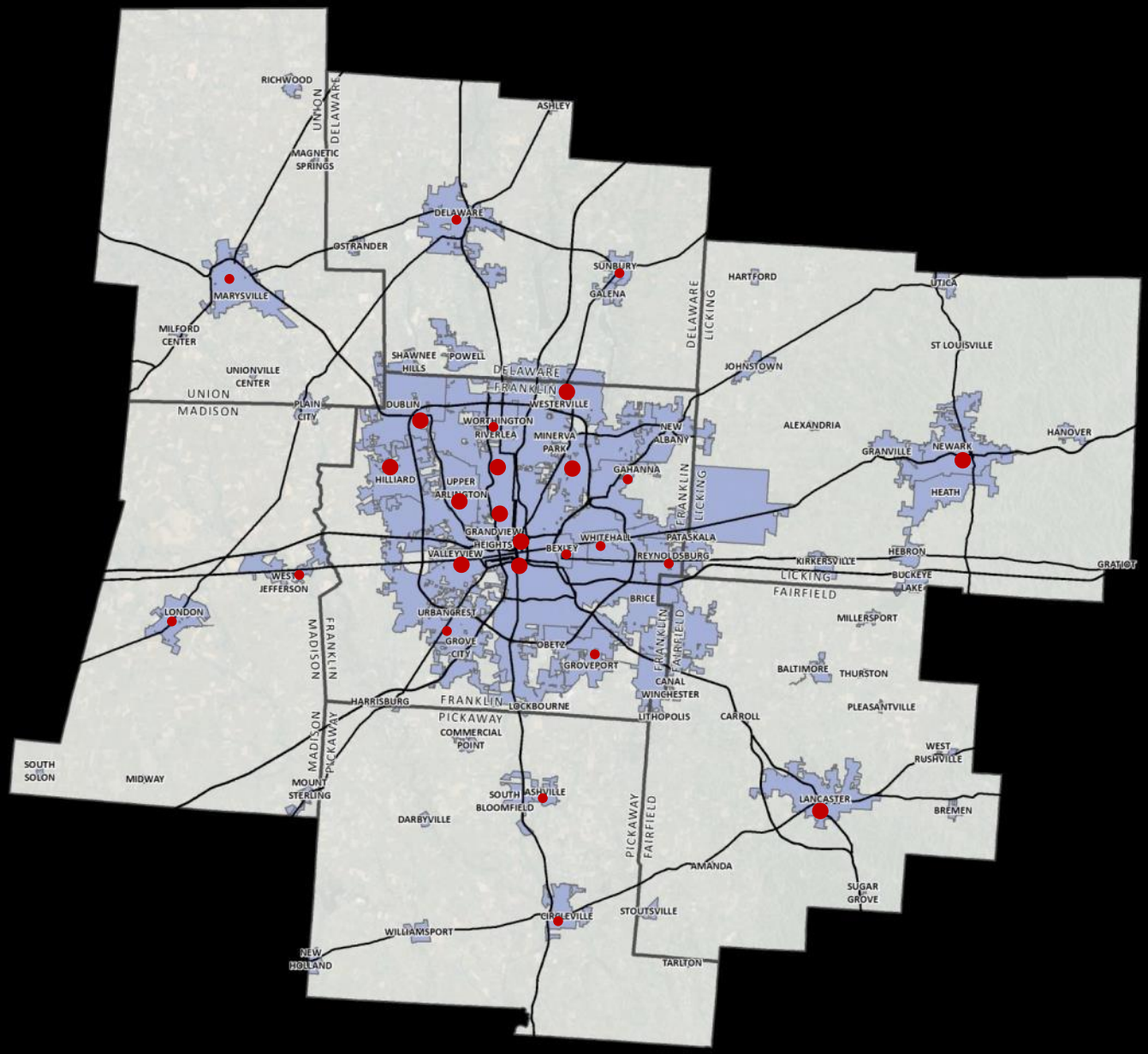
Urban Places



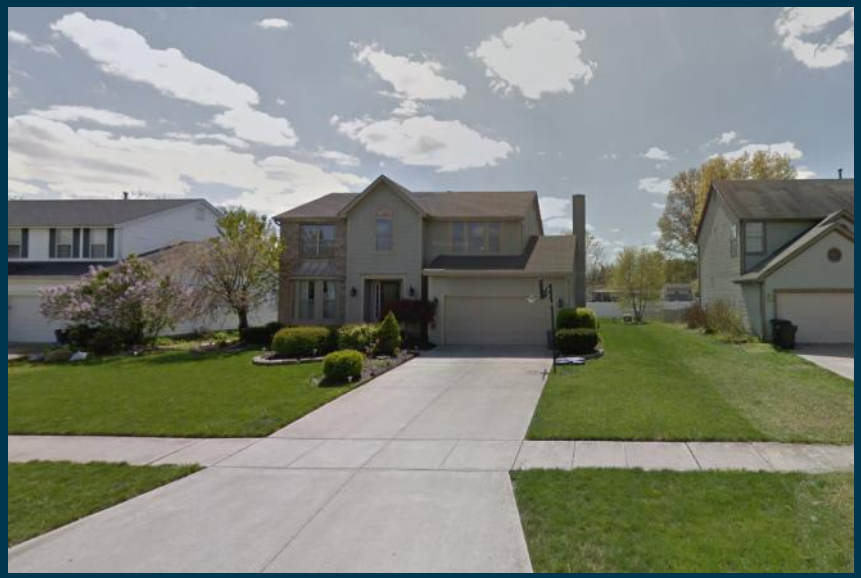


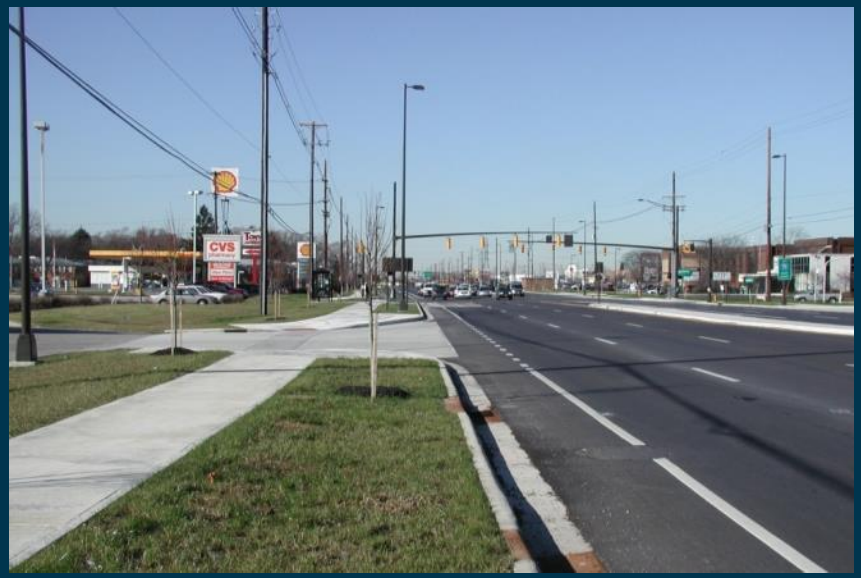
Compact Places

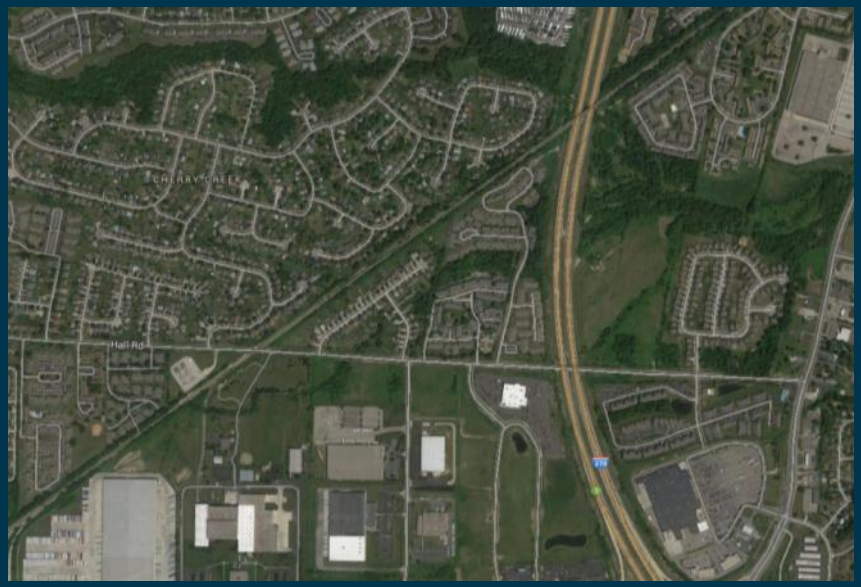
Compact Places



Standard Places







Stationery
Greeting Cards

Stationery
Greeting Cards

1-800-SAY-TRIM

EQUITY HOUS
Investor Services
4GMW324

Big Apple
BAGELS
GARRITY'S
Big Apple BAGELS
White Bear Ave
CHECKER

Big Apple
BAGELS
GARRITY'S
Big Apple BAGEL
White Bear Ave

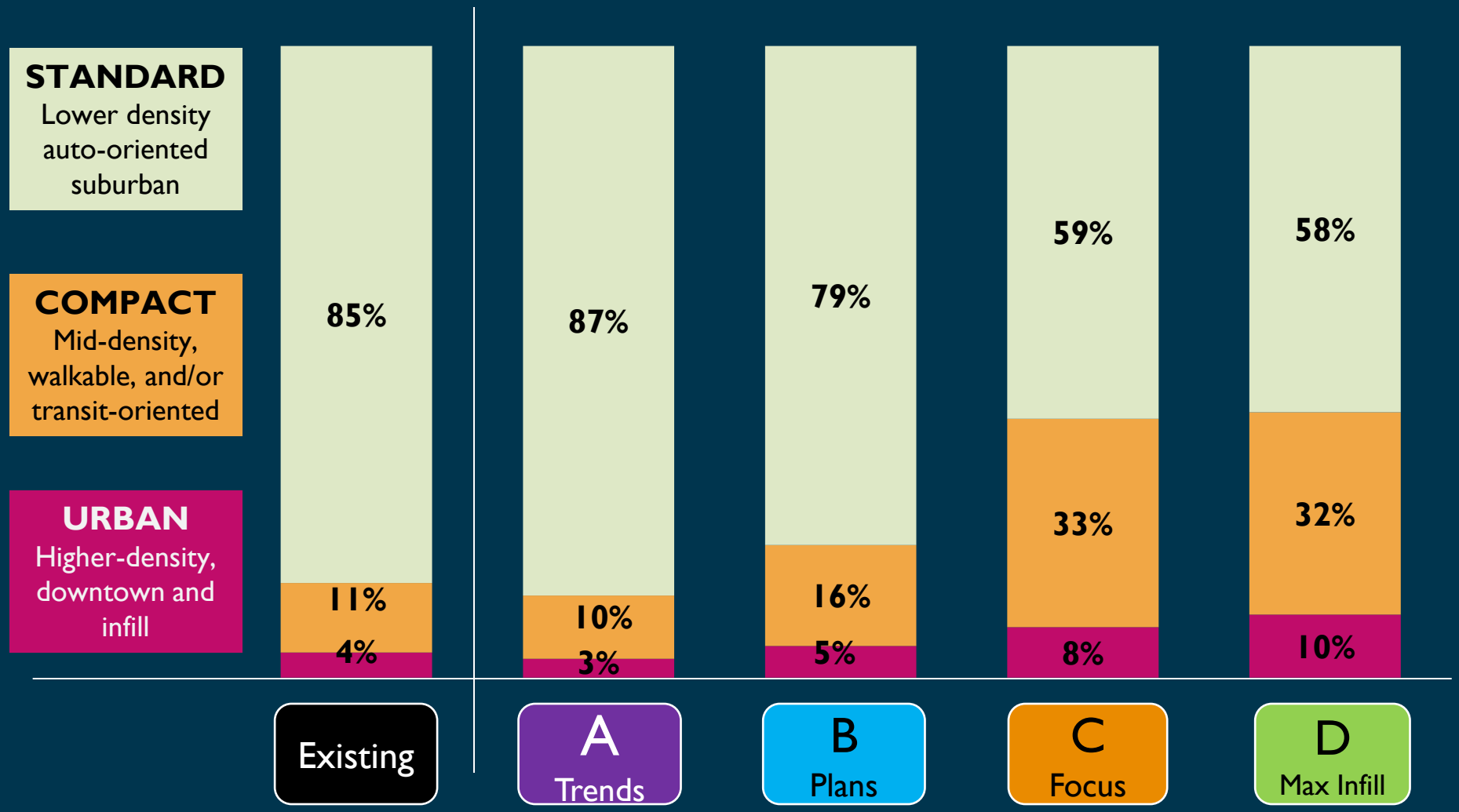
White Bear Ave

Draft Scenario Concepts

A	Past Trends	Extends past development trends (from 1990) forward to 2050
B	Planned Future	Reflects and extends the direction of local plans with moderate infill/ redevelopment
C	Focused Growth	Informed by housing demand forecasts, with significant infill/redevelopment
D	Maximum Infill	Informed by housing demand forecasts, with maximum infill/redevelopment in existing corridors and city centers

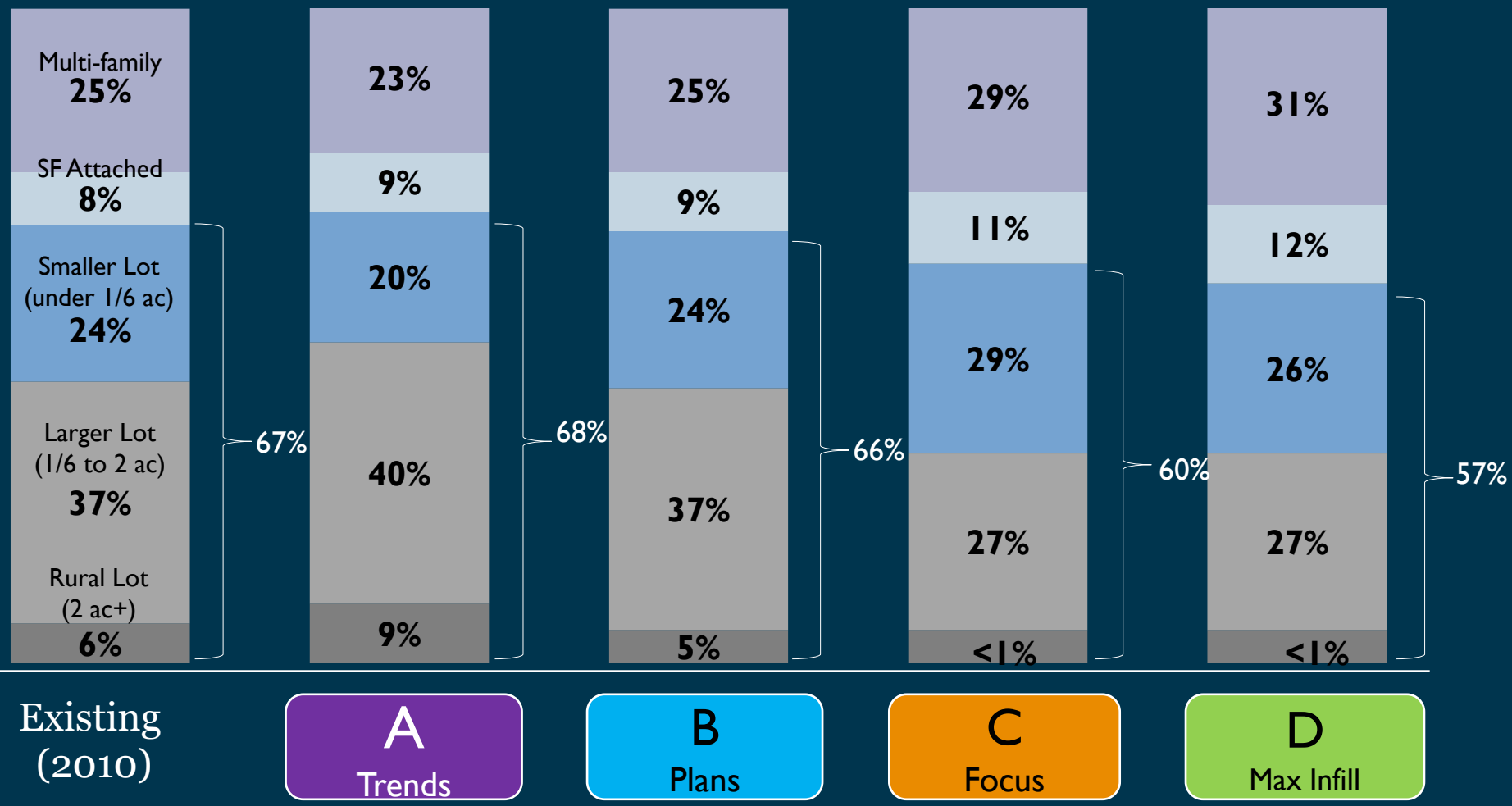
Development Proportions

End State, 2050



Total Housing Product Mix

End State, 2050



Existing (2010)

A Trends

B Plans

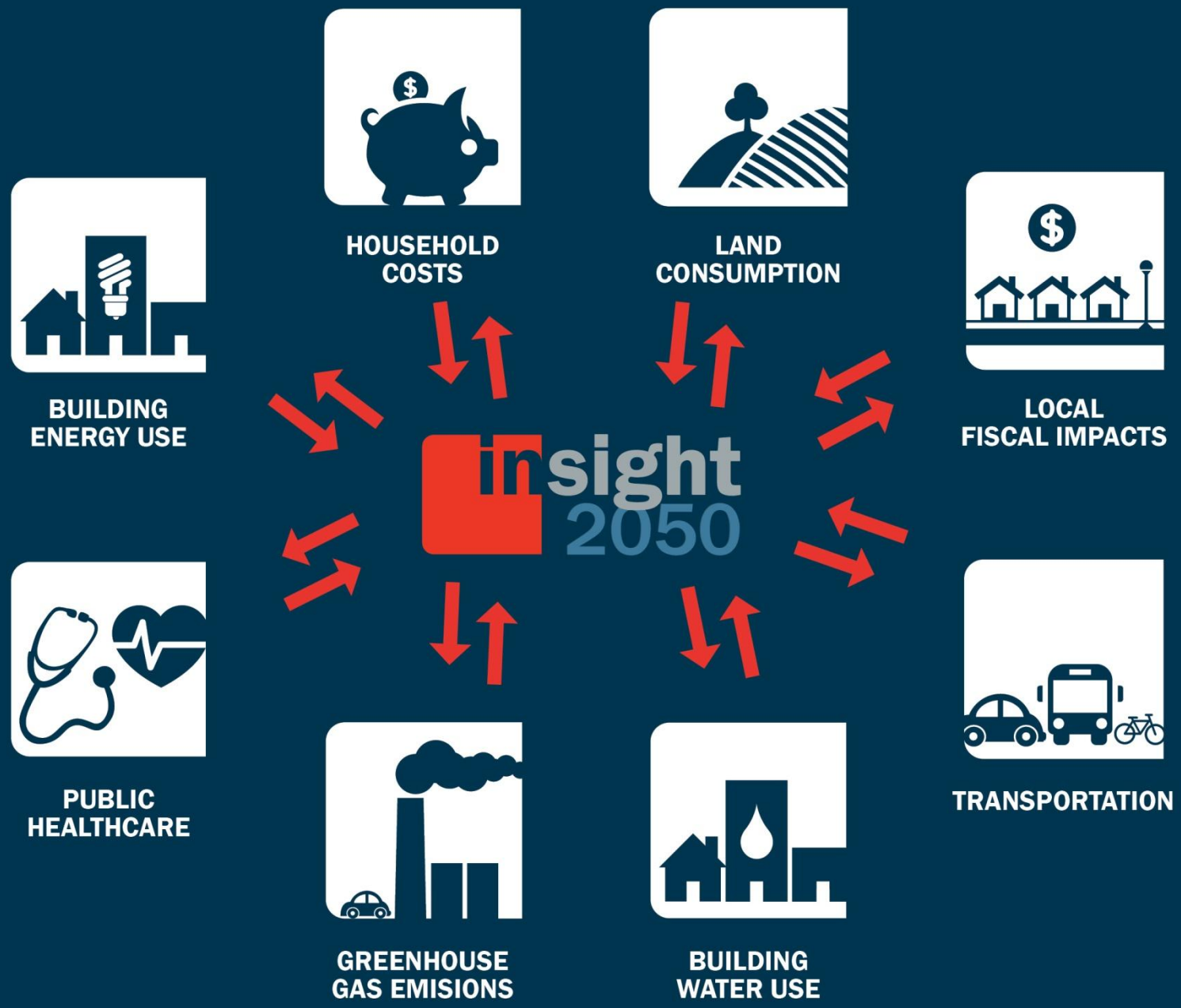
C Focus

D Max Infill

Infill/Redevelopment vs. Undeveloped Land

	New Housing Units and Jobs 2050
A Past Trends	4% Infill/Redevelopment 96% Undeveloped Land
B Planned Future	50% Infill/Redevelopment 50% Undeveloped Land
C Focused Growth	75% Infill/Redevelopment 25% Undeveloped Land
D Maximum Infill	85% Infill/Redevelopment 15% Undeveloped Land

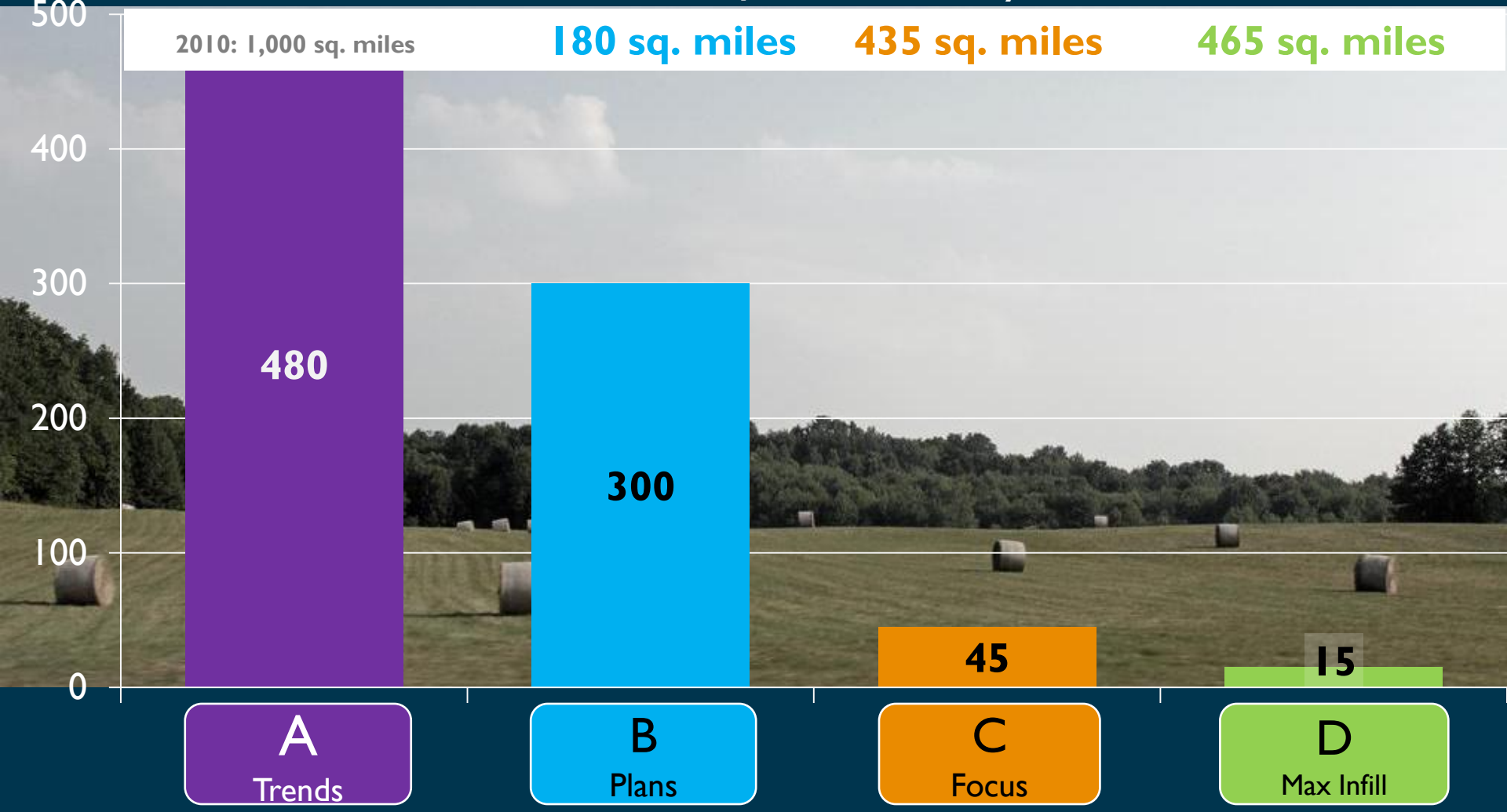
What are the impacts?


HOUSEHOLD COSTS
LAND CONSUMPTION
BUILDING ENERGY USE
LOCAL FISCAL IMPACTS
insight 2050
PUBLIC HEALTHCARE
TRANSPORTATION
GREENHOUSE GAS EMISIONS
BUILDING WATER USE

Land Consumed

Square Miles of Greenfield Land Developed: 2010-2050

Cumulative Reduction from Scenario A by 2050



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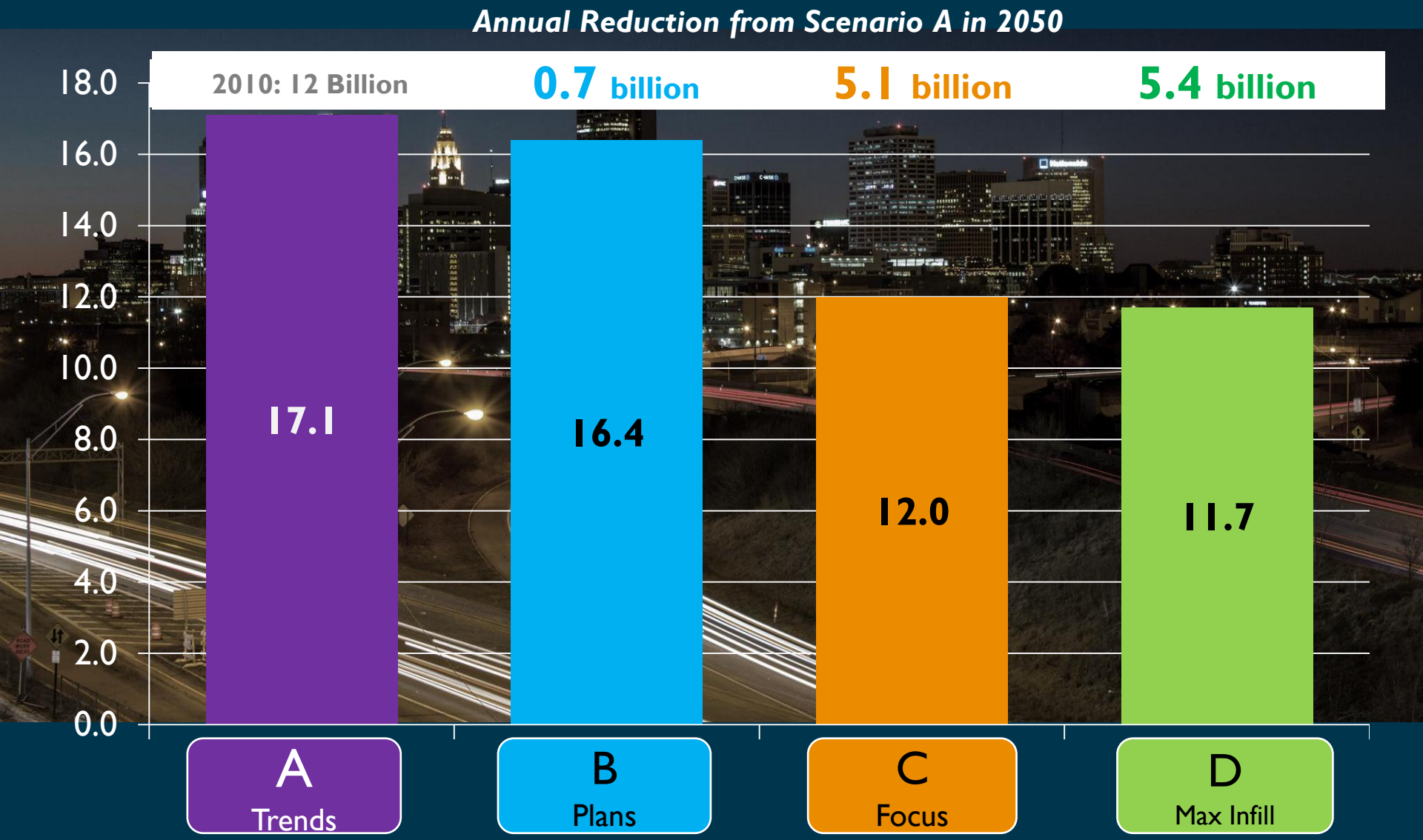
Vehicle Miles Traveled

Regional passenger miles, Annual (2050)



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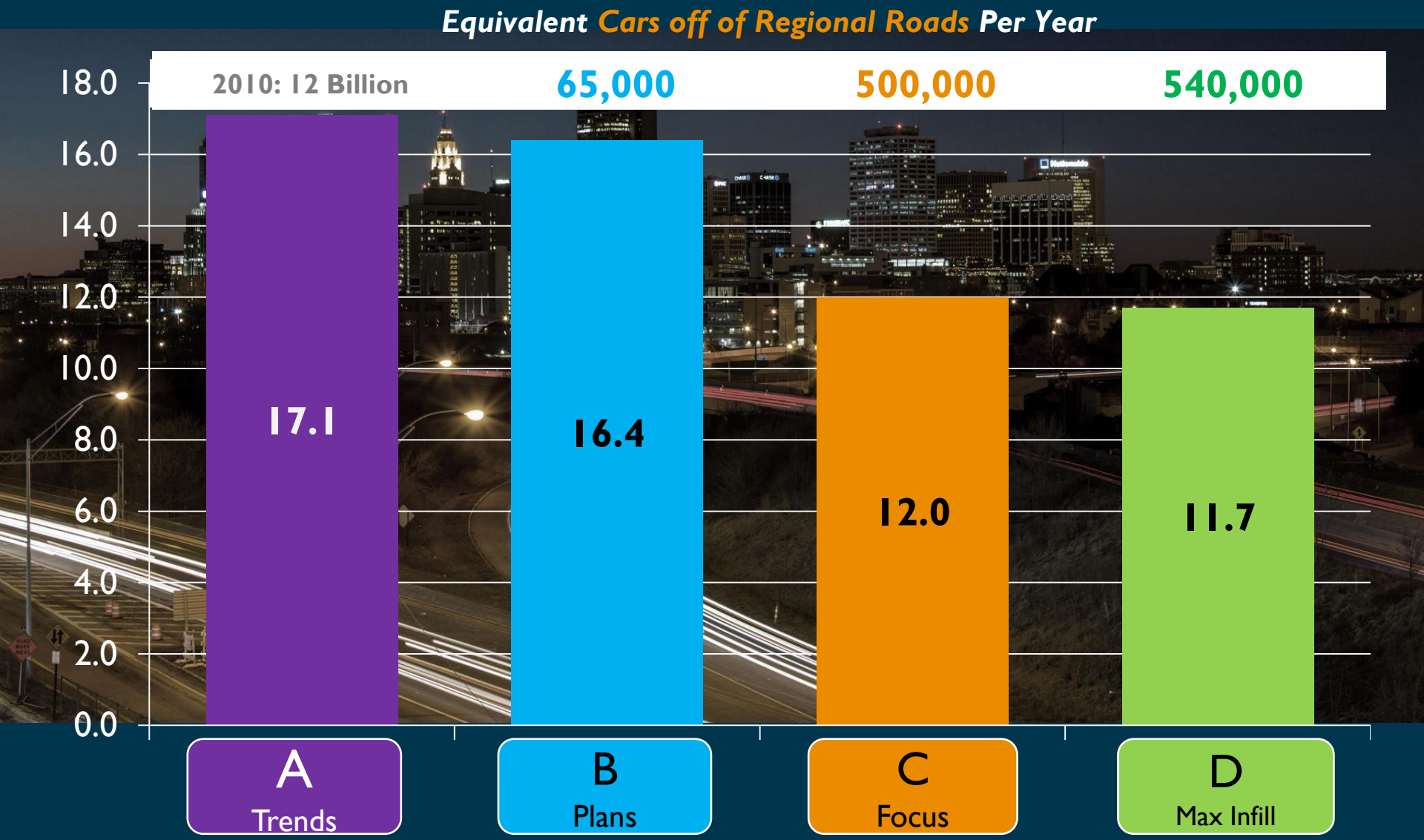
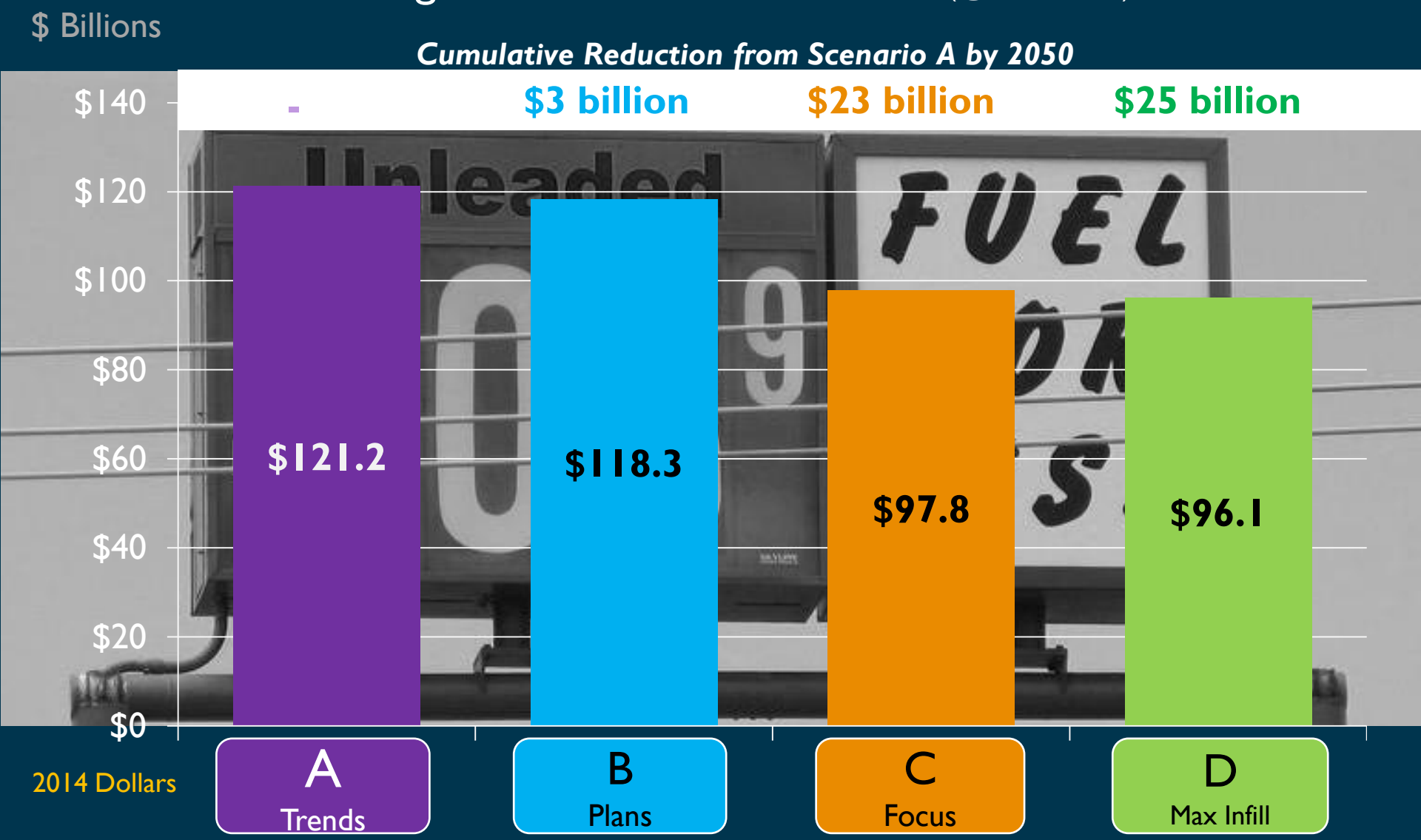


Fuel Cost

Passenger Vehicle Fuel, 2010-2050 (@ $5/Gallon)



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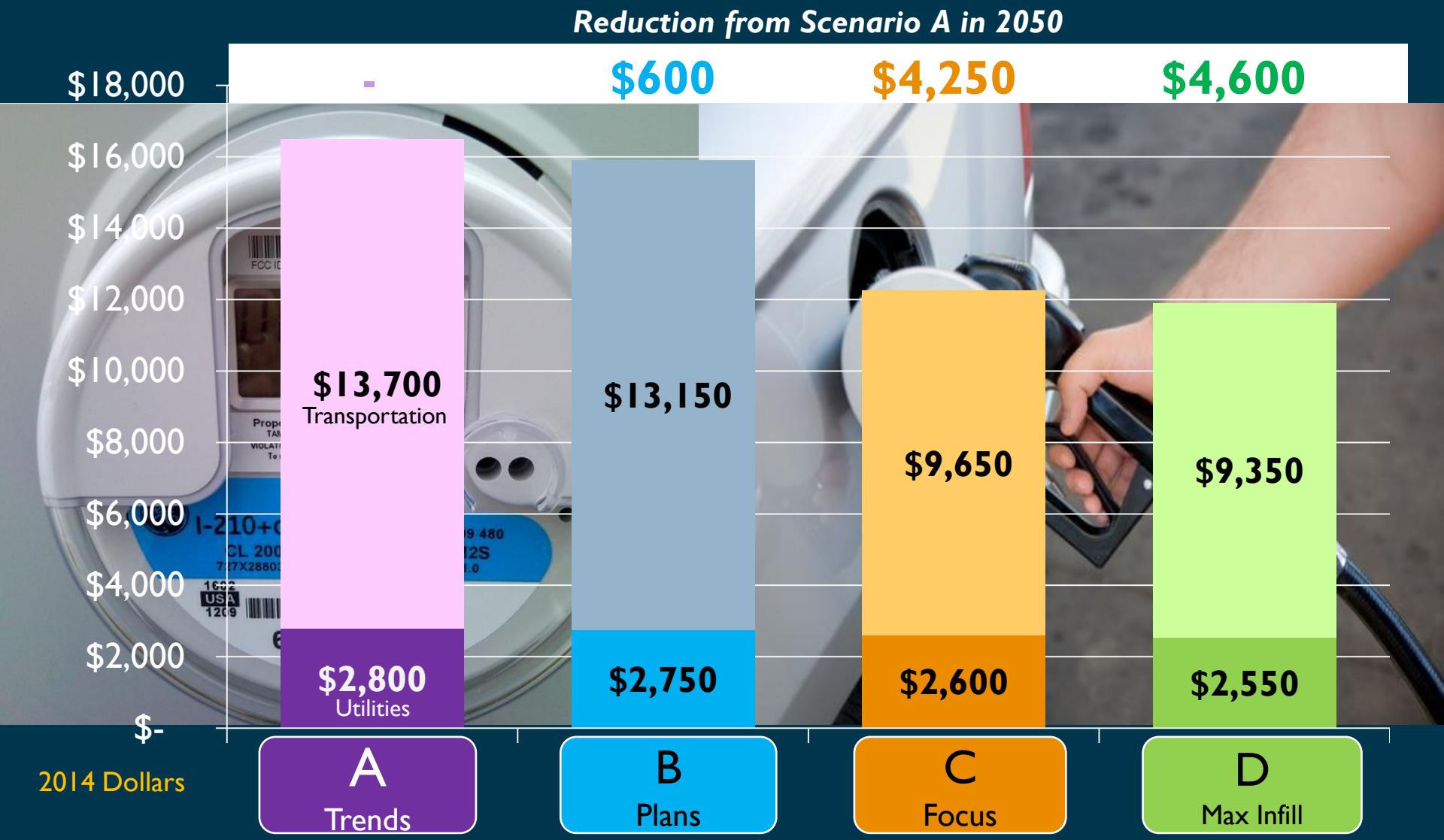
Household Costs

Transportation and Home Energy/Water Use, *All* Households, Annual (2050)



Comparison Chart

Scenario Metrics Summary

The comparative scenario metrics summarized here are described in detail in the following sections. For clarity, values are rounded. All costs are expressed in 2011 dollars.

	Land Consumption	Vehicle Miles Traveled (VMT)	Highway and Arterial Roadway Costs	Building Energy Use	Water Consumption	GHG Emissions	Fiscal Impacts of Development	Rail Transit Ridership	Household Costs
	Includes all previously undeveloped land that will be urbanized in a scenario.	Miles driven in passenger vehicles on Oahu.	Capital and ongoing operations and maintenance costs of additional roadway capacity needed to accommodate VMT increases.	Energy (electricity and gas) consumed by new and existing residential[2] and commercial buildings.	Water used to serve and maintain new and existing homes.	CO_2e emissions from passenger vehicles, and residential and commercial buildings.	Capital and ongoing operations and maintenance costs for new local roads, sewer, water, and wastewater infrastructure. *For public-sector revenues, see detailed results on page 15.*	Daily transit boardings on the proposed Honolulu Rail Transit line.	Automobile transportation (fuel, insurance, maintenance) and home energy and water costs.
Scenario A: Business as Usual — This scenario extends the land development and transportation investment choices of the past decades out to 2050.	21.8 square miles (cumulative to 2050)	6.2 billion miles (annual in 2050); 12,720 miles / year (per new household, 2050)	$9.2 billion (cumulative to 2050); 230 lane miles (to 2050)	22.2 million Btu (annual in 2050); 5,790 kWh / year[2] (per new household, 2050)	1,515 billion gallons (cumulative to 2050); 105,700 gallons / year (per new household, 2050)	4.58 MMT / year (annual in 2050)	$8.6 billion (cumulative to 2050); $81,900 (per new household, 2050)	(Scenario A does not include rail)	$16,950 (per new household, 2050)
Scenario B: Forecast Future — This scenario represents the housing and job distribution forecast in official state and city/county projections.	16.8 square miles (cumulative to 2050)	5.8 billion miles (annual in 2050); 10,650 miles / year (per new household, 2050)	$8.5 billion (cumulative to 2050); 155 lane miles (to 2050)	21.7 million Btu (annual in 2050); 5,470 kWh / year (per new household, 2050)	1,500 billion gallons (cumulative to 2050); 101,850 gallons / year (per new household, 2050)	4.39 MMT / year (annual in 2050)	$8.0 billion (cumulative to 2050); $76,300 (per new household, 2050)	140,000 trips (daily in 2035)	$14,750 (per new household, 2050)
Scenario C: Station Area Plans — This scenario is built upon the City and County of Honolulu's station-area planning efforts, and focuses significantly more growth along the rail corridor than Scenarios A or B.	10.8 square miles (cumulative to 2050)	5.1 billion miles (annual in 2050); 6,950 miles / year (per new household, 2050)	$2.7 billion (cumulative to 2050); 35 lane miles (to 2050)	21.1 million Btu (annual in 2050); 5,300 kWh / year (per new household, 2050)	1,480 billion gallons (cumulative to 2050); 93,200 gallons / year (per new household, 2050)	4.13 MMT / year (annual in 2050)	$7.5 billion (cumulative to 2050); $72,000 (per new household, 2050)	200,000 trips (daily in 2035)	$11,150 (per new household, 2050)
Scenario D: Corridor Focus — This scenario takes greatest advantage of the planned rail investment, while also seeking to meet projected housing demand by type.	7.8 square miles (cumulative to 2050)	4.8 billion miles (annual in 2050); 5,350 miles / year (per new household, 2050)	$0 billion (cumulative to 2050); 0 lane miles (to 2050)	20.8 million Btu (annual in 2050); 4,950 kWh / year (per new household, 2050)	1,455 billion gallons (cumulative to 2050); 84,200 gallons / year (per new household, 2050)	4.03 MMT / year (annual in 2050)	$7.1 billion (cumulative to 2050); $68,000 (per new household, 2050)	160,000 trips (daily in 2035)	$9,300 (per new household, 2050)

Environmental

- Greenhouse Gas Emissions
- Air Pollution & Health Impacts
- Water and Energy Consumption

Transportation

- Vehicle Miles Traveled
- Vehicle Emissions
- Transportation Costs

Fiscal

- Capital Infrastructure Costs
- O&M/Public Works Costs
- Household/Business Costs

Social

- Housing Diversity & Affordability
- Household Costs

Honolulu Transit Oriented Development Study Scenarios

RESULTS REPORT

Introduction

The Honolulu Transit-Oriented Development (TOD) Scenarios Study was undertaken to inform discussions about the role that rail transit and growth focused around transit can play in addressing the challenges facing Oahu today and into the next decades. The scenarios produced in this project posit varying futures in which population and job growth is more or less focused around the Honolulu Rail Transit corridor. These scenarios are analyzed for their impacts on a full range of fiscal, environmental, transportation, and quality of life indicators to express the island-wide costs, benefits, and consequences of land use, transportation, and related policy and investment decisions on Oahu.

This project builds on the station-area TOD studies completed or being undertaken by the City and County of Honolulu and other agencies, and adds a higher-level, corridor-wide perspective to studies of demand, capacity, and development potential along the Honolulu Rail Transit corridor. It sheds critical light on the island-wide impacts and fiscal implications of how and where growth occurs on Oahu, providing a broader context for the public TOD station-area planning process and discussions of the role rail transit and related investments play in the future of Honolulu.

Project Working Group and Consultant Team

The Honolulu TOD Study Scenarios Project was commissioned by the Pacific Resource Partnership (PRP) to analyze the development potential and full range of impacts of transit corridor-focused development. PRP assembled a diverse project working group to provide crucial input and bring a broad set of perspectives and opinions to discussions about TOD, rail, and future growth and development on Oahu. This group includes leaders and key stakeholders from environmental, business, development, finance, social equity, and public policy groups.

The project is led by Calthorpe Associates, a national and international leader in TOD planning and scenario development and analysis. Market analysis and TOD implementation expertise is provided by Strategic Economics, and the firm Bowers + Kubota adds critical local expertise and perspective.

The Pacific Resource PARTNERSHIP

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Rev. 05-31-2012

Appendix: Model Assumptions

TRANSPORTATION	Base Year	2050
Fuel economy	Passenger vehicle average: 20.7 mpg (est. per 2007 and projected 2035 mpg change from OMPO RTP). Represents on-road cars, trucks, SUVs, vans.	37 mpg, per EIA Reference Case fleet mix scenario.[29]
Fuel price	$4.13 Hawaii state average motor gasoline price, extrapolated from 2008.	$15.00 per gallon.
Auto operating cost	$0.26 per mile, including ownership and maintenance.	$0.45 per mile, based on Edmunds.com *True Cost of Ownership* data for Hawaii.
Roadway costs	Costs estimated for additional lane-miles only.	$139.6 billion per lane-mile for high-cost freeway projects; $15.4 million per lane-mile for lower-cost freeway projects; $5 million per lane-mile for arterials. Freeway maintenance: $18,300 per lane-mile, per year.
Transportation fuel emissions	24 lbs carbon dioxide equivalent (CO_2e) per gallon, derived from ORTP 2007 total fuel consumed and tons CO_2e.	21.6 lbs CO_2e per gallon, based on a modest assumption of 10% emissions reduction from baseline by 2050.
BUILDINGS		
Energy use of new buildings	HECO 2010 average electricity use per housing unit by type (single family 729 kWh/month avg. multifamily 426 kWh/month avg). Gas use (though minimal) differentiation by type is assumed based on EIA RECS data. • Larger-lot single family: 9,800 kWh/year; 17 thm/year • Smaller-lot single family: 7,250 kWh/year; 13 thm/year • Townhome: 7,000 kWh/year; 11 thm/year • Multifamily: 5,112 kWh/year; 9 thm/year Commercial energy use: 22.6 kWh/sq ft/year, based on EIA CBECS data, 2006.	30% below baselines, reflecting modest efficiency improvements.
Energy use of existing buildings	HECO 2010 average electricity use per household: 7,224 kWh. Average natural gas use per household: 11 therms, estimated based on total residential consumption and number of households, 2008. (Minimal natural gas market penetration/use rates for the residential sector are assumed into the future.) Commercial energy use: 22.6 kWh/sq ft/year, based on EIA CBECS data, 2006.	0.5% less energy used per year, reflecting modest improvements for building retrofits.
Electricity price	$0.35 per kWh state average (residential).	$0.69 state average, twice the baseline price.
Natural gas price	$4.19 per therm state average.	$9.33 per therm state average, reflecting a trend-based 2% annual increase in price.
Water use of new residential buildings	Estimated use per housing unit, by type, by subregion. Indoor use based on average per-capita rates; outdoor use based on lot size and evapotranspiration (water use) zone.	30% reduction below base year rates, reflecting modest efficiency and conservation policies.
Water use of existing residential buildings	313 gallons per household/day Oahu average (0.35 acre-feet per year), estimated from total water use and households served. Includes indoor and outdoor water use.	0.5% less water used per year, reflecting modest improvements for building retrofits. (This translates to a 50% reduction by 2050.)
Water price	$3.68 per 1,000 gallons ($1,200 per acre-foot) Oahu average.	$5.58 per 1,000 gallons ($1,819 per acre-foot), representing a 1.1% annual increase in price.
ENERGY EMISSIONS		
Electricity emissions	1.75 lbs CO2e/kWh state average.	1.05 lbs/kWh state average, based on a 40% reduction in emissions from the increase of renewable energy sources in state portfolio (HCEI goal is 40% renewables by 2030).
Natural gas emissions	11.7 lbs/therm average.	11.7 lbs/therm average (no change, since emissions are constant).

Residential and Commercial Building Energy

With the most fossil fuel-dependent energy supply in the nation, conserving building energy use is a major goal for Hawaii. The Hawaii Clean Energy Initiative (HCEI) sets a statewide goal of achieving 70% clean energy by 2030, with 40% coming from renewable sources, and 30% from efficiency measures. The Honolulu TOD Study scenarios address the efficiency side of this goal, demonstrating the energy savings that can be realized through more compact development.

The scenarios vary in their building energy use profiles due to their different mixes of housing types. Scenarios that contain more Mixed-Use Walkable and Urban Infill development accommodate a higher proportion of growth in more energy-efficient housing types like apartments, attached single-family homes, and smaller single family homes, as well as more compact commercial building types. By contrast, a large proportion of Standard Suburban development leads to a higher proportion of larger single family homes, which are typically less energy-efficient.

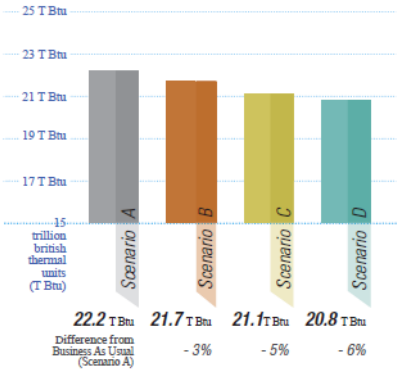
Energy Consumption, Cost, and Emissions

Variations in land use patterns lead to substantial differences in the amount of energy used. These differences will vary depending on policies regulating how efficient buildings become. Assuming the same efficiency standards for new buildings in all scenarios — an improvement to 30% below current baselines[28] by 2050 — there would be marked differences in energy use due to land use-related variations.

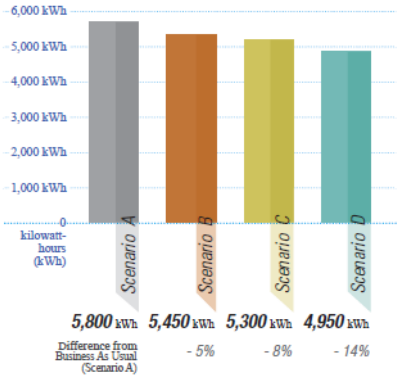
Total energy use, including electricity and natural gas for all existing and new homes and commercial buildings, amounts to 22.2 trillion Btu in Scenario A (Business as Usual). By comparison, Scenario B (Forecast Future) uses 3% less; Scenario C (Station Area Plans) uses 5% less, and Scenario D (Corridor Focus) uses 6% less.

Looking at new residential growth alone, the differences between scenarios are magnified. Compared to Scenario A, the average new household in Scenario B uses 5% less electricity per year; Scenario C, 8% less; and Scenario D, 14% less. These savings equate to $220 per new household in Scenario B; $340 per household in Scenario C; and $590 per new household in Scenario D.

Annual Residential and Commercial Building Energy Use in 2050 (Btu)



Annual Residential Electricity Use per New Household in 2050 (kWh)



Major Tasks & Timeline

Mar Apr May Jun Jul Aug Sep Oct

- Data Compilation and Development
  - Regional/county data development and compilation
  - Regional and county assumptions development
- Fiscal Impact Module Customization
  - Capital and O&M cost assumptions development
  - Revenues assumptions development
- Scenarios Development and Modeling
  - Trend analysis, alternatives development
  - Metrics modeling
- Reports, Presentations, and Website
  - Reports and summery sheets
  - Website (if implemented)

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