Baltimore Regional Transportation Board

LRTP Scenario Planning

BRTB Technical Committee

February 4, 2025

BMC

Presentation Outline

- **Introduction to Project and Key Concepts**
  - Project Purpose, Process, Desired Outcomes & Schedule
  - Strategic Modeling Overview
  - Case Study Literature Review & Interviews
- **Scenario Development**
  - Public Input on Policy Priorities and Desired Outcomes
  - Categories and Combinations of Inputs and Outputs
    - Policy Actions (“Levers”) Inputs
    - External Forces Inputs
    - Performance Outputs
  - Example Visualization

Purpose, Process, Desired Outcomes

Purpose:

- **Build BRTB's capacity for exploring and selecting policy actions to address transportation issues that are 1) pressing and 2) difficult to predict.**

Process:

- **Develop and evaluate alternative future scenarios using three key tools**
  - **VisionEval (VE) strategic planning model**
  - **InSITE (activity-based travel forecasting model)**
  - **GIS-based spatial analyses**
- **Communicate results and seek input to shape and refine scenarios**
  - **Public Survey**
  - **Stakeholder Workshops**
- **Discern implications, risks, and opportunities**
  - **Transportation investments**
  - **Policy priorities**

Desired Outcomes:

- **Identify potential refinements to 2027 LRTP goals, investment policies, and project prioritization and scoring criteria.**

Project Schedule

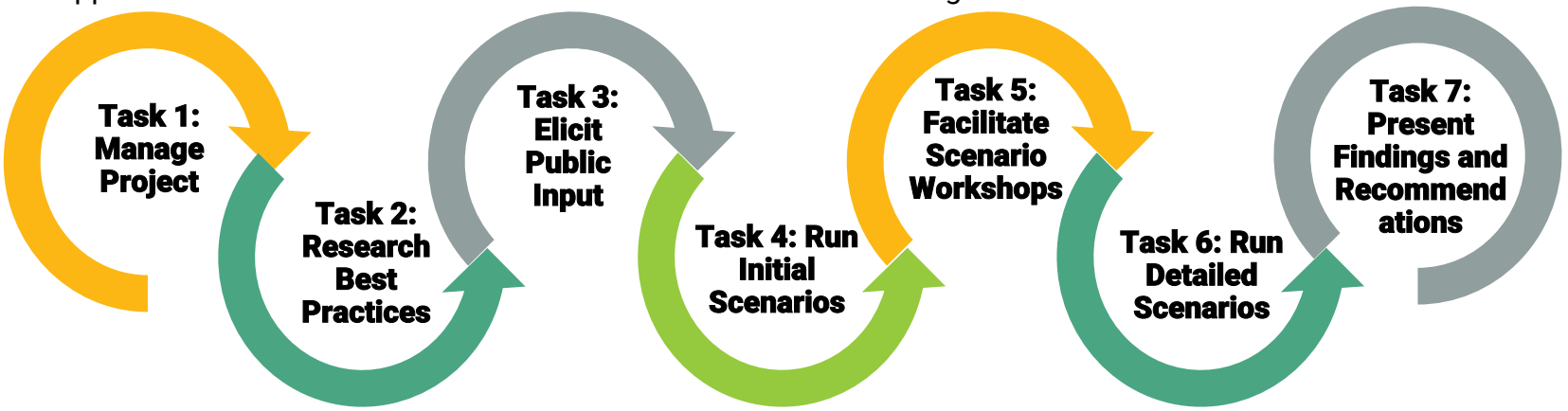
Oct	Nov – Dec – Jan - Feb	Mar - Apr	May-Jun

- Refine the overall work plan
- Conduct bi-weekly check-in meetings to affirm / adjust approach

- Design and implement public survey
- **Finalize scenario drivers and performance measures**

- Explore tradeoffs and affirm priorities with stakeholders
- Refine scenarios based on workshop insights

- Recommend refinements to LRTP policies and project scoring processes

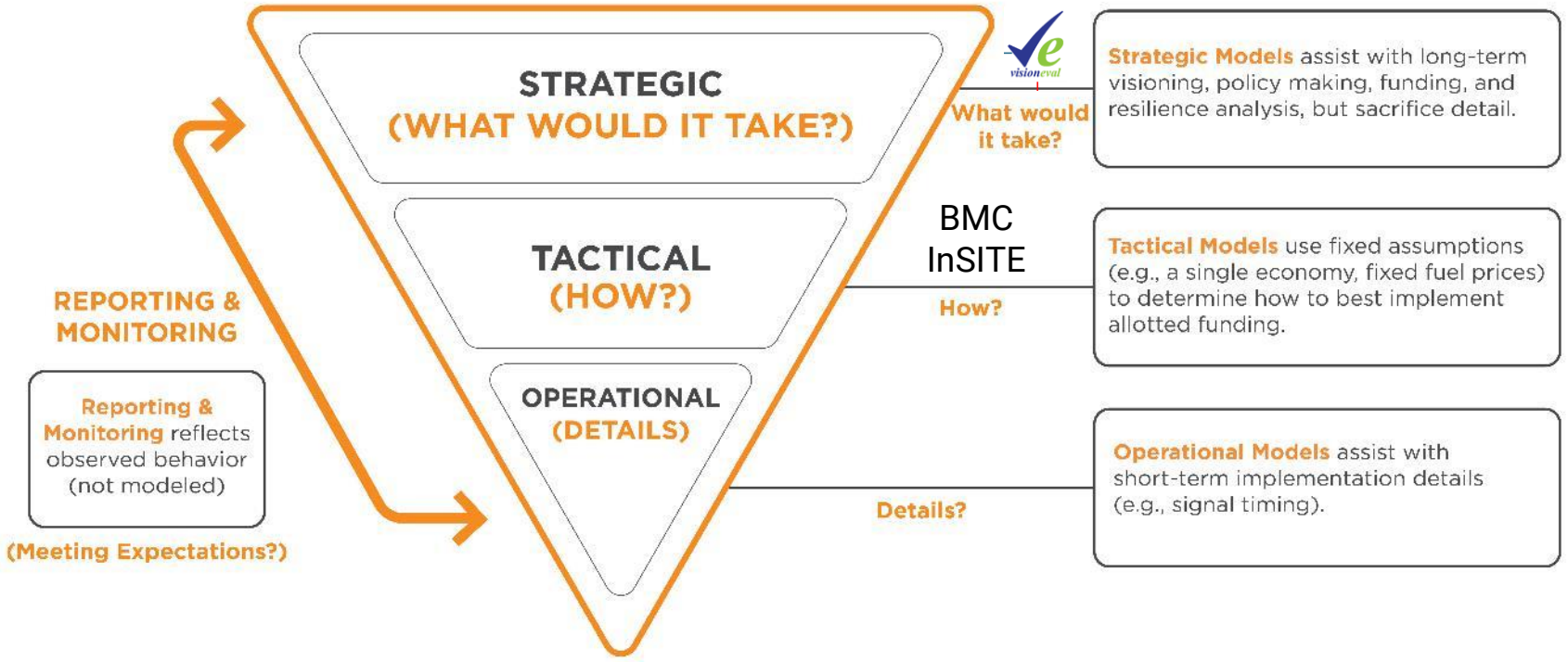


- Design analysis framework based on lessons learned from peer agencies
- Identify potential scenario drivers and performance measures

- **Run initial scenarios with VE** and spatial data
- Identify potential policy implications, risks, opportunities

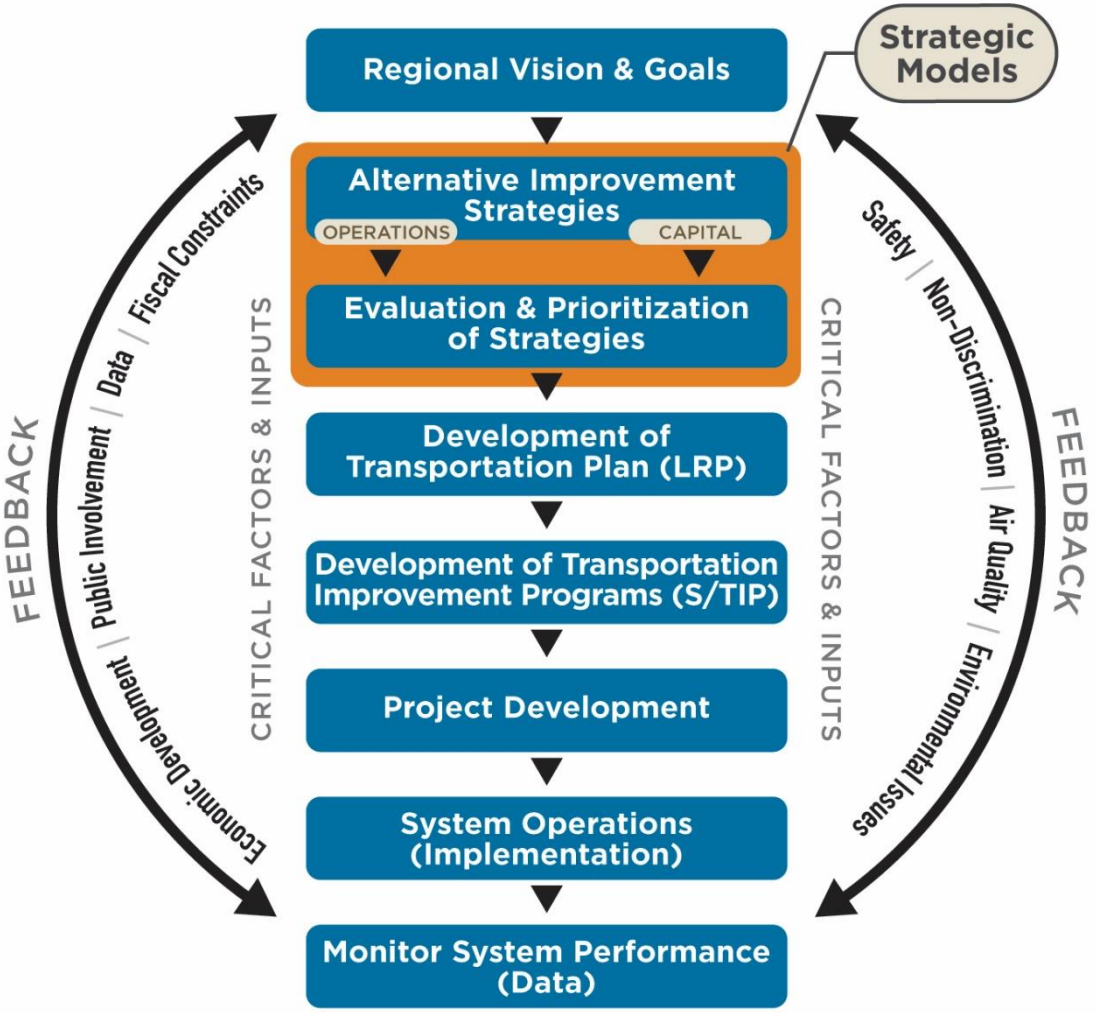
- Run refined scenarios with VE and InSITE
- Discern policy implications, risks, opportunities

Strategic, Tactical, and Operational Models



Source: Oregon DOT, adapted by RSG

Strategic Modeling For Transportation Decision-Making



Strategic Model "Building Blocks"

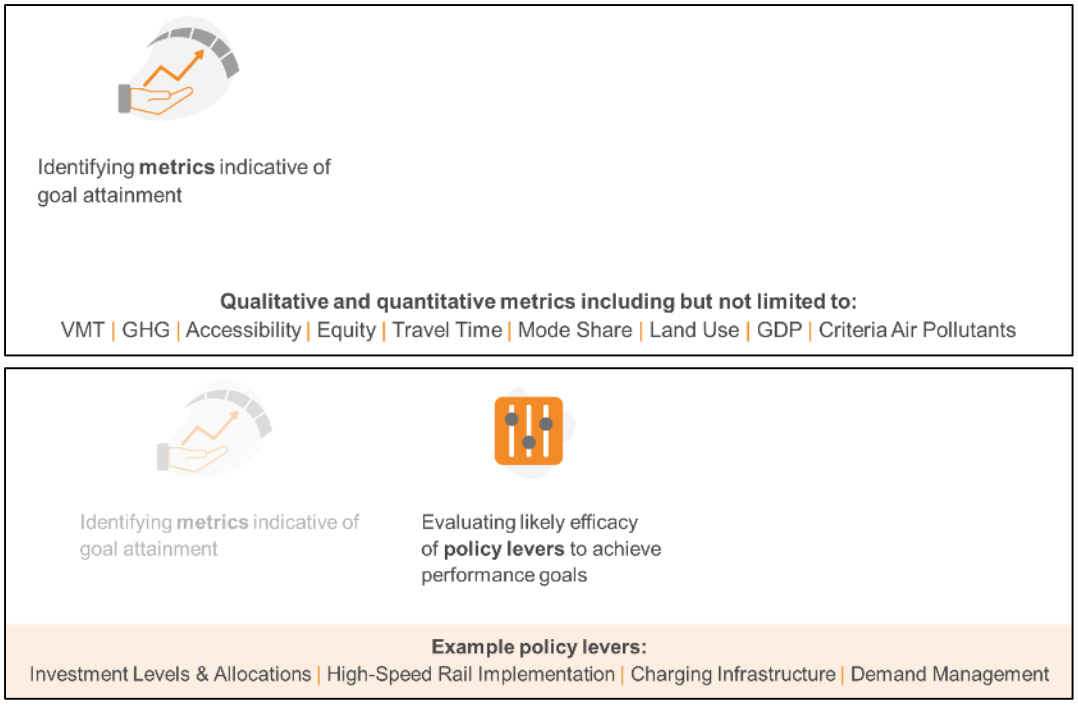
Identifying **metrics** indicative of goal attainment

Qualitative and quantitative metrics including but not limited to:

VMT | GHG | Accessibility | Equity | Travel Time | Mode Share | Land Use | GDP | Criteria Air Pollutants

Outcomes

Strategic Model "Building Blocks"

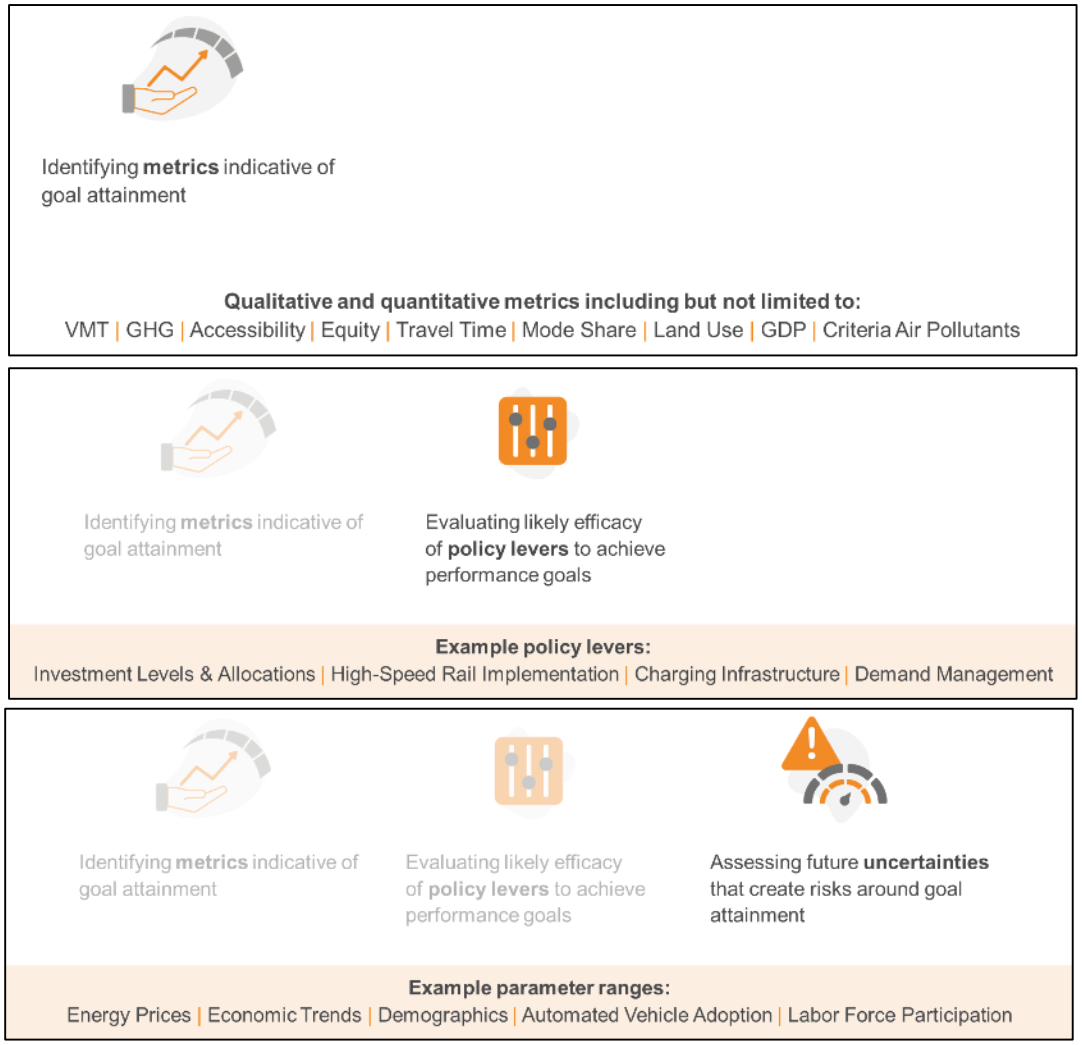


Outcomes

are generated by

Actions
(Policy Levers)

Strategic Model "Building Blocks"



Outcomes

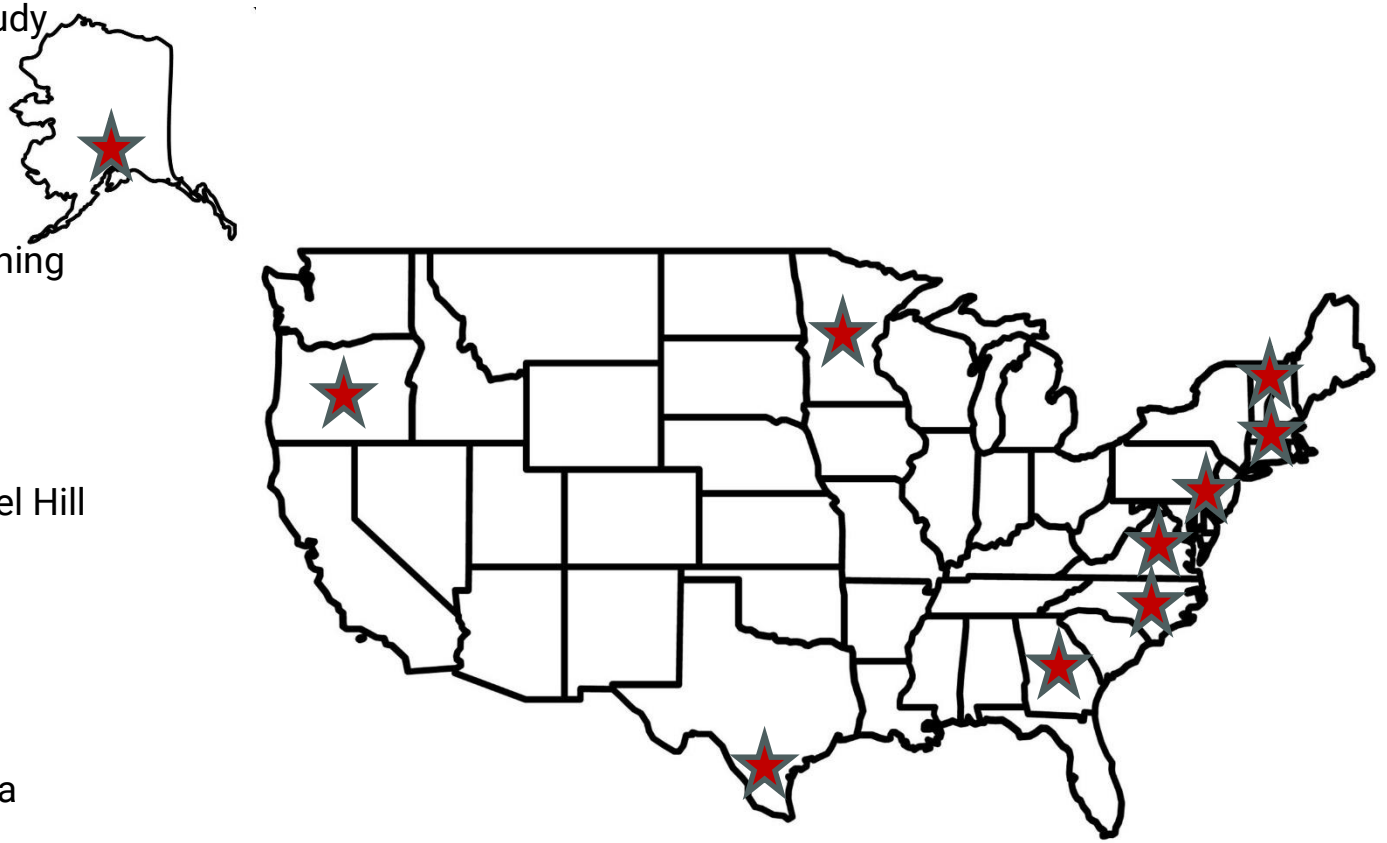
are generated by

Actions
(Policy Levers)
combined with

Uncertainties
(External Forces)

VE Case Study Research

- Anchorage, AK Metropolitan Area Transportation Study (AMATS)
- Atlanta Regional Commission (ARC)
- Boston Region MPO/ Metropolitan Area Planning Council (MAPC)
- Chittenden County (Burlington) VT MPO (CCRPC)
- Durham Carrboro Chapel Hill (DCHC) MPO
- Delaware Valley (Philadelphia) Regional Planning Commission (DVRPC)
- Houston-Galveston Area Council (H-GAC)
- Minnesota DOT (MNDOT)
- Oregon DOT (ODOT)
- Virginia DOT (VDOT)



Experiences & Lessons Learned

Anchorage (AMATS): Focus on air quality. Few strategies moved the needle but process helped policymakers & public to realize and tackle hard questions. Led to new TOD corridor plan with supportive land use policies.

Atlanta (ARC): Helped to shape 2016 vision. Experimenting with using VE for TIP and mapping out strategic policy questions for LRTP update. Multidisciplinary engagement is critical. Learning curve is steep but improves over time.

Boston (MPO + CTPS): Building an "uncertainty archive" to stress-test policies. Combining overlay maps of coastal flooding.

Burlington (CCRPC): Built TDM strategy package in response to public pushback that threatened to halt I-89 roadway expansion plan. Although some strategies are infeasible, their inclusion has jumpstarted new TDM initiatives.

Durham (DCHC): Board-driven ambitious focus on VMT reduction. Had to revise highest-performing scenario to remove the (minimal) roadway expansion. Coordinating with adjacent MPOs for tri-regional scenarios.

Philadelphia (DVRPC): 2016 VE version was most effective for testing policy strategies, not as much for building complex futures focused on deep uncertainties. Shifted resources toward building an in-house exploratory model.

Houston-Galveston Area Council (H-GAC): Built and tested many scenarios internally, working on some tweaks to resolve a few odd results, hope to integrate VE into next LRTP after hiring a new planning director.

Oregon DOT: Made data-driven decisions on cost-feasible strategies to achieve GHG & mobility goals. Simple bar graphs (what we need, where we want to be, and how much it will cost) help to check progress and change tactics.

MnDOT: Using VE internally to help respond to state mandate for regional emissions targets. Multidisciplinary engagement and leadership buy-in are critical.

VDOT: Experimented with GHG reduction strategies for DC suburbs. Planning to engage 7 MPOs in a variety of applications.

Baltimore Region Public Input

Survey Design

- Internal and external drivers of change: Which ones are most important/relevant to your community?
- Metrics for success grouped under five goals: Which of these do you care most about?

Responses

- Administered from November 19 to December 15, 2024, on the PublicInput platform.
- Total of **659 responses**. However, respondents were **not representative of the BMC region**.
  - The typical respondent was male (58%), white (77%), with a graduate/professional degree (50%).
    - 7% of respondents identified as Black/African American.
    - 85% of respondents had a bachelor's degree or higher.
  - Among residents in BMC region, 52% are female, 55% are white, 29% are Black, and 43% have a bachelor's degree or higher.

Internal Drivers of Change (Policy Levers)

- Transportation Improvements
- Ways to Pay for Transportation Infrastructure
- Housing and Land Use

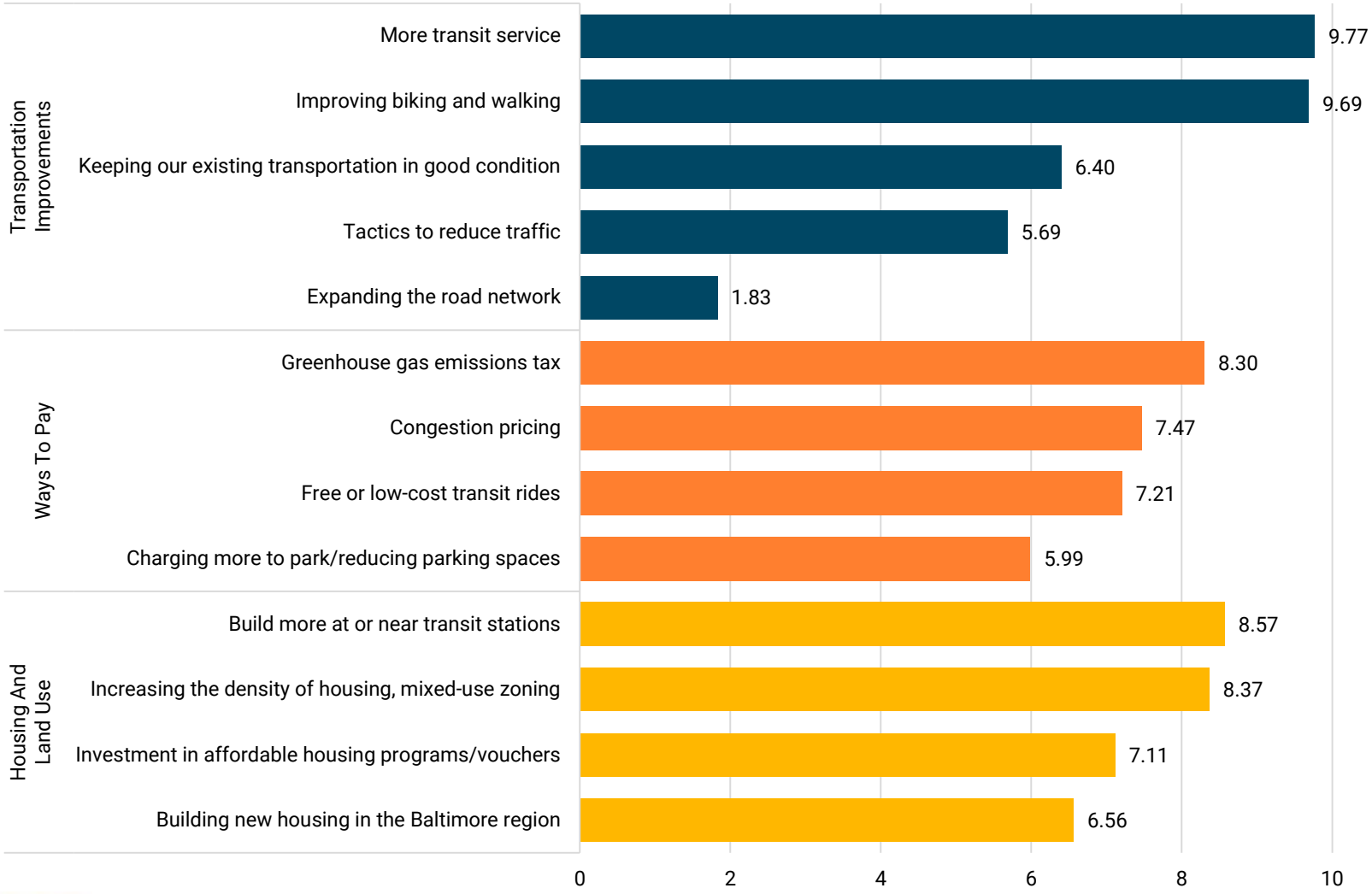
External Drivers of Change

- New and Emerging Transportation Trends
- Population and Economic Growth
- Climate and the Environment

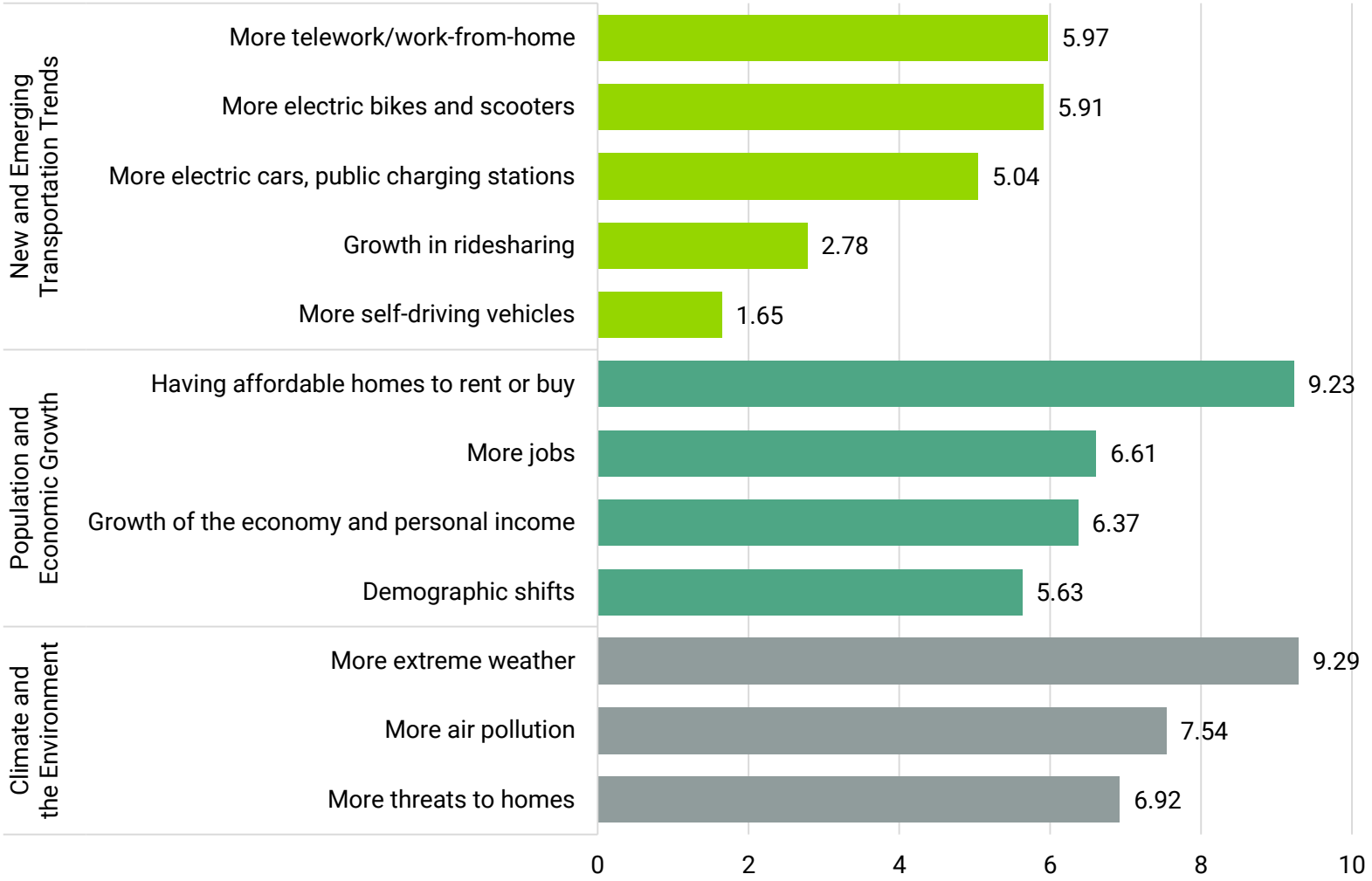
Goal-based Outcome Metrics

- Accessibility
- Safety
- Mobility
- Economic Prosperity
- Environmental Responsibility

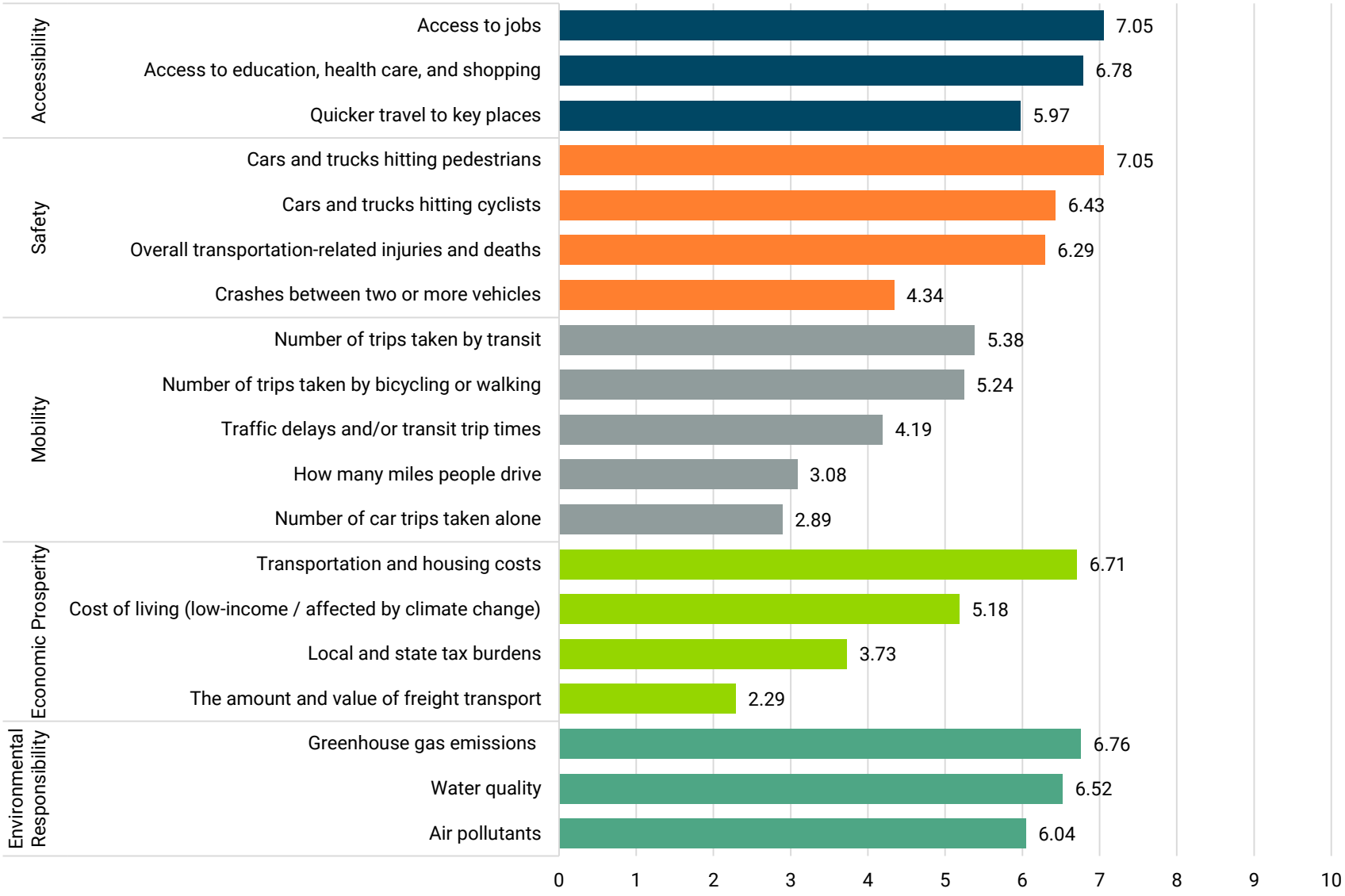
Public Ranking — Internal Drivers of Change (Policy Levers)



Public Ranking — External Drivers of Change



Public Ranking — Outcome Metrics



Scenario Inputs: Drivers and Elements*

Policy Lever Drivers

External Force Drivers

Element Level 1 = 2010-2050 growth per current LRTP. Levels 2-6 = Level 1 + additional growth or new changes by 2050

Elements	A) Transportation Investments	B) Housing + Demographics	C) Fees and Incentives	D) Economy	E) Technology	F) Resilience & Environment
1	Transit RvM 15% Transit Freq 50% Bike/Walk 8.5% Comp St n/a TSMO 24% TDM n/a Roadway 4.8%	Housing +282k	Gas Tax 21% VMT Tax n/a Parking Fee n/a Cong. Fee n/a	Jobs 17% Income 43%	EV n/a CarShr n/a Telework 2010 base (~4.5%) Shared AV n/a	n/a
2	Transit RvM 25% Transit Freq 25% Bike/Walk 25% Comp St 1%	Housing +90k Transit Distrib	Gas Tax 50% VMT Tax 5¢	Jobs 5% Income 5%	EV fleet 100% EV charging 80%	Inundation Map Overlay Vulnerable Populations Map Overlay
3	Transit RvM 35% Transit Freq 35% Bike/walk 50% Comp St 2%	Housing +90k Job Distrib	Gas Tax 100% VMT Tax 10¢	Jobs 10% Income 10%	CarShr Svc High CarShr Cost 2% CarShr Appeal 25%	
4	TSMO 50% TDM 50%	Housing +90k Transit + Job Distrib	Gas Tax 50% VMT Tax 5¢ Parking Fee 25% Cong. Fee 50¢		Telework 50%	
5	TSMO 50% Roadway 10%	Housing +90k Level 1 Distrib			Shared AV: High	

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* This is DRAFT data. Numbers are being finalized.

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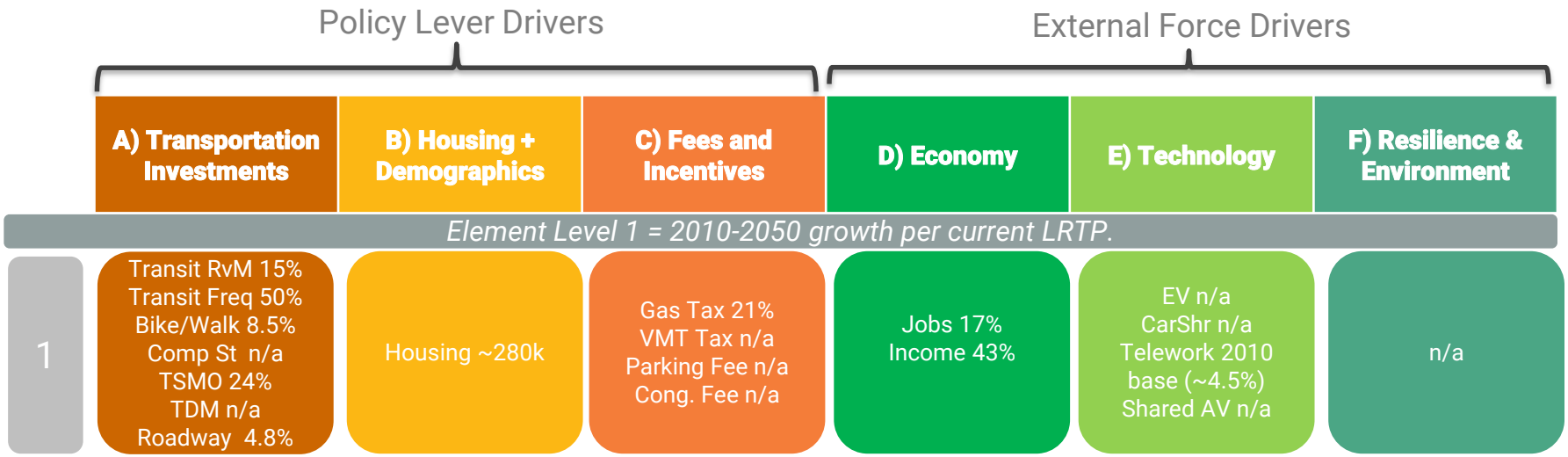
All Drivers: Element Level 1*



Between 2010 and 2050:

- Transit revenue miles increase 15%, primarily due to a 50% increase in transit frequency (i.e., reduced headways on key routes)
- Bike and walk trips increase 8.5%
- 24% of freeway DVMT is on corridors with TSMO controls such as ramp metering, incident management, signal coordination.
- There are 4.8% more roadway lane miles
- There are 280,000 more housing units
- Average gas tax increases 21%
- There are 17% more jobs, and per capita income has increased 43%
- About 4.5% of employees work from home (typical pre-2020 level)

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Driver A: Transportation Investments*

Policy Lever Drivers | External Force Drivers

A) Transportation Investments	B) Housing + Demographics	C) Fees and Incentives	D) Economy	E) Technology	F) Resilience & Environment

Element Level 1 = 2010-2050 growth per current LRTP. Levels 2-6 = Level 1 + additional growth or new changes by 2050

Elements

	A) Transportation Investments	Between 2010 and 2050, in addition to Level 1:
1	Transit RvM 15% Transit Freq 50% Bike/Walk 8.5% Comp St n/a TSMO 24% TDM n/a Roadway 4.8%	
2	Transit RvM 25% Transit Freq 25% Bike/Walk 25% Comp St 1%	• Transit revenue miles and frequency increase 25% • Bike and walk trips increase 25% • 1% of 3,000 urban arterial lane miles are reduced to encourage more active travel
3	Transit RvM 35% Transit Freq 35% Bike/walk 50% Comp St 2%	OR • Transit revenue miles and frequency increase 35% • Bike and walk trips increase 50% • 2% of 3,000 urban arterial lane miles are reduced to encourage more active travel
4	TSMO 50% TDM 50%	OR • 50% more regional freeway DVMT is on corridors with TSMO controls • Participation in TDM programs increases 50%
5	TSMO 50% Roadway 10%	OR • 50% more regional freeway DVMT is on corridors with TSMO controls • The number of freeway and arterial lane miles increases 10%

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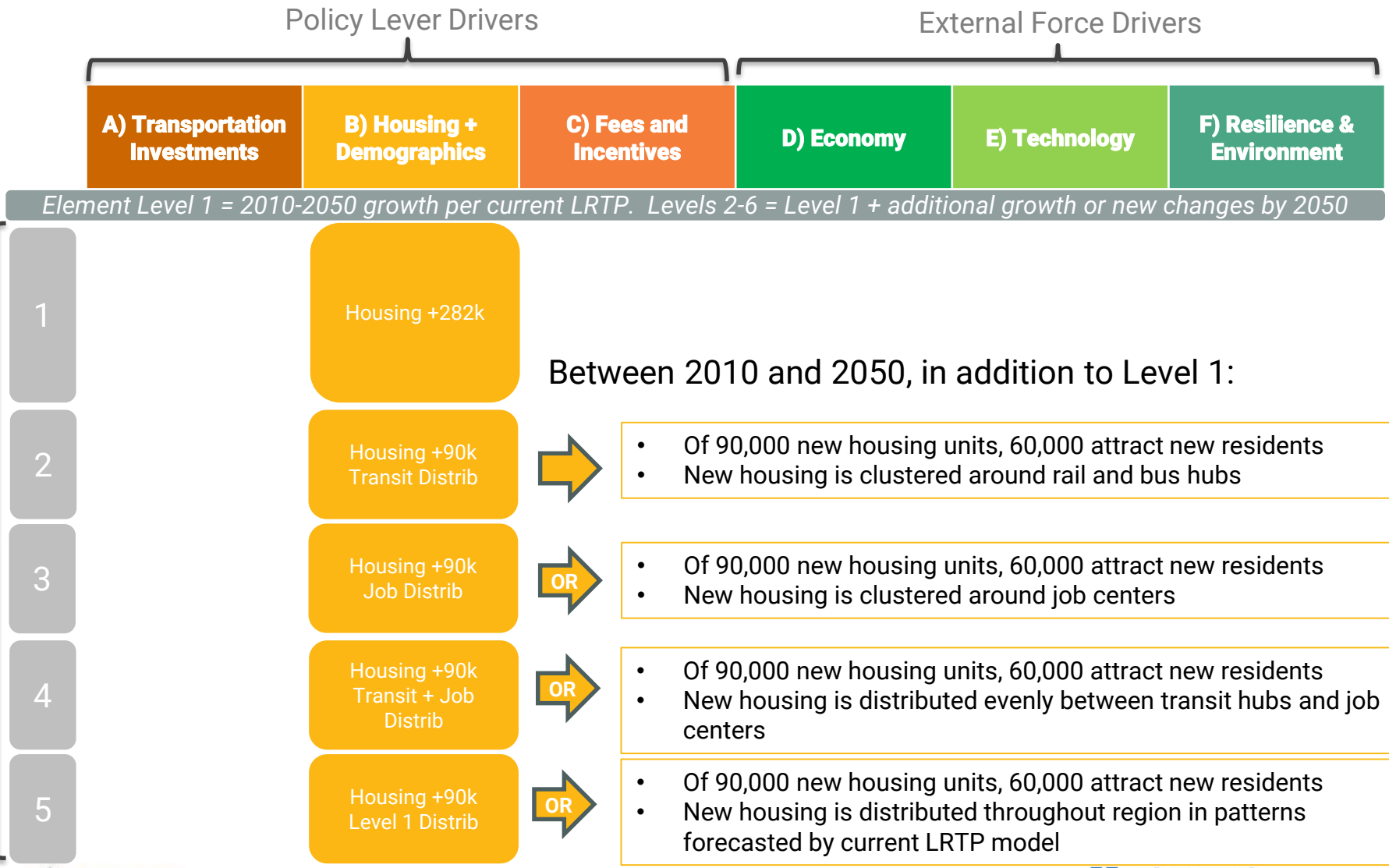
Driver B: Housing & Demographics*



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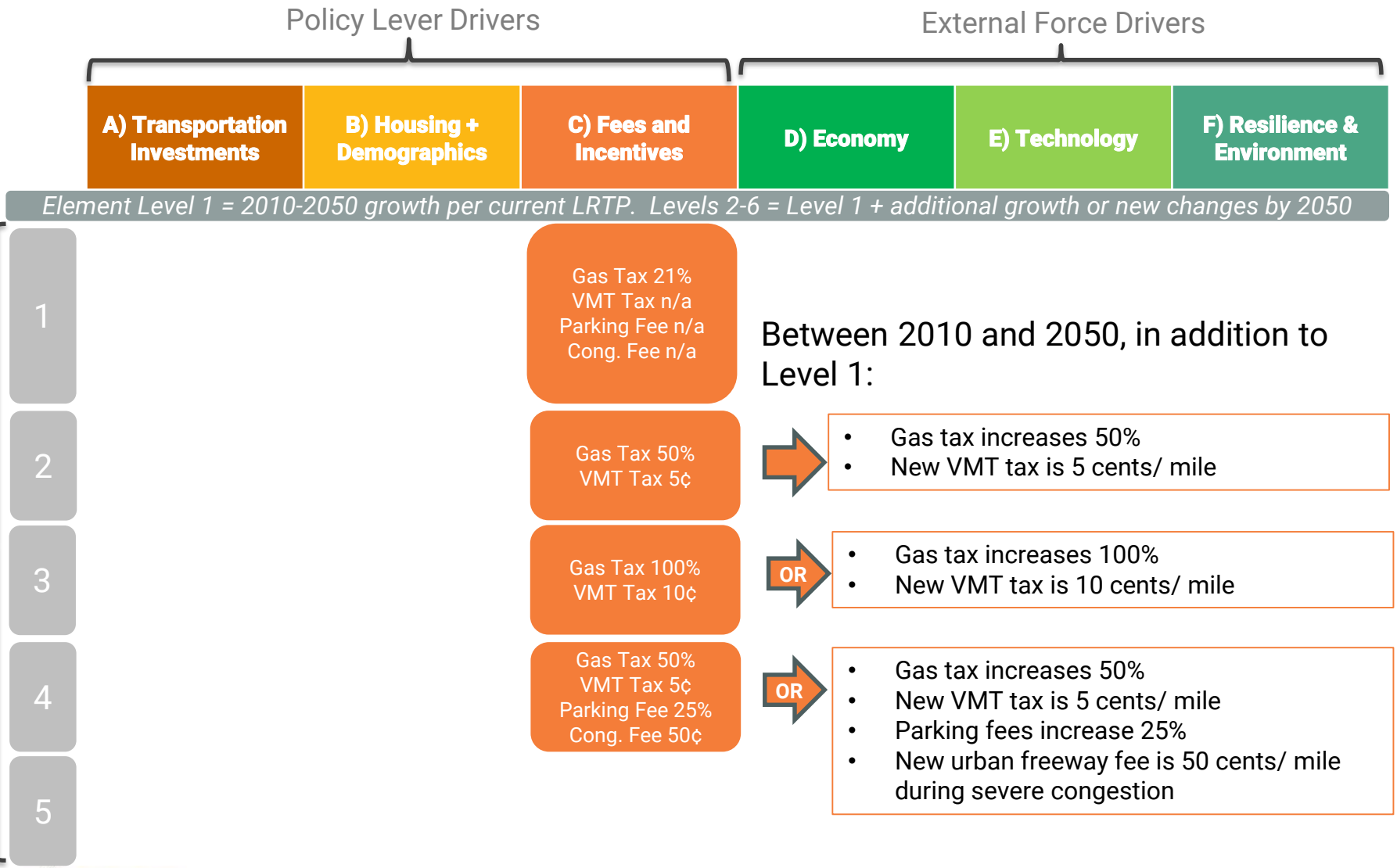
Driver C: Fees and Incentives*



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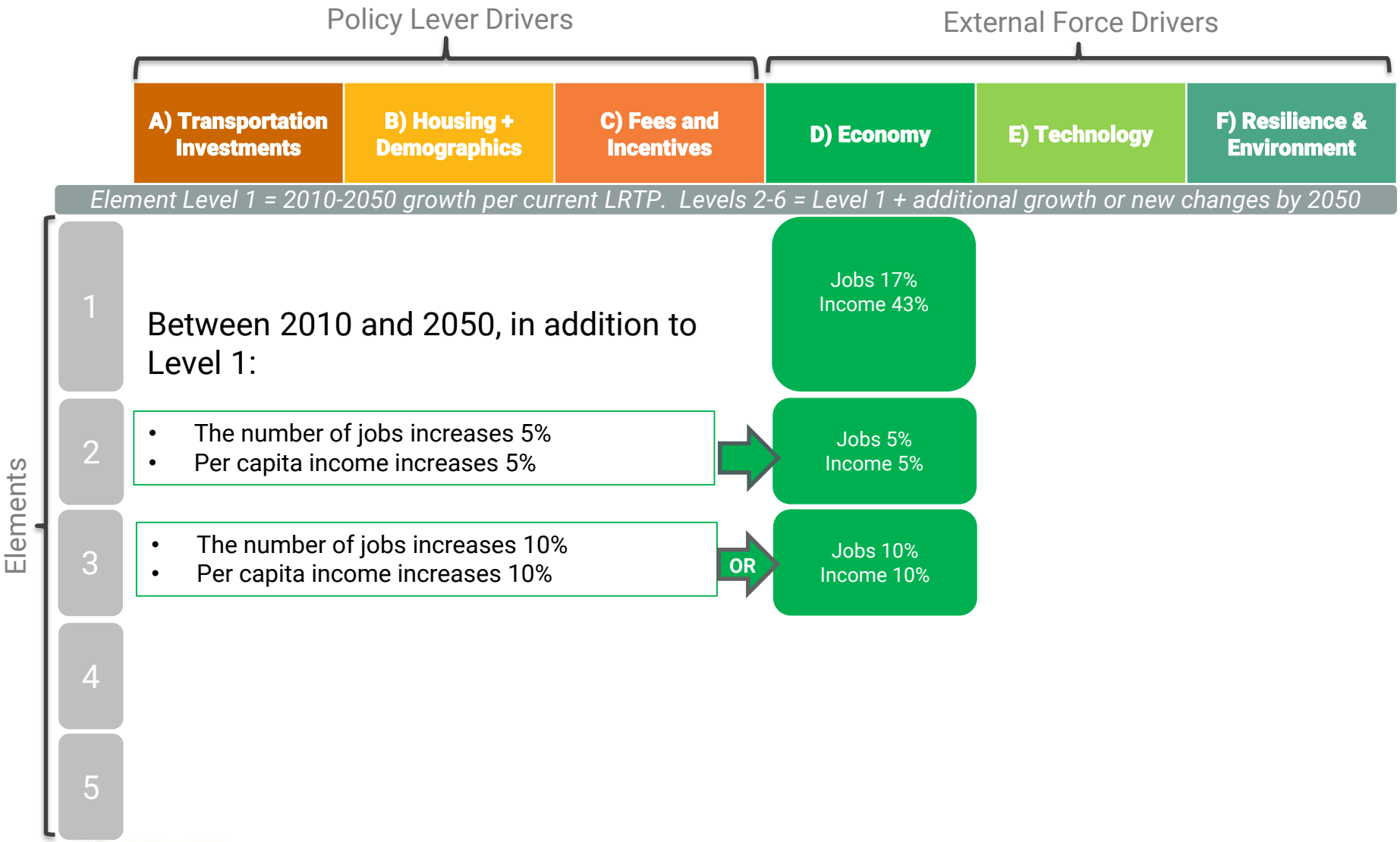
Driver D: Economy*



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Driver E: Technology*

Policy Lever Drivers

External Force Drivers

A) Transportation Investments	B) Housing + Demographics	C) Fees and Incentives	D) Economy	E) Technology	F) Resilience & Environment

Element Level 1 = 2010-2050 growth per current LRTP. Levels 2-6 = Level 1 + additional growth or new changes by 2050

Elements

1	Between 2010 and 2050, in addition to Level 1:	EV n/a CarShr n/a Telework 2010 base (~4.5%) Shared AV n/a
2	• All cars and trucks run on electric power • 80% of multifamily units have EV charging facilities	EV fleet 100% EV charging 80%
3	• Car-sharing services are abundant, cost-effective, and popular	OR CarShr Svc High CarShr Cost 2% CarShr Appeal 25%
4	• 50% more employees work from home	OR Telework 50%
5	• Shared automated vehicles (e.g., driverless ridehailing, microtransit) are abundant, cost-effective, and popular	OR Shared AV: High

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Driver F: Resilience & Environment*

Policy Lever Drivers

External Force Drivers

A) Transportation Investments	B) Housing + Demographics	C) Fees and Incentives	D) Economy	E) Technology	F) Resilience & Environment

Element Level 1 = 2010-2050 growth per current LRTP. Levels 2-6 = Level 1 + additional growth or new changes by 2050

Elements

1	n/a
2	Inundation Map Overlay
3	
4	Vulnerable Populations Map Overlay
5	

Implications for all combinations of Elements within Drivers A, B, C, D, and E will be considered in light of:

- Anticipated inundation of coastal and low-lying land and infrastructure due to sea level rise and persistent flooding
- Locations and numbers of people with high vulnerability to transportation barriers (e.g., persons with disabilities, older adults, low-income or zero-vehicle households)

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Scenario Outputs: Performance Measures*

Improve Accessibility *How easily can people reach destinations or activities using a variety of transportation options?*	**Improve Mobility** *How do people travel and how efficient and reliable is their travel?*	**Improve Safety** *Reduce the number of crashes, injuries and fatalities for all transportation system users*	**Implement Environmentally Responsible Transportation Solutions** *Pass on to future generations the healthiest natural and human environment possible. Improve resilience to climate change risks.*	**Promote Economic Prosperity and Opportunity** *Support the vitality of communities and business, opportunities for workers, and the movement of goods and services*
All scenarios account for a variety of scales (regional, local) and demographic groups.				
Access to jobs by car, transit, bike, and walk (e.g., # of jobs accessible within 20-minute trip)	Vehicle Miles Traveled (VMT)	Crash Rates	GHG Emissions per capita and by vehicle type	Transportation revenues
Access to shopping, medical care, education, etc. (TBD with InSITE model)	Number and Percentage of Bike, Walk, Transit, and HOV Trips	Vehicle Passenger Injuries and Fatalities	Fuel consumption per capita	Transportation costs per household and per vehicle
	Hours of Delay	Non-Motorist Injuries and Fatalities	Fuel efficiency of vehicle fleet	Transportation + housing costs per household
	Travel Time Reliability		Impacts of sea level rise & flooding inundation on network connectivity & accessibility	

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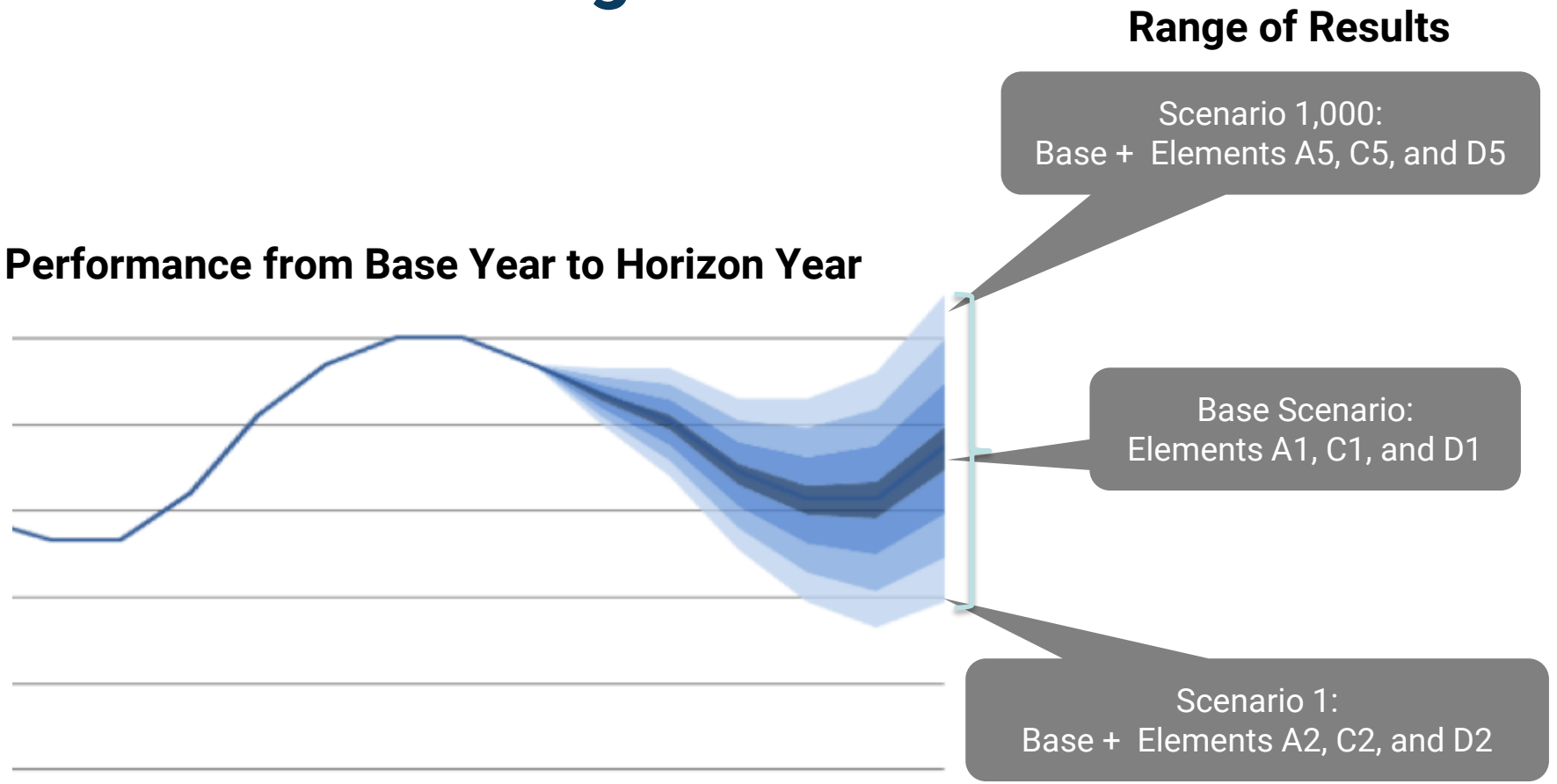
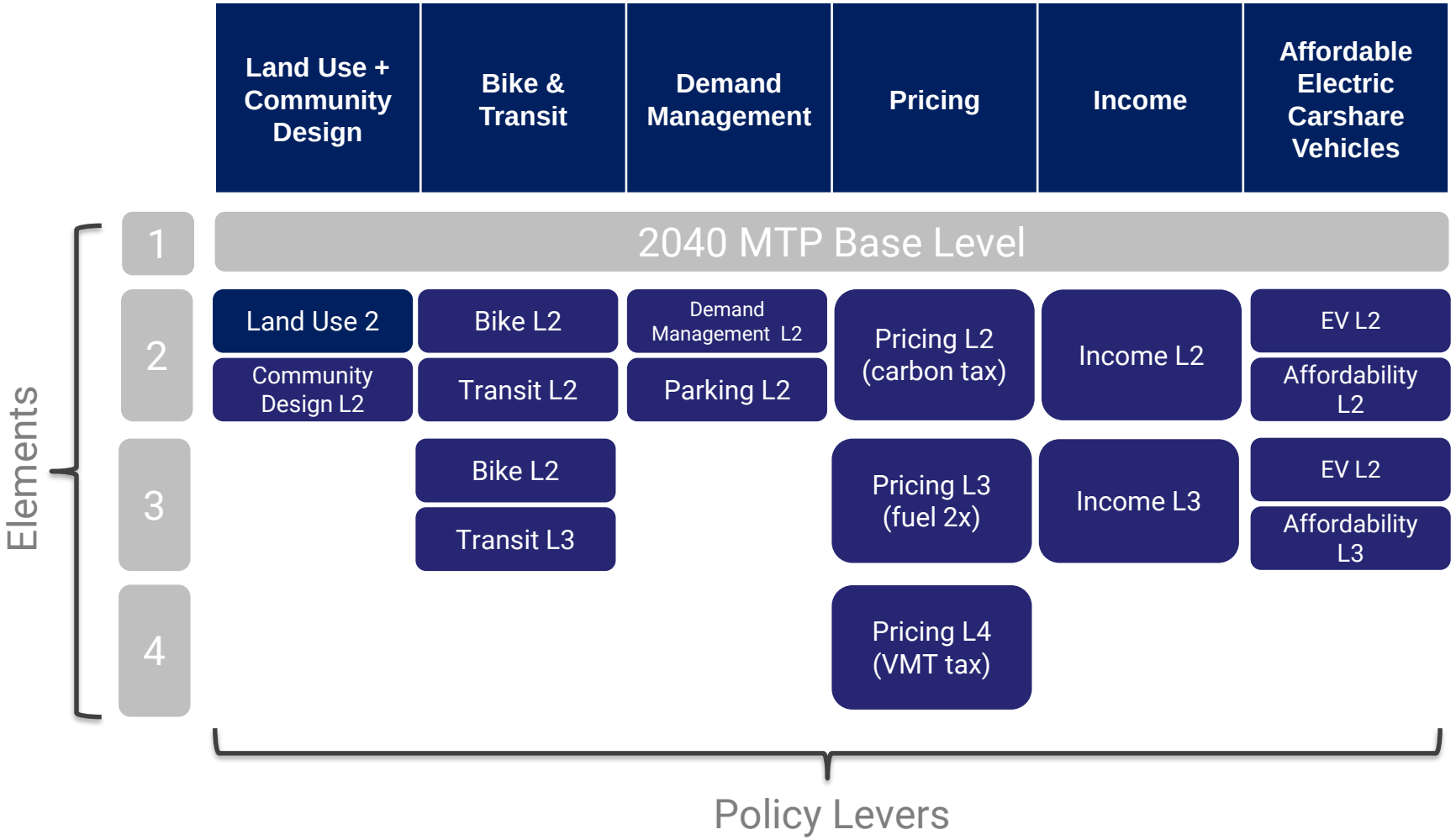
Scenario Testing



Example Visualization: Chittenden County, Vermont I-89 Study



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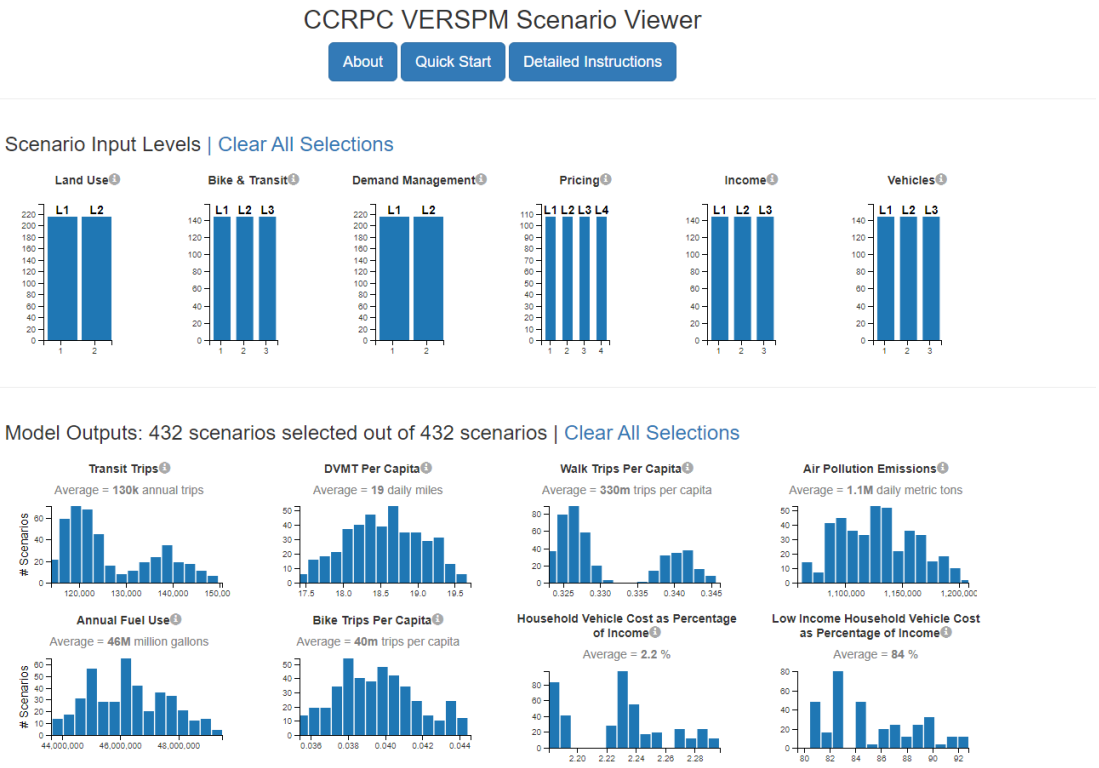
Building Scenarios by “Goal-Seeking”

Look for the best combination of policy elements …

…by selecting a desired set of results



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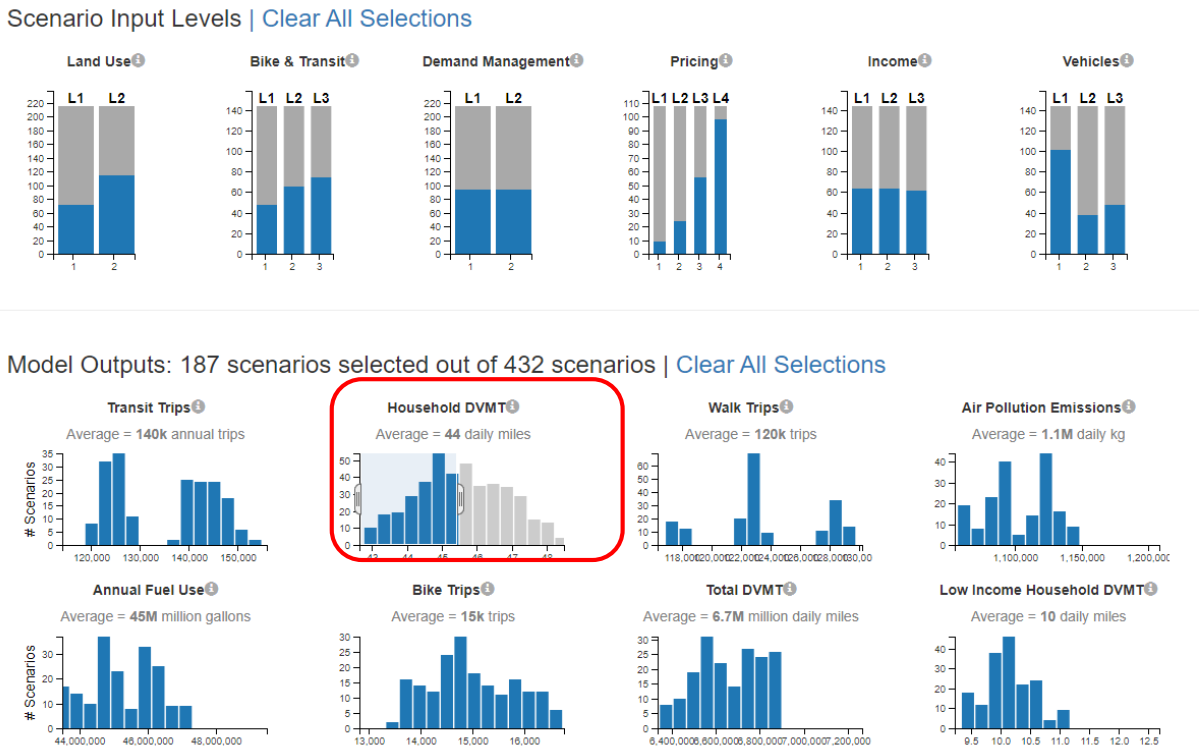
Best Policies to Reduce Household DVMT

- Higher population growth in more dense, mixed-use communities (Land Use L2)
- Greater access to bike and transit (Bike & Transit L3)
- VMT tax particularly impactful (Pricing L4)
- Current MTP carsharing & EV policies (Vehicles L1)
- Demand management and income polices less sensitive



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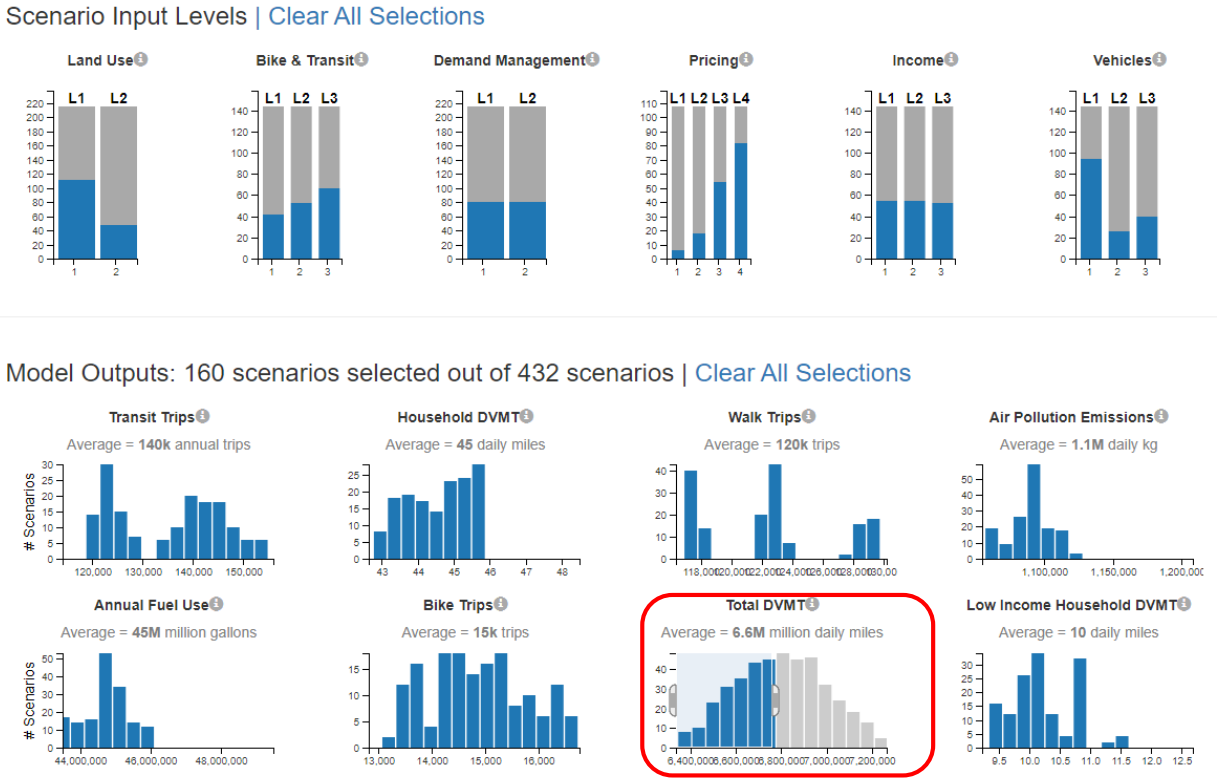
Best Policies to Reduce Overall DVMT

- Current MTP population growth (Land Use L1) plus compact community design (Land Use L2)
- Otherwise, the same combination as Best Policies to Reduce Household DVMT



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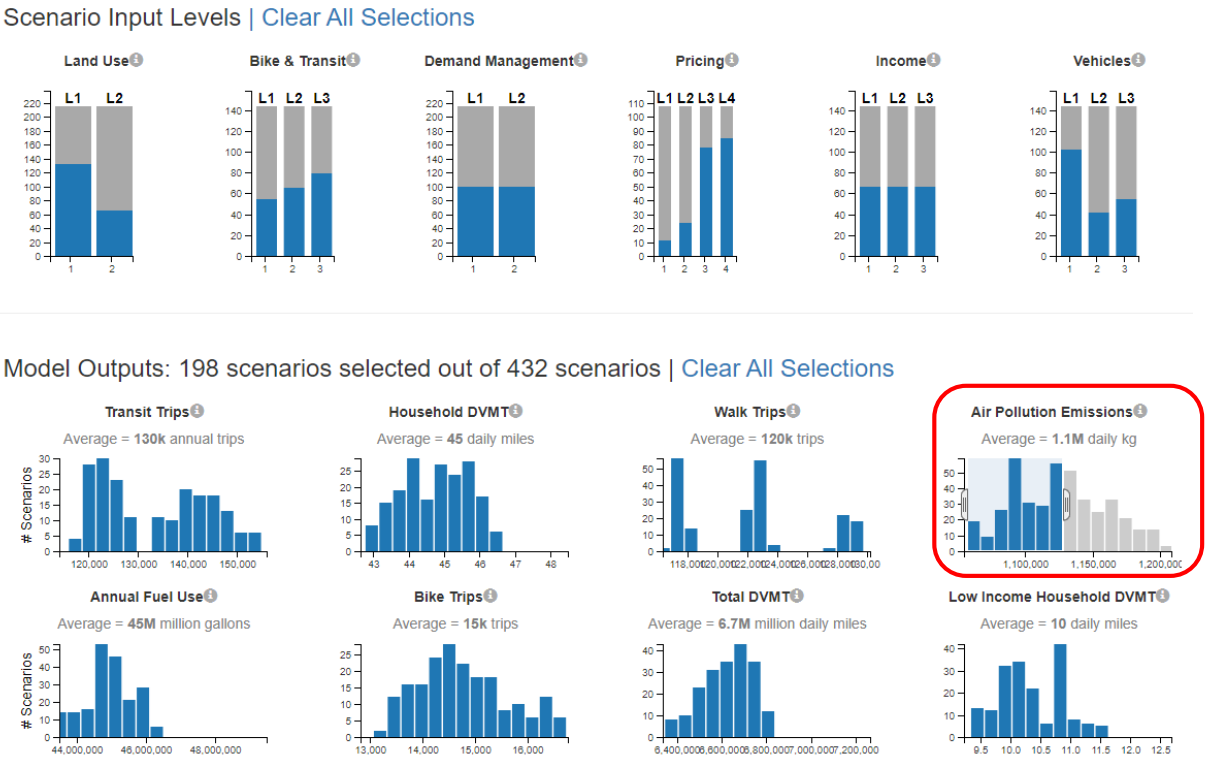
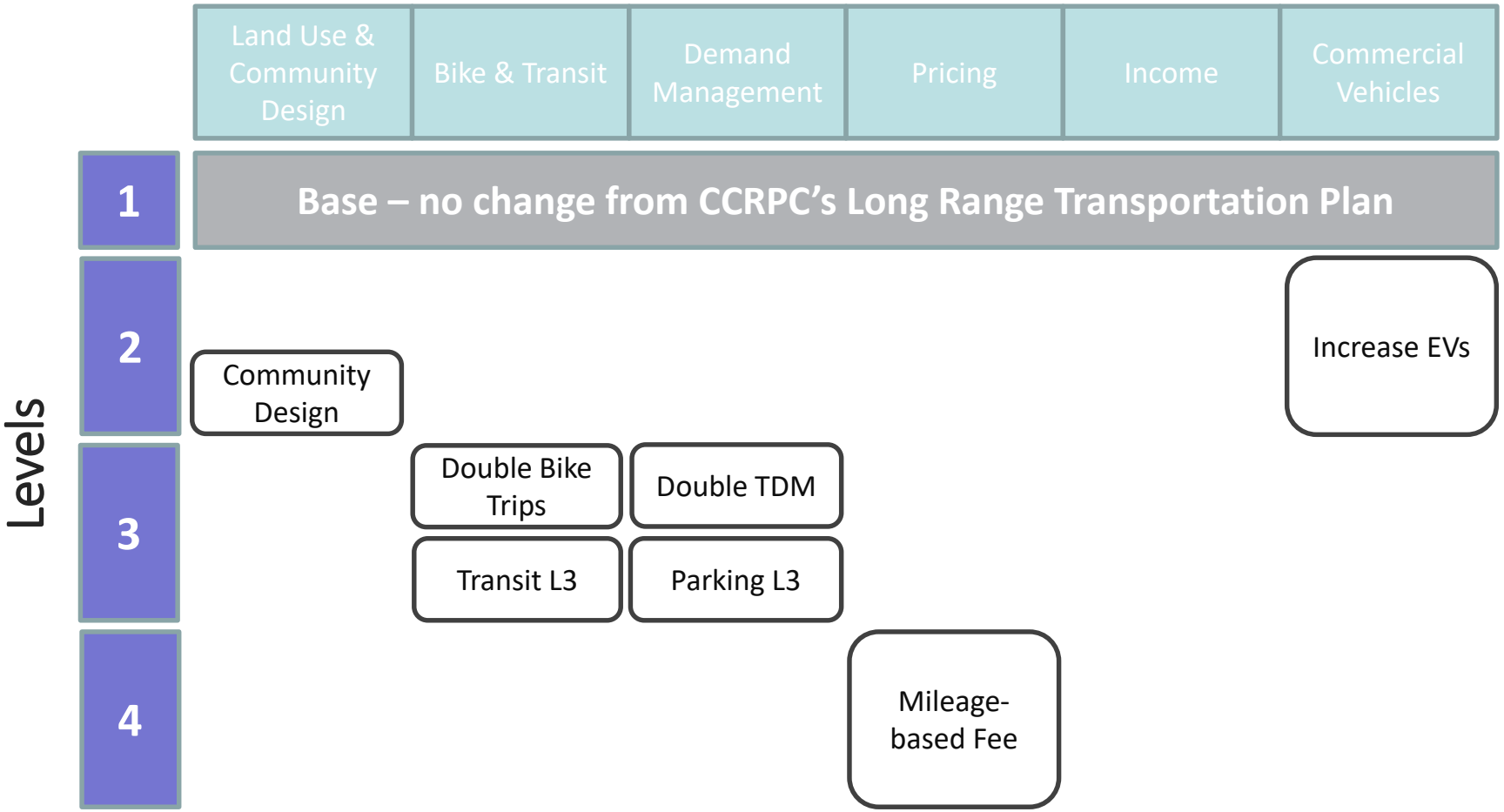
Best Policies to Reduce GHG

- Essentially the same combination as Best Policies to Reduce Overall DVMT



Best Combination of Policies

Based on evaluation of all Driver + Element Level combinations



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I-89 TDM Recommendations

- Increase teleworking by 50%
- Metropolitan Transportation Plan land use density (90% of Households in existing developed areas)
- Double trips made by bike
- Triple transit services and improve frequencies
- Double participation in TDM programs and increase cost of parking
- Mileage-based fee (5 cents/mile)

Total VMT reduction between 10% and 20%

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BRTB Scenario Planning: Next Steps

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- Refine the overall work plan
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- Design and implement public survey
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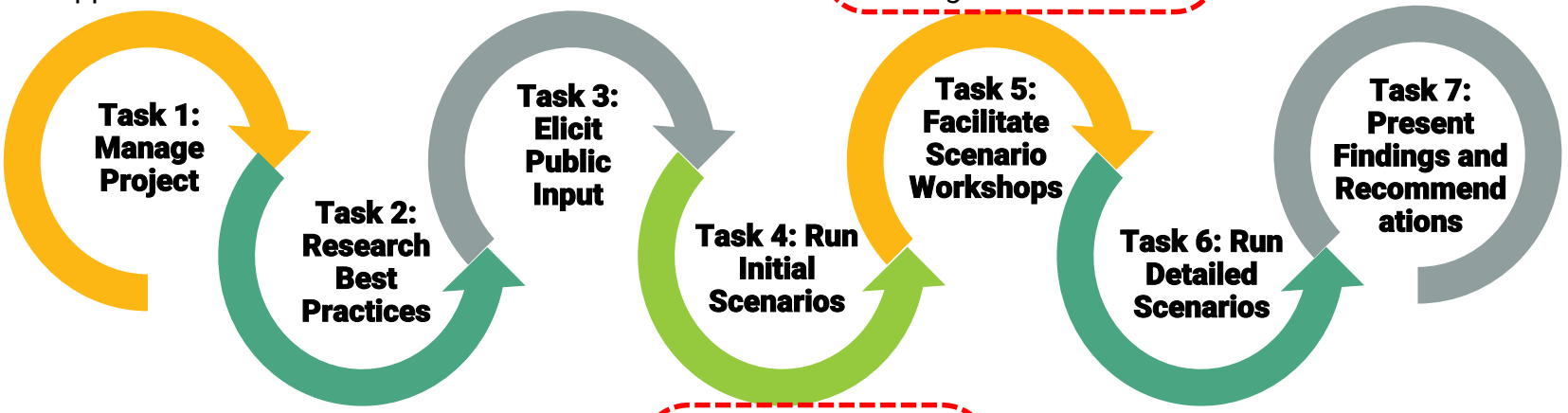

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