



PRESTO!

The Plan for Regional Sustainability Tomorrow

Introduction

Maryland has a national reputation as a pioneer in smart growth and sustainability. Over the past 20 years, Maryland adopted some of the nation's most progressive strategies for creating sustainable communities, restoring the natural environment, and protecting farmland and natural resources at both the state and local levels.

At the state level, these policies include Maryland's nationally acclaimed Smart Growth and Neighborhood Conservation Acts, the Smart, Green and Growing Acts, the Greenhouse Gas Reduction Act, the federally mandated Watershed Implementation Plan, the Sustainable Growth and Agricultural Preservation Act, as well as other important acts, executive orders, and plans. In addition, the state set ambitious goals for doubling transit ridership by 2020, cutting greenhouse gas emissions 25 percent by 2020, and reaching a tipping point for restoring the Chesapeake Bay by 2025. To explore the efficacy of these policies in an integrated modeling framework, to examine whether these policies are likely to achieve their goals, and to explore whether the state is truly on a path toward sustainable development—perhaps the greatest challenge of our time—researchers at the National Center for Smart Growth Research and Education (the Center) at University of Maryland have launched a project called the Plan for Regional Sustainability Tomorrow (PRESTO). PRESTO is a multiyear scenario analysis and planning effort that will document existing conditions and trends and develop scenarios that could lead to a more sustainable future for Maryland and the Baltimore-

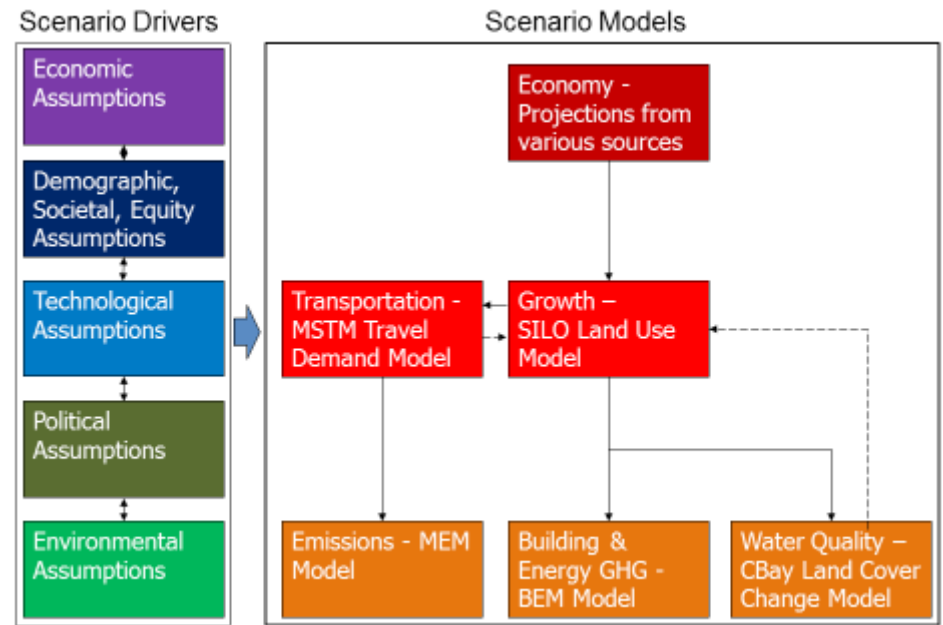
Washington region. Toward these ends, with support from the Town Creek Foundation and the National Socio-Environmental Synthesis Center, the Center will exercise a suite of integrated mathematical models to analyze how state policies will impact the future of the state's economy, transportation system, land use patterns, and environmental quality.¹

To begin, we constructed a baseline scenario based on official projections and policy parameters and introduced these into the PRESTO modeling suite. These include projections and assumptions contained in the fiscally constrained long-range transportation plan (called the CLRP) developed by the Baltimore and Washington Metropolitan Planning Organizations, the Greenhouse Gas Reduction Plan developed by the Maryland Department of Environment, and other projections provided by the Maryland Department of Planning and other government agencies. Incorporating the assumptions and projections from these sources into the PRESTO modeling suite provides estimates of the future levels of population, employment, housing, travel behavior, traffic conditions, greenhouse gas emissions, land use, water quality, and more. While the estimates and indicators we report here are for the state of Maryland, the maps we present focus on the Baltimore-Washington region, which contains over 80 percent of the state's population and jobs. It is important to note that these projections presume no major changes in external driving forces, such as major shifts in federal government spending, major changes in the price of energy, changes in immigration policy, profound changes in technology, or major changes in the natural environment.

At this initial stage, our baseline analysis has led us to three general conclusions:

- Economic growth will continue to drive increases in population, land development, travel, traffic congestion, housing prices, energy consumption, greenhouse gas emissions, and nutrient loading into the Chesapeake Bay.
- State policy is moving Maryland toward a more sustainable future but state programs will fall short of stated goals.
- Additional research is necessary to determine how external forces might alter the baseline scenario and which policy changes will lead to more sustainable futures in various baseline scenarios.

PRESTO Modeling Suite



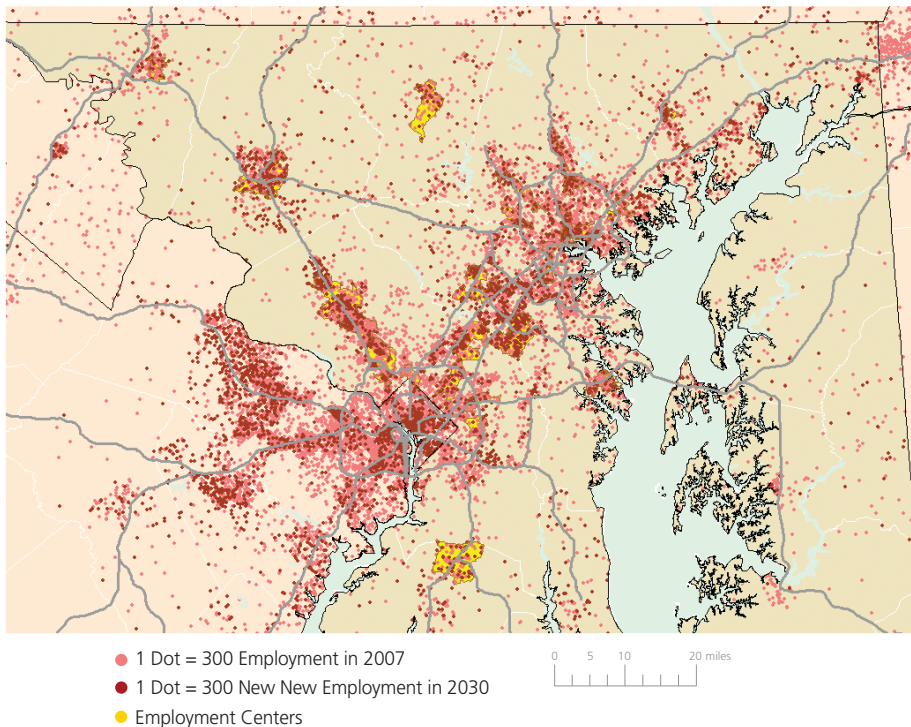
Employment and Economic Growth

The economies of the Baltimore and Washington metropolitan areas will continue to drive growth and stimulate change. Over the next 20 years the state will gain another 582,000 jobs, more than the 559,000 jobs added in the previous twenty years. Seventy-five percent of these new jobs will be created in the Baltimore-Washington region, nearly the same share the region currently holds. Further, 42 percent of these jobs will locate in 23 job centers, slightly more than the 39 percent these centers currently hold.²

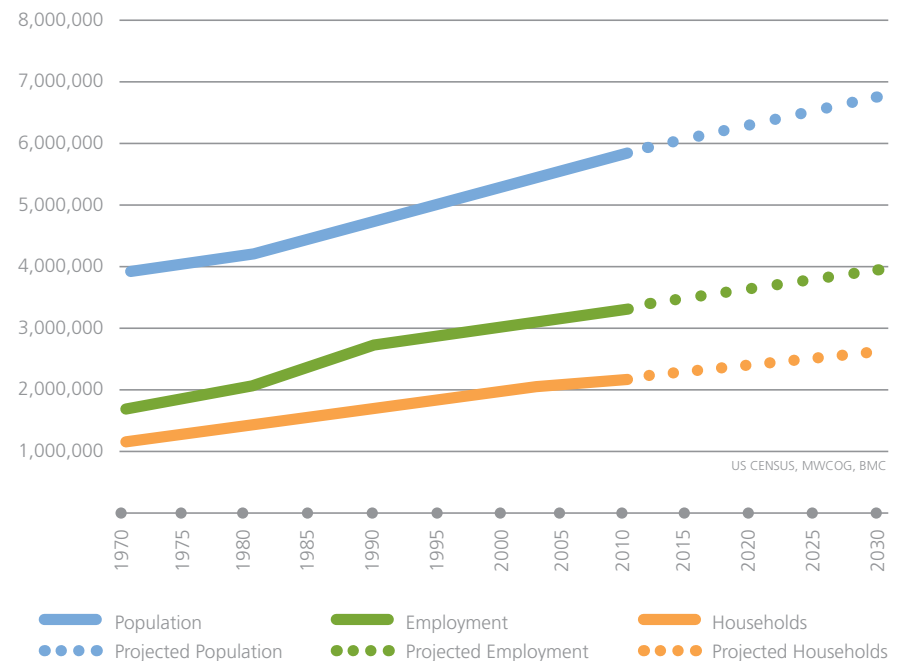
Though more jobs will locate in every center, the relative share of jobs will continue to shift from the Baltimore towards the

Washington metropolitan area. The share of jobs in downtown Baltimore will fall from 7.1 to 6.7 percent of the state's jobs. Job centers around Fort Meade and Frederick, in particular, will grow substantially. Some locations outside existing job centers will also experience significant employment growth, including National Harbor, Joint Base Andrews, and in Bowie in Prince George's county. An increasing share of new jobs will locate in northern Virginia. Northern Virginia currently holds 31 percent of jobs in the Baltimore-Washington Region but will capture 34 percent of new jobs created.

Employment, Employment Growth and Job Centers in the Baltimore-Washington Corridor, 2007 and 2030



Past and Projected Population, Employment, and Household Growth in Maryland, 1970 to 2030

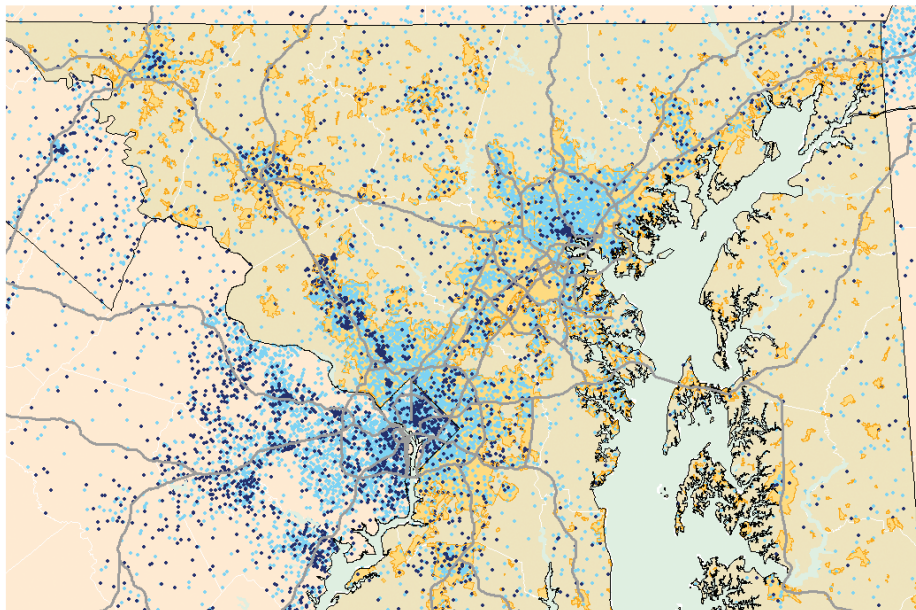


Population and Housing

Growth in jobs will attract over 872,000 new residents or 410,000 new households, slightly less than the 990,000 new residents and 407,000 new households during the previous twenty years. Fifty-four percent of the new housing units will be single-family detached, a similar proportion to the current 52 percent single-family detached share. New construction will slow as land in the growth areas of the inner counties builds

out. The likely result— more development is pushed beyond the state border. Rezoning or redevelopment, if implemented, could also accommodate additional new multifamily housing. Eighty-two percent of future household growth will occur inside Priority Funding Areas, about the same share they have captured since 1999, but still well below the 90 percent target.

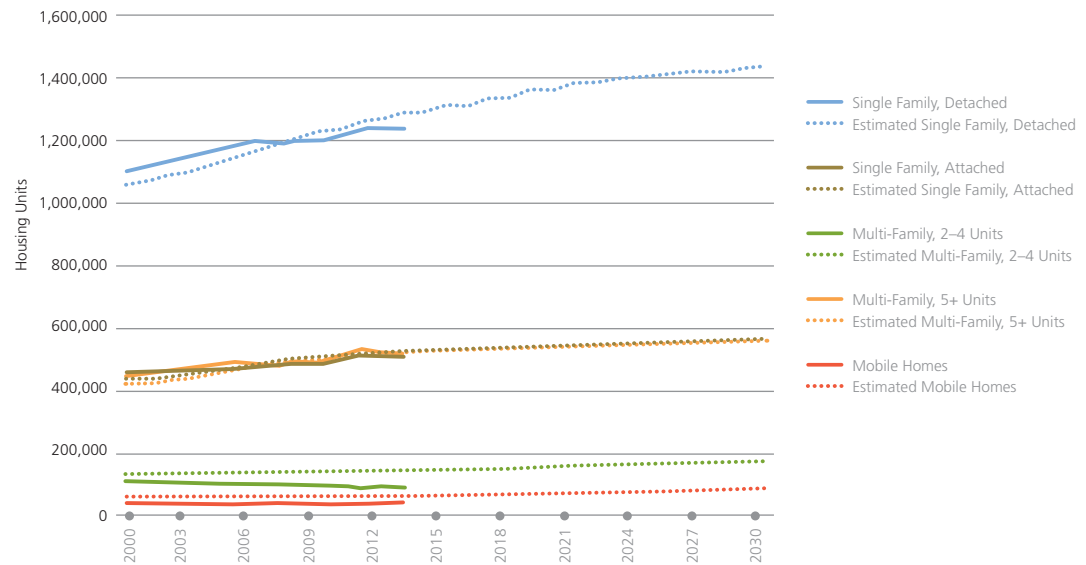
Household, Household Growth and Priority Funding Areas in the Baltimore-Washington Corridor, 2007 to 2030



- 1 Dot = 300 Households in 2007
- 1 Dot = 300 New Households in 2030
- Priority Funding Area



Actual and Estimated Housing Units by Type in Maryland, 2000 to 2030

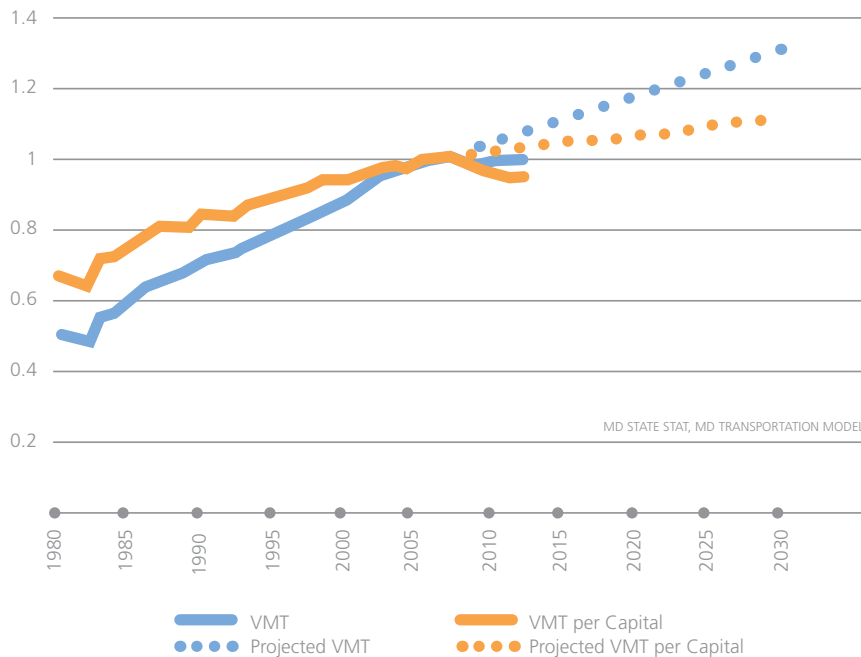


Transportation

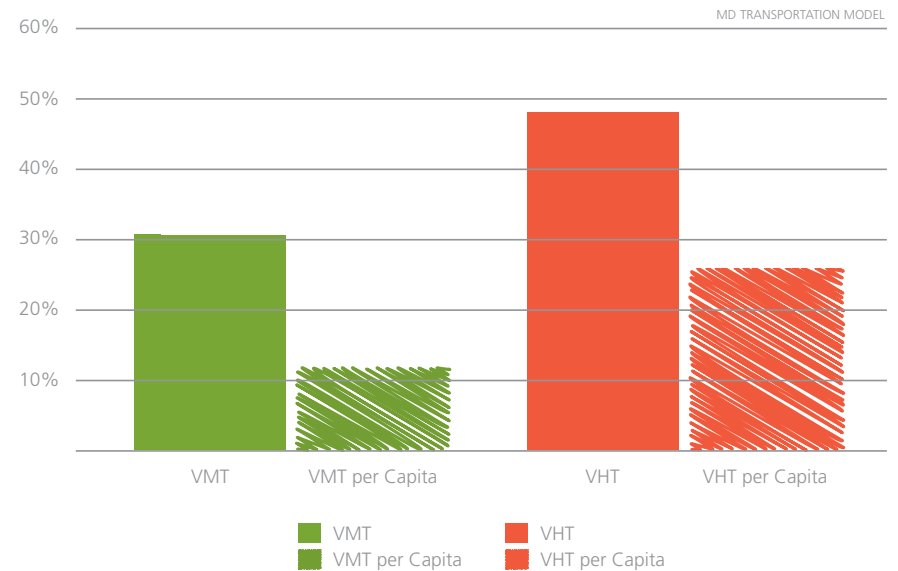
Strong economic and population growth will generate additional demand for travel—to work, school, shopping, and other destinations. Over the past decade, vehicle-miles traveled (VMT) declined slightly in Maryland and the nation for the first time in decades, but much of this decline can be attributed to the contraction of the national economy and increases in the price of gas. Vehicle-miles traveled have again begun to rise, however, and we project VMT will continue to rise in total and on a per capita basis. While the millennial generation is less

inclined to drive than previous generations, small declines in travel by this cohort will be offset by growth in population. Vehicle-hours traveled (VHT), or time spent driving, will increase faster than VMT (or distance traveled) due to slower travel times caused by congestion.³ Because the state plans to make few and relatively minor investments in roads and transit, congestion will worsen nearly everywhere. Nearly all significant highway links in the Baltimore-Washington corridor will be congested during the morning and afternoon peak travel

Past and Projected Vehicle Miles Traveled in Maryland Relative to 2007 Levels, 1980 to 2030



Growth in Total and Per Capita Vehicle Miles and Vehicle Hours Traveled in Maryland, 2007 to 2030

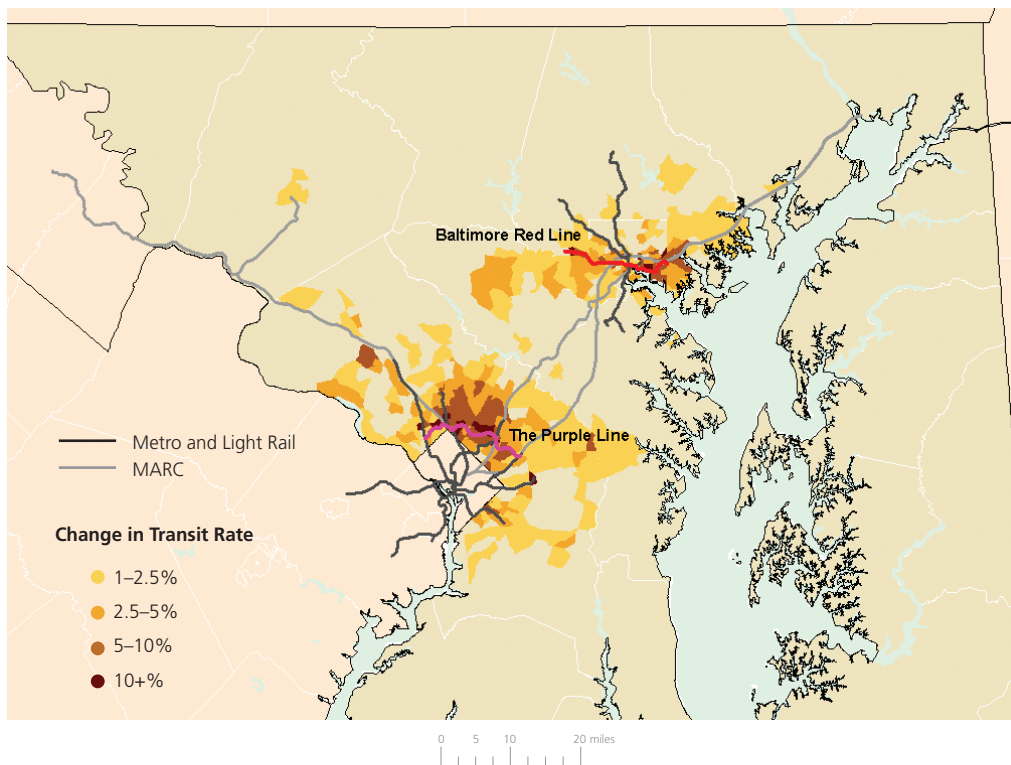


periods.⁴ Highways in fast growing suburbs, such as Howard, Anne Arundel, and Frederick Counties, will become far more congested. With additional congestion, the average driver will drive only 11 percent more in distance but spend 25 percent more time driving. Interstates and major state highways, already heavily congested during peak travel periods, will suffer longer durations of congestion. More severe congestion will be seen on both beltways and the outer reaches of the Washington-Baltimore region.

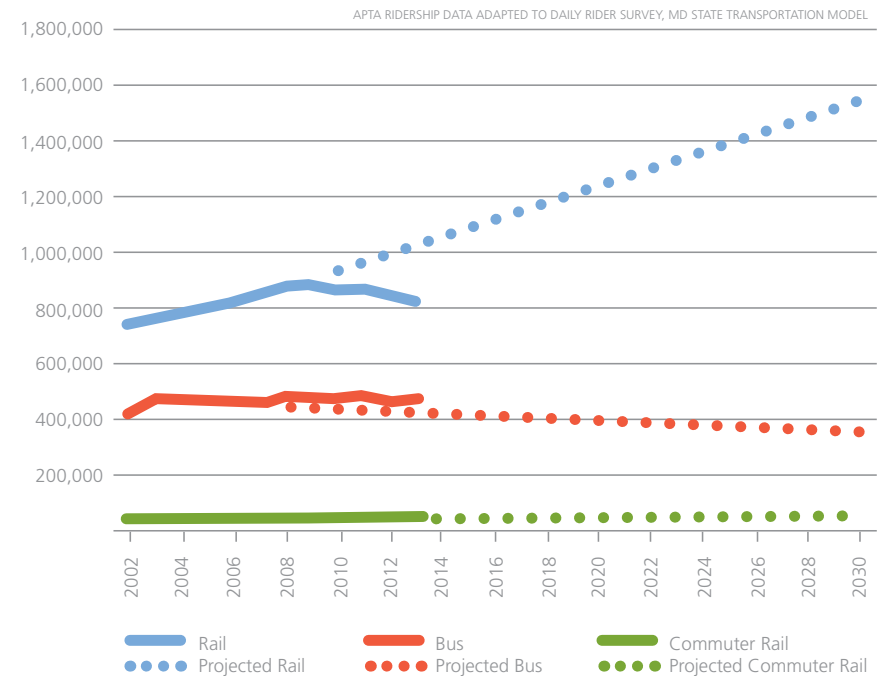
Transit ridership will grow following construction of the Purple Line and Red Line.⁵ Communities along the two new lines

or with access to new park-and-ride facilities will show the greatest increase in transit ridership. The transit share of trips will increase by less than one percent from 4.8 to 5.5 percent, however, for the entire study area. Between the Washington Metro and Baltimore transit systems, we estimate the demand for transit ridership to double by 2030, a decade after the target date of 2020. Our model does not, however, include constraints on ridership imposed by the capacity of the transit system, which is already severe during peak travel times. Therefore, actual ridership in 2030 is expected to remain below 5.5 percent without major investments in transit capacity.

Estimated Change in Transit Ridership in Maryland, 2007 to 2030



Past and Projected Rail, Bus, and Commuter Rail Demand in Maryland, 2007 to 2030

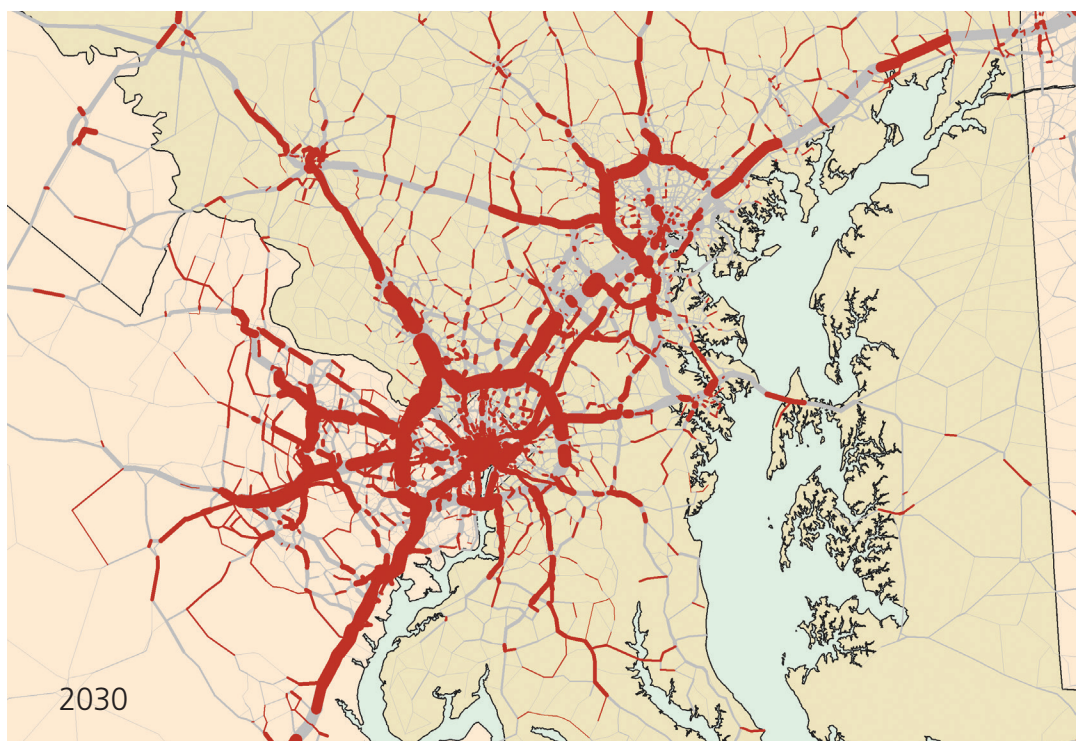
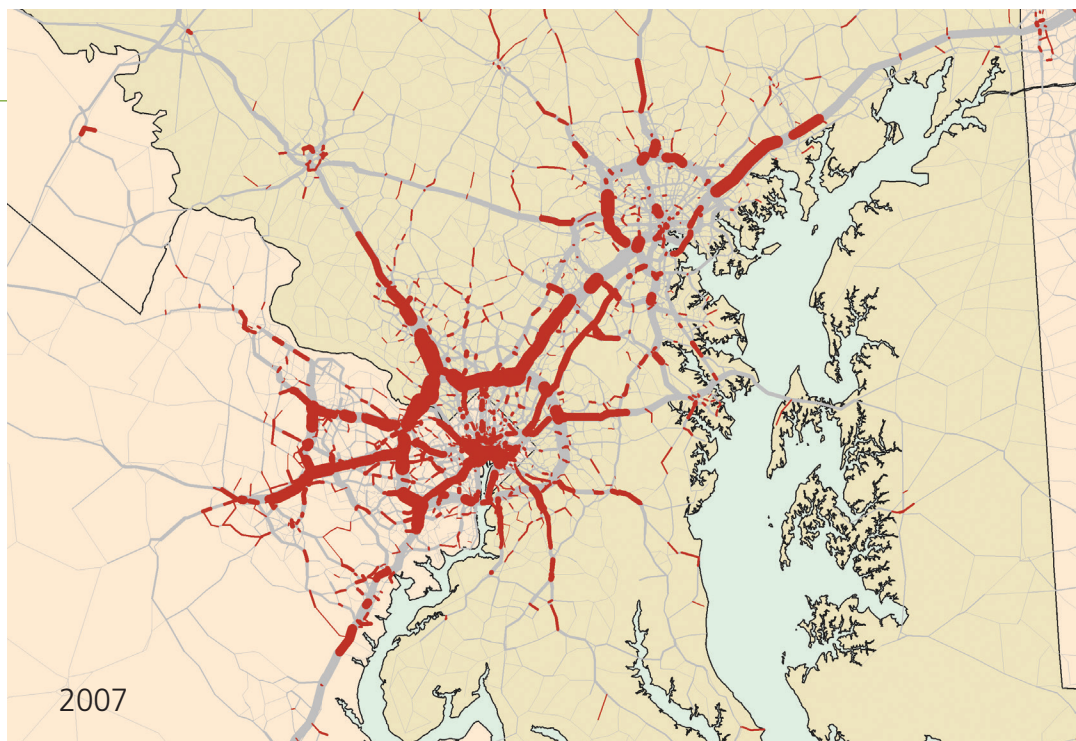
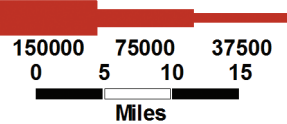


Traffic Volume and Congested Links in the
Baltimore-Washington Corridor,
2007 to 2030

Total traffic volumes



Congested links

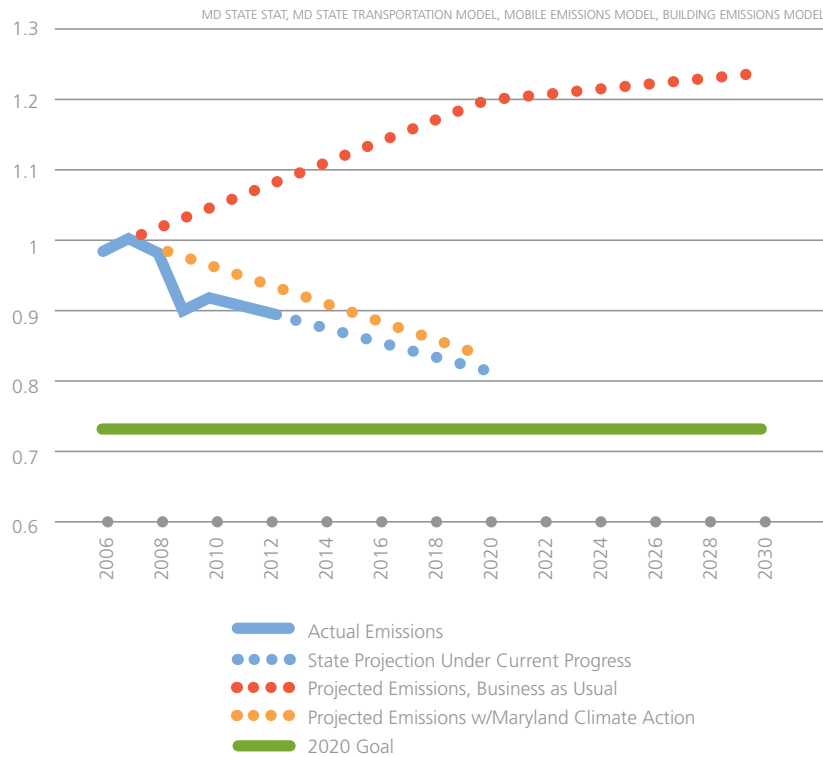


Greenhouse Gas Emissions

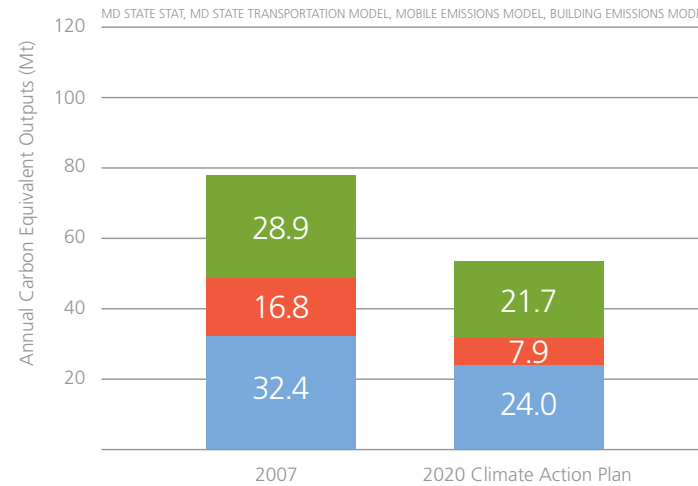
If energy demand grew at the same rate as it was growing in 2007, statewide carbon emissions would increase by nearly 25 percent by 2030, due largely to growth in population. Under the policies outlined in the Greenhouse Gas Reduction Plan, however, combined with slower economic growth, carbon emissions have fallen 10 percent since 2007. Assuming continued implementation of the Greenhouse Gas Reduction Plan, greenhouse gases will fall an additional sixteen percent by 2020, a significant reduction but still short of 25 percent target.⁶

Carbon reduction depends heavily on the continued success of the Regional Greenhouse Gas Initiative. This cap and trade system is expected to reduce emissions from power generation in Maryland and in other states from which Maryland purchases electricity. If the state implements the efficiency recommendations in the Green House Gas Reduction Plan, emissions from buildings will decrease 20 percent per capita by 2030. Additional reductions in carbon emissions will also result from improved gas mileage in the vehicular fleet.

Past, Projected, and Target Greenhouse Gas Emissions in Maryland Relative to 2007 Levels, 2006 to 2030



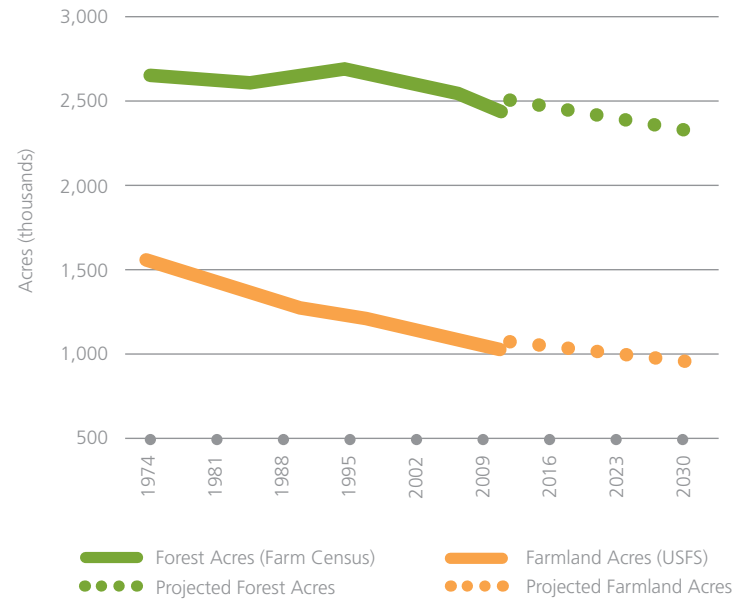
Sources of Greenhouse Gases in Maryland, 2007 and 2020



Farm and Forest Land

If growth occurs at projected rates, nearly 140,000 acres of farmland will be developed between 2007 and 2030, slightly less than during the previous two decades. There are early indications, however, that farmland conversion will continue at a pace closer to previous decades. Forest land peaked in Maryland at 2,920,000 in the 1950s and declined to 2,666,000 acres by 1992. Over the last 20 years, the state lost an additional 204,000 acres to a current total of 2,460,000 acres. Our projections indicate that forest loss will accelerate with 225,000 additional acres of forest developed by 2030.

Past and Projected Farm and Forest Land in Maryland, 1974 to 2030

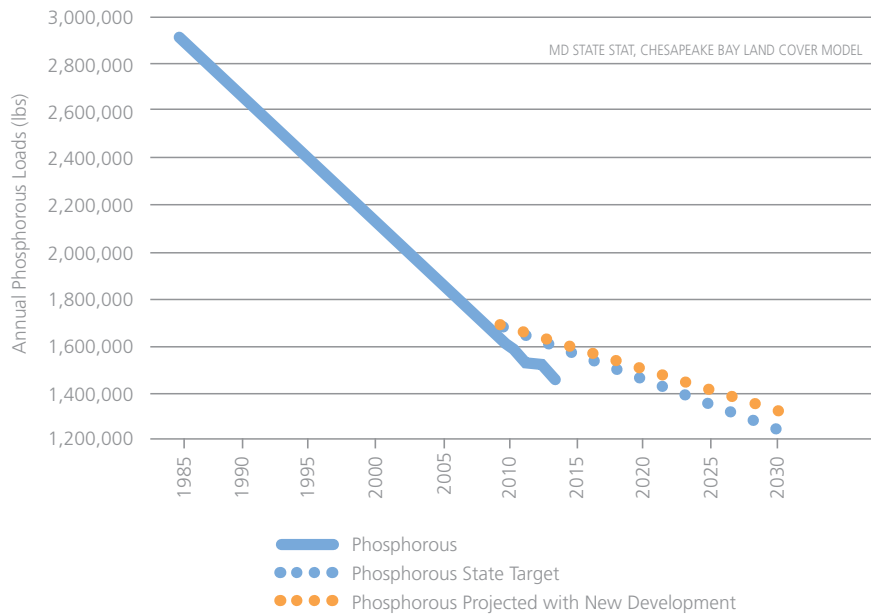


Nutrient Loads

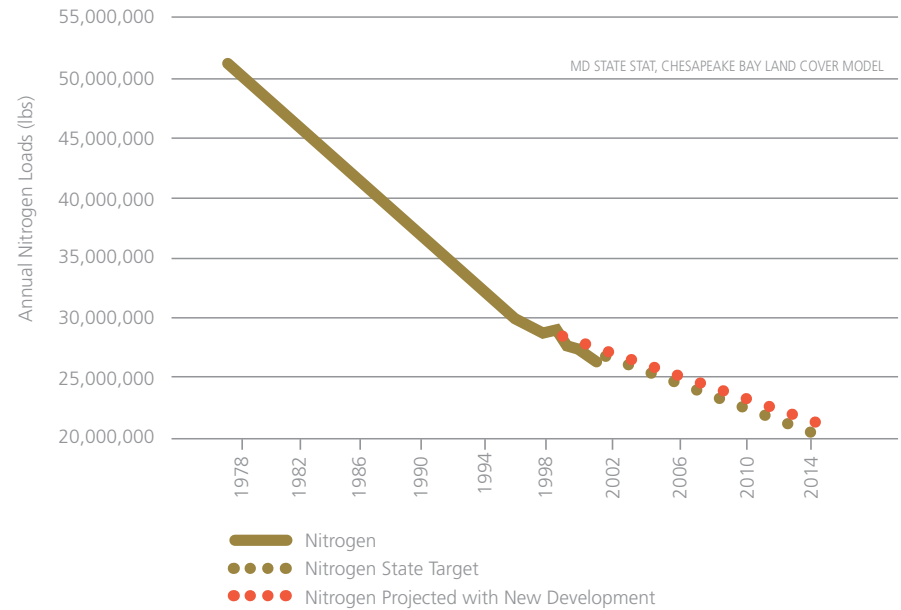
Additional development on forest and farmland will increase nutrient loadings in the Chesapeake Bay. Over the past two decades, Maryland reduced nitrogen and phosphorous pollution through point-source control, but the state Watershed Implementation Plan requires the state and local jurisdictions to reduce nutrient loading from new development. New development will discharge over 6 million pounds of nitrogen and about 0.9 million pounds of phosphorous into the Bay

between 2007 and 2030. In 2030, these additional loads will represent 2.7 and 6.4 percent of total nitrogen and phosphorous loads, respectively, if the state achieves its Total Maximum Daily Load targets in other sectors. The primary source of nutrient loads will come from farmland and urban runoff. New housing development will contribute 11.4 percent of 2030 sediment loads.

Past and Projected Phosphorus Loads in Maryland, 1985 to 2030



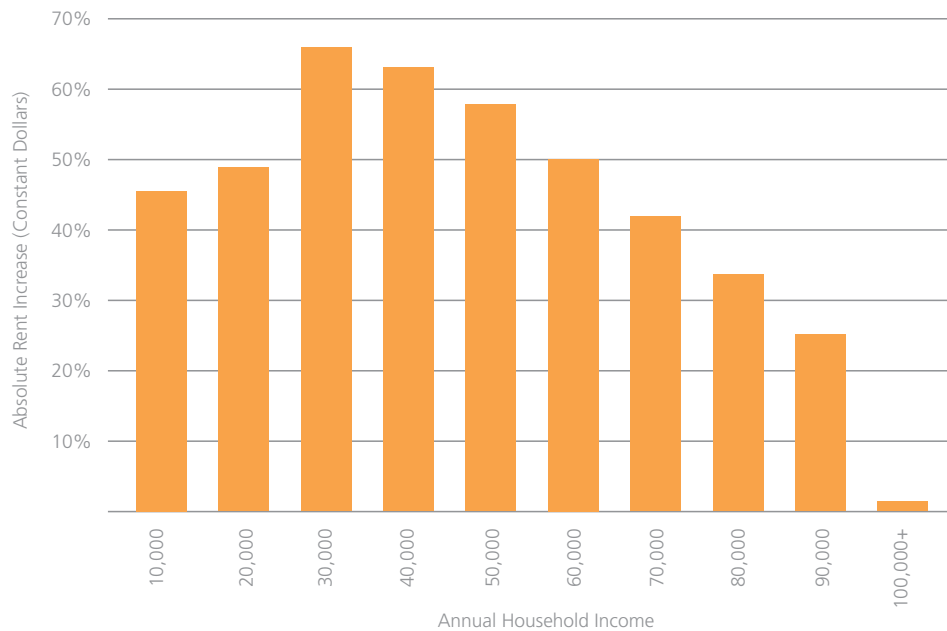
Past and Projected Nitrogen Loads in Maryland, 1978 to 2030



Equity and Opportunity

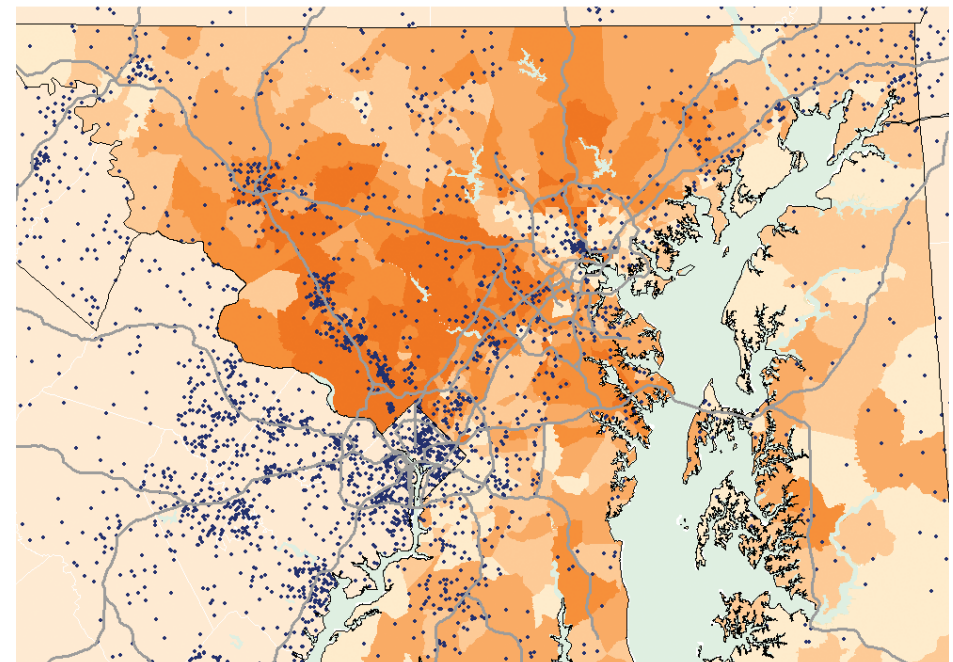
Due in part to land-supply constraints, land will increase in value and inflate the price of housing. Low and middle-income households will suffer the greatest percentage increase in housing costs. Individuals with incomes between \$30,000 and \$50,000 will pay 50 percent more (in constant dollars) for housing in 2030 than they paid in 2007.

Percent Change in Housing Costs in Maryland by Income Class, 2007 to 2030



High opportunity areas are those that rank high in education, housing, social, health, employment, and transportation indicators and foster social mobility.⁷ Areas of high opportunity are likely to change over time, but as currently distributed, 37 percent of new households will locate in areas of low or very low opportunity, somewhat less than the 40 percent of households that live in such areas now. Thirty eight percent of new households will live in areas of high or very high opportunity, less than the 40 percent of households that do so now.

Housing Growth and Opportunity Areas in Maryland, 2007 to 2030



Opportunity Score

- Very Low
- Low
- Fair
- High
- Very High

● 1 Dot = 300 Households

0 5 10 20 miles

Concluding Comments

Over the past several decades, the state of Maryland has adopted some of the most progressive and aggressive land use and environmental policies in the nation. To monitor the efficacy of these policies, the state has also made substantial investments in data collection and advanced analytical models. The PRESTO project was launched in 2014 to employ those data and models to identify policies that will lead to a more sustainable future for Maryland and the larger Baltimore-Washington region. More specifically, by incorporating state policy and growth assumptions into our modeling framework, we can analyze the extent to which the state is progressing towards this more sustainable future and offer policy recommendations that make this more likely.

Our preliminary findings are mixed. Specifically, even under the relatively optimistic baseline scenario derived from the cooperative forecast of job and household locations, the state will not meet its land use, transportation, greenhouse gas, or

water quality goals. Development will continue outside priority funding areas above the target 10 percent level, greenhouse gas emissions will not fall by the target 25 percent by 2020, and total transit trips will not double by 2020. What's more, although some residents will migrate to higher opportunity suburbs, many new residents will continue to live in low opportunity neighborhoods. Rising congestion and housing costs will make access to opportunity even more difficult.

It is clear that state and local policies have moved the state closer to its sustainability goals. Those goals will not be reached, however, if current policies and trends remain unchanged. Unanticipated external forces, however, such as rising energy prices, economic restructuring, federal government policy, and climate change may move the state closer—or further—from its goals and alter the most effective policy response. We intend to explore these possibilities in the next phase of the PRESTO project.

¹ For more on the PRESTO project, see: <http://smartgrowth.umd.edu/PreSto.html>

² These job centers have at least eight jobs per acre and a minimum of 10,000 jobs. In previous research we show that these centers represent just over one percent of the state's land area but 40 percent of the state's jobs. Further our research showed that firms in these center have higher survival rates, pay higher wages, and are more productive. Employees who work in these centers are more likely to take transit to work but have longer commute times. For more on employment centers, see: <http://smartgrowth.umd.edu/ancEDReports.html>

³ The cooperative forecasts do not consider the effects of travel times on the spatial distribution of households and thus could imply travel times longer than households might tolerate.

⁴ These travel times could be slightly overestimated since travel times are based on estimates during the peak of the peak travel time.

⁵ The model includes the Red and Purple Lines but not the Silver Line in the Washington Metro system.

⁶ For more on the Maryland Greenhouse Gas Reduction plan, see <http://climatechange.maryland.gov/publications/greenhouse-gas-emissions-reduction-act-plan/>. For analysis of the effects of that plan, see: Timothy F. Welch. (2013). *Climate Action Plans-Fact or Fiction? Evidence from Maryland* (Dissertation). University of Maryland, College Park, College Park, Maryland, accessible at: <http://hdl.handle.net/1903/14270>

⁷ For more on opportunity maps in the region, see: <http://smartgrowth.umd.edu/oppmapinfo>

A special thanks to all our partners participating in the PRESTO Project

Outside Partners

The Town Creek Foundation



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Tim Welch

Assistant Director, Center for Quality Growth and Regional Development, Georgia Tech

Peter Claggett

Research Geographer, Chesapeake Bay Program: US Geological Survey

The Scientific Advisory Committee

The Scientific Advisory Committee meets every two to three months in order to advise the direction of the PRESTO project. The committee includes technical experts in watersheds, energy, demographics, transportation, economics, and neighborhood development. The members of the committee inform the teams understanding of the forces driving the region, the enhancement of NCSG models for the purpose of measuring sustainability, and the crafting of future scenarios.

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Website

To learn more about the PRESTO Project website:
<http://smartgrowth.umd.edu/PReSTo.html>



