Use of VisionEval for LRTP Exploration

Baltimore Case Study

RSG
the science of insight

14 September 2025

Outline

- Why VisionEval was used for early stage LRPT scenario exploration
- The BMC VisionEval model development
- The BMC LRTP goals and how scenarios were developed
- Results and conclusions

Acknowledgments

This work was sponsored by the Baltimore Metropolitan Council (BMC). ICF and RSG teamed to apply the regional VisionEval to perform scenario exploration as an early step in the long range transportation planning effort.

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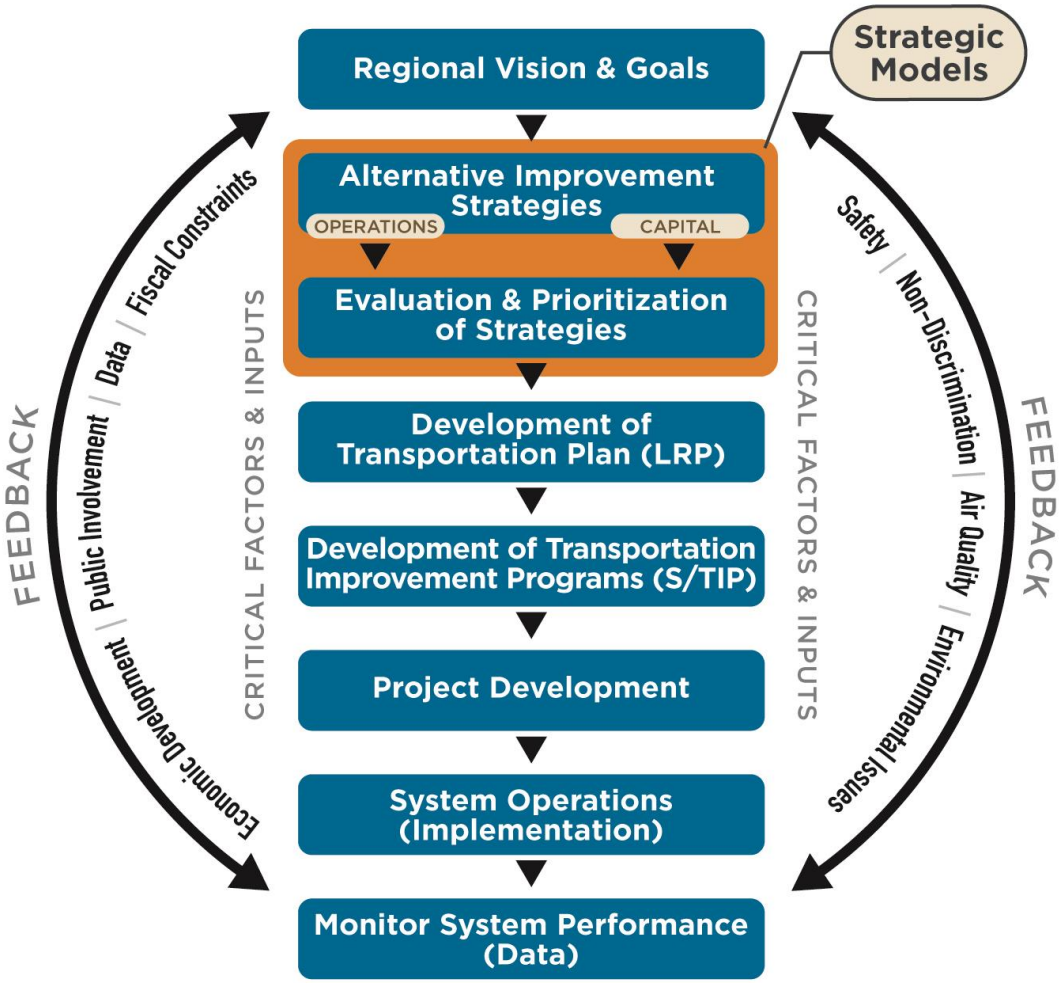
Strategic Modeling in the Planning Process



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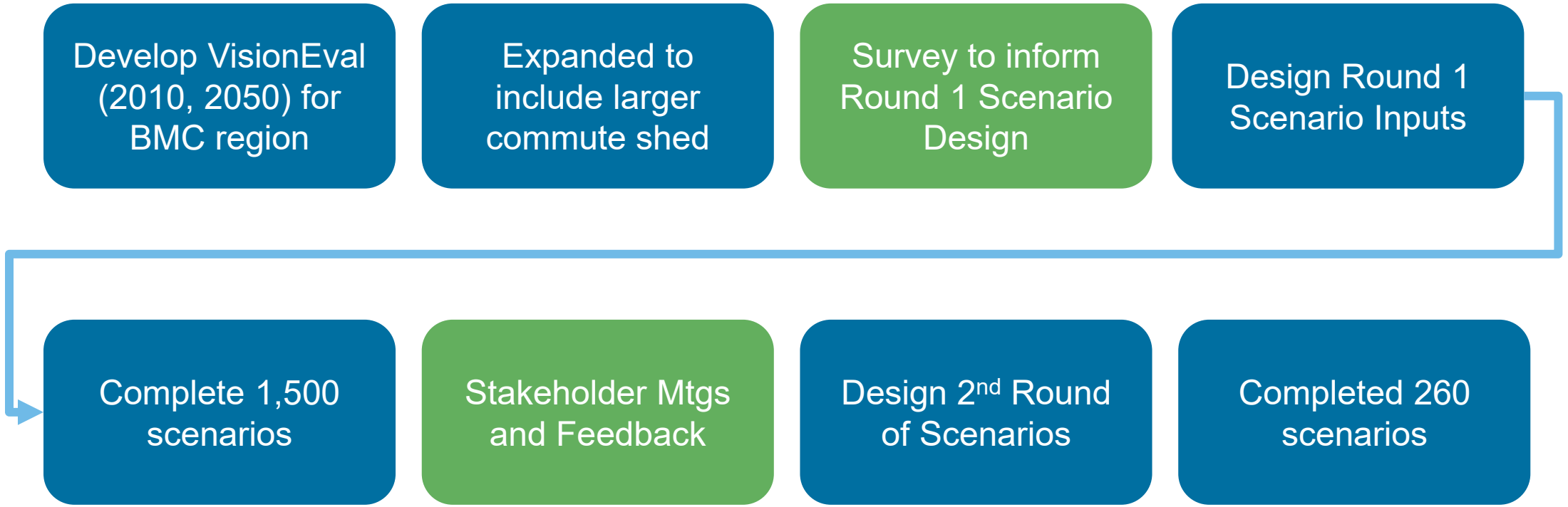
Process of using VisionEval for Scenario Exploration



Key:

Blue = A VisionEval Task

Green = Stakeholder Outreach

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The Baltimore Model

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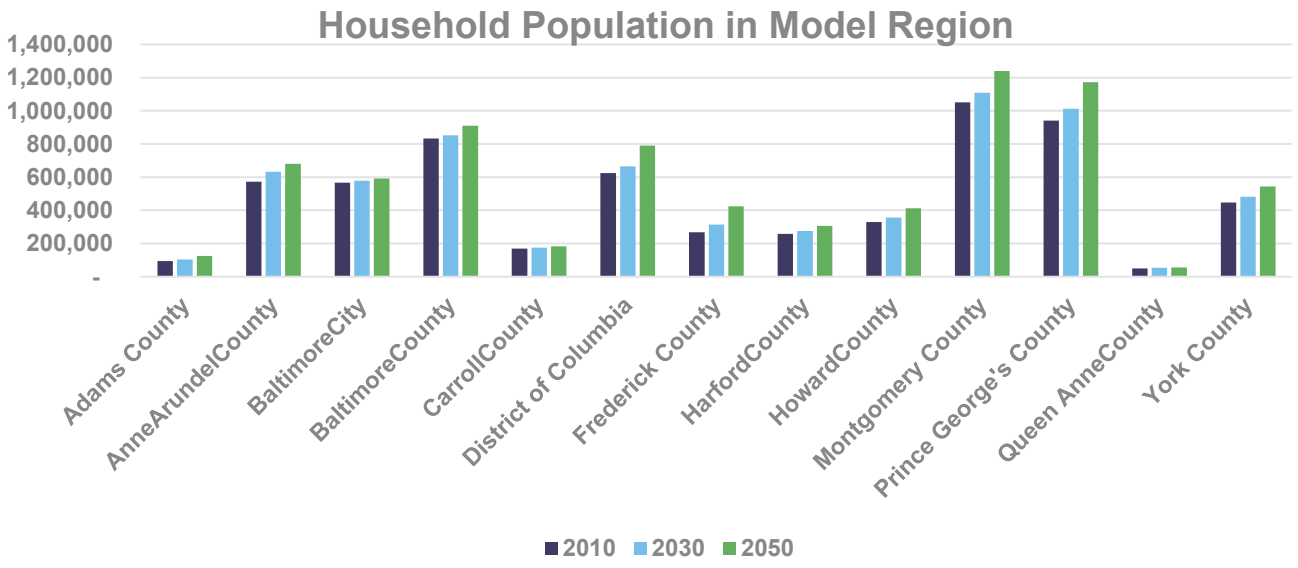
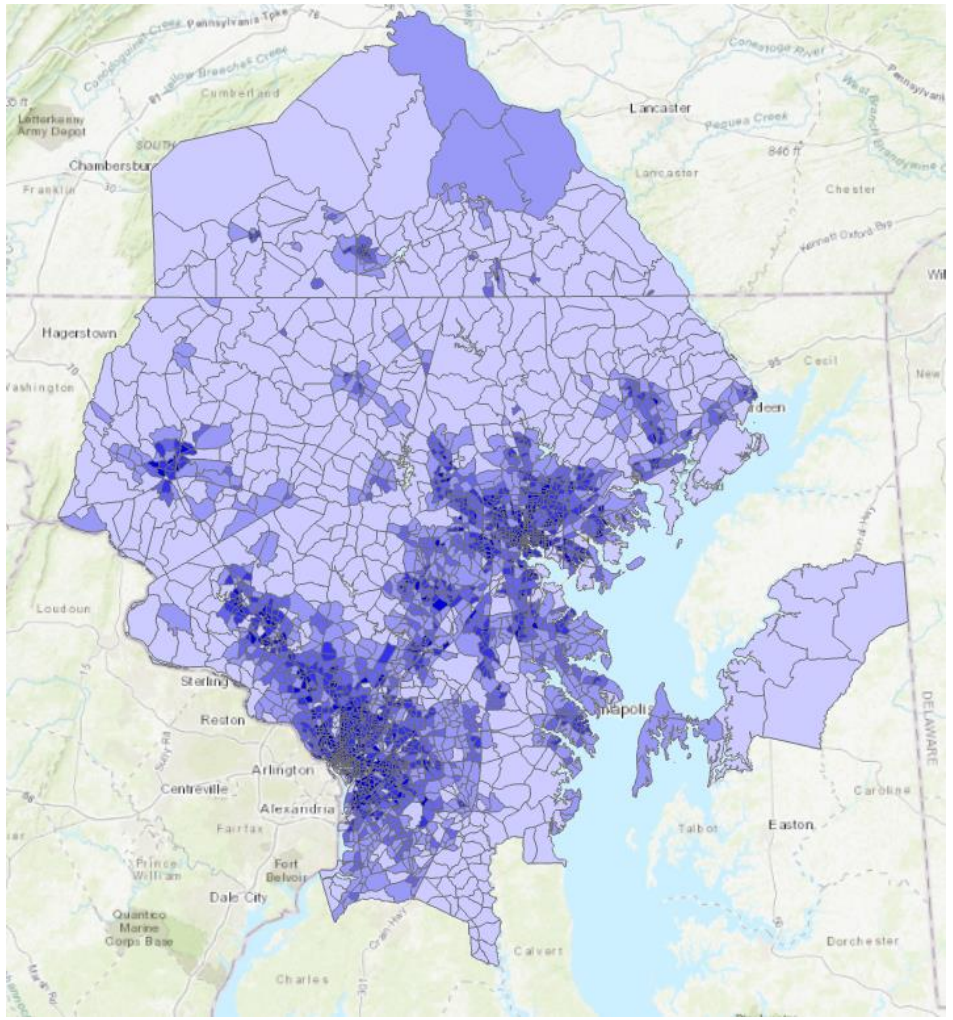
Baltimore VisionEval Implementation

- 13 Counties in the Baltimore Planning Area
- Includes Baltimore and Washington DC
- 2.5 million households in 2010
- Forecasted to be over 3 million by 2050
- Over 3000 zones in the model





Housing Density in VisionEval Zones

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Experience Creating the VisionEval Model

- It can take approximately 400 hours (about 6 months) to create the VisionEval model
- Most of the time is spent developing the inputs. If the necessary data is missing (parking inputs, etc.) it can take more time.
- The actual time to stand up the model after data development is about 4-6 weeks
- There can also be delays when considering how to address sensitive policy options such as pricing.
- The BMC VisionEval model runs in 5 hours as opposed to their Activity Based Model which runs in approximately 5 days.

Developing Scenarios for Policy Exploration

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Scenario Model Performance Measures per LRTP Goals

GOAL

Increase Mobility

Help people and freight to move reliably, efficiently and seamlessly.

- ❑ More Trips by Transit, Biking, and Walking
- ❑ Less Time Stuck in Traffic (Vehicle Delay)
- ❑ More Efficient Highways (Travel Time Index [TTI])

GOAL

Improve Accessibility

Identify and support multimodal options and systems that are resilient and sustainable and enable all individuals to reach their destinations safely and seamlessly.

- ❑ More Jobs Reachable by Transit, Bike, Or Walk within 20 and 40 minutes

GOAL

Improve System Safety

Reduce the number of crashes, injuries and fatalities experienced by all users of the transportation system toward meeting Zero Deaths Maryland.

- ❑ Fewer Vehicle Crashes
- ❑ Fewer Bike/ Ped Crashes

GOAL

Promote Prosperity and Economic Opportunity

Support the vitality of communities and businesses, opportunities for workers and the movement of goods and services within and through the region.

- ❑ Lower Cost Travel and Housing

GOAL

Implement Environmentally Responsible Transportation Solutions

Pass on to future generations the healthiest natural and human environment possible.

- ❑ Lower Vehicle Miles Traveled (VMT)
- ❑ Lower Emissions

PRINCIPLE

Fairness

Balance impacts to lower-opportunity areas vs. higher-opportunity areas

- ❑ Apply this comparison to all results

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Initial Scenarios: Policy Levers and External Forces

Transportation Investments

Land Use and Housing

Fees and Incentives

Economy

Technology

Natural Environment

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Developing policy variables and levels combined to form scenarios

Land Use and Housing Policy Levers (LU)					
Policy Variables	**LU Level 0**	**LU Level 1**	**LULevel 2**	**LU Level 3**	**LU Level 4**
Distribution of New Households	**Wide Distribution**	**Located near transit**	**Located near jobs**	**Even Distribution** around transit and jobs	**Wide Distribution** Same as Level 0*
Housing Units	**165K More Units** From 1.1M to 1.265M 15% total increase	**255K More Units** 90K units added to the Level 0 forecast 23% total increase	**255k More Units** Same as Level 1	**255k More Units** Same as Level 1	**255k More Units** Same as Level 1
Population	**360K More People** From 2.85M to 3.21M 13% Increase	**452K More People** 92K people added to the Level 0 forecast 16% total increase	**452K More People** Same as Level 1	**452K More People** Same as Level 1	**452K More People** Same as Level 1

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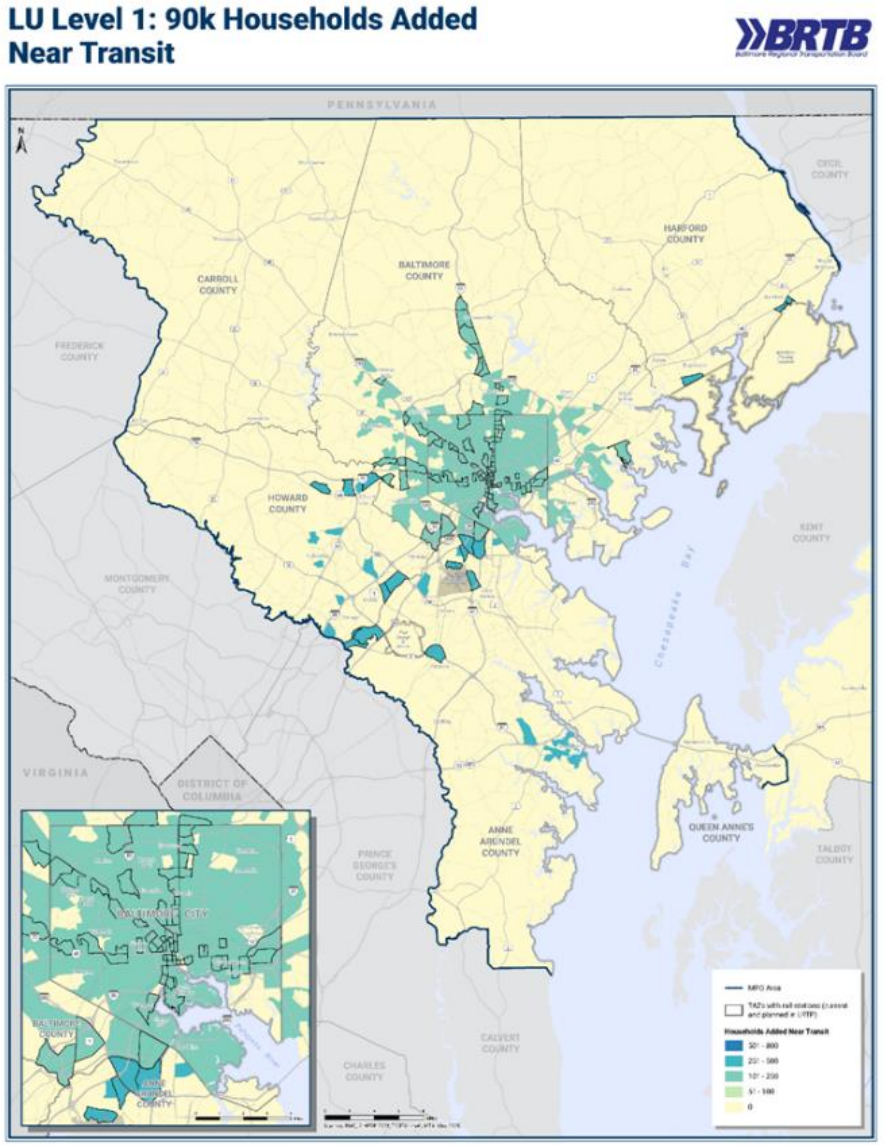
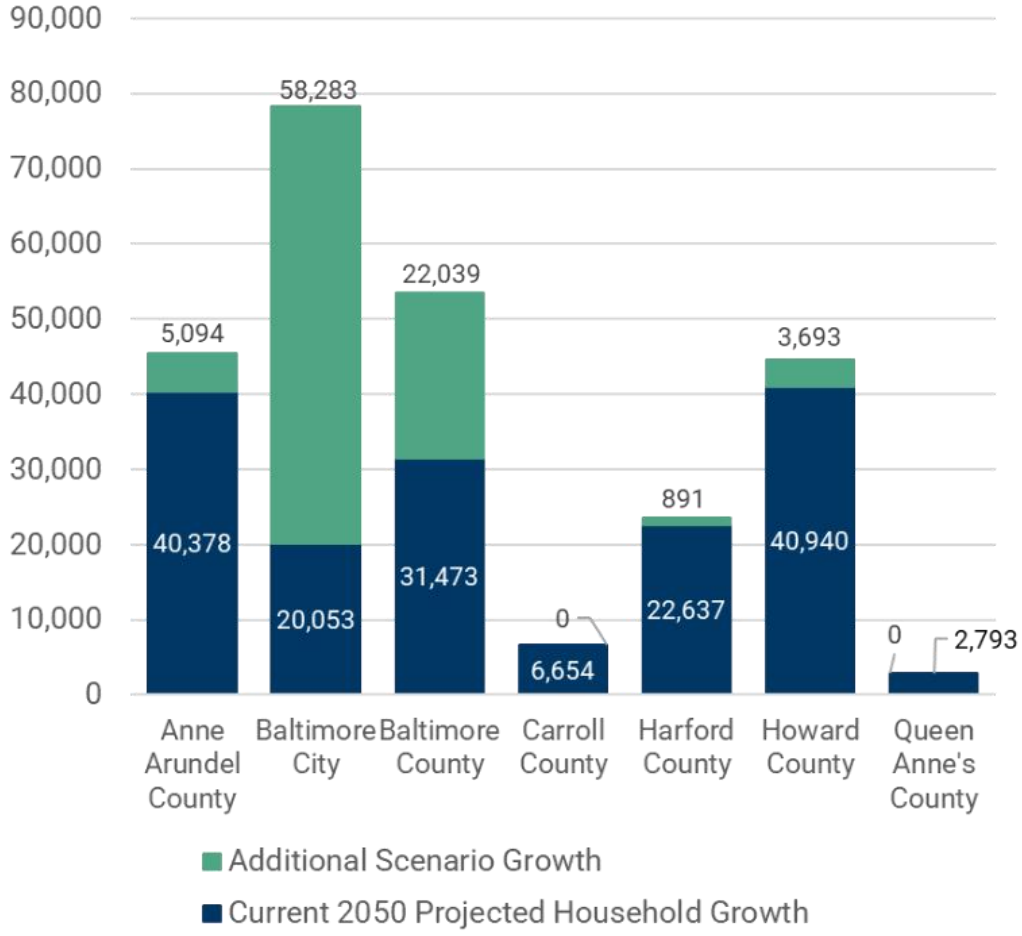
Analyses were developed to support each policy level variable





Transportation Investment Policy Levers (TI)					
Policy Variables	**TI Level 0** 	**TI Level 1** 	**TI Level 2** 	**TI Level 3** 	**TI Level 4** 
Transit Service	**15%** more coverage **15%** more frequency	**25%** more coverage **25%** more frequency	**35%** more coverage **35%** more frequency	Level 0	Level 0
Bicycling and Walking	**8.5%** more trips	**33.5%** more trips	**58.5%** more trips	Level 0	Level 0
Complete Streets	**Less than 1%** of urban arterial lane miles reallocated	**1%** of urban lane miles reallocated	**2%** of urban lane miles reallocated	Level 0	Level 0
TSMO	**24%** of freeway driving is TSMO-controlled	Level 0	Level 0	**36%** of freeway driving is TSMO-controlled	**36%** of freeway driving is TSMO-controlled
TDM	**16%** commuter participation	Level 0	Level 0	**24%** commuter participation	Level 0
Roadway Lane Miles	**5%** more lane miles	Level 0	Level 0	Level 0	**10%** more lane miles

These policies represent areas where the agency wants to provide insights on scope and potential outcome

Fees and Incentives Policy Levers (Fees)				
Policy Variables	**Fees Level 0**	**Fees Level 1**	**Fees Level 2**	**Fees Level 3**
State Gas Tax	**$0.53 per gallon**	**$0.80 per gallon** (50% increase)	**$1.06 per gallon** (100% increase over Level 0)	**$0.80 per gallon** (same as Level 1)
VMT Fee*	n/a	$0.05 per mile	**$0.10 per mile** (100% increase over Level 1)	**$0.05 per mile** (same as Level 1)
Urban Parking Fees**	n/a	Level 0	Level 0	**25% increase****
Congestion Fee***	n/a	Level 0	Level 0	**$0.50 per-mile**

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The scenarios also consider external factors

Economic External Forces (Econ)			
Policy Variables	**Econ Level 0**	**Econ Level 1**	**Econ Level 2**
Jobs	**25% More Jobs** From 1.47M to 1.84M	**30% More Jobs** From 1.47M to 1.91M	**35% More Jobs** From 1.47M to 1.98M
Per Capita Income	**43% Higher Income** From $48,850 to $69,725	**48% Higher Income** From $48,850 to $72,300	**53% Higher Income** From $48,850 to $74,740

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Technology External Forces (Tech)					
Policy Variables	**Tech Level 0** 	**Tech Level 1** 	**Tech Level 2** 	**Tech Level 3** 	**Tech Level 4** 
Access to EV Chargers	**40% multifamily** units 100% single-family units	**80% multifamily** units 100% single-family units	Level 0	Level 0	Level 0
EV Adoption	**48%** of all passenger and transit vehicles are EV or hybrid	**100%** of all vehicles are EV or hybrid	Level 0	Level 0	Level 0
Carshare Service	**Moderate** Available most of the day in some areas	Level 0	**25% higher** availability and usage	Level 0	Level 0
Carshare Cost	**$2/mile** multiple passengers **$2.50/mile** individual passenger	Level 0	**50% lower multi-passenger fares** Multi-passenger $1.00/mi	Level 0	Level 0
Work From Home	**16.3%** work from home at least once a week (3X pre-COVID avg)	Level 0	Level 0	**24.5%** work from home. 50% more than Level 1	Level 0
Autonomous Vehicle Adoption	n/a	Level 0	Level 0	Level 0	**60%** Level 5 autonomy* **30%** Level 3 autonomy*

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Number of policy permutations analyzed

- Land Use:
  - 3 policies variables with 5 levels
- Transportation:
  - 4 policies variables with 3 levels
  - 3 policies variables with 2 levels
- Fees and Incentives:
  - 2 policies variables with 4 levels
  - 1 policy variables with 3 levels
  - 2 policies variables with 1 level
- Economic External Forces
  - 2 policies variables with 3 levels
- Technology External Forces
  - 6 policies variables with 2 levels

If we were to run all possible permutations the model would produce 373,248,000 scenarios.

Several of the policies were grouped together to reduce the number of scenario model runs.

This resulted in just under 1,500 scenarios

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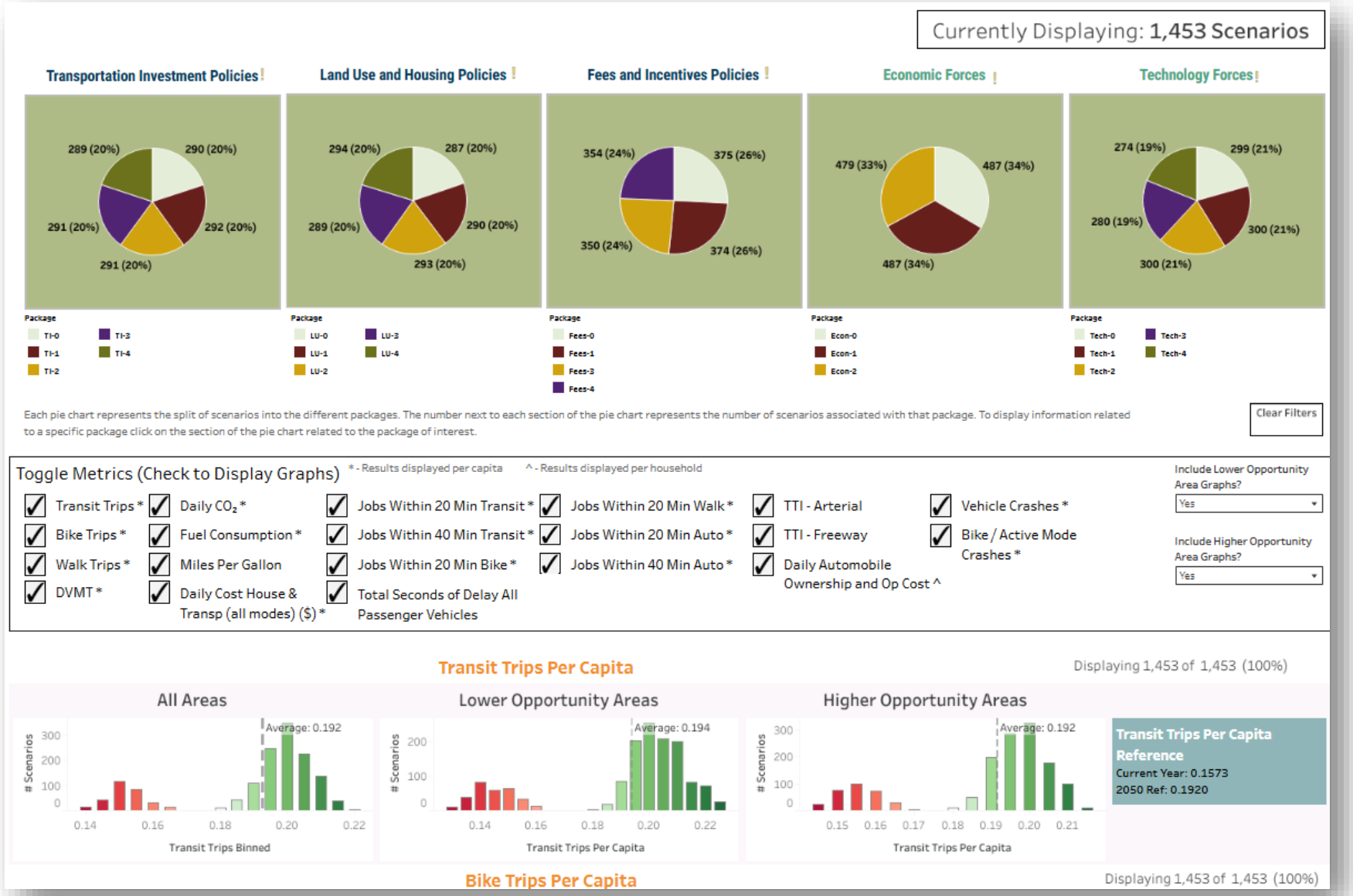
Lessons Learned

Phase 1 Poloicy Exploration Generated Refined Learnings



Three select lessons learned from policy exploration

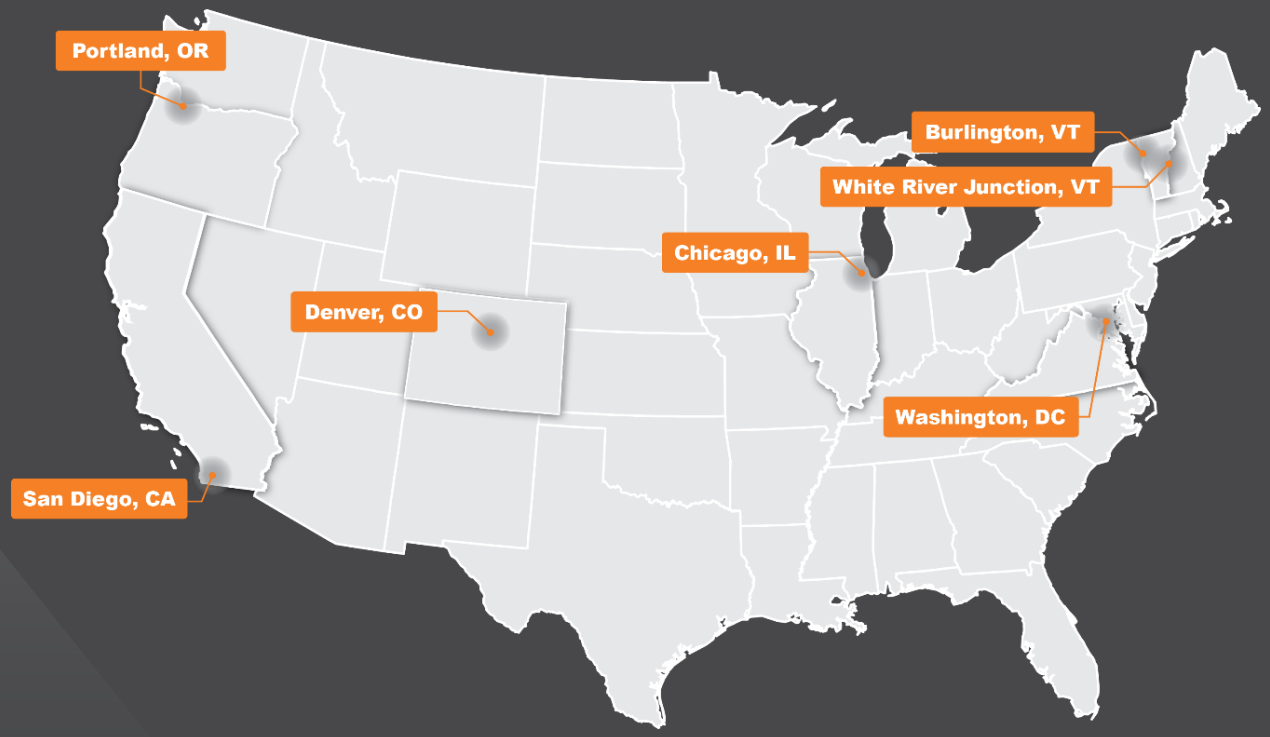
1. Locating housing near jobs and transit networks is demonstrably effective in increasing transit and walk/bike shares, reduce VMT, emissions and delays.

2. Introducing even a 5-cent VMT fee meaningfully boosts the increased use of transit and impacts land use policies but higher costs hit lower-income households harder requiring targeted policies.

3. Increases in effective roadway capacity through Transportation Systems Management and Operations (TSMO) is effective and can reduce delays.

BMC Reactions to use of VisionEval in the LRTP

- The use of VisionEval allowed BMC to efficiently narrow the broad number policies in the LRTP
- VisionEval enabled an effective stakeholder outreach because of the wide range of outputs it produces that align with many interests
- BMC has observed that there is a need to navigate the very large number of insights to present in a way that tells a meaningful story
- BMC plans to use VisionEval in future LRTP efforts.



Contacts

Stephen Lawe
Principal
Stephen.lawe@rsginc.com
802-299-7370

Jonathan Slason
Managing Consultant
Jonathan.slason@rsginc.com
802-861-0508

www.rsginc.com