



I-89 2050 Study

**Strategic Model: TDM /Bike /Ped/
Transit/other Investments**

CCRPC TAC – December 7th, 2021



Context and Background

MTP Investments for 2050

2050 MTP Transportation Capital Investments: \$420M

- \$215M Multimodal Roadway Improvements
- \$74M Interstate & Interchange Projects ← Dollars available for additional TDM investments
- \$70M Bicycle & Pedestrian Enhancements
- \$40M Transit Expansion (*capital investments*)
- \$16M Stormwater/Environmental
- \$6M Park & Ride Facilities

Vehicle Fleet Electrification

- 89% of fleet electrified by 2050
- Consider investments in charging stations



Proposed I-89 Corridor Bundles (2050)

		Bundle 1 No Build	Bundle 2 TDM / Bike/Ped / Transit	Bundle 3 Exit 14 DDI	Bundle 4 Exit 13 SPDI	Bundle 5 Exit 12B
	Investments					
Multimodal Operational Improvements	CCRPC MTP Investments		✓	✓	✓	✓
	Public Transit (<i>new service, increased frequency, etc.</i>)		✓	✓	✓	✓
	Biking (<i>lanes, paths, signals, etc.</i>)		✓	✓	✓	✓
	Walking (<i>sidewalks, paths, crosswalks, signals, etc.</i>)		✓	✓	✓	✓
	Transportation Demand Management (<i>park and ride lots, ridesharing, telecommuting, TMA, etc.</i>)		✓	✓	✓	✓
	Intelligent Transportation Systems (<i>signage, signals, etc.</i>)		✓	✓	✓	✓
	Interchange Geometric & Safety Enhancements		✓	✓	✓	✓
Capacity Expansion	Exit 14 Diverging Diamond Interchange			✓	✓	✓
	Exit 13 Single Point Diamond Interchange				✓	
	Exit 12B New Interchange					✓
	I-89 Third Lane (TBD)				?	?

Why Strategic Model?

- Travel demand models are insensitive to many of the TDM policies and investments considered in the I-89 Corridor Bundle 2
- Strategic model is an econometric model that is sensitive to:
 - a variety of policies and investments that affect household travel
 - the modes (bus, walk, taxi, bike) that travel can take
 - how travel may be constrained by pricing





I-89 TDM Focus Group

I-89 TDM Focus Group Participants

- Jill Allen, Transportation Equity Coalition
- Billy Miles, Transportation Equity Coalition
- Kirsten Nielsen, Transportation Equity Coalition
- Amy Bell, Dan Currier, Costa Pappis, Joe Segale, VTrans
- Matt Boulanger, Town of Williston
- Justin Rabidoux, City of South Burlington
- Jamie Smith and Chris Damiani, GMT
- Jennifer Green, Burlington Electric Dept.
- Sandy Thibault, CATMA
- Jonathon Weber, Karen Yacos, Local Motion
- Dale Azaria, Conservation Law Foundation
- Jack Hanson, Sustainable Transportation Vermont
- CCRPC, RSG, VHB Staff



I-89 Corridor TDM Focus Group Role

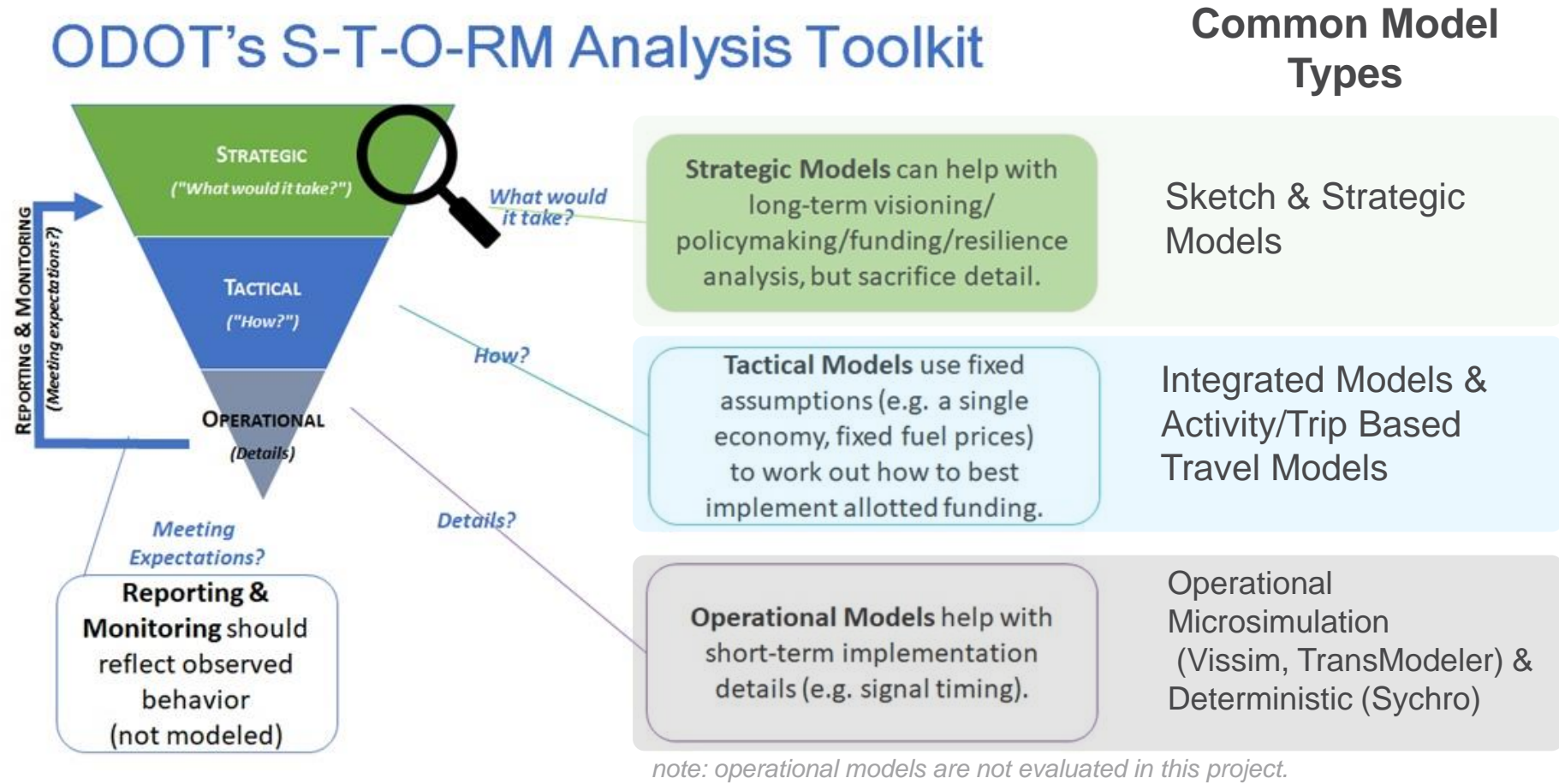
- Inform policies and investments to evaluate
 - Where to apply policies
 - What assumptions and values should be tested
- Review results
- Provide direction on the investment packages to advance





Strategic Planning Model

Model Type Hierarchies (Oregon example)



Source: Oregon DOT adapted by RSG



When are Strategic Models appropriate?

When the policy questions involve complexity and uncertainty

- Impacts of
 - Emerging trends such automated vehicles, driver licensing rates, scooters/e-bikes, etc., on total VMT
 - Electrification
 - Travel demand management policies, parking, and pricing
 - Car sharing, shared travel / ride-hailing and pooled vehicles

How does this work?

- Uses econometric theory along with engineering concepts
- Uses available socioeconomic and demographic data
- Outputs provide helpful information but not overly detailed to the point that precision is mistaken for accuracy



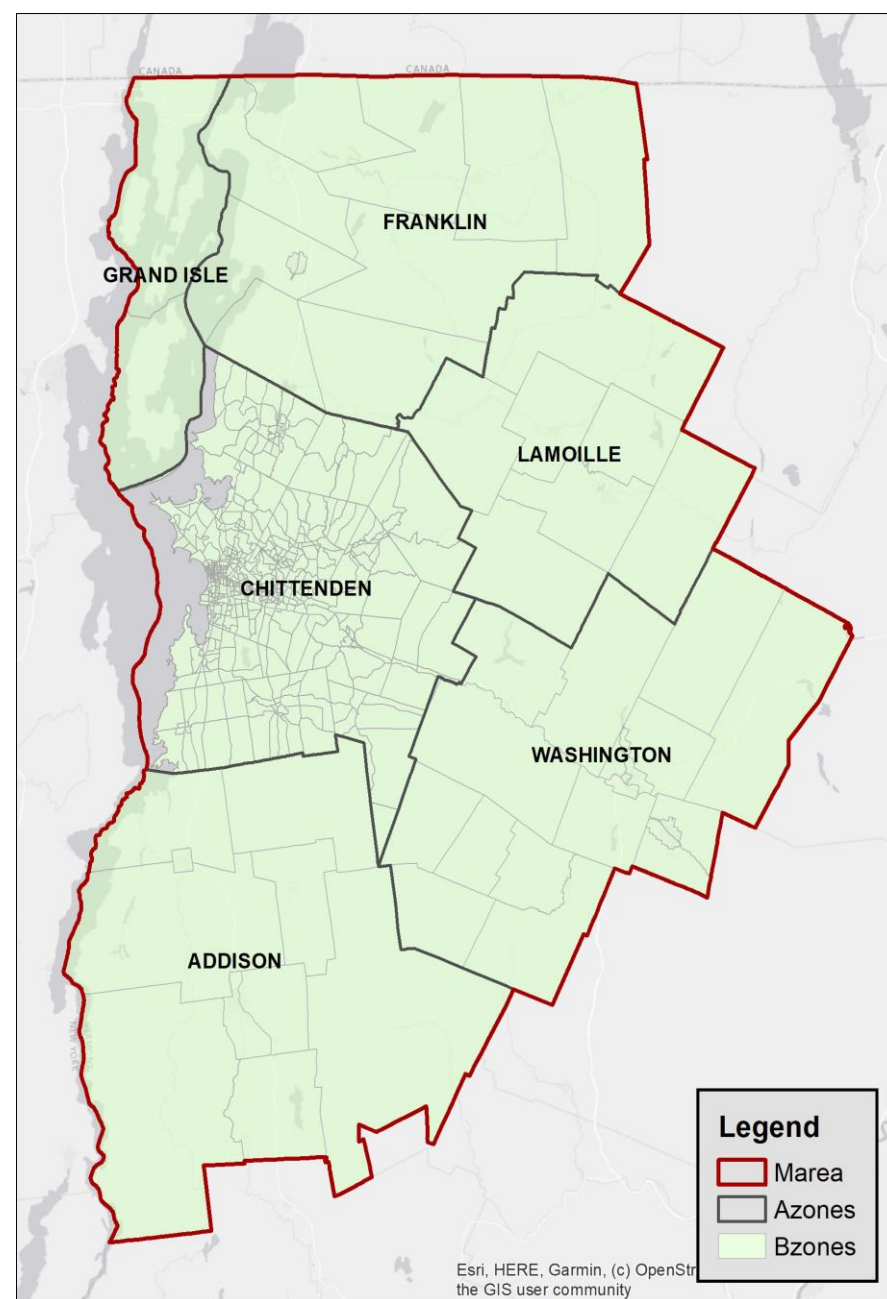
Regional Model Area

M-areas represent metropolitan urbanized areas and the boundary of the model region. Chittenden County and 5 surrounding counties.

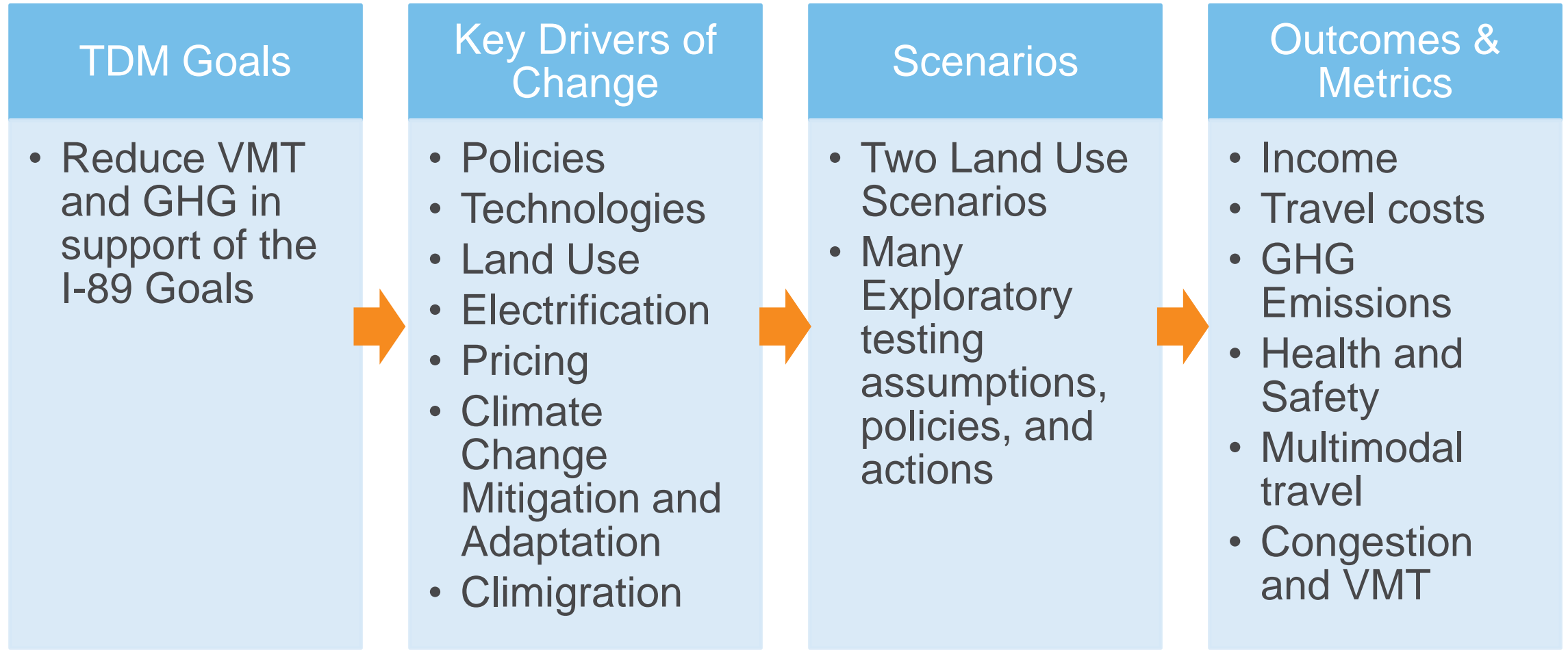
A-zones are large subdivisions of the M-area. The A-zones in this model are set at the county level.

B-zones are subdivisions of A-zones.

- Provide more granularity on the intensity and nature of development.
- Within Chittenden County are the same as the Traffic Analysis Zones in the regional travel demand model.
- Outside Chittenden County, Census Tracts are the B-zone boundaries.



Planning Outcomes with Strategic Model

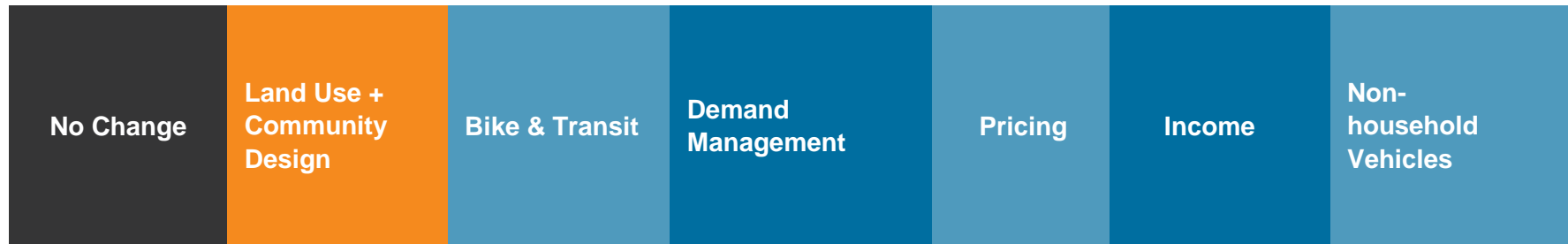




Packages of Investments

Scenario Testing Structure

- The baseline will be tested against six future alternative “packages” analyzed for 2050



- Each package has different levels to which it is evaluated in the model
- The Model will run all the combinations of levels within the six packages

Land Use & Community Design

Land Use: Inputs on housing and population

- Housing by dwelling unit type and population by age cohorts
- Levels:
 - L1: CCRPC MTP forecast
 - L2: assumes additional 10% increase in housing and population growth in Chittenden County and reduced growth in surrounding counties

Mixed-use neighborhoods and walkability

- Share of urban households in a mixed-use neighborhood & density of pedestrian-oriented intersections per square mile
- Levels:
 - L1: Base
 - L2: 50% increase in mixed-use and walkability



Bicycle & Transit

Bicycle & Personal lightweight devices

- Target proportion of trips that can be completed by bicycle, scooter, etc. (eligible SOV trips with round-trip distances of 20 miles or less) by county
- Levels:
 - L1: Base
 - L2: Double trips for each county

Transit

- Miles in Service by mode (demand response, commuter bus, regular bus) model wide & frequency (number of buses within a .25 mile)
- Levels:
 - L1: Base
 - L2: Moderate increase in existing services and frequency (reduction of headways)
 - L3: Substantial increase in existing services and frequency (reduction of headways)



Demand Management

Inputs on travel demand management (TDM) programs and parking

TDM Participation

- Increase the proportion of workers participating in commute TDM program and participation of households in TDM programs

Parking

- Average number of free parking spaces per dwelling unit (SF, MF, GQ) and average daily cost for parking

	Single Family	Multi-Family	Group Quarters	Cost (\$2010)
Level 1 (base)	4	1	0.5	\$5 – \$8
Level 2	2	0.5	0.25	\$10 – \$15



Pricing

Inputs on fuel costs, VMT taxes, and/or carbon taxes

- **Fuel Costs & Carbon Tax**

- Retail costs of fuel and electric power and excise taxes on fuel by county
- Carbon pricing based on the embedded carbon in the fuel being consumed (gas, diesel, PHEVs, etc.) model-wide

- **VMT Tax**

- Tax per mile of all vehicle travel (2010 dollars)

	Fuel Cost	Power Cost	Fuel Tax	VMT Tax	Carbon Tax
Level 1 (base)	\$2.69	\$0.22	\$0.30	\$0.00	0
Level 2 (carbon)	\$2.69	\$0.22	\$0.30	\$0.00	\$50.00/ ton CO2e
Level 3 (2x fuel)	\$5.38	\$0.44	\$0.30	\$0.00	0
Level 4 (VMT)	\$2.69	\$0.22	\$0.30	\$0.05	0



Household Income

Income Disparity

- Share of households in 1st, 2nd, 3rd, and 4th quartile of household income in Chittenden County
- Vary the future income disparity (households in 1st and 4th quartiles).

Income Disparity	
Level 1 (base)	-
Level 2 (increase disparity)	10% increase in HH in Q1/Q4 10% reduction in HH in Q2/3
Level 3 (decrease disparity)	10% reduction in HH in Q1/Q4 10% increase in HH in Q2/3



Non-household Vehicles

Inputs on vehicle powertrains and ride hailing availability

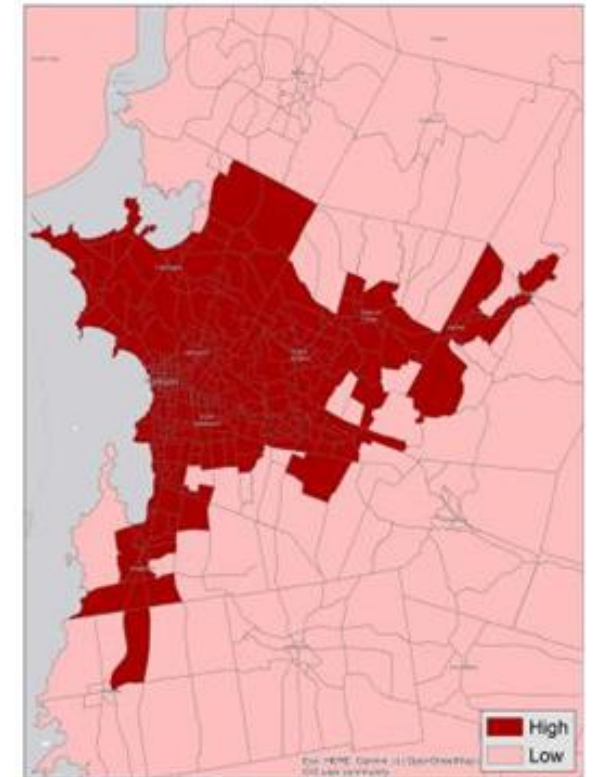
Powertrains

- Proportions for non-household vehicles (heavy trucks, commercial service light-duty vehicles, buses, etc.)
- Level: Increase EVs for transit, car service, and commercial service vehicle

Ride Hailing Availability

- Two levels of ride hailing; high in urban areas of Chittenden County and low in all other areas
- 90% of ride hailing (personal) vehicles are EVs

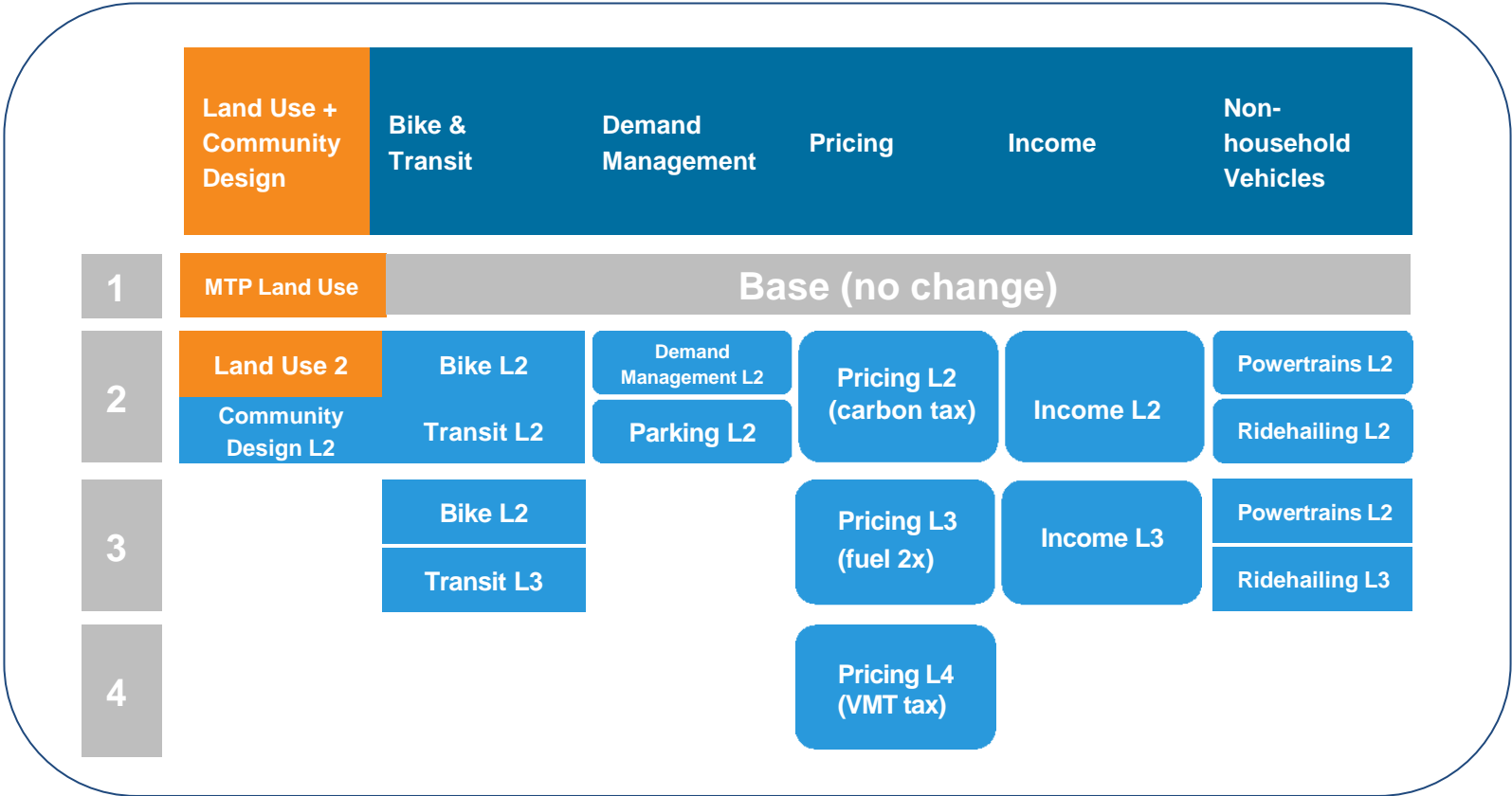
Area with High Service
(Levels 2 & 3 only)





Strategic Model Runs, Results

Scenario Testing Structure



2 x 3 x 3 x 4 x 3 x 2 = 432 possible scenarios!

Selected Scenarios (Draft)

Low Daily Vehicle Miles Travel (VMT)

- Less ride hailing opportunities
- MTP Land Use
- Double Bike Share
- Triple Transit Services and improve frequencies
- Increase participation in TDM programs and cost of parking
- Universal VMT Tax (5 cents/mile)
- No changes in income distribution

Low Green House Gas (GHG) Emissions

- More EVs for non-household vehicles



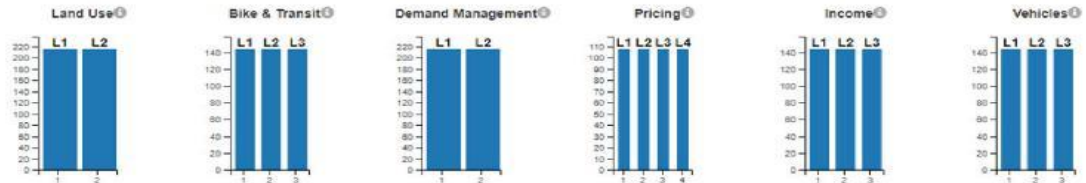
Scenario Viewer can Goal-Seek Solutions

You can see the set of policies...

CCRPC VERSPM Scenario Viewer

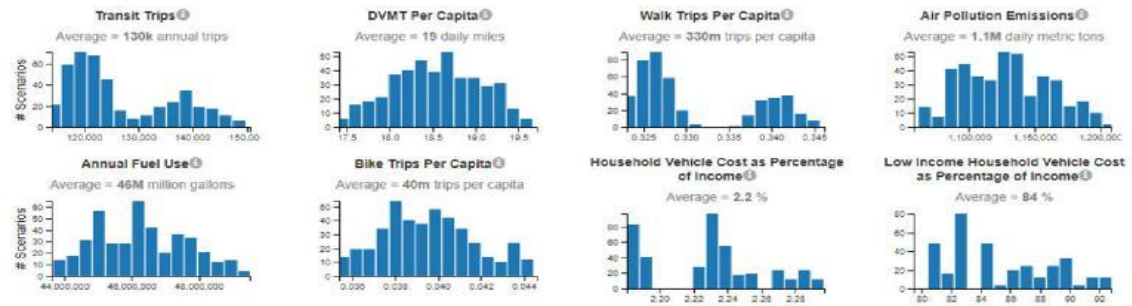
About Quick Start Detailed Instructions

Scenario Input Levels | Clear All Selections



...by selecting a desired set of results

Model Outputs: 432 scenarios selected out of 432 scenarios | Clear All Selections





Next Steps

I-89 Study Next Steps

- Discussions with RSG and VHB on ways to incorporate relevant strategic model outputs into the TDM/Transit/Bike/Ped I-89 Bundle 2
 - Likely nexus between strategic and regional models is VMT percent change
- Use Bundle 2 transportation network as the base to run Bundles 3 (*Exit 14 DDI*), Bundle 4 (*Exits 14 DDI & 13 SPDI*), and Bundle 5 (*Exits 14 DDI & 12B*)
- Possible capacity increase of the I-89 mainline will be evaluated
- Numerous opportunities to engage and provide feedback
 - Public Meetings in January, April, and June
 - CCRPC committee presentations





Thank you!