

SCENARIO PLANNING PEER EXCHANGE

Sponsored by:

FHWA Office of Planning

Hosted by:

Piedmont Authority for Regional Transportation

May 3, 2023

Welcome!

We are excited to have you here today.

Thank you for joining us!

Transportation Planning and Capacity Building (TPCB) Program

- Designed to help decision makers, transportation officials, and staff resolve the increasingly complex issues they face when addressing transportation needs in their communities.
- Targets State, local, regional, and Tribal governments, transit operators, and community leaders.

Purpose of Peer Exchange

- This peer exchange will introduce the concept of scenario planning to build awareness and encourage information-sharing among transportation planning agencies in the Piedmont Triad.

WELCOME AND INTRODUCTIONS

Jeremy Raw, FHWA Office of Planning

Mark Kirstner, PART

George Hoops, FHWA NC Division

Liz Biskar, U.S. DOT Volpe Center

WELCOME TO OUR PEERS

Dale Stith, Hampton Roads Transportation
Planning Organization (HRTPO)

Martin Rivarola, Mid-America Regional Council
(MARC)

Peer Exchange Agenda – May 3

- 9:00 – 9:30 AM Welcome and Introductions
- 9:30 – 9:50 AM Getting Started: An Overview of Scenario Planning
- 9:50 – 10:45 AM Scenario Planning in the Piedmont Triad: Setting the Course – Past, Present, and Future
- 10:45 – 11:00 AM BREAK
- 11:00 AM – 12:00 PM Peer Presentation 1: *Using Scenario Planning to Prepare for Uncertainty*
- 12:00 – 1:15 PM Lunch

Peer Exchange Agenda – May 3 (Continued)

- 1:15 – 2:15 PM Peer Presentation 2: *Assessing and Implementing Scenarios*
- 2:15 – 2:30 PM Break
- 2:30 – 3:15 PM Virtual Presentation and Q&A: *Introducing a New Transportation Planning Paradigm*
- 3:15 – 4:15 PM Breakout Group Discussion and Report-Out
- 4:15 – 4:30 PM Recap of Day / Next Steps

GETTING STARTED: AN OVERVIEW OF SCENARIO PLANNING

Featured Speaker:

Jeremy Raw, P.E.

Office of Planning

Federal Highway Administration (FHWA)

FHWA Scenario Planning Guidebook

FHWA Scenario Planning Guidebook

September 2010

Prepared for:
Office of Planning
Federal Highway Administration
U.S. Department of Transportation

Prepared by:
Transportation Policy, Planning and Organizational Excellence Division
John A. Volpe National Transportation Systems Center
Research and Innovative Technology Administration
U.S. Department of Transportation




Stakeholder Involvement Identify, Prepare, and Refine Analysis Tools Data Collection	1	How should we get started?	Scope the effort and engage partners. Considerations: Process goals, objectives, budget, and stakeholder roles and responsibilities.	Output: Work plan.
	2	Where are we now?	Establish baseline analysis; identify factors and trends that affect the state, region, community, or study area. Considerations: Transportation and land supply, suitability, and demand; state, regional, community, or study area trends.	Outputs: Transportation systems inventory, land suitability analysis, evaluation of historic trends.
	3	Who are we and where do we want to go?	Establish future goals and aspirations based on values of the state, region, community, or study area. Considerations: Key values and priorities for the state, community, region, or study area.	Outputs: Set of working principles that document broad state, community, region, or study area goals and preferences.
	4	What could the future look like?	Create baseline and alternative scenarios. Considerations: Scenario types, analysis tools, travel demand model.	Outputs: Identification of appropriate scenario analysis tool or refinement of travel demand model; baseline and alternative scenarios.
	5	What impacts will scenarios have?	Assess scenario impacts, influences, and effects. Considerations: Indicators to help evaluate scenario performance.	Outputs: Refined or calibrated analysis tool(s) or model(s) if necessary. List of indicators to compare scenario outcomes. Qualitative or quantitative assessment of scenario impacts.
	6	How will we reach our desired future?	Craft the comprehensive vision; identify strategic actions and performance measures. Considerations: Stakeholder feedback on scenarios and the future blueprint; potential actions, investments, or policies to lead the state, community, region, or study area toward the comprehensive vision.	Outputs: Comprehensive vision, action steps, performance measures to assess progress, plan for monitoring progress.

NEXT GENERATION SCENARIO PLANNING: A TRANSPORTATION PRACTITIONER'S GUIDE



U.S. Department
of Transportation

**Federal Highway
Administration**

Next Generation Scenario Planning

A TRANSPORTATION PRACTITIONER'S GUIDE

- Three styles of scenario planning
 - Predictive – work out most likely future
 - Normative – how to get the future we want
 - Exploratory – what could happen?

**A Scenario Planning process
may include all these styles**

Next Generation Scenario Planning

A TRANSPORTATION PRACTITIONER'S GUIDE

- “Predictive” scenario planning tries to tell us how the world is going to be
- Often: one hypothetical future target that helps us reasonably assess projects
- Predictions often emerge from normative and exploratory scenarios
- The best predictions are regularly reconsidered and revised

**Scenario Planning provides a
backdrop for planning decisions**

Next Generation Scenario Planning

A TRANSPORTATION PRACTITIONER'S GUIDE

- “Normative” scenario development explores what is important
- Replace “certainty of outcome” with “certainty of direction”
- Examine metrics and possible targets

Scenario Planning clarifies community goals

Next Generation Scenario Planning

A TRANSPORTATION PRACTITIONER'S GUIDE

- Explore risks and uncertainty
- Fiscal constraints
 - Federal, State, Local Funding outlook
- Changing travel behavior
- More frequent and extreme weather events
- Changing market and economic trends
 - Shared economy
- Technology advances

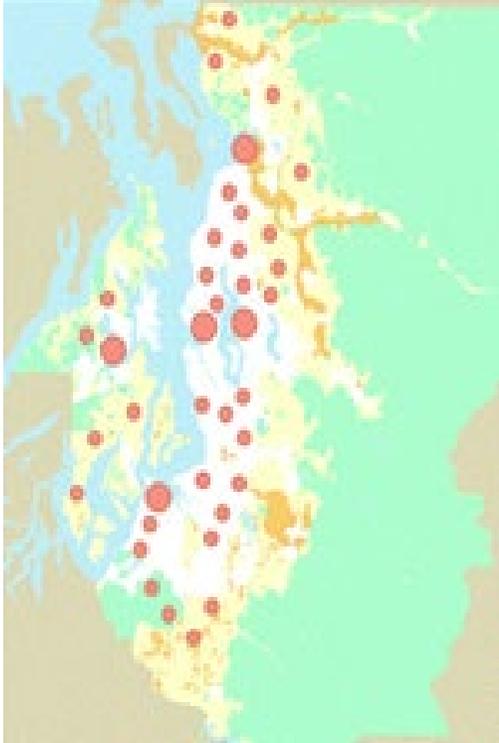
**Scenario Planning prepares for
range of possible futures**

Scenarios are Stories, Not End States

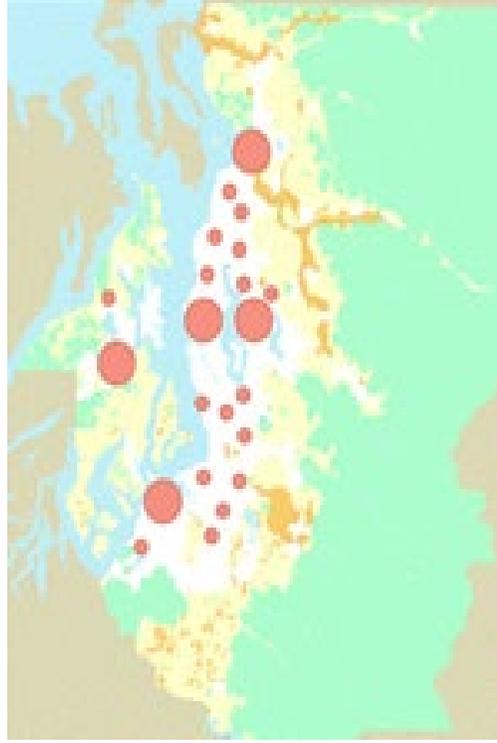
- How we might get there is critical
- Examine “Drivers”, “Levers”, “Tipping Points”, “Prerequisites”, “Black Swans”, etc.
- Aim for resiliency in plans
 - Which set of projects gives us the most flexibility in the face of everything that might happen?



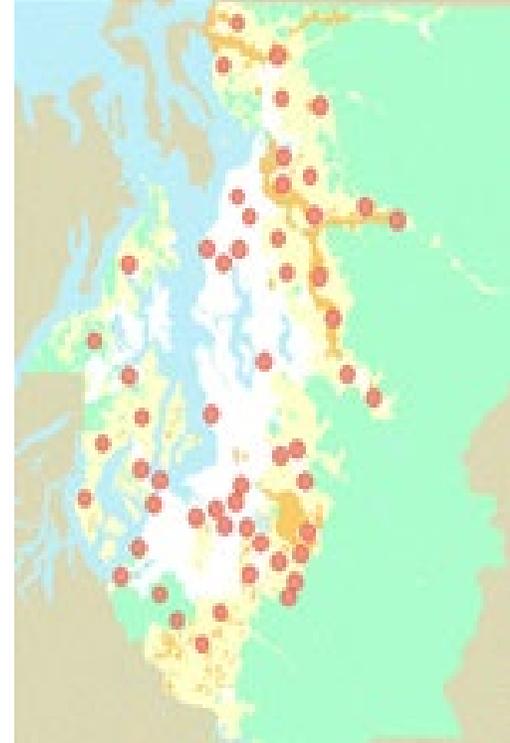
Three Simple Scenarios



Continue as planned



Focus growth in bigger cities



Focus growth in smaller cities
and towns

Denver Scenarios

Urban Footprint

Compact

Expanded

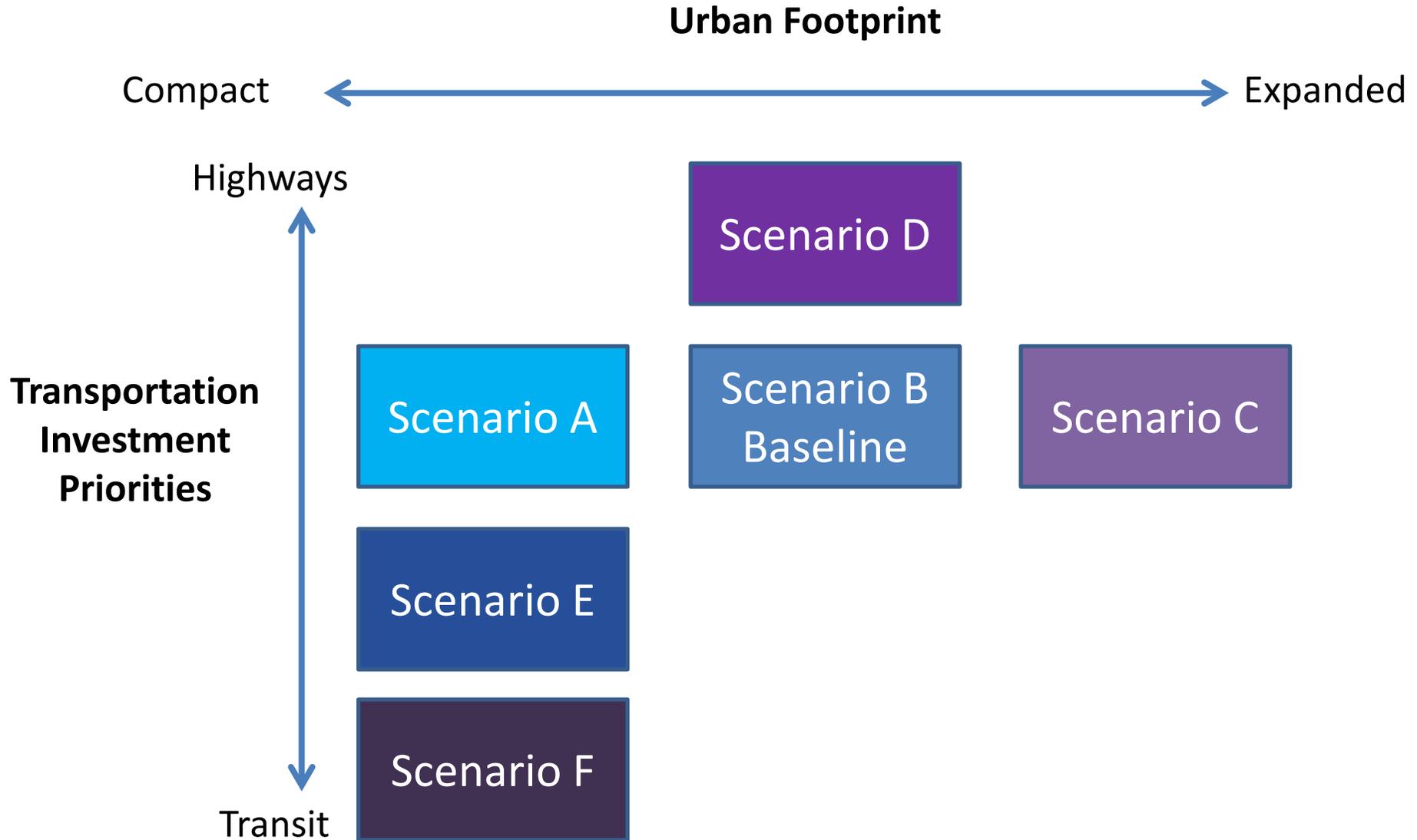
Highways

Transportation
Investment
Priorities

Scenario B
Baseline

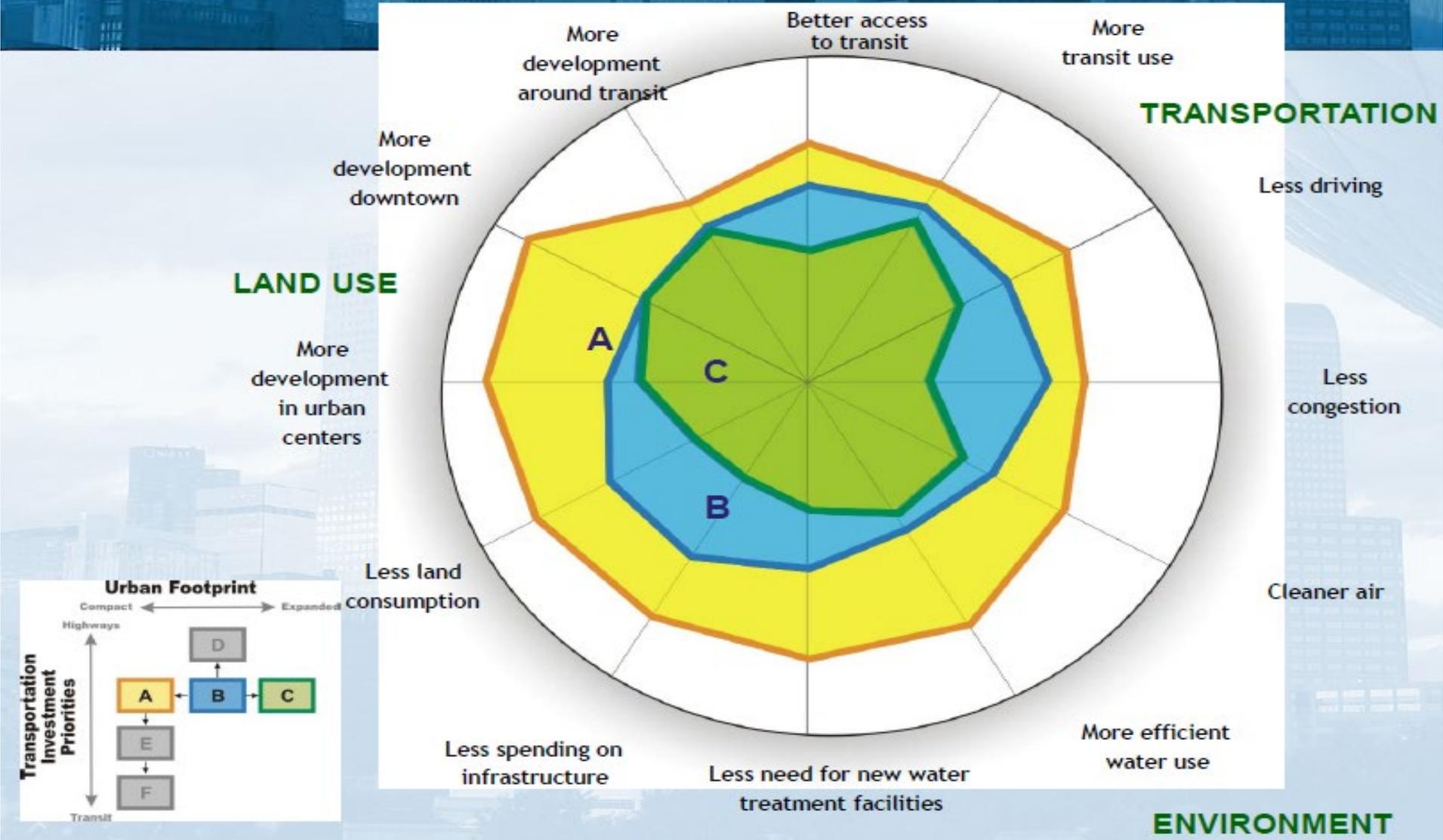
Transit

Denver Scenarios



DRCOG: Comparing Outcomes

Scenario outcomes: Compact vs. Expanded



DVRPC Future Forces



- Enduring Urbanism
- People and jobs moving to walkable communities is the start of a long-term trend.
- Free Agent Economy
- Increased outsourcing and automation means individuals must create their own economic opportunities.
- Severe Climate
- Continued rise in atmospheric carbon levels lead to significant disruptions from climate change.
- Transportation on Demand
- Smartphones, apps, and real-time info help people get around using new and existing transportation modes.
- US Energy Boom
- An abundance of domestically produced oil and natural gas keeps the cost of energy low.

TPCB Scenario Planning Program



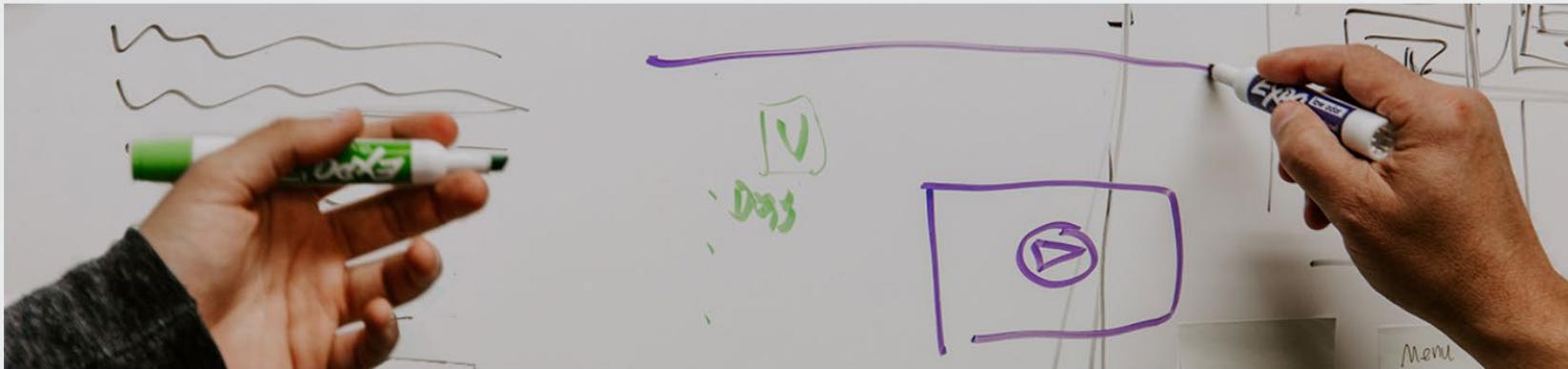
Search the TPCB website:

Home Peer Program ▾ [Planning Portal](#) ▾ Resource Hub Connect & Learn

PLANNING TOPICS

SCENARIO PLANNING

[VIEW MORE TOPICS](#)



https://www.planning.dot.gov/planning/topic_scenarioplanning.aspx

Capacity and Place Making

Scenario Planning in the Piedmont Triad: Setting the Course – Past, Present and Future

May 3, 2023

Scenario Planning Peer Exchange

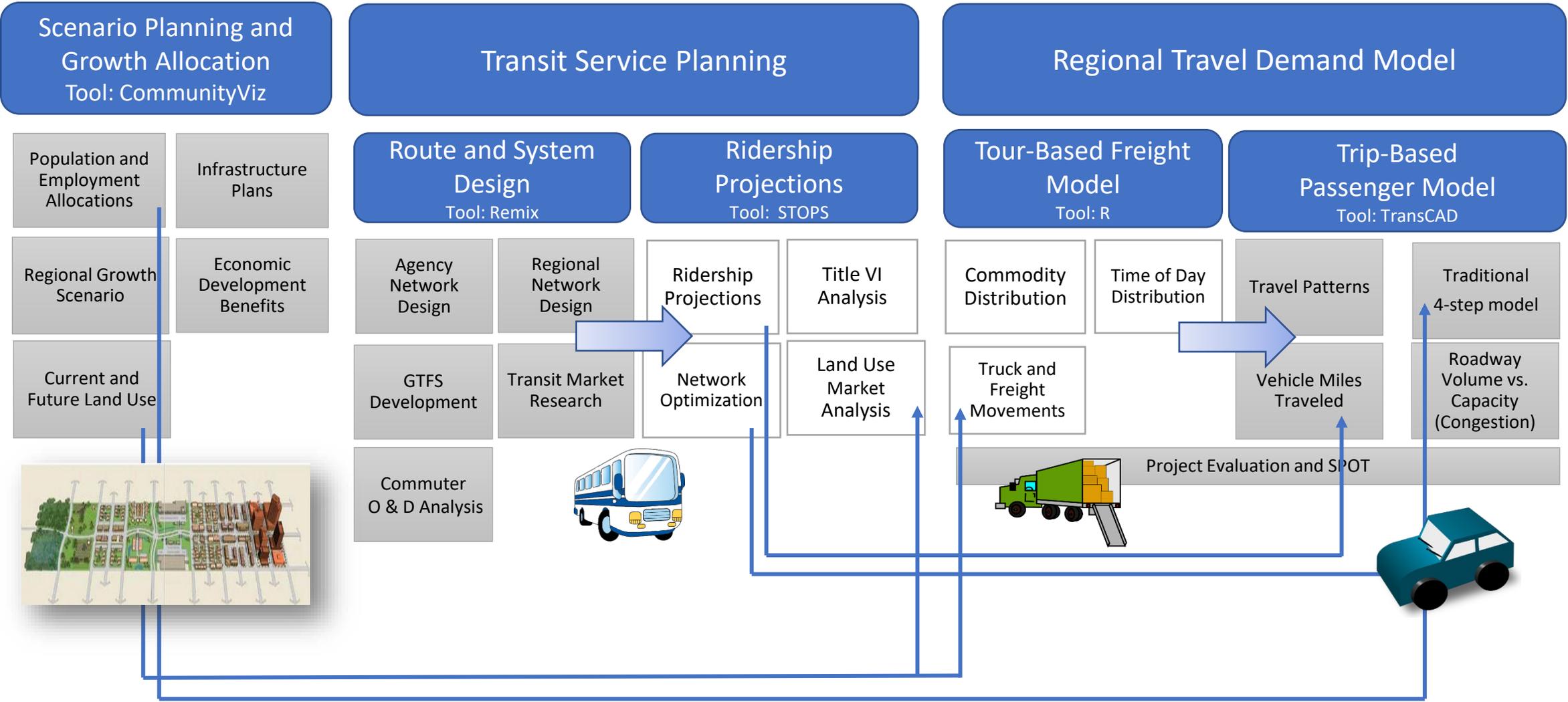
Residential Density (DUs/1 acre)	# of Stories	Residential	Non-residential	Flex	Single-Fam	Mix
2	0	0%	0%	0%	0%	0%
3	0	0%	0%	0%	0%	0%
0.07	0	50%	50%	100%	100%	0%
0.2	2	100%	20%	100%	100%	0%
0.5	2	100%	0%	100%	100%	0%
1	3	50%	10%	100%	100%	0%



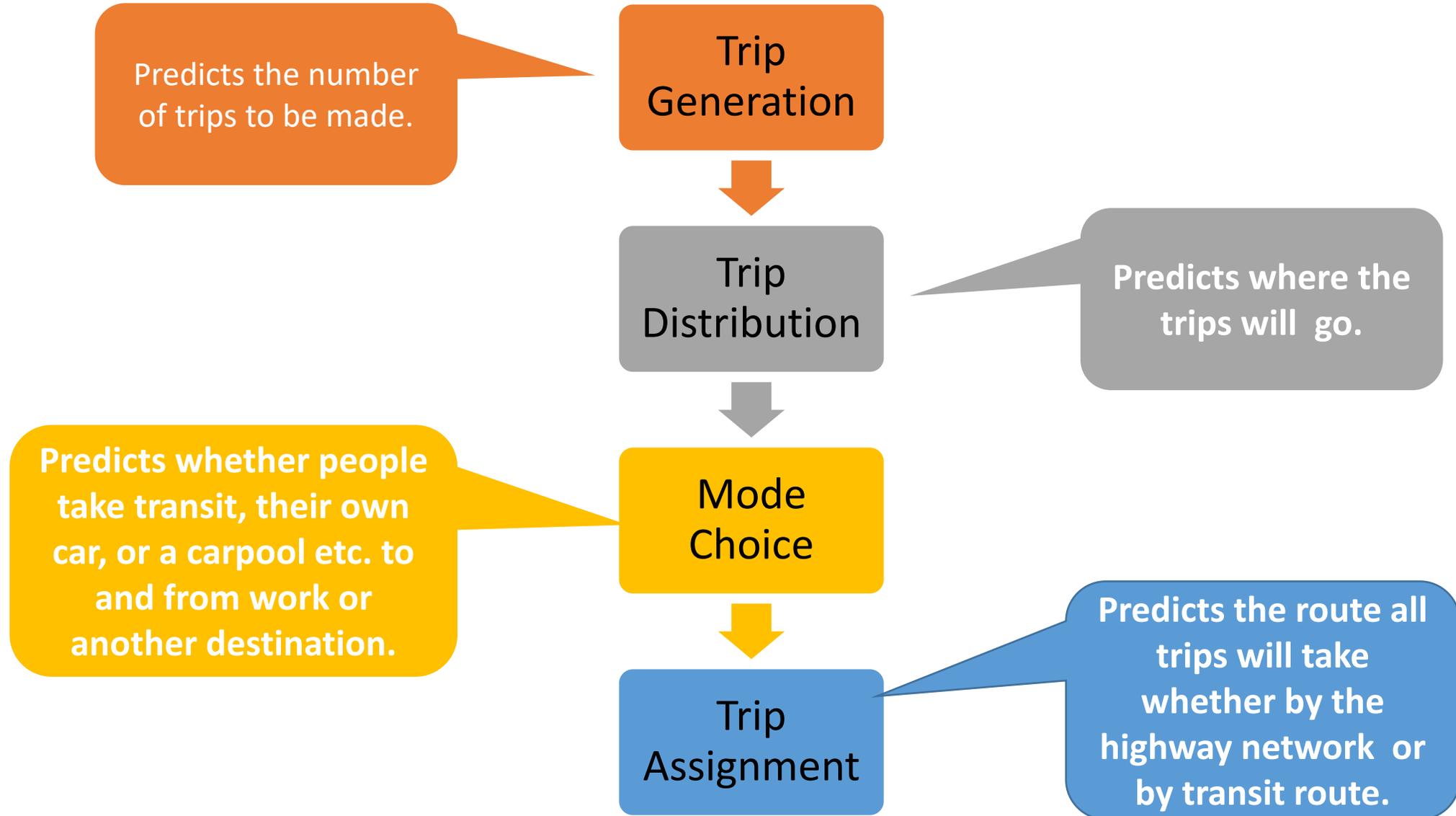
What is this project about?

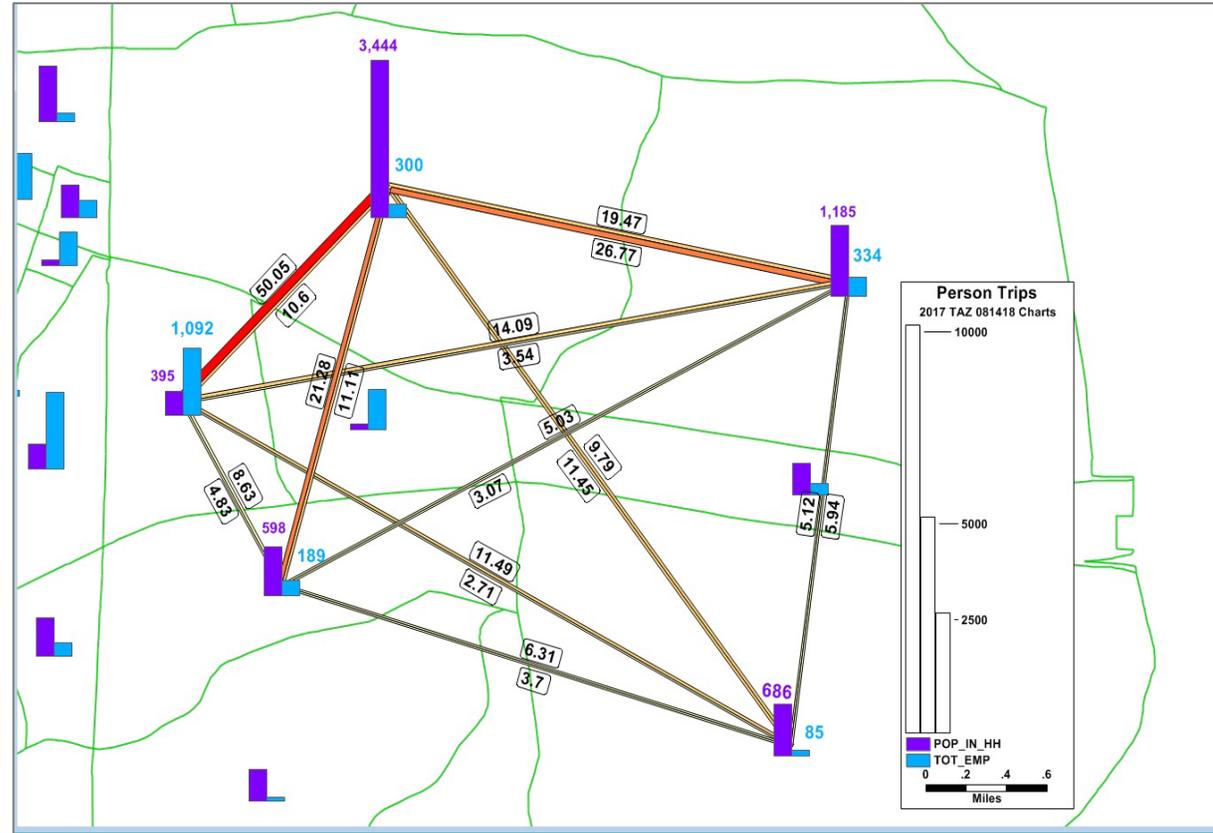
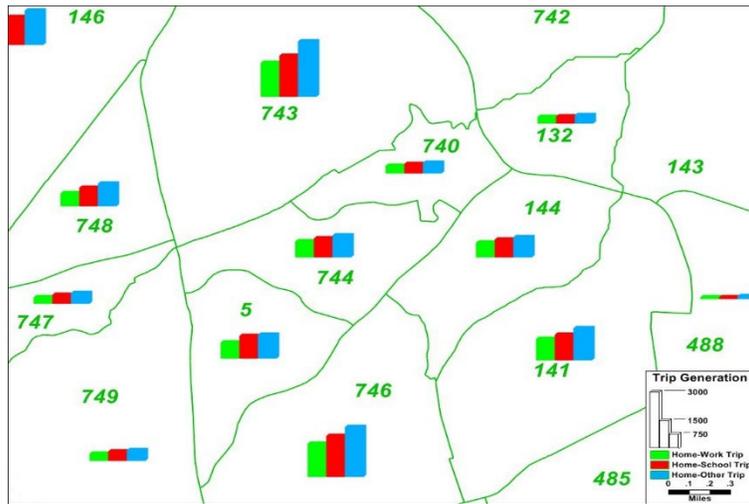
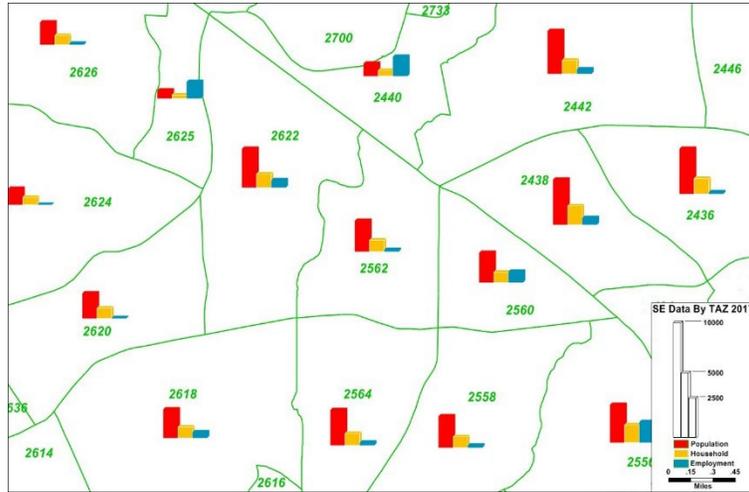
A little background

Piedmont Triad Regional Modeling Program



The Four Step Travel Demand Model





Why?

PART

Scenarios
 2017BASE
 2017ALT1
 2025NBLD

Stop after stage
 Run all steps

Build Scenario Hwy Layer and Route System

Network Diagnostic Procedure

Create Walk/Drive Access

Model Steps:
 Feedback Iterations: 0
 Fixed Distribution Option:

Trip Generation

Create Network

Modal Split

Trip Distribution

PA to OD

Highway Assignment

Transit Assignment

Feedback

Fixed Distribution

Summit Input Preparation

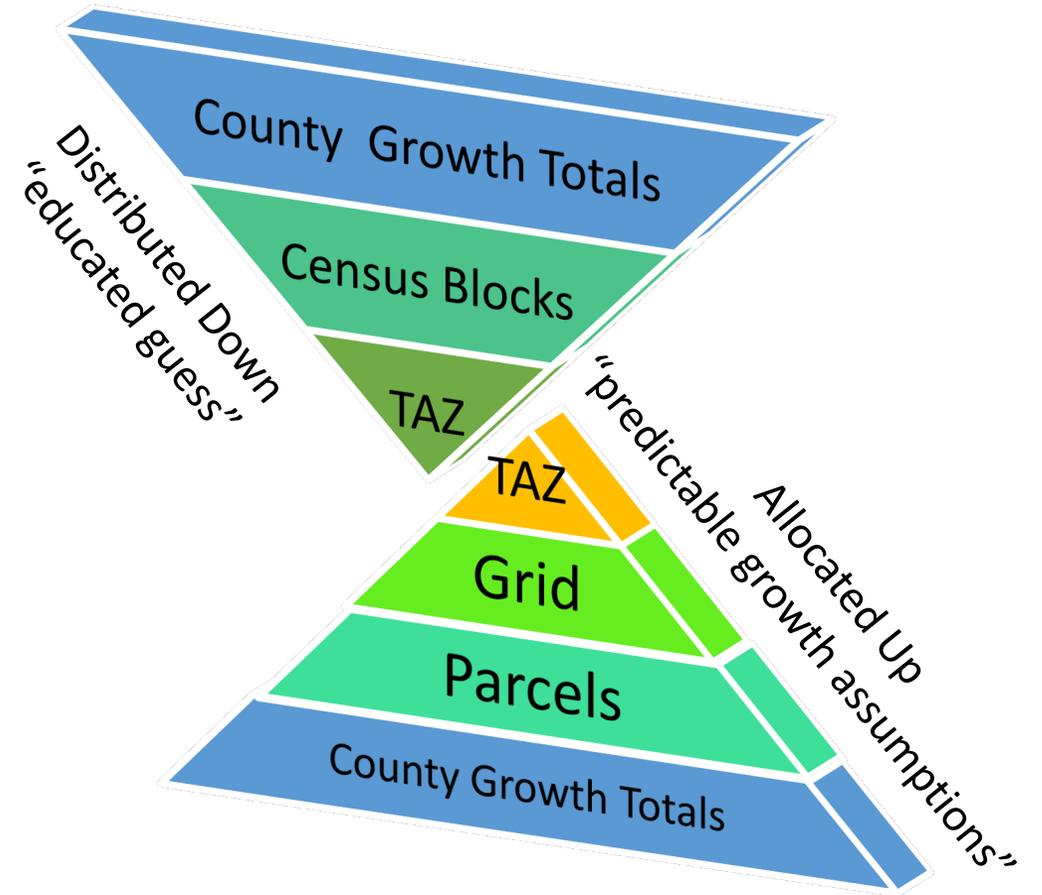
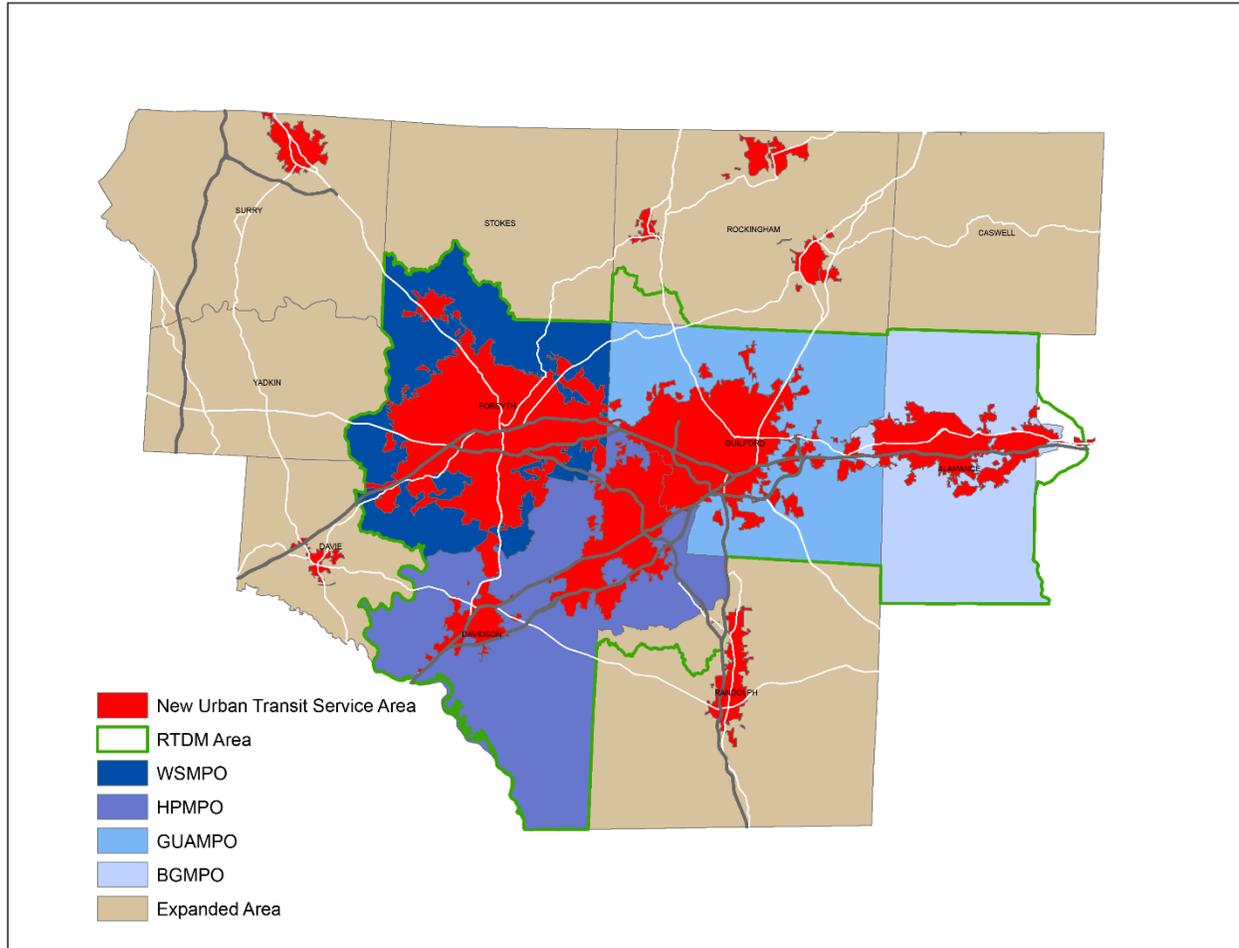
Model Summary Reports

Summary Plots

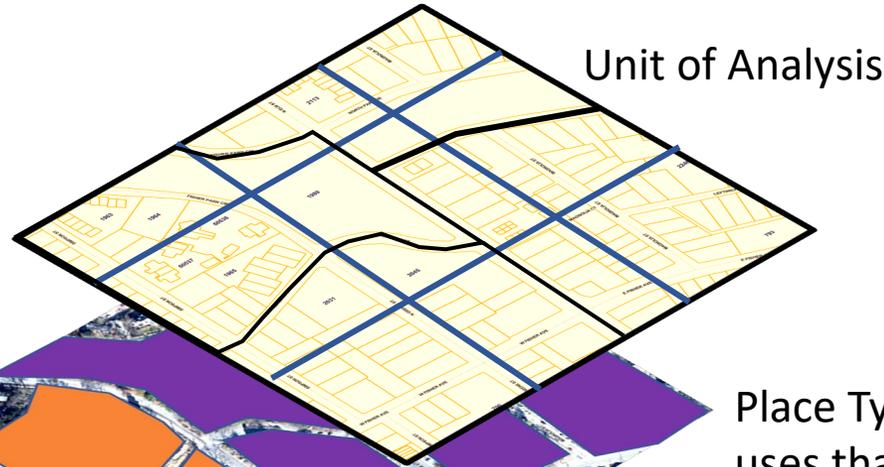
Quit

Our Geography

Top Down vs. Bottom Up



DATA FROM THE GROUND UP



Unit of Analysis



Parcel



Grid Cell



Traffic Analysis Zone (TAZ)

Place Type: A group of land uses that create a "Place"

- Walkable Neighborhood
- Health Care Campus
- Urban Neighborhood
- Townhome Community

Individual land uses and development status'

- Single Family Dwelling
- Church
- Restaurant
- Townhouses
- Park
- Developed
- Undeveloped
- Underdeveloped
- Open Space
- Redevelopment

What's on the ground?



The Scenario Development and Growth Allocation Process

Capacity and Placemaking

Vision and Allocation

Step 1

Step 2

Step 3

Step 4

Step 5

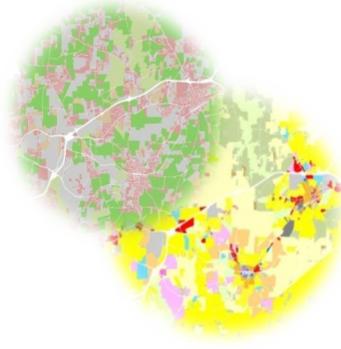
Step 6

Step 7



Carrying Capacity Analysis

Areas that consists of bodies of water, highways, stream buffers and other areas deemed undevelopable are 'off limits' for allocating new growth. These are areas a pre-determined and not considered during the rest of the processes.



Development Status & Place Type Assignments

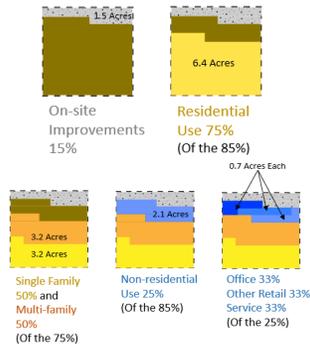
Development status determines whether new growth is allowed on a parcel. Place types define the existing and future land use for each parcel.

Development Look Up Table

Development Density (DU's / acre)	# of Homes	Residential	Non-residential	1-Fam.	Single Fam.	Multi-Fam.
0	0	0%	0%	0%	0%	0%
0.2	2	0%	0%	100%	100%	0%
0.5	5	0%	0%	100%	100%	0%
1	10	0%	0%	100%	100%	0%
2	20	0%	0%	100%	100%	0%
3	30	0%	0%	100%	100%	0%
4	40	0%	0%	100%	100%	0%
5	50	0%	0%	100%	100%	0%
6	60	0%	0%	100%	100%	0%
7	70	0%	0%	100%	100%	0%
8	80	0%	0%	100%	100%	0%
9	90	0%	0%	100%	100%	0%
10	100	0%	0%	100%	100%	0%
11	110	0%	0%	100%	100%	0%
12	120	0%	0%	100%	100%	0%
13	130	0%	0%	100%	100%	0%
14	140	0%	0%	100%	100%	0%
15	150	0%	0%	100%	100%	0%
16	160	0%	0%	100%	100%	0%
17	170	0%	0%	100%	100%	0%
18	180	0%	0%	100%	100%	0%
19	190	0%	0%	100%	100%	0%
20	200	0%	0%	100%	100%	0%
21	210	0%	0%	100%	100%	0%
22	220	0%	0%	100%	100%	0%
23	230	0%	0%	100%	100%	0%
24	240	0%	0%	100%	100%	0%
25	250	0%	0%	100%	100%	0%
26	260	0%	0%	100%	100%	0%
27	270	0%	0%	100%	100%	0%
28	280	0%	0%	100%	100%	0%
29	290	0%	0%	100%	100%	0%
30	300	0%	0%	100%	100%	0%
31	310	0%	0%	100%	100%	0%
32	320	0%	0%	100%	100%	0%
33	330	0%	0%	100%	100%	0%
34	340	0%	0%	100%	100%	0%
35	350	0%	0%	100%	100%	0%
36	360	0%	0%	100%	100%	0%
37	370	0%	0%	100%	100%	0%
38	380	0%	0%	100%	100%	0%
39	390	0%	0%	100%	100%	0%
40	400	0%	0%	100%	100%	0%
41	410	0%	0%	100%	100%	0%
42	420	0%	0%	100%	100%	0%
43	430	0%	0%	100%	100%	0%
44	440	0%	0%	100%	100%	0%
45	450	0%	0%	100%	100%	0%
46	460	0%	0%	100%	100%	0%
47	470	0%	0%	100%	100%	0%
48	480	0%	0%	100%	100%	0%
49	490	0%	0%	100%	100%	0%
50	500	0%	0%	100%	100%	0%

External Lookup Tables

These tables contain variables and values used in the calculations used to determine develop typed and capacity for a parcel. The general development characteristics are defined by Place Type.



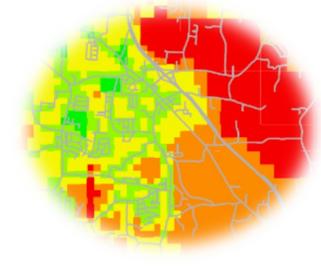
Build-Out Estimates

Build-out potential estimates the development yield for each parcel based on it's assigned development status, community type & general development values.



Future Growth Scenarios

Three to four future growth scenarios are defined. Each scenario has different values for the land suitability factors. Parcels are tagged with a development status and Place Type reflective goals and policies in local growth plans.



Land Suitability Analysis Calculations

Measures the attractiveness for parcels to attract development on a scale of 0 to 100. Begins with identifying Suitability Factors that act as positive or negative growth attractors then the factors are weighted differently within each scenario.

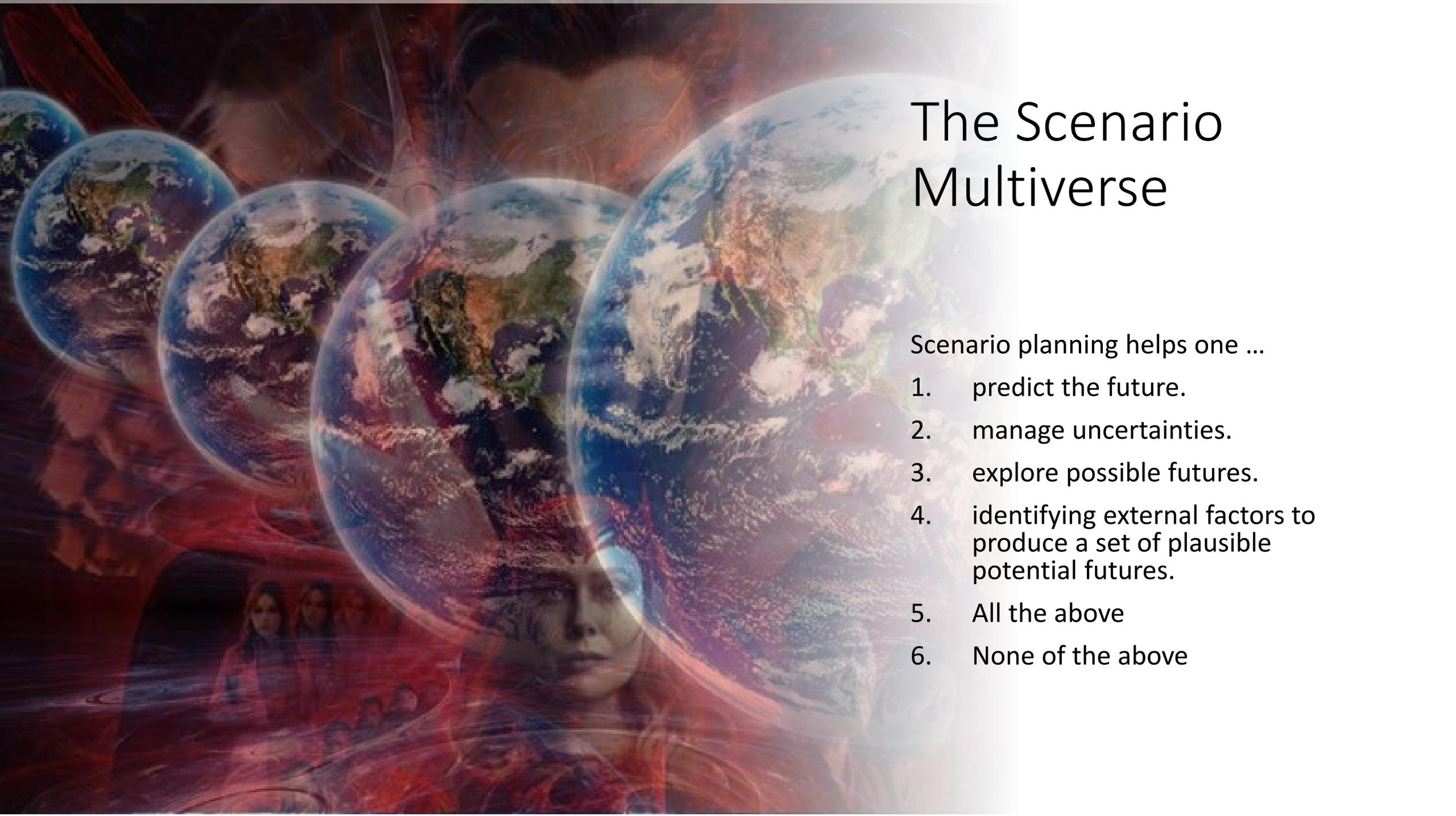


Growth Allocation

Performed using build-out potential and land suitability statistics calculated for each parcel, TAZ and grid cell.

Scenario Planning

Let's Begin



The Scenario Multiverse

Scenario planning helps one ...

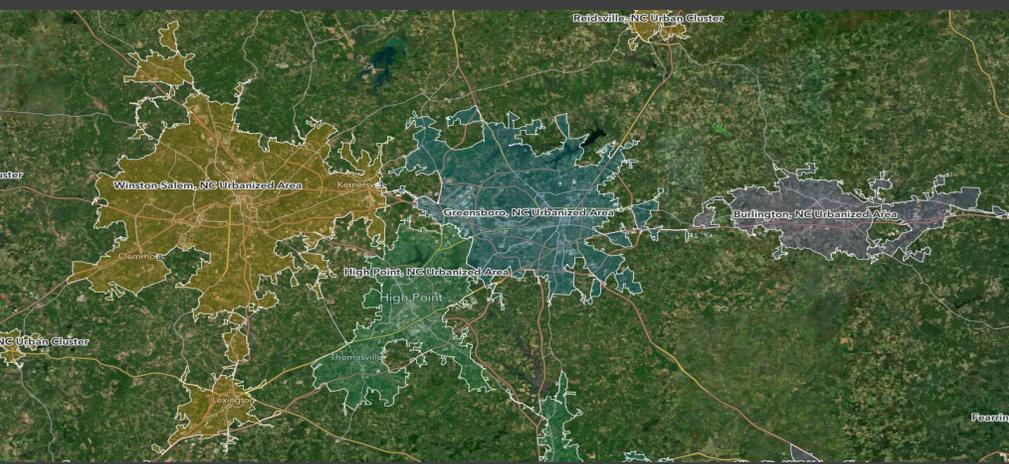
1. predict the future.
2. manage uncertainties.
3. explore possible futures.
4. identifying external factors to produce a set of plausible potential futures.
5. All the above
6. None of the above

Where does it all start?

It begins with the here and now

Current Growth Trend

- Less emphasis on density and more emphasis on growth outside sewer service areas.
- Doesn't recognize transit emphasis corridors and the existing transit service areas as strong growth attractors.



Current Trend

Attractors

Growth Corridors	Light Green
Interchanges	Light Green
Water Service Area	Light Green

Neutral

Regional Activities Centers	Light Brown
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Detractors

Community Activity Centers	Light Red
Municipal Centers	Light Red
Urban Centers	Light Red
Transit Emphasis Corridors	Dark Red
Existing Local Fixed Routes	Dark Red
Transit Induced Development Zone	Dark Red
Sewer Service Area	Light Red
100-yr Floodplain	Dark Red
Critical Watershed	Dark Red

Randomness

High

Place Types

- Single Family Neighborhood
- Multi-family Neighborhood
- Urban Neighborhood
- Suburban Office Center
- Suburban Commercial Center

% of new DU's outside sewer service area vs. inside
Average trip distance



Activity Centers Growth Scenario

- Emphasizing high suitability to Municipal, Regional and Urban Centers
- Focusing growth in “centers” serving the neighborhood and region
- Creating employment centers



Activity Centers

Attractors

Regional Activities Centers	Light Green
Community Activity Centers	Light Green
Municipal Centers	Light Green
Urban Centers	Medium Green
Growth Corridors	Medium Green
Transit Emphasis Corridors	Light Green
Sewer Service Area	Light Green
Water Service Area	Light Green

Neutral

Existing Local Fixed Routes	Light Olive
Transit Induced Development Zone	Light Olive

Detractors

Interchanges	Dark Red
100-yr Floodplain	Dark Red
Critical Watershed	Dark Red

Randomness

Moderate

Place Types

Town Center

Metropolitan Center

Walkable Activity Centers

Regional Employment Centers

Suburban Commercial Centers

Number DU's and Jobs within a ½ mile of Activity Center
Average drive distance from DU's to Jobs



Public Transit-Centric Scenario

- Focus growth along transit emphasis corridors
- Utilize existing utility and street infrastructure
- Provide multi-modal support for Activity Centers

Public-Transit Centric Attractors

Regional Activities Centers	█
Community Activity Centers	█
Municipal Centers	█
Urban Centers	█
Growth Corridors	█
Interchanges	█
Transit Emphasis Corridors	█
Existing Local Fixed Routes	█
Transit Induced Development Zone	█
Sewer Service Area	█
Water Service Area	█

Neutral

Critical Watershed	█
--------------------	---

Detractors

100-yr Floodplain	█
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Randomness

LOW

Place Types

- Transit Activity Centers
- Walkable Activity Center
- Walkable Neighborhood
- Town House Community
- Multi-Family Neighborhood

Reduction in VMT

Increased tax base within transit corridors



Current Trend



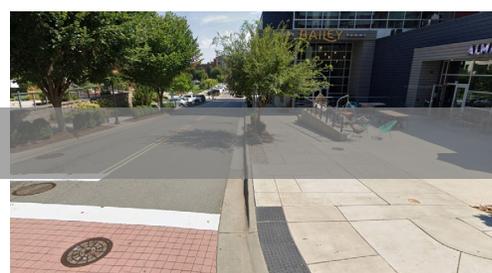
Activity Center Focus



Metro Center



Climate Change Sensitivity



“Scenario Planning is a structured process to support decision-making that helps planners navigate the uncertainty of the future in the short and long term.”

Intensity – Low, Medium, High

Growth Rate – High, Moderate, Low

Placement – Market Driven, Focused, Managed

Mobility – Car Centric, Car Optional, Transit Focused

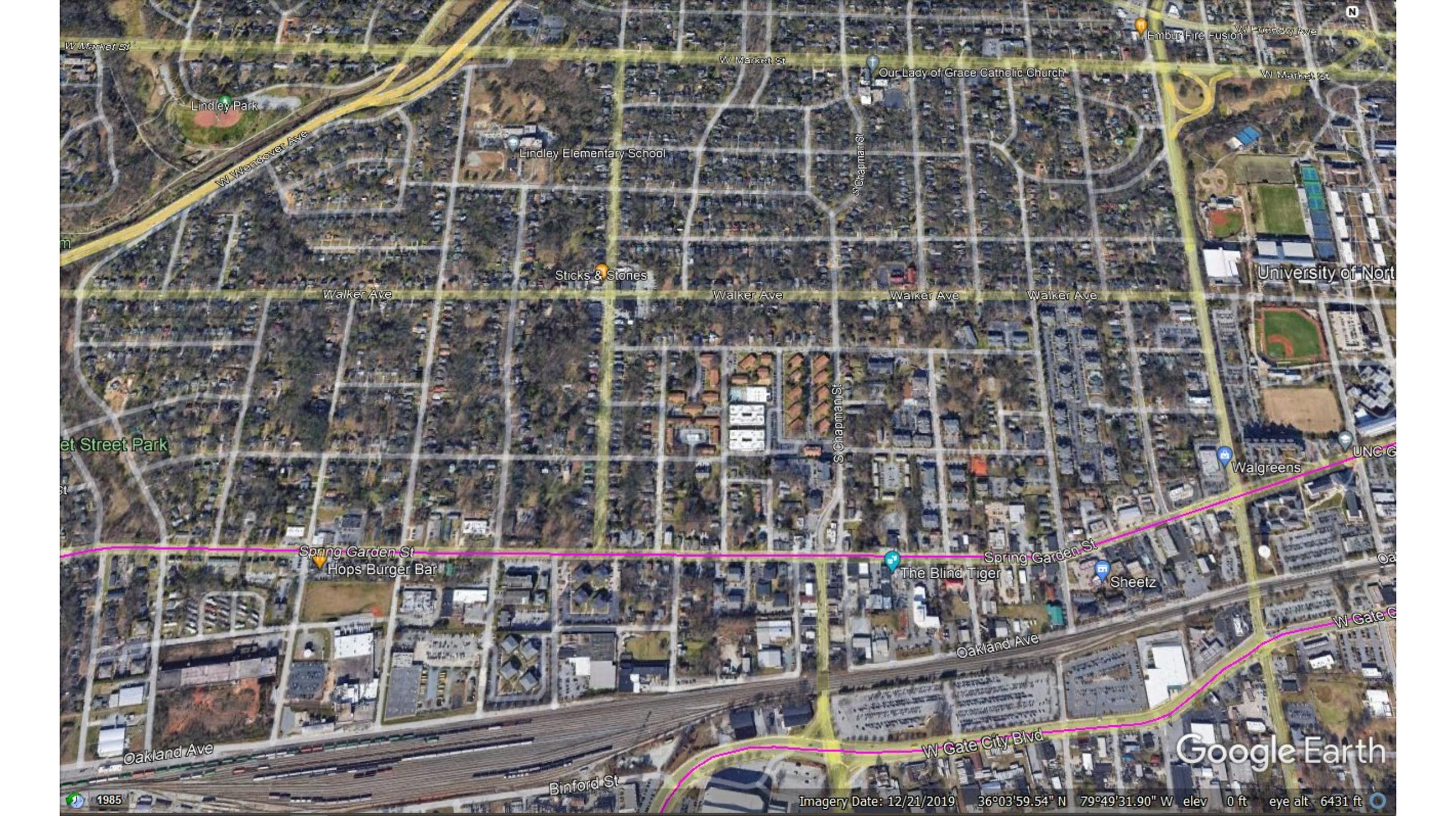
Climate Adaptation – Lower CO², renewable energy, “green space” preservation

Development Policies

Land Use Map

“I’ve got some scenarios, now what?”

It’s all in the tagging.



W Market St

Lindley Park

W Wendover Ave

Lindley Elementary School

W Market St

Our Lady of Grace Catholic Church

Ember Fire Fusion

W Pringle Ave

W Market St

Sticks & Stones

Walker Ave

Walker Ave

Walker Ave

Walker Ave

University of North

et Street Park

S Chapman St

Walgreens

UNCC

Spring Garden St

Hops Burger Bar

The Blind Tiger

Spring Garden St

Sheetz

Oakland Ave

W Gate C

Oakland Ave

W Gate City Blvd

Google Earth

Binford St



1985

Imagery Date: 12/21/2019

36°03'59.54" N

79°49'31.90" W

elev 0 ft

eye alt 6431 ft



Civic and Institutional (Developed)
Educational Campus K-12 (Developed)

Make sure there is a Community Activity Center in the Land Suitability Layer

Walkable Neighborhood (Underdeveloped)

Make sure there is a Transit Emphasis Corridor in the Land Suitability Layer

Walkable Activity Center (Redevelopable)

Light Industrial Center (Redevelopable)

Light Industrial Center (Redevelopable)

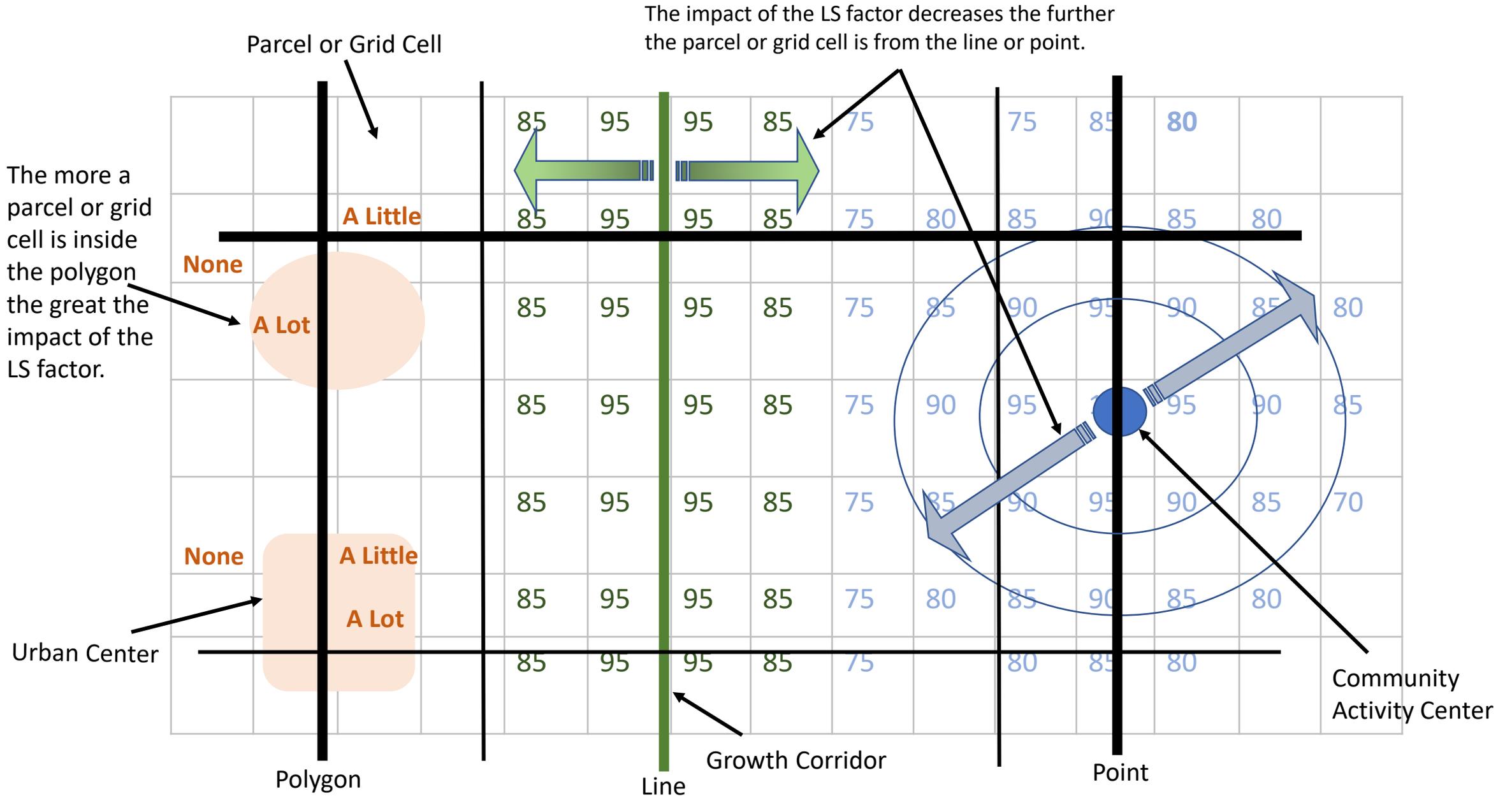
Light Industrial Center Expansion (Developed)

University Camp (Undeveloped)
Future University Growth Area

Google Earth

“But how does growth get placed here rather than over there?”

Land Suitability Factors My Friend



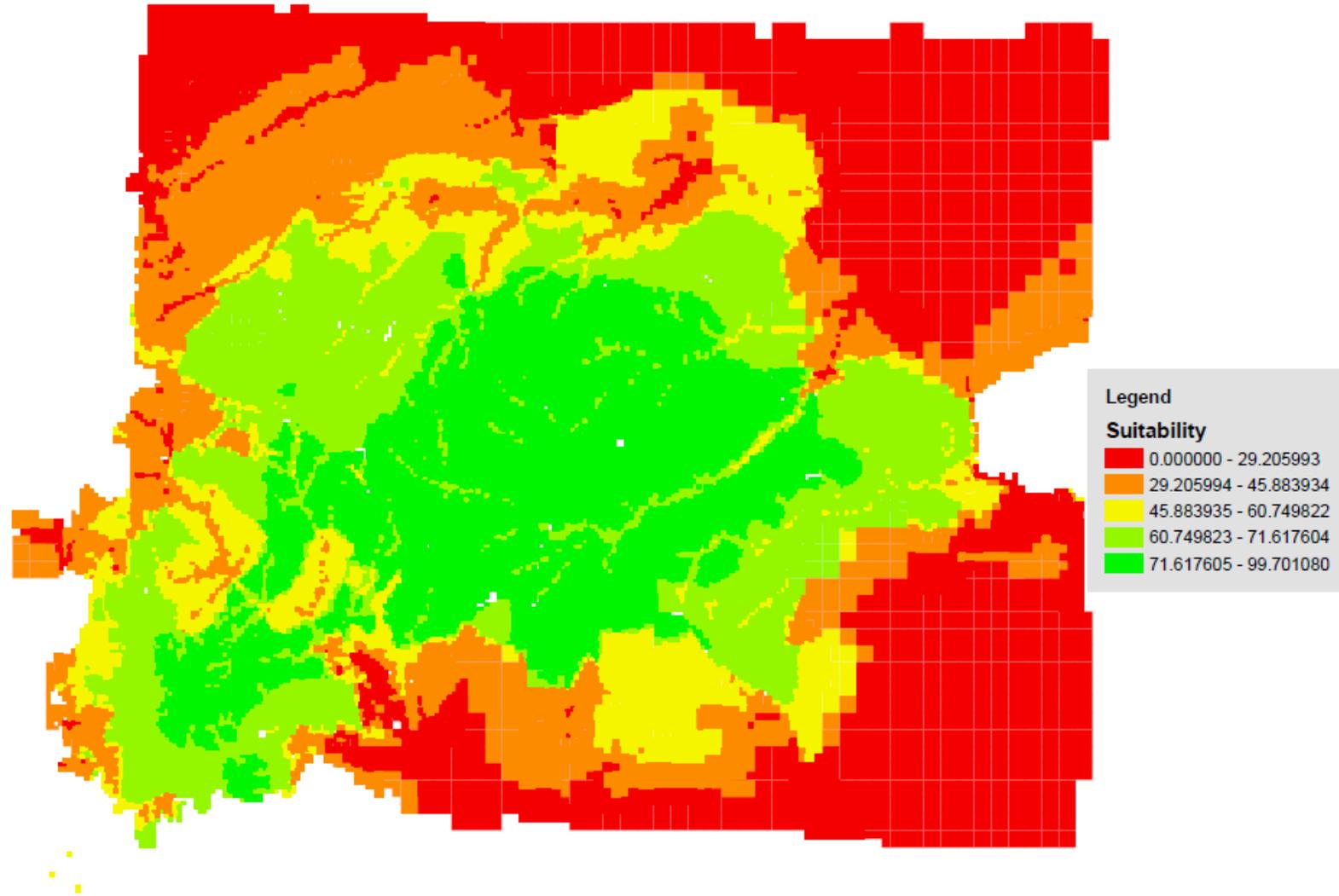
Land Suitability Factors

Land Suitability Matrix

SUITABILITY FACTORS	Characteristics					Scenarios		
	Measure	Geography	Correlation	Identification	Category	Current Growth Trend	Activity Centers Growth	Public Transit-Centric
Regional Activity Centers	<i>Proximity</i>	<i>Point</i>	<i>Positive</i>	<i>Local</i>	<i>Develop Activity Centers</i>	5.0	6.0	8.0
Community Activity Centers	<i>Proximity</i>	<i>Point</i>	<i>Positive</i>	<i>Local</i>	<i>Develop Activity Centers</i>	4.0	6.5	5.5
Municipal Centers	<i>Proximity</i>	<i>Point</i>	<i>Positive</i>	<i>Local</i>	<i>Develop Activity Centers</i>	4.0	6.5	5.5
Urban Centers	<i>Overlap</i>	<i>Polygon</i>	<i>Positive</i>	<i>Local</i>	<i>Develop Activity Centers</i>	4.0	8.0	6.5
Growth Corridors	<i>Proximity</i>	<i>Line</i>	<i>Positive</i>	<i>Local</i>	<i>Transportation</i>	6.0	7.0	8.0
Interchanges	<i>Proximity</i>	<i>Point</i>	<i>Positive</i>	<i>Uniform</i>	<i>Transportation</i>	6.0	3.0	7.0
Transit Emphasis Corridors (15-Minute Frequency)	<i>Proximity</i>	<i>Line</i>	<i>Positive</i>	<i>Local</i>	<i>Transportation</i>	0.0	6.0	8.0
Existing Local Fixed Routes (1/4 mile buffer)	<i>Overlap</i>	<i>Polygon</i>	<i>Positive</i>	<i>Local</i>	<i>Transportation</i>	0.0	5.0	7.0
Regional Commuter Rideshed	<i>Overlap</i>	<i>Polygon</i>	<i>Positive</i>	<i>Local</i>	<i>Transportation</i>	0.0	5.0	7.0
Sewer Service Area	<i>Overlap</i>	<i>Polygon</i>	<i>Positive</i>	<i>Local</i>	<i>Development Infrastructure</i>	4.0	7.0	7.0
Water Service Area	<i>Overlap</i>	<i>Polygon</i>	<i>Positive</i>	<i>Local</i>	<i>Development Infrastructure</i>	6.0	8.0	8.0
100-year Floodplain	<i>Overlap</i>	<i>Polygon</i>	<i>Negative</i>	<i>Uniform</i>	<i>Environmental Features</i>	8.3	8.3	8.3
Critical Watersheds	<i>Overlap</i>	<i>Polygon</i>	<i>Negative</i>	<i>Uniform</i>	<i>Environmental Features</i>	8.3	8.3	5.0

Suitability Score

Sets the priority for where growth will be allocated.



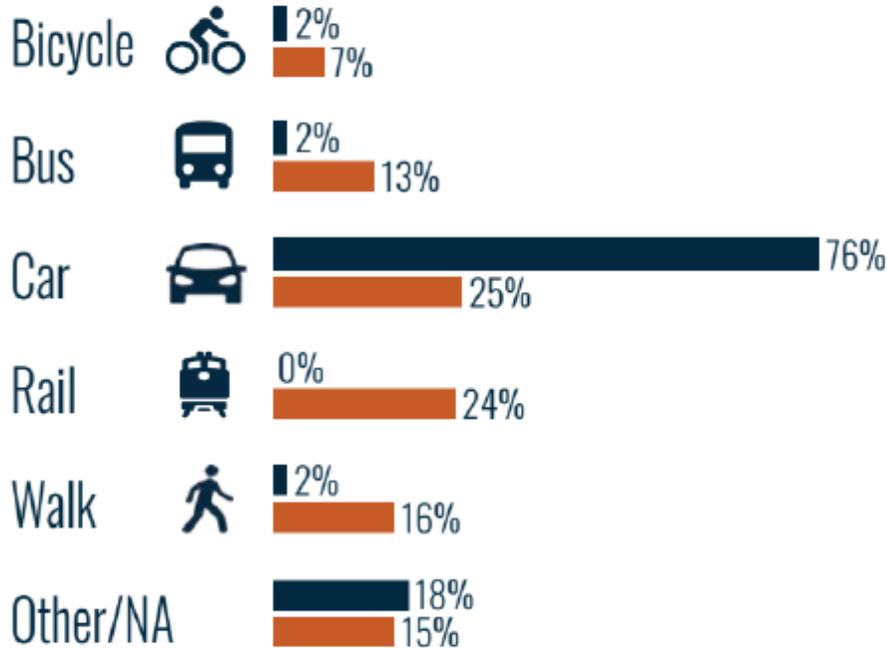
You are going to hear a lot
about “drivers”,
here’s an example

North Carolinians Want Multimodal Options

NC Moves 2050 Survey Results

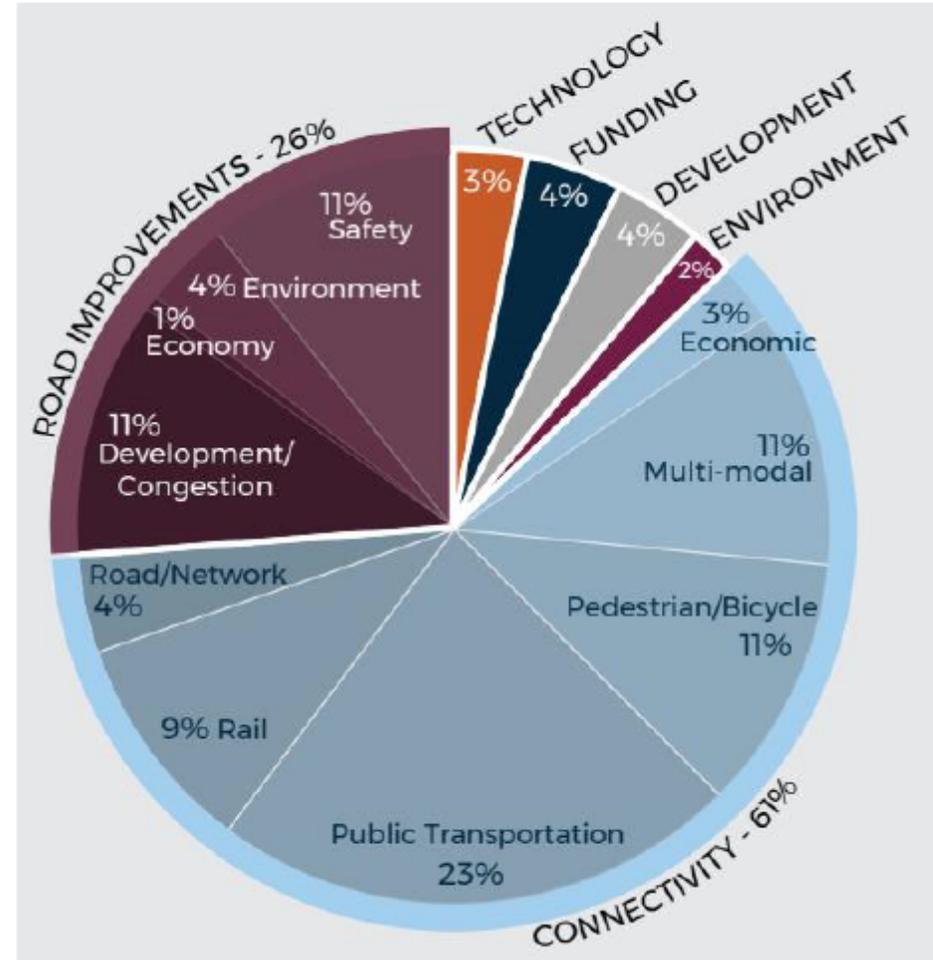
HOW WE MOVE

■ Present ■ Future



The importance of traveling by car in the future decreases by **51%↓**

What should be the focus of transportation in your region for the future?



It's your turn...





Confession Time

For our MPO's...

Related to developing and evaluating scenarios this fall... what are you most apprehensive about?

What are you looking forward to the most?

What value do you hope scenario planning brings to the transportation planning process?

What do you hope to learn from this workshop?

For everyone else...



And now for something
completely different



How familiar are you with Scenario Planning?

I could teach a graduate level course on the complexities of scenario planning

I'm not sure I learn much

I have been involved before but have never led a process

I am familiar with the concepts

Not at all

What are your major concerns heading into this process? (multiple answers possible)

Having adequate staff resources

Having enough time to complete
the process

Achieving consistency across the
many jurisdictions in the MPO

Not understanding what to do

I don't have any concerns

I've already finished our scenarios

Will you engage the public during the preparation of your scenarios?

Yes

No

No sure

Why would I?

What do you think will be the top three "drivers" in your community in the future?

- Another global pandemic
- Declining birth rates and increased longevity
- Deepening climate change impacts
- Increase in multi-modal travel
- Increase in multi-story, mixed used development
- More remote work and delivery of goods
- Increasing use of PEV's and autonomous vehicle travel
- Increased social tension and disenfranchisement of the non-privileged
- Other

SCENARIO PLANNING PEER EXCHANGE

Sponsored by:

FHWA Office of Planning

Hosted by:

Piedmont Authority for Regional Transportation

May 3, 2023

PEER PRESENTATION 1: USING SCENARIO PLANNING TO PREPARE FOR SCENARIO PLANNING

Featured Speakers:

Dale Stith, Hampton Roads Transportation
Planning Organization

Martin Rivarola, Mid-America Regional
Council

Using Scenario Planning to Prepare for Uncertainty

Hampton Roads Perspective

Dale M. Stith, Principal Transportation Planner
Hampton Roads Transportation Planning Organization

Presented to the Piedmont Authority for Regional Transportation
Scenario Planning Peer Exchange
May 3, 2023



**This present moment
used to be the
unimaginable future.**

- STEWART BRAND

Hampton Roads



Coastal Virginia
Mouth of the Chesapeake Bay



1.7 Million
People



Strategic Location
Foreign Trade
Tourism
Military Facilities



Hampton Roads Transportation Planning Organization



15 Localities



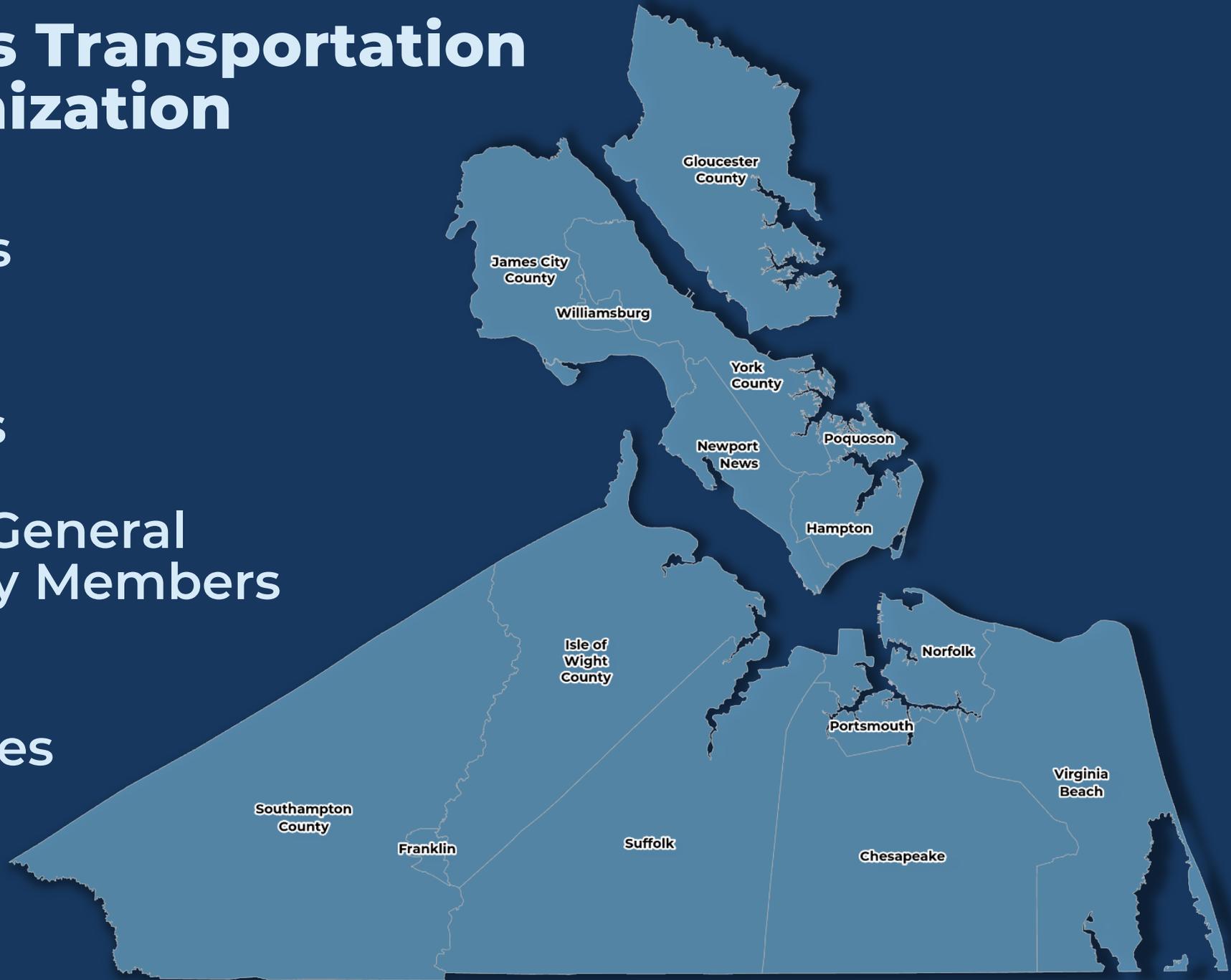
3 Transit Agencies



4 Virginia General Assembly Members

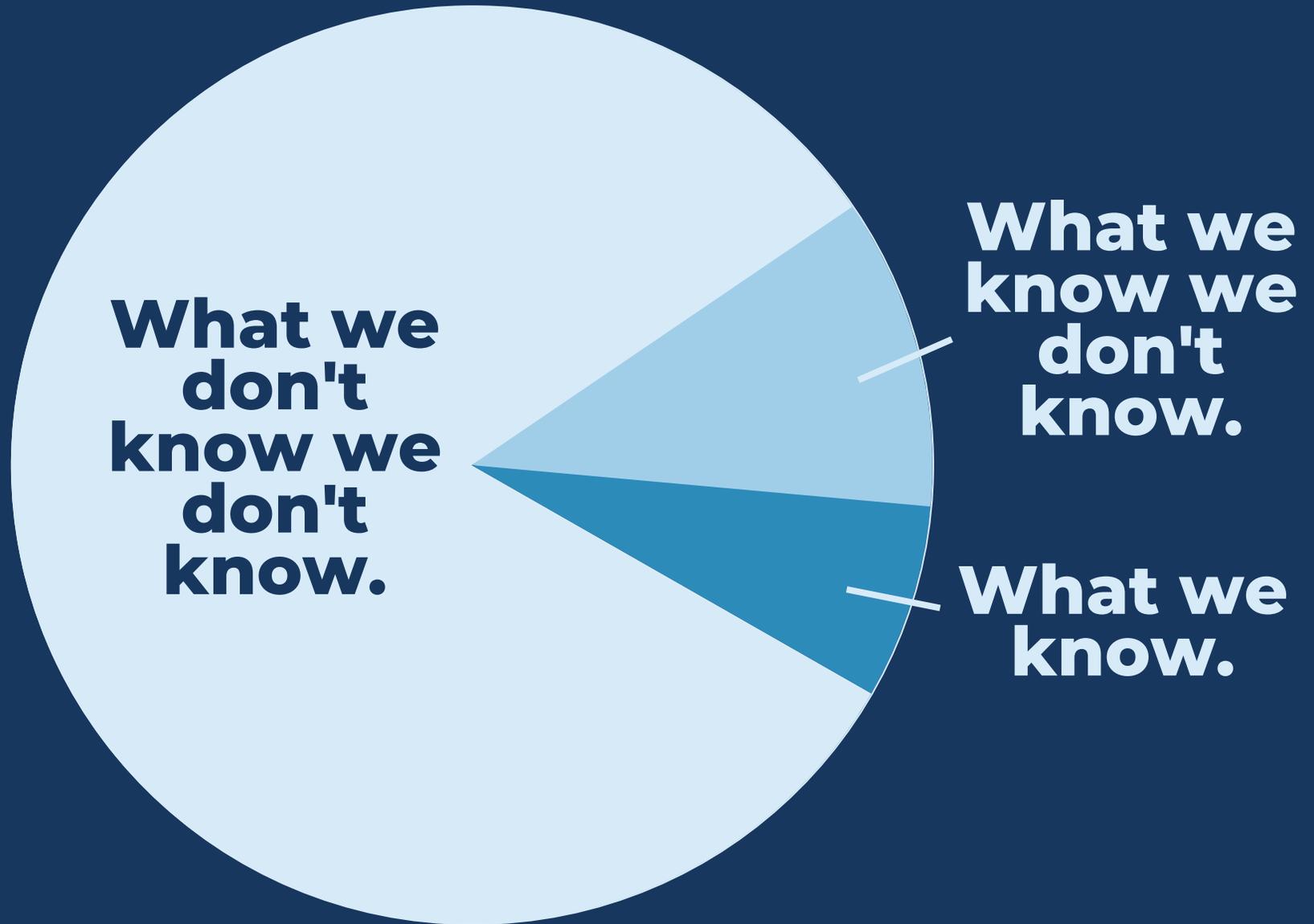


Federal and State Agencies



Need for Scenario Planning

2040
LRTP



PREDICTING  **PREPARING**

FHWA Scenario Planning Workshop

- November 2016
- Highlighted noteworthy practices and key recommendations for scenario planning
- Set the stage for the 2045 Long-Range Transportation Plan (LRTP) Scenario Planning effort



- **MPO Peers**
- **Virginia Peers**
- **Technical Experts**
- **Regional Stakeholders**

2045 LRTP: Planning Considerations



Regional Economic Drivers

- Military
- Port
- Tourism



Multimodal Connectivity

- High-Capacity Transit Corridors
- Passenger Rail
- Active Transportation
- Connected and Automated Vehicles



Resiliency Considerations

- Sea Level Rise
- Storm Surge
- Coastal Resiliency
- Recurrent Flooding



Demographic Considerations

- Aging Population
- Alternate Growth Scenarios



Funding

- Hampton Roads Transportation Fund
- Transportation Revenues
- SMART SCALE

where
do we go
from
here?



REGIONAL CONNECTORS STUDY

Michael Baker
INTERNATIONAL

EPRPC

EBP

Regional Scenario Planning Process



Objectives

- Establish framework to prepare for uncertainty
 - Identify Drivers and Trends
 - Link preferred outcomes to goals
- Analyze 3-4 Scenarios, with no preferred scenario
- Evaluate candidate projects across ALL plausible future scenarios

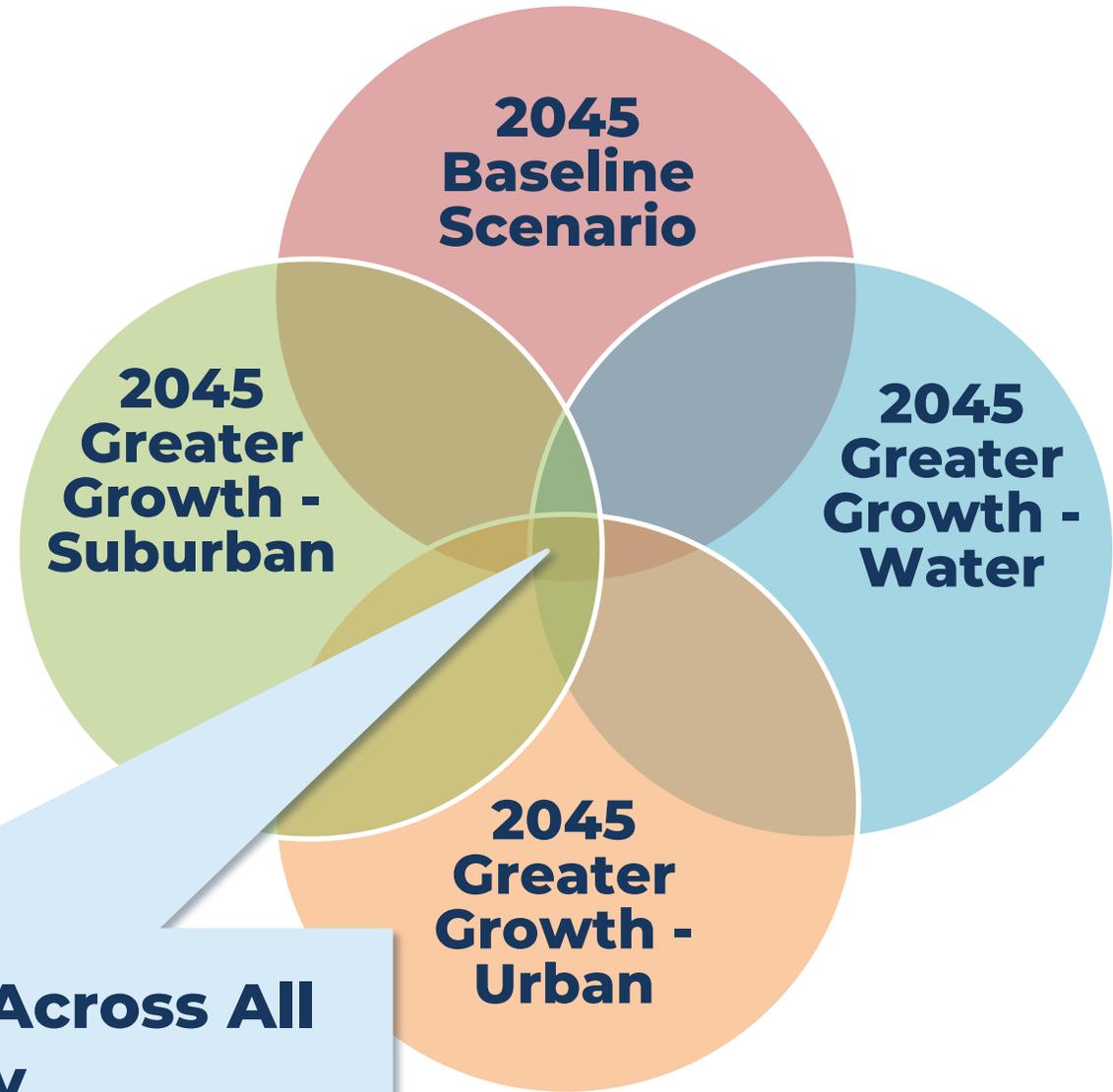


Major Considerations

- Objective, data driven process
- Utilize Regional Land Use Data, updated Regional Travel Demand Model, updated Project Prioritization Tool
- Scenario Planning tools/models transferable to other/future planning efforts

Exploratory Scenario Planning

- Develop Plausible Futures (no preferred scenario)
- Stress test the transportation network to identify best projects



Evaluate and Rank Projects Across All Scenarios to Identify Most Robust Projects



Goals and Objectives

ECONOMIC VITALITY

Support regional growth and productivity

Support efficient freight movement

Support accessibility for tourism

SUSTAINABILITY: EQUITY, COMMUNITY & ENVIRONMENTAL

Improve the sustainability of communities through increased housing choice and reduced auto-dependency

Ensure that mobility benefits positively affect low-income residents

Minimize the environmental impact of future growth and transportation

CONNECTIVITY & ACCESSIBILITY

Improve connectivity and reliability between the Peninsula and Southside

Improve connectivity and access for all

Reduce delay and improve travel efficiency

SAFETY, RESILIENCY & INNOVATION

Improve safety through a more adaptive transportation network

Make investments that improve flood resiliency

Consider the impacts of technology on system demand and performance

Performance Measures

Performance Measures ↓	GOALS →		ECONOMIC VITALITY			SUSTAINABILITY -- EQUITY, COMMUNITY & ENVIRONMENTAL			CONNECTIVITY & ACCESSIBILITY			SAFETY, RESILIENCY & INNOVATION		
	Scenario Measure	Candidate Project Measure	Support regional growth and productivity	Support efficient freight movement	Support accessibility for tourism	Improve the sustainability of communities through increased housing choice and reduced auto-dependency	Ensure that mobility benefits positively affect low income residents	Minimize the environmental impact of future growth and transportation	Improve connectivity and reliability between the Peninsula and Southside	Improve connectivity and access for all	Reduce delay and improve travel efficiency	Improve safety through a more adaptive transportation network	Make investments that improve flood resiliency	Consider the impacts of technology on system demand and performance
(Change in) Cross-harbor accessibility														
(Change in) Multimodal accessibility to jobs	■	■												
(Change in) Accessibility index by mode	■	■												
Performance of the transit-serving roadway network (i.e., average speed)	■	■												
(Change in) Regional delay (total + spatial)	■	■												
System reliability	■													
Reliability cost savings		■												
(Change in) User cost	■	■												
Bottlenecks on identified evacuation routes (daily peak conditions)		■												
Cost of forecasted crashes	■	■												
Percent of trips by automated vehicles	■													
(Change in) Percent of travel using facilities with adaptive technologies (e.g., V2L, ITS)	■	■												
Percent of growth near flood-prone areas	■													
(Change in) Transportation network impact from flood-prone conditions (e.g., delay, trip length, and/or circuitry)	■	■												
Reliability enhancement from technology	■													
Induced trip demand from technology	■													
(Change in) Lost productivity from delay	■	■	✓									✓	✓	
(Economic impact of change in) Labor market accessibility	■	■	✓									✓	✓	
Performance on the freight network - total delay + spatial results	■			✓								✓	✓	
Change in hours of delay on freight network		■		✓								✓	✓	
Economic impact of change in delay and reliability on the freight network		■		✓										
(Change in) Percent of freight traffic on secondary streets - total + spatial	■	■		✓						✓				✓
Traffic volumes at at-grade rail crossings		■								✓			✓	
(Change in) Accessibility to major tourist attractions	■	■			✓									
Percent of population in multi-family housing	■									✓				
(Change in) Mode share index	■	■								✓				
(Change in) Transit ridership	■	■								✓				
Percent of growth near key destinations	■									✓				
Average trip length by purpose		■								✓			✓	
Percent of jobs/pop within (15 min) drive time to airport or Amtrak station	■	■								✓			✓	
Ratio of user costs for low income travelers to all user costs (ratio of savings)	■	■									✓			
Low income household access to employment	■	■									✓			
Percent of growth near transit stops	■									✓	✓			
Percent of growth in urban place types	■									✓	✓			
(Change in) cost of emissions	■	■								✓				
Percent of growth on formerly undeveloped land (per 2016 Land Cover Data)		■								✓				
(Change in) Delay on cross-harbor trips (time and dollar value)	■	■									✓		✓	
(Change in) Circuitry of cross-harbor trips	■	■									✓		✓	
(Change in) Reliability for cross-harbor trips (time and dollar value)	■	■									✓			

Regional Scenario Planning Framework

Regional Place Types

- **Virtual 2015**
- **Virtual 2045**
- **2045 Greater Growth**

Scenario Narratives

- **Drivers**
- **Themes**

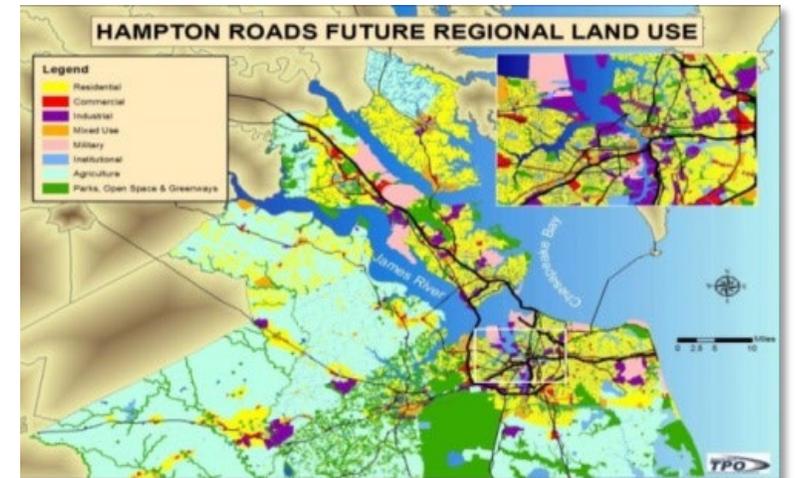
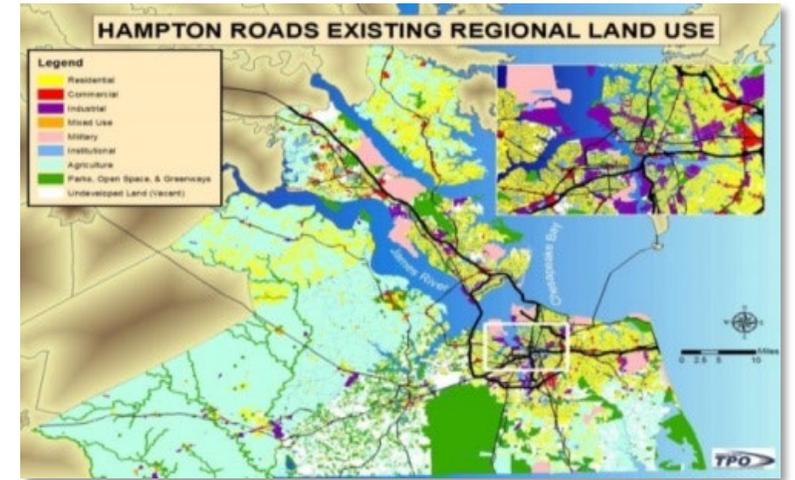
Greater Growth Control Total

- **16% Employment Growth in addition to 2045 Baseline**

- Engaged technical stakeholders throughout process
- Board approval of Regional Scenario Planning Framework

Developing Place Types

- Regional Land Use classification system initiated in 2011
- Synthesizes existing and future land use data from locality comprehensive plans into regional land use categories
 - Common language for analyzing patterns across the region
- Is NOT regional land use planning
- Updated with LRTP cycle



Common land use classification system (Major and Minor Regional Codes)

Developing Place Types

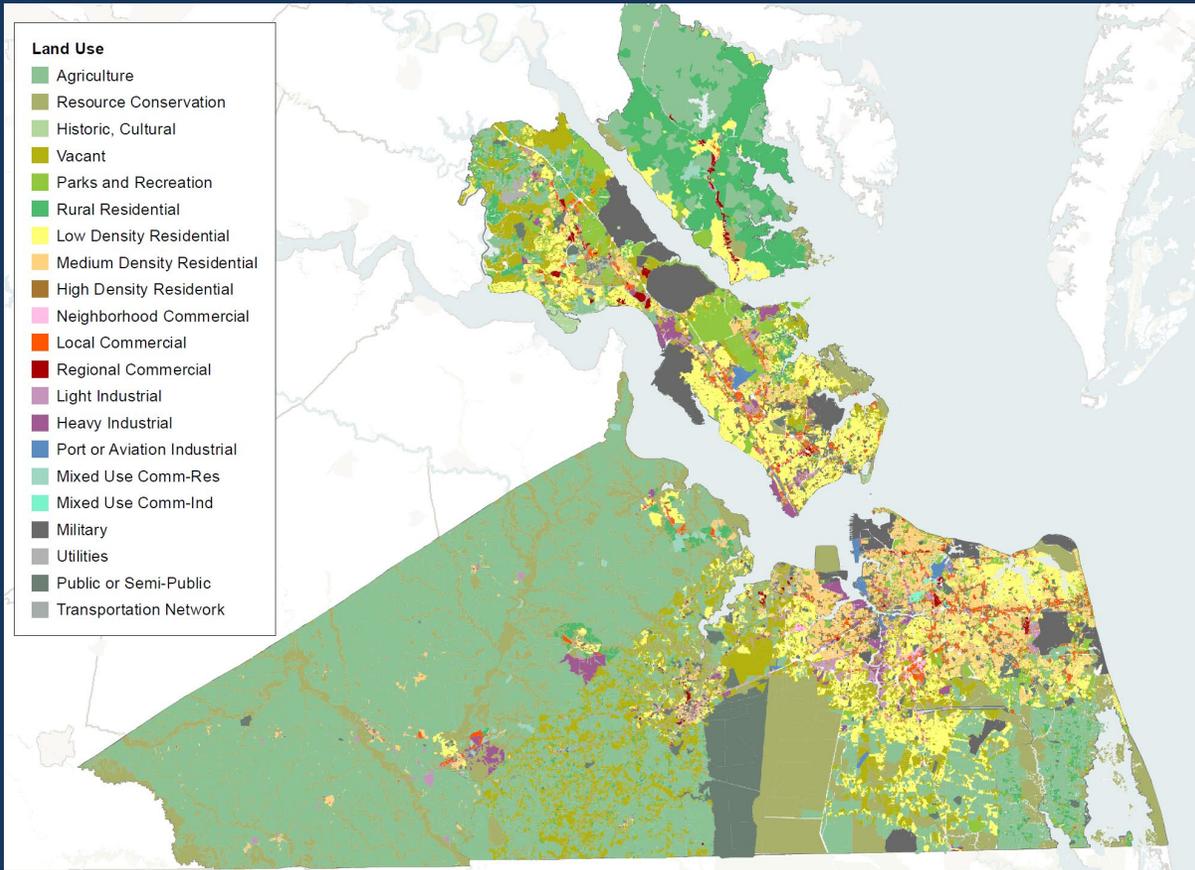
- Place Types used to allocate potential future growth
- “Minor” regional land use codes provide appropriate distinction – adopted as Regional Place Types
- Same place types were used for the Virtual Present (2015), Virtual Future (2045), and Greater Growth scenarios

“MINOR” REGIONAL LAND USE CODES

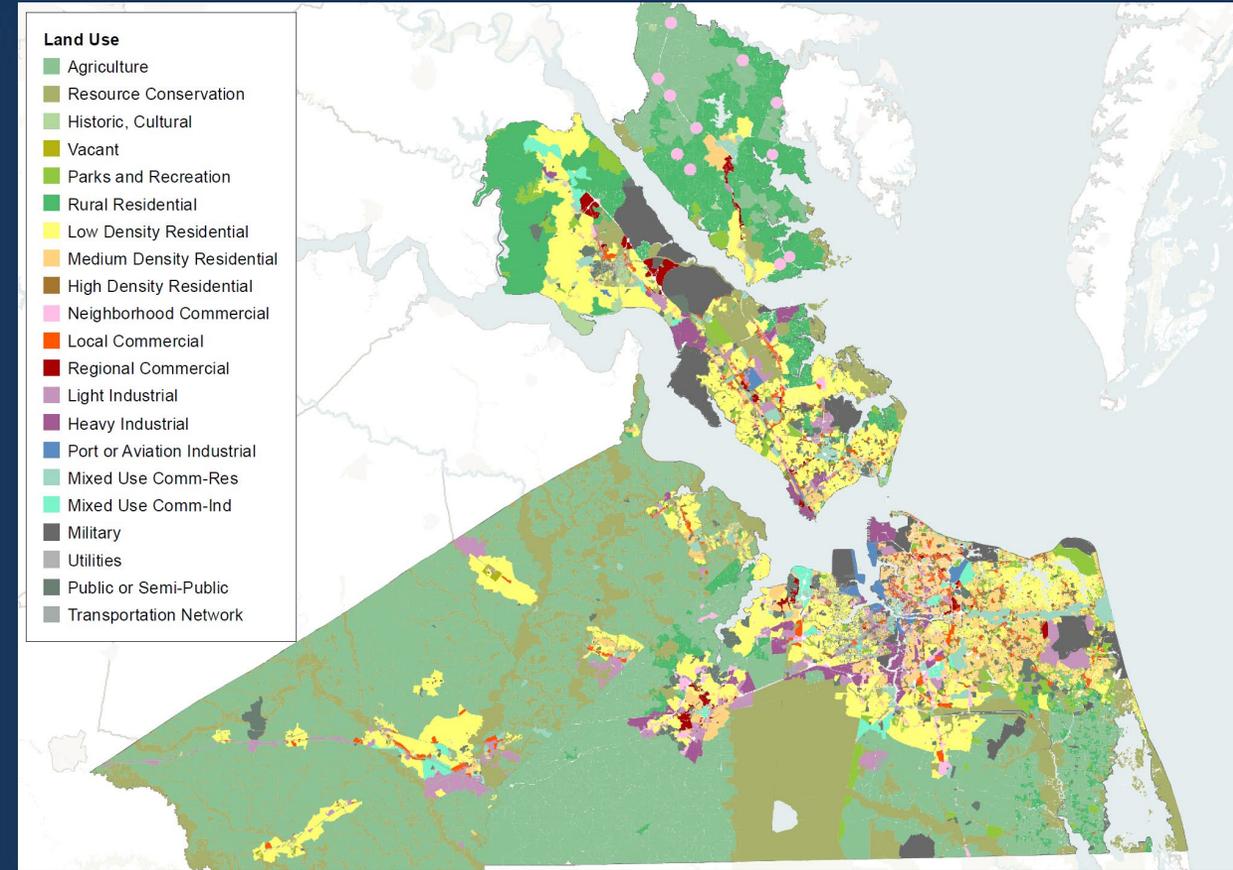
Vacant	Rural Density Residential	Parks & Recreation	Low Density Residential	Medium Density Residential	High Density Residential	Neighborhood Commercial
Local Commercial	Regional Commercial	Light Industrial	Heavy Industrial	Port/Aviation Industrial	Mixed Use Commercial /Resid.	Mixed Use Commercial /Indust.
Military	Utilities	Public/Semi Public	Transport. Network	Agricultural	Resource Conservation	Historic/Cultural

Regional Place Types

Virtual Present & Virtual Future

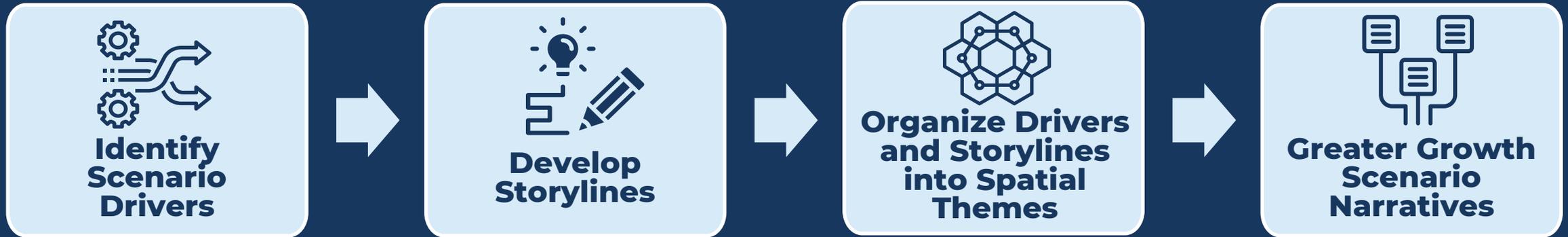


Virtual Present (2015)
Where development is currently



Virtual Future (2045)
Where development can go

Developing Scenario Narratives



- **Considerations**

- Do drivers represent highly impactful *and* highly uncertain factors?
- Do scenarios explore the bounds of possible outcomes?
- Do drivers align within scenario narratives in a way that is mutually reinforcing rather than cancelling-out of spatial effects?
- Can drivers be reflected in available modeling tools (levers)?

Scenario Drivers



Economic

- Military Growth
- Port of VA/Freight Growth
- Diversification
- Digital Port
- High Tech Services
- High Tech Mfg
- Spatial pattern of employment



Demographic/Behavioral

- Urban and Multimodal
- New Suburbia (dispersed but with mixed use centers)
- Behavior and land use responses to technology such as
 - Reduced parking
 - Longer commutes
- Specific travel-related behaviors
 - Freight modes
 - Vehicle ownership



Technology

- CAV Adoption rates
- Ride purchase (or TNC) mode
- System use (such as dedicated facilities for AV)
- System performance (altered capacity from CV)
- Micro-production
- Advanced Manufacturing



Environmental

- Sea Level Rise
- Recurrent Flooding

- Drivers should represent highly impactful and highly uncertain factors

Scenario Narratives

Greater Growth on the Water

- Growth in water-oriented activity.
- Port of Virginia becomes even more competitive with freight more multimodal.
- More dispersed housing locations.
- Moderate assumptions for CAV adoption and network adaptation.

Greater Growth in Urban Centers

- Significant economic diversification.
- Low space requirements per job.
- Large role for “digital port.”
- New professionals prefer to live/work in urban settings.
- High level of CV adoption and low auto ownership/high TNC mode.

Greater Suburban/Greenfield Growth

- Growth is suburban/exurban, includes walkable mixed-use centers.
- Port of Virginia becomes even more competitive.
- “Digital port” brings additional jobs.
- Housing is more suburban.
- High level of AV adoption and network adaptation.

WHAT THESE HELP US TEST

Test greater cross-harbor travel.

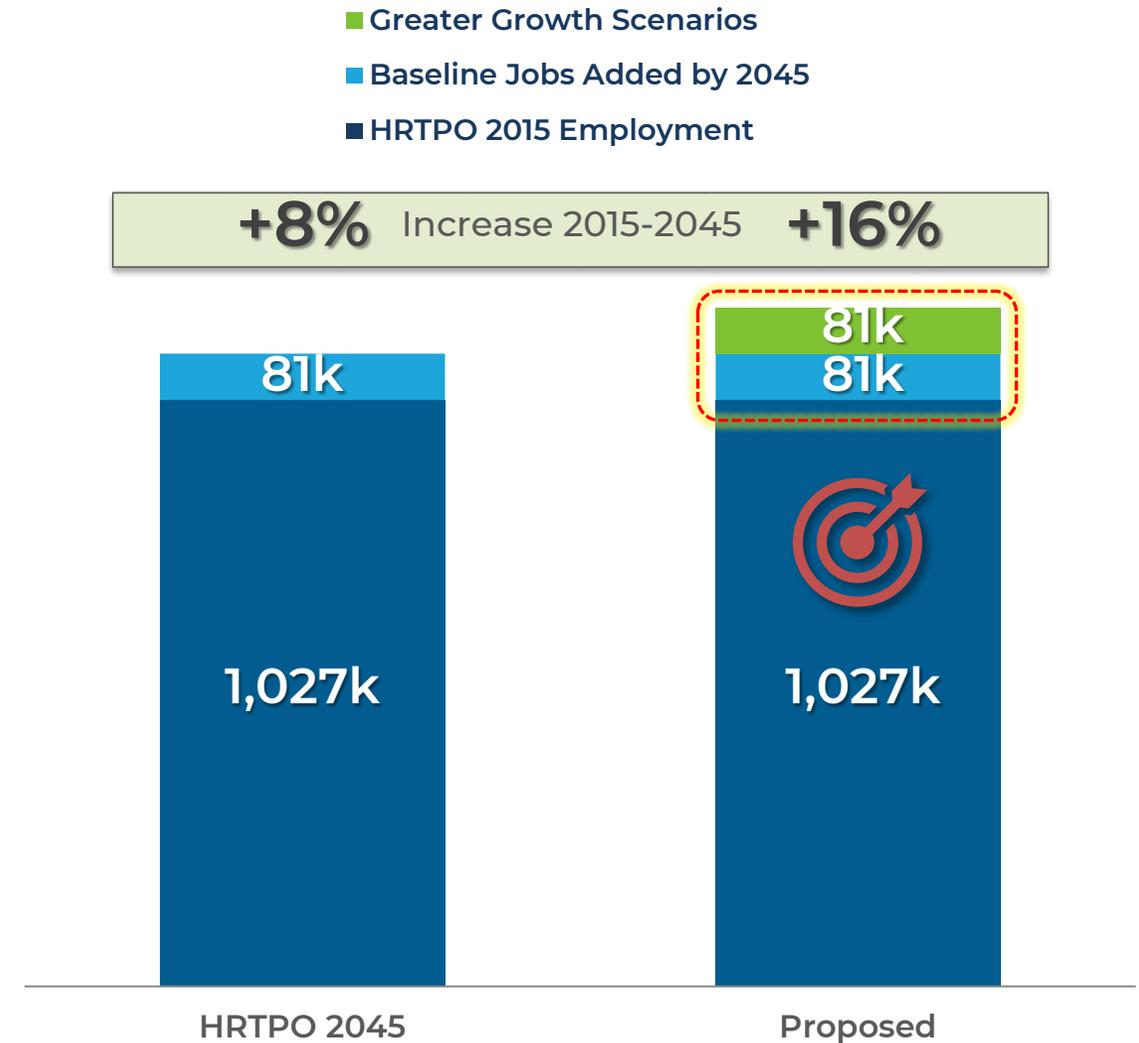
Test more urban and multimodal travel patterns.

Test more overall regional travel.

NOTE: Sea Level Rise (SLR) assumed as 3 ft. in all Scenarios

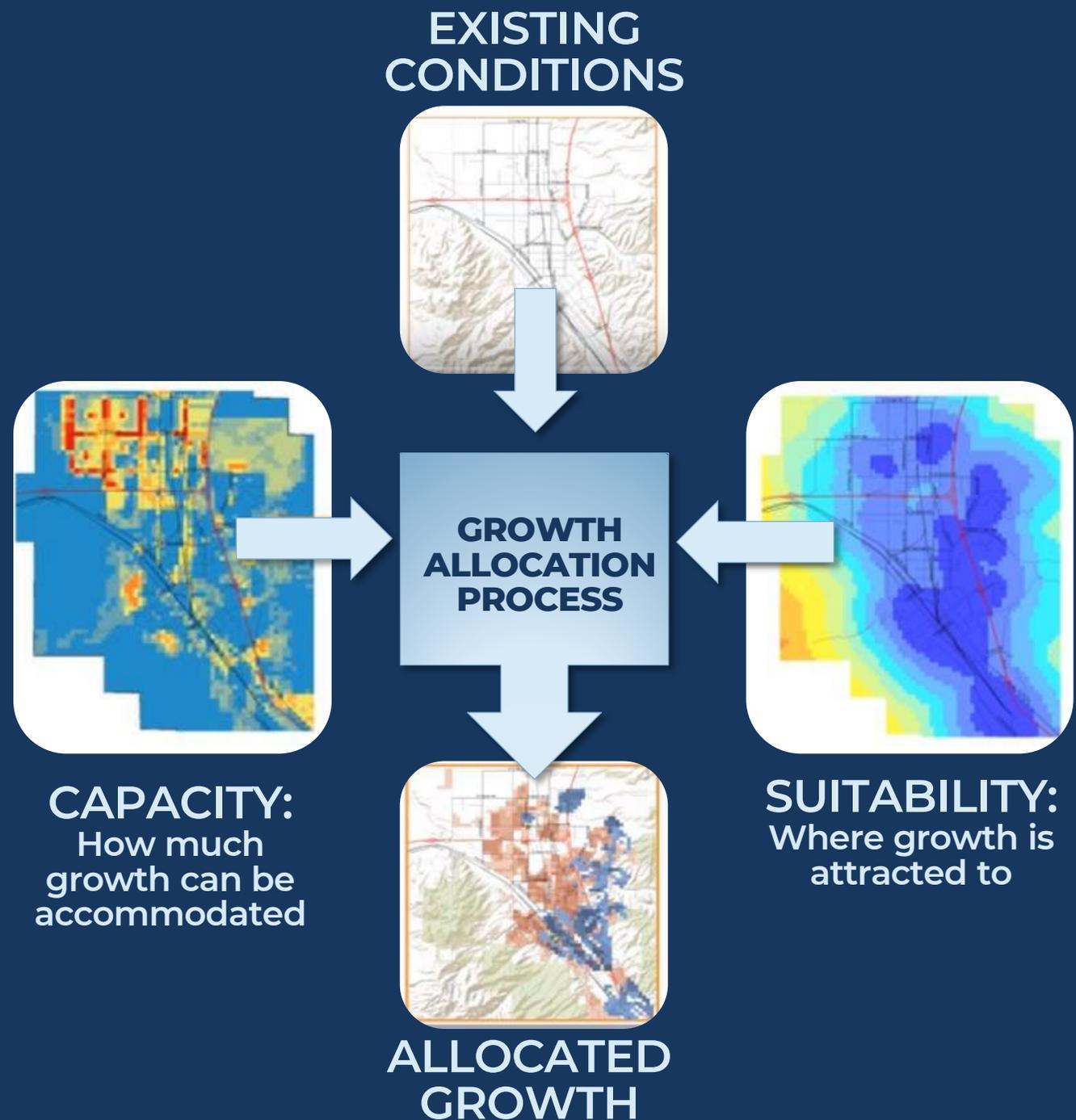
Greater Growth Control Total

- “Greater Growth” intended to stress test transportation alternatives (not predict future)
 - Plausible growth
 - Too little growth could dilute differences
 - Too much growth could mask differences



Allocating Scenario Growth

- Capacity determines how much growth can be accommodated
- Suitability determines where growth will be allocated (scenario specific)
- Allocations of future jobs and population occur where there is both high suitability and capacity



Scenario Modeling

Across all Scenarios



CANDIDATE PROJECTS

Land Use Model

Travel Demand Model

Economic Model

HRTPO PROJECT PRIORITIZATION TOOL

Project Utility

Economic Vitality

Project Viability

Coordination and Input



- (2) Workshops
- (7) Technical Webinars
- Numerous Meetings, Conference Calls, and Emails
- Reviewed and Approved by:
 - Long-Range Transportation Plan Subcommittee
 - Transportation Technical Advisory Committee
 - Regional Connectors Study Working Group and Steering Committee
 - HRTPO Board
- Public Review and Comment Period on Framework



Successful Outcomes

- ✓ Leverage and enhance existing data and tools
- ✓ Ensure applicability for future use
- ✓ Able to stress test the network and identify the most resilient projects
- ✓ Feel more prepared for future uncertainty

Key Takeaways

- Establish objectives and approach early
- Ensure stakeholders have solid understanding of Exploratory Scenario Planning
- Regional input – early and continuous (including decision makers)
- Ensure staff understanding of transferable tools
- Approvals at critical milestones
- Budget appropriate staff time

THANK YOU!



L RTP RESOURCES:

2045 L RTP WEBPAGE

https://www.hrtpo.org/page/2045-long_range-transportation-plan/

2045 L RTP SCENARIO PLANNING

https://www.hrtpo.org/page/2045-long_range-transportation-plan:-scenario-planning/



HRTPO PROJECT PRIORITIZATION

<https://www.hrtpo.org/page/project-prioritization/>

2050 L RTP WEBPAGE

https://www.hrtpo.org/page/2050-long_range-transportation-plan/

DALE M. STITH
HRTPO PRINCIPAL TRANSPORTATION PLANNER
DSTITH@HRTPO.ORG
WWW.HRTPO.ORG



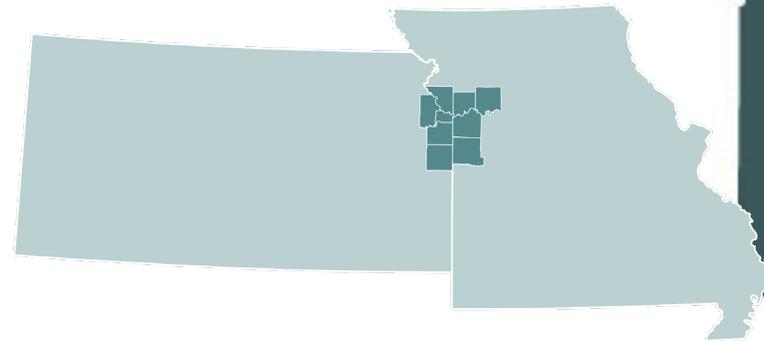
Scenario planning at the Mid-America Regional Council

Presented to the Piedmont Authority for Regional Transportation
May 3, 2023

Martin Rivarola, AICP
Assistant Director of Transportation and Land Use

Kansas City region

- Two states
- Nine counties (eight in MPO boundary)
- 119 cities
- More than 2.1 million people
- 4,400 square miles



Early goals

- Take multi-disciplinary approach
- Raise public awareness of possible futures and driving forces
- Set direction for region — inform update of regional vision statement



Early goals

Once we moved into work to update Long-range Metropolitan Transportation Plan, this work:

- Supported decisions and actions
- Informed project prioritization
- Led to inclusion of two new policy goals:
 - Financial sustainability
 - Data and technology



Future driving forces

We're living in a time of great change, driven by forces largely beyond our control.



Rapidly emerging new technologies



Climate change — more weather extremes



Globalization of our regional economy



Shifting demographics

Our purpose

- How can we stay on track to achieve our vision of a vibrant, connected and green region?
- How can we take advantage of the opportunities and limit the challenges these forces create?



Scenario Planning process

1

ANTICIPATE what the future might bring

Fall/winter 2016 — Dec. 14 & Jan. 11 Driving Forces workshops

2

Analyze alternative FUTURES

Winter 2017 — committee & staff work to construct alternative futures

3

Refresh Regional Vision & Set POLICY direction

Spring 2017 — Jan. 31 Scenario Planning workshop

4

INTEGRATE into regional plan updates

Starting summer 2017

Scenario Planning workshops

- Two early Driving Forces workshops
- One FHWA-sponsored workshop (panel with three peer regional councils)
 - Discussed driving forces, potential impacts, vision for the future.
- One general audience workshop.

Committee discussions

- Recurring discussions with MARC programming and policy committees, Board of Directors



Public engagement



Steering work group provided guidance and policy advice

Ongoing public engagement included:

- Pop-up meetings
- Public meetings
- Other outreach including Facebook Live, Story Maps and other online engagement

1

ANTICIPATE what the future might bring

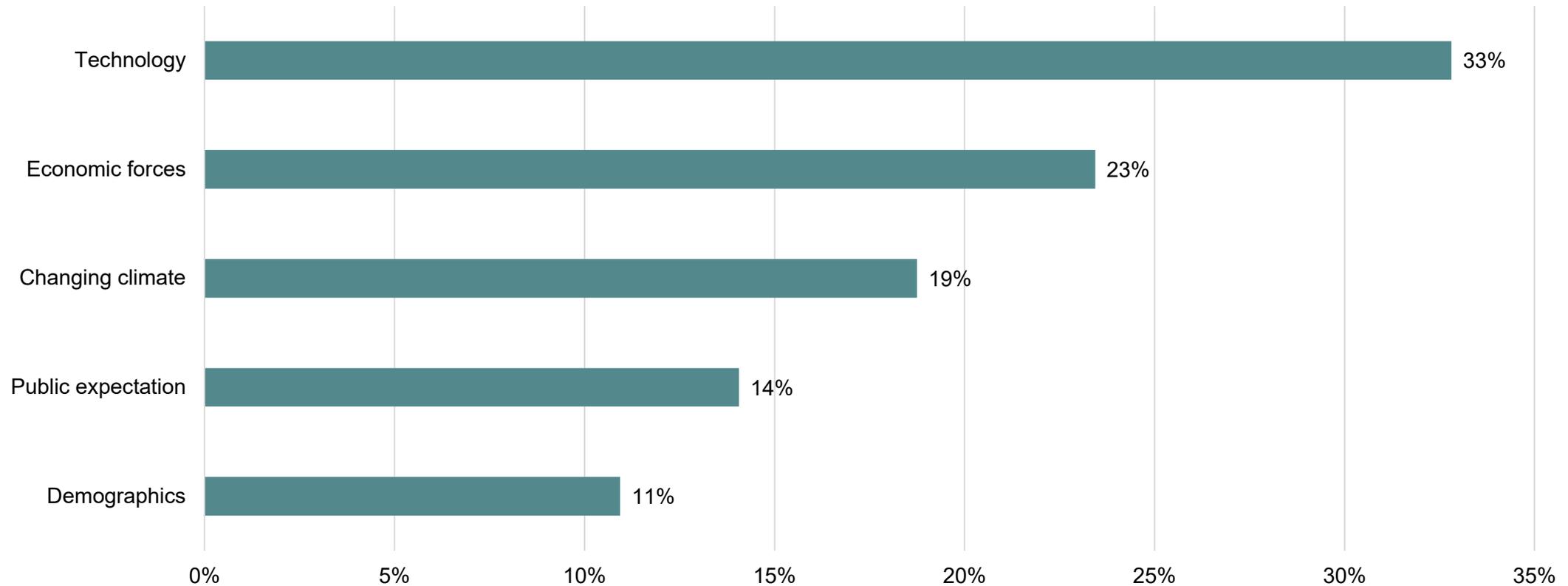
Fall/winter 2016 — Dec. 14 & Jan. 11 Driving Forces workshops

TECHNOLOGY	DEMOGRAPHICS	ECONOMIC FORCES	CHANGING CLIMATE	PUBLIC EXPECTATIONS
<p>Internet of things</p> <p>Autonomous vehicles</p> <p>Automation affects all occupations</p> <p>Health technologies extend lifespans</p> <p>Cleaner energy technologies</p>	<p>Aging population</p> <p>More diversity</p> <p>Changing nature of poverty</p> <p>Migration patterns</p> <p>Immigration</p>	<p>Globalization</p> <p>Income inequality</p> <p>Portability of capital</p> <p>Outsourcing</p> <p>Global labor market</p> <p>Recession or expansion</p>	<p>Extreme weather</p> <p>Higher temperatures</p> <p>More flooding</p> <p>Scarcity of clean water</p> <p>Species extinctions</p>	<p>Desire for more choices</p> <p>Generational differences in tastes and attitudes</p> <p>Discontent with status quo</p> <p>Resource constraints</p>



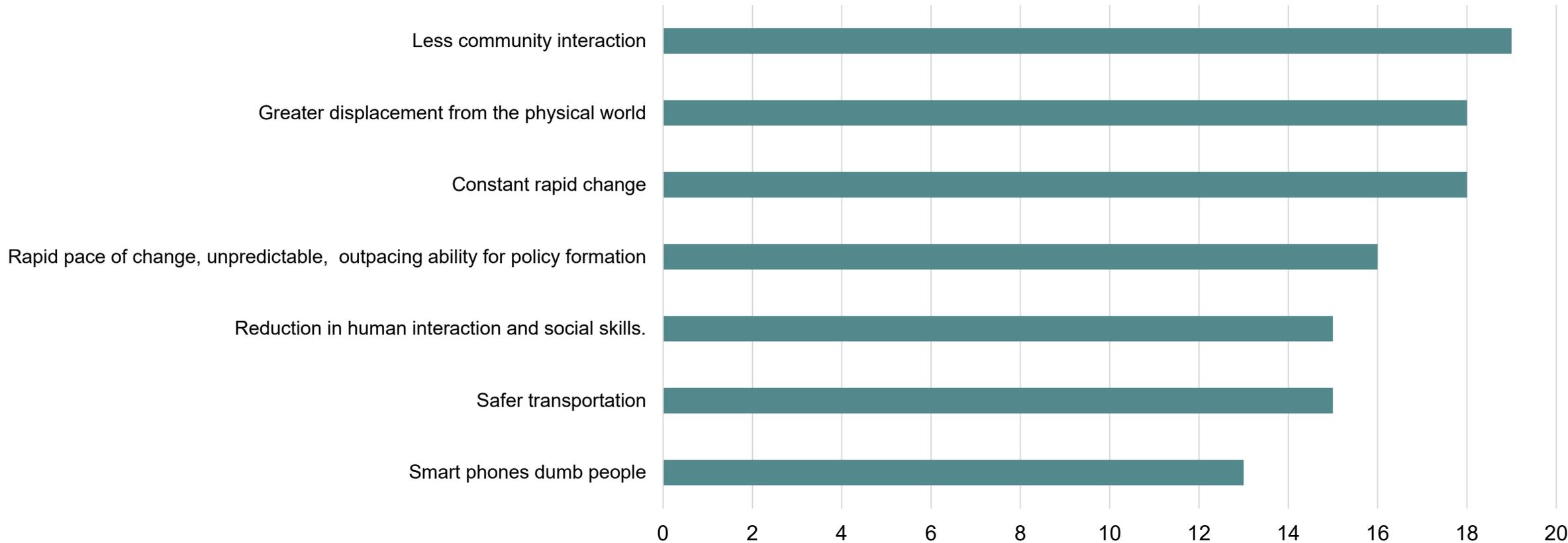
Driving Forces workshop interactive exercises

Which force is most important to you?



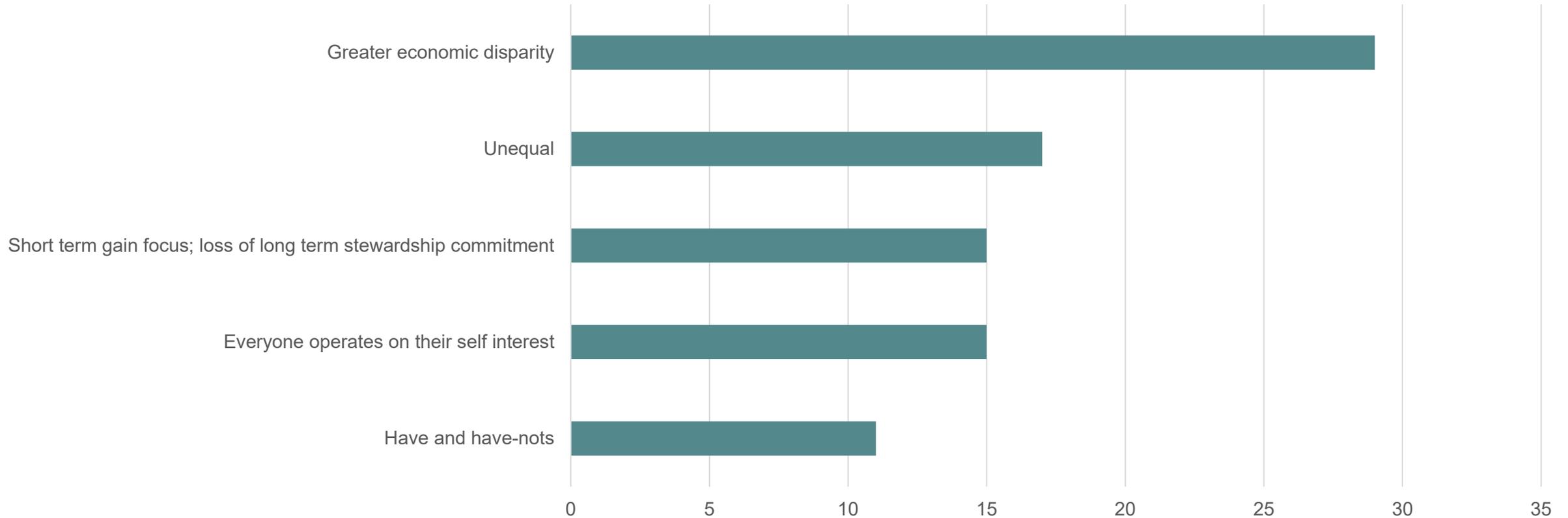
Driving Forces workshop interactive exercises

What will a future look like where TECHNOLOGY is the most influential?



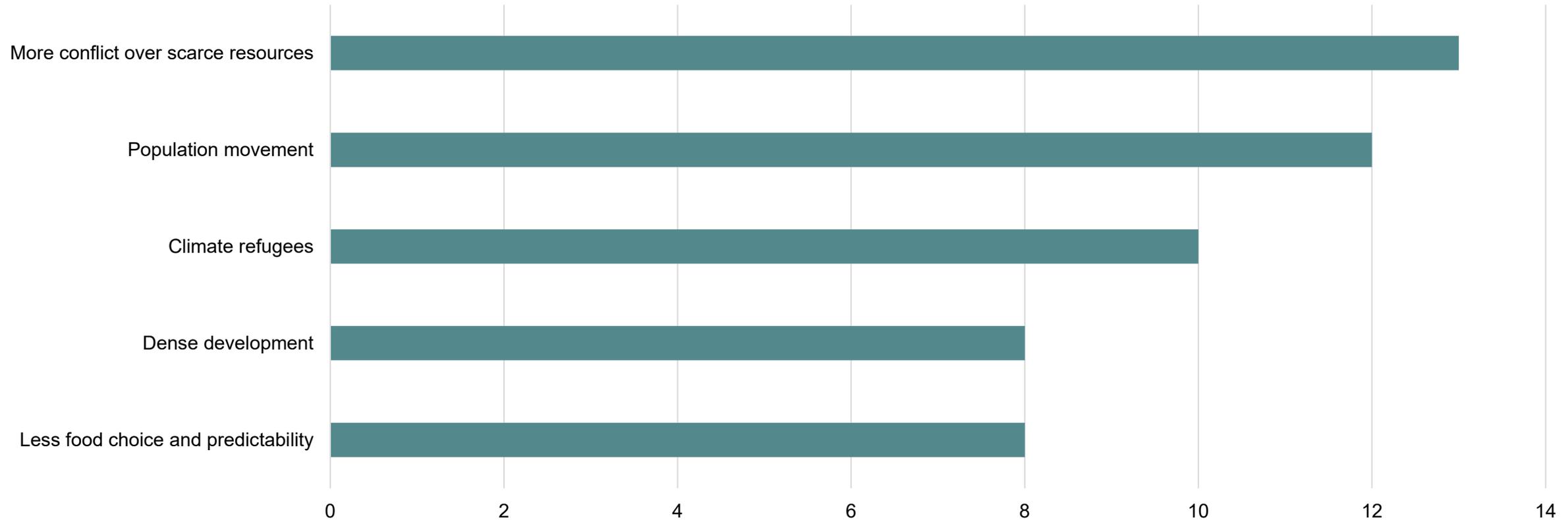
Driving Forces workshop interactive exercises

What will a future look like where ECONOMIC FORCES is the most influential?



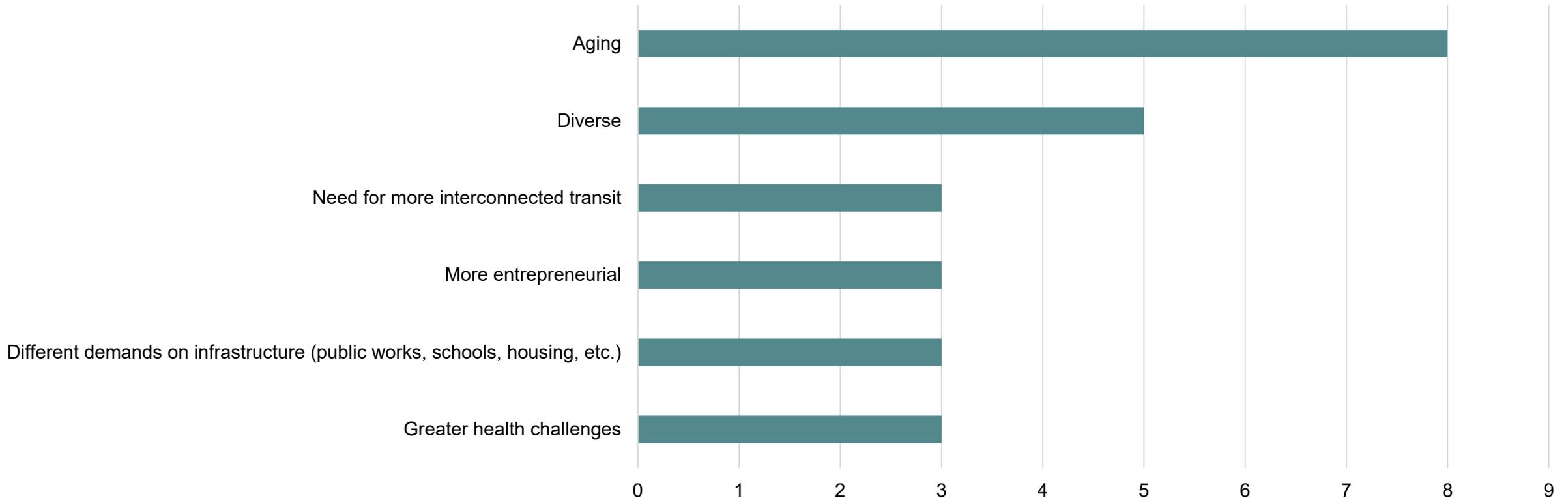
Driving Forces workshop interactive exercises

What will a future look like where CHANGING CLIMATE is the most influential?



Driving Forces workshop interactive exercises

What will a future look like where changing DEMOGRAPHICS is the most influential?





What three potential impacts of climate change are MOST LIKELY?

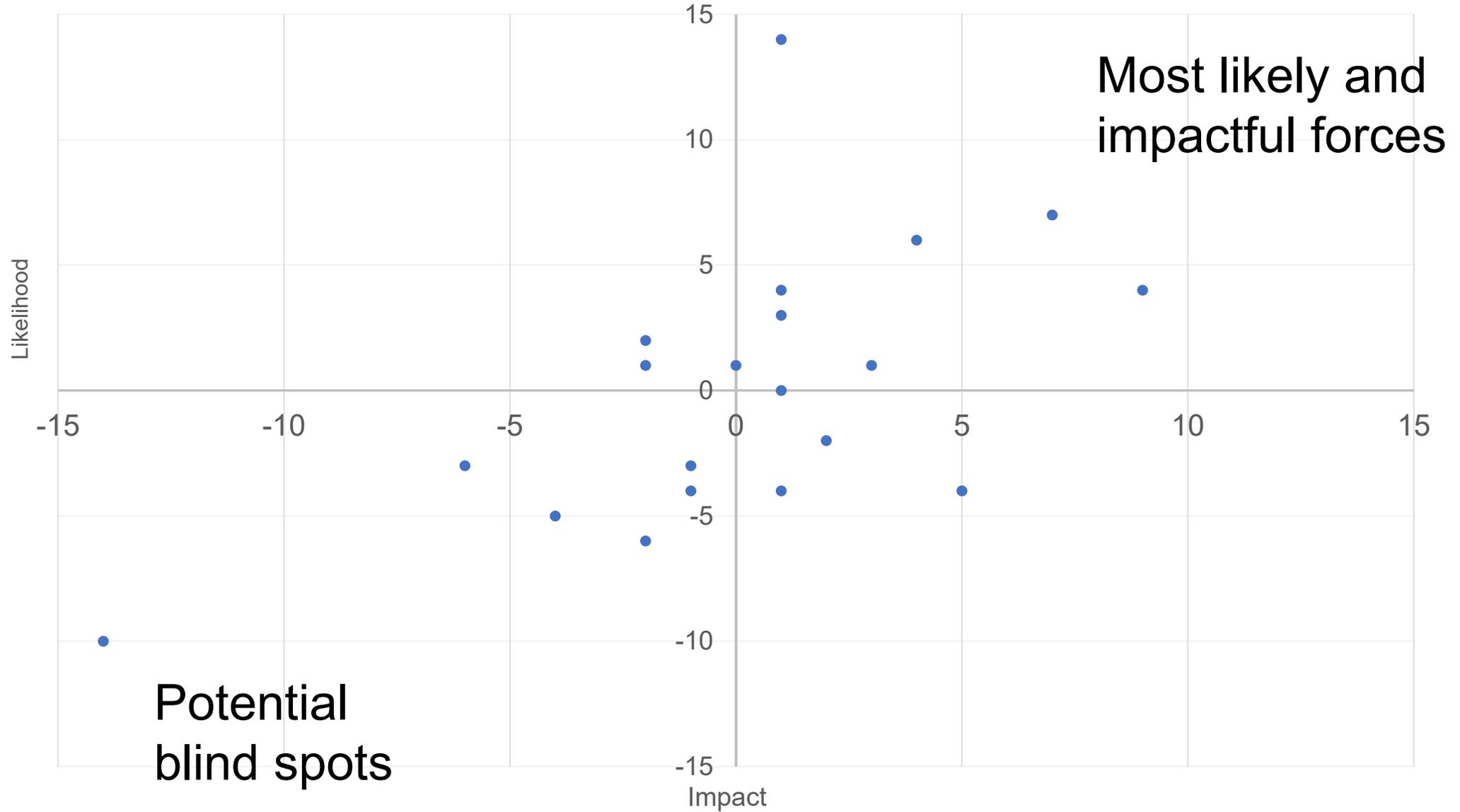
	TTPC	SPPC	Air Quality Forum
Increase in extreme weather	1	1	1
Higher energy costs	2	3	2
Greater impact on low-income residents	3		2
Higher costs to retrofit and maintain infrastructure		2	
Increase in demand for transportation choice			
More energy efficient communities gain an advantage			3
Increase in demand for more efficient development			
More urban heat islands			
More prevalent disease and illnesses related to heat			
Influx of climate refugees from the coasts			



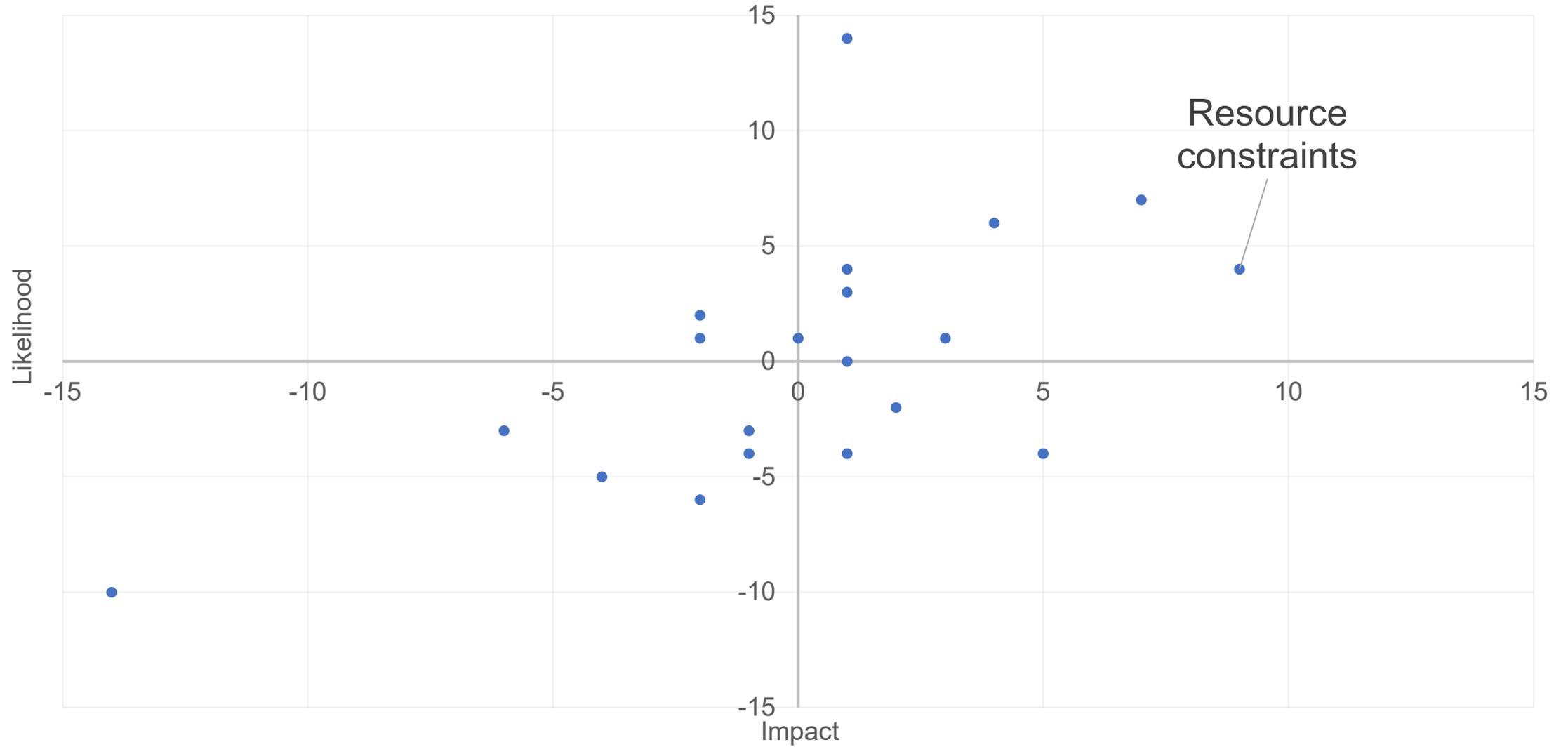
What three potential impacts of climate change are MOST SIGNIFICANT?

	TTPC	SPPC	Air Quality Forum
Increase in extreme weather	1	1	1
Greater impact on low-income residents	2	2	3
More prevalent disease and illnesses related to heat		3	2
Higher costs to retrofit and maintain infrastructure		1	
Higher energy costs	3		
More energy efficient communities gain an advantage			
Influx of climate refugees from the coasts			
Increase in demand for transportation choice			
More urban heat islands			
Increase in demand for more efficient development			

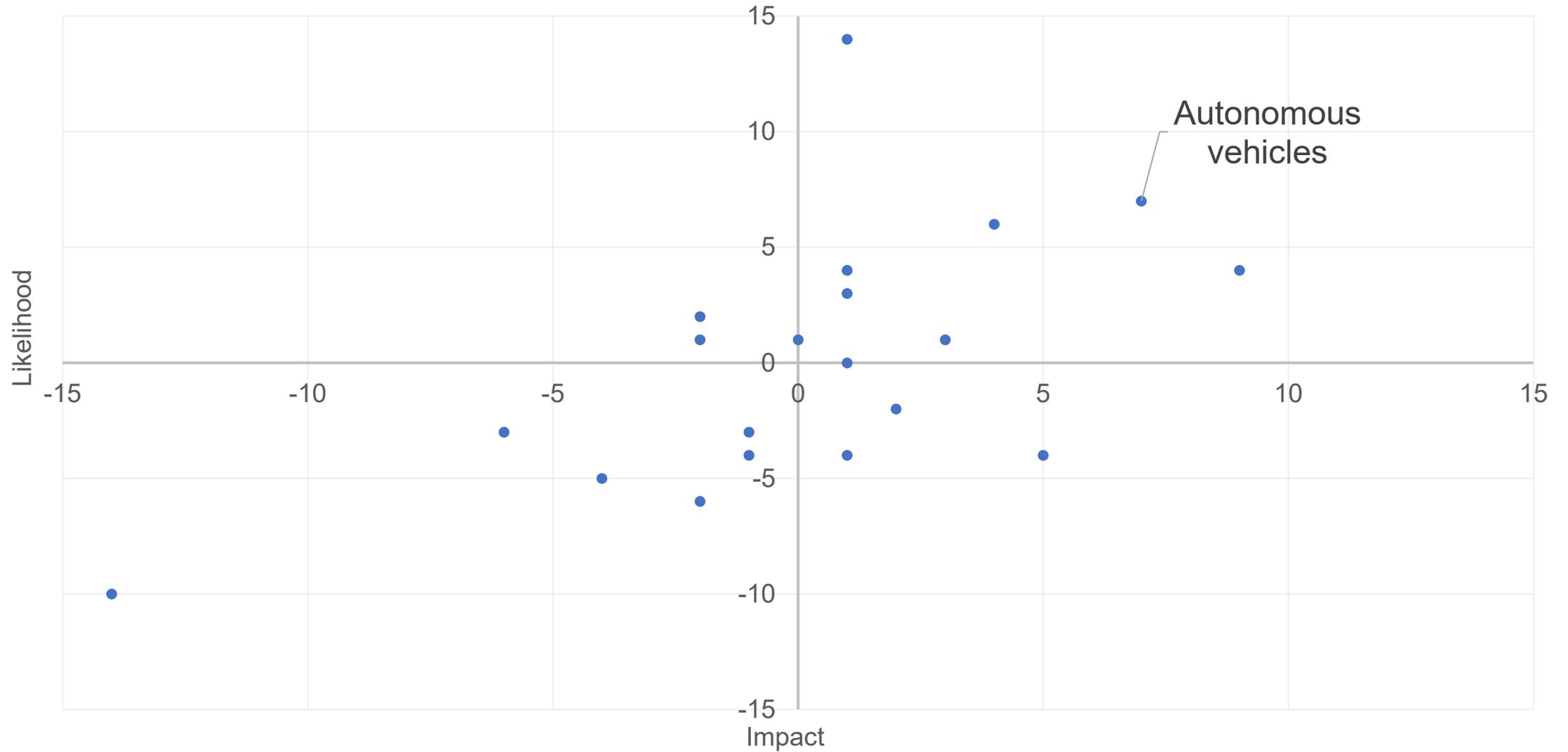
Interactive exercises (Likelihood vs Impact)



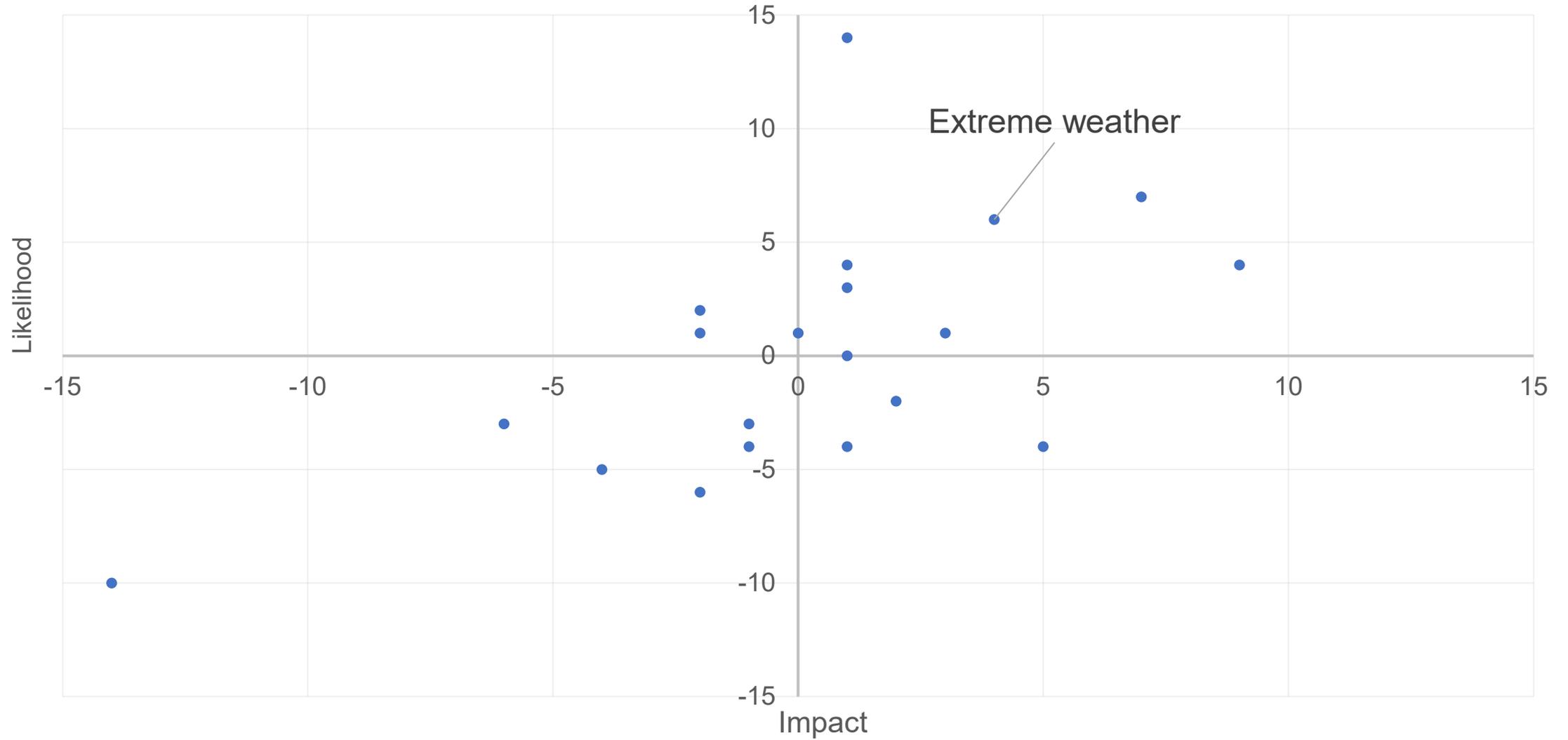
Interactive exercises (Likelihood vs Impact)



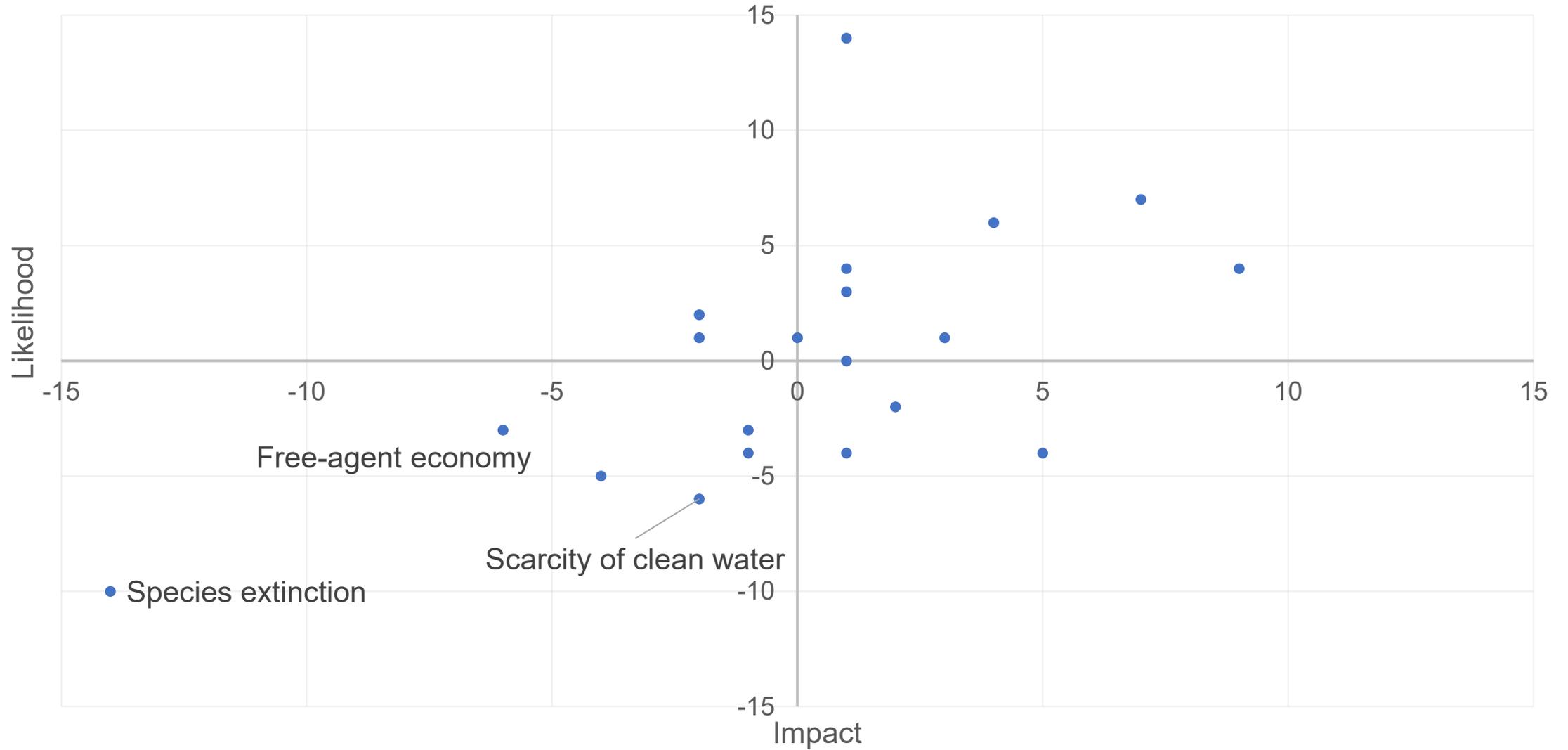
Interactive exercises (Likelihood vs Impact)



Interactive exercises (Likelihood vs Impact)



Interactive exercises (Likelihood vs Impact)



Top impacts

	Most likely	Most significant
CLIMATE CHANGE		
Increase in extreme weather	○	○
Higher energy costs	○	
Greater impact on low-income residents	○	○
More prevalent disease and illnesses related to heat		○

DEMOGRAPHIC CHANGE

Fewer working adults to support retiree benefits	○	○
Competition for resources between ages and races	○	○
Demand for transportation choices	○	
Labor shortages and rising unemployment		○

	Most likely	Most significant
ECONOMIC CHANGES		
Increase in income inequality	○	○
Contract workers make employment more unpredictable	○	○
More frequent and severe boom/bust cycles	○	○

TECHNOLOGICAL CHANGES

Fewer low- to medium-skill jobs	○	○
Increasing role of data requires new ways to use, store and manage it	○	
Highly automated vehicles reduce traffic fatalities and injuries	○	○
Widening of the digital divide		○

Key plans & strategies

We have existing plans and strategies. Do any of them address these forces?

		CURRENT PLANS											
Intersection of forces with goals and strategies of current plans		Creating Sustainable Places	Transportation Outlook 2040	Clean Air Action Plan	MetroGreen Action Plan	Smart Moves Transit Plan	Solid Waste Strategic Plan	Regional Energy Efficiency and Conservation Strategy	Comprehensive Economic Development Strategy	Affirmatively Furthering Fair Housing	KC Rising	KC Communities for All Ages Toolkit	Regional Multi-Hazard Mitigation Plan
TOP IMPACTS	CLIMATE CHANGE												
	Increase in extreme weather												
	Higher energy costs												
	Greater impact on low-income residents												
	More prevalent disease and illnesses related to heat												
	DEMOGRAPHIC CHANGE												
	Fewer working adults to support retiree benefits												
	Competition for resources between ages and races												
	Demand for transportation choices												
	Labor shortages and rising unemployment												
	ECONOMIC CHANGES												
	Increase in income inequality												
	Contract workers make employment more unpredictable												
	More frequent and severe boom/bust cycles												
	TECHNOLOGICAL CHANGES												
	Fewer low- to medium-skill jobs												
Increasing role of data requires new ways to use, store and manage it													
Highly automated vehicles reduce traffic fatalities and injuries													
Widening of the digital divide													

Key plans & strategies

We have existing plans and strategies. Do any of them address these forces?

		CURRENT PLANS											
Intersection of forces with goals and strategies of current plans		Creating Sustainable Places	Transportation Outlook 2040	Clean Air Action Plan	MetroGreen Action Plan	Smart Moves Transit Plan	Solid Waste Strategic Plan	Regional Energy Efficiency and Conservation Strategy	Comprehensive Economic Development Strategy	Affirmatively Furthering Fair Housing	KC Rising	KC Communities for All Ages Toolkit	Regional Multi-Hazard Mitigation Plan
TOP IMPACTS	CLIMATE CHANGE												
	Increase in extreme weather												○
	Higher energy costs		○	○				○					
	Greater impact on low-income residents	○	○										○
	More prevalent disease and illnesses related to heat												○
	DEMOGRAPHIC CHANGE												
	Fewer working adults to support retiree benefits												
	Competition for resources between ages and races											○	
	Demand for transportation choices	○	○	○	○	○				○		○	
	Labor shortages and rising unemployment								○		○		
	ECONOMIC CHANGES												
	Increase in income inequality		○						○	○	○		
	Contract workers make employment more unpredictable										○		
	More frequent and severe boom/bust cycles										○		
	TECHNOLOGICAL CHANGES												
	Fewer low- to medium-skill jobs								○		○		
	Increasing role of data requires new ways to use, store and manage it												
	Highly automated vehicles reduce traffic fatalities and injuries												
Widening of the digital divide											○		

What we learned

Some clear gaps in our plans

- Disruptive technology
- An unreliable economy
- Increasing competition for resources
- Increasing divides – addressed by process but not directly by policy

Some emphasis areas don't have formal plans

- Communities for All Ages
- Energy conservation and efficiency
- Workforce (labor shortages due to fewer working adults)

**Considering fundamental forces
both broadened and sharpened our
understanding.**

But was this understanding adequately
captured in our vision statement?

Regional vision

Greater Kansas City is a region of opportunity. Its robust economy, healthy environment and social capacity support the creativity, diversity and resilience of its people, places and communities.





Scenario Analysis

Long-range transportation plan



CONNECTEDKC
2050
REGIONAL TRANSPORTATION PLAN

- Establish regional vision
- Develop policies and strategies
- Identify significant projects

Objectives for MTP update

- Respond to future driving forces
- Re-emphasize focus on vibrant centers and corridors
- Adapt to, incorporate, and leverage emerging technology
- Develop scenarios for new revenues
- Develop a more integrated approach
- Strengthen ties between land use and environmental vision, economic goals, and work toward addressing regional equity issues

Plan update timeline



Transportation modeling

Decisions we make about transportation infrastructure today can have a big impact well into the future.

Modeling demonstrates how choices we make today might:

- Affect the system in the future.
- Help us meet our goals.
- Have unintended consequences.

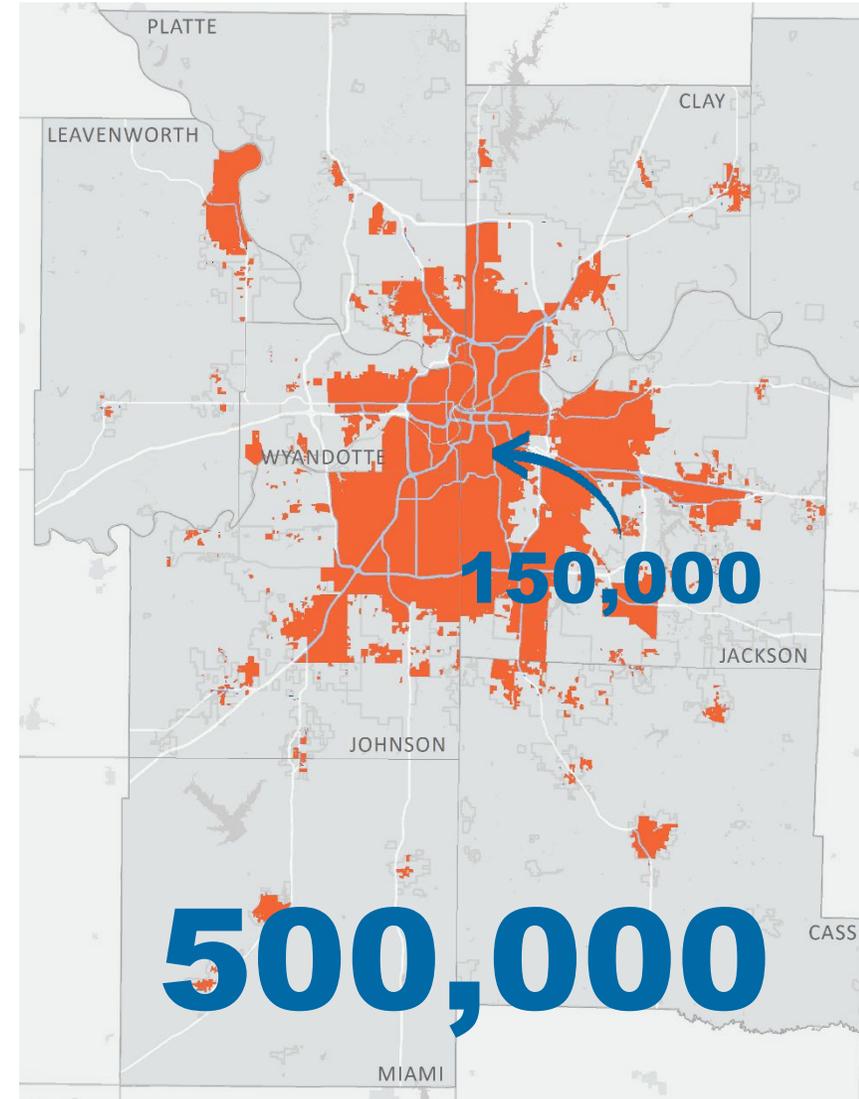
Two central land use scenarios — *trend vs focused growth*

Let it ride

Trend growth scenario

Within redevelopment area

- Population growth: 30%
(150k out of 500k)
- Job growth: 50%
(150k out of 300k)

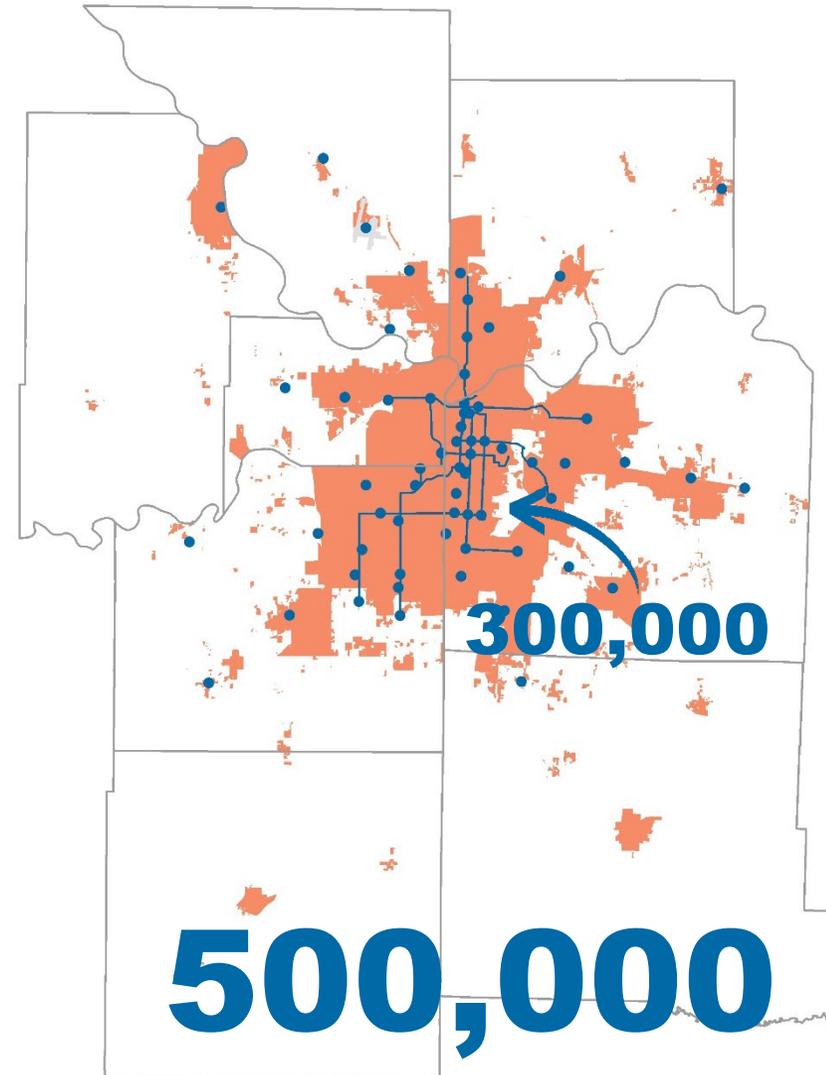


Take the wheel

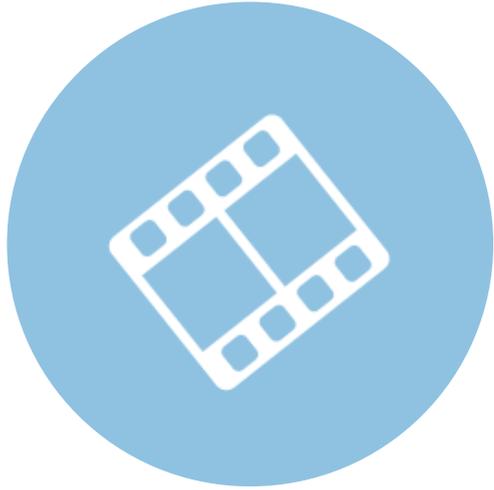
Focused growth scenario

Within redevelopment area

- Population growth: 60%
(300k out of 500k)
- Job growth: 80%
(240k out of 300k)



Transportation scenarios



Freeze frame

- TIP only



If you build it...

- Transportation Outlook 2040



Hop on the bus, Gus

- Focus on transit



Money DOES grow on trees

- Focus on roadway capacity

Considered wild cards...



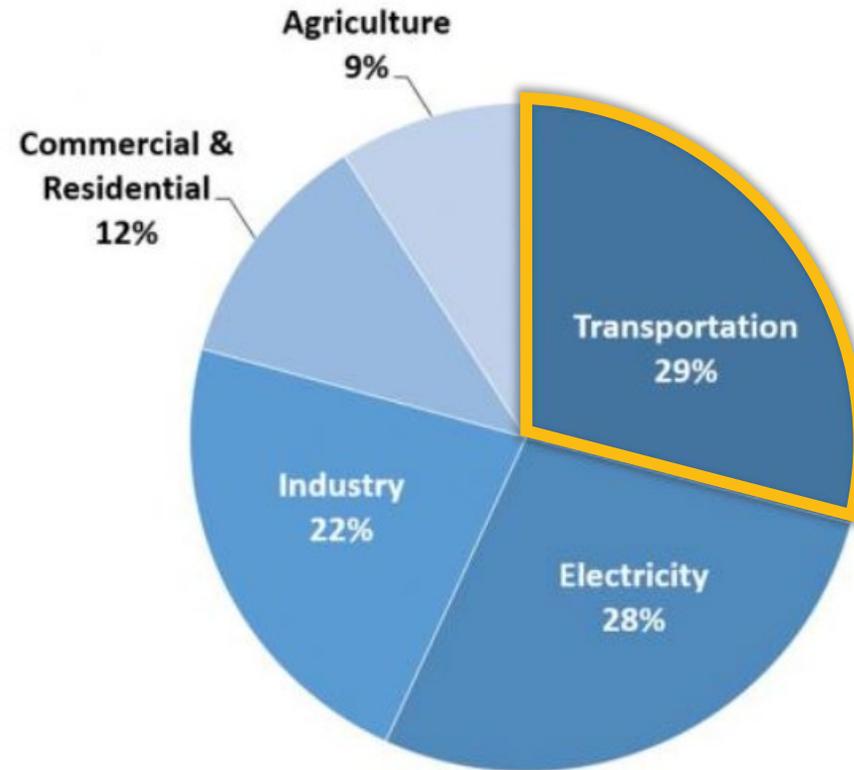
Impact of autonomous and connected vehicles.

Considered wild cards...

Greenhouse gas emissions and climate change

As of 2017, the largest share of greenhouse gas emissions comes from transportation.

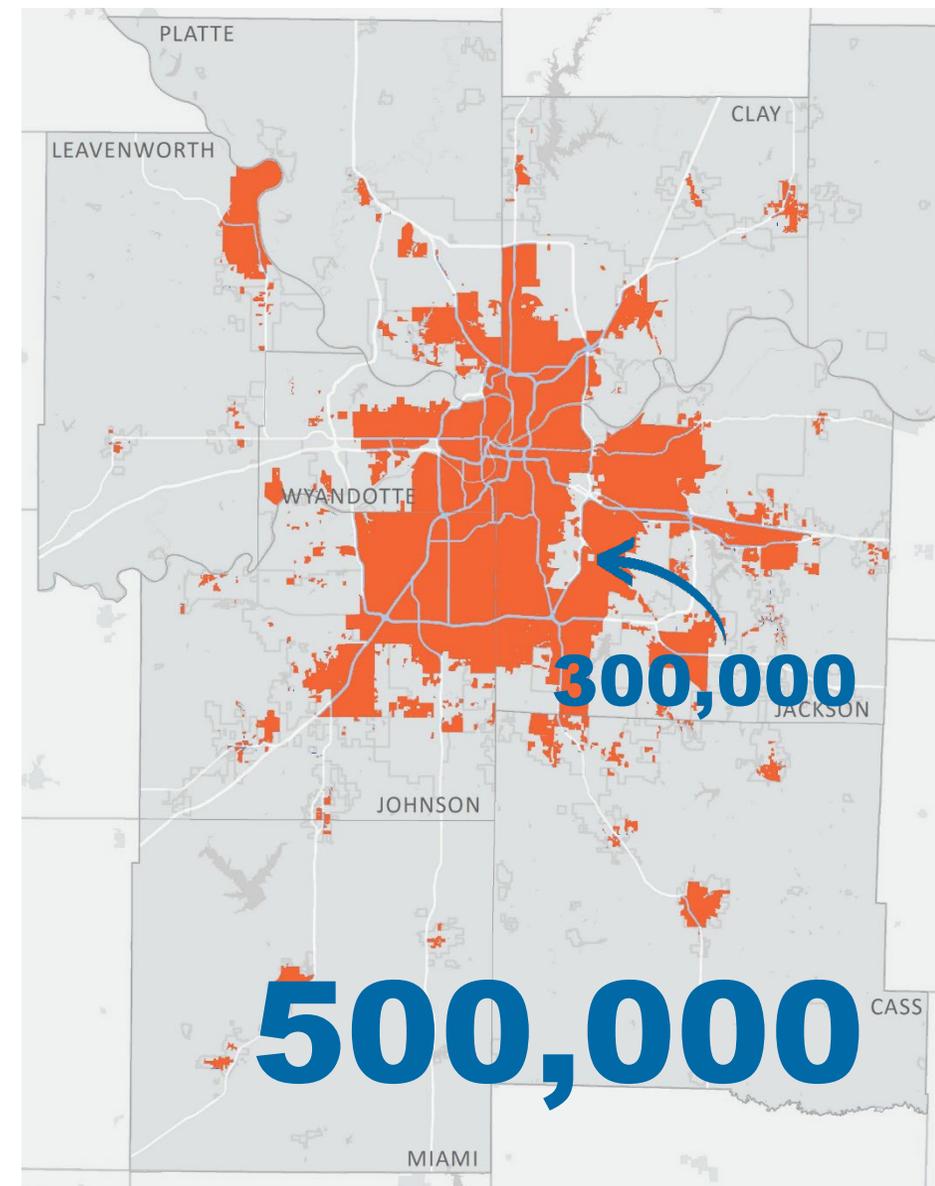
Total U.S. Greenhouse Gas Emissions by Economic Sector in 2017



What this means

Strategies that promote **focused growth** are the best way to accommodate our needs, meet our goals and achieve our vision.

Electric vehicle adoption and pricing strategies, combined with **focused growth** and **multimodal (transit) investments**, appear to be the best way to make significant reductions in greenhouse gas emissions.



Impact on MTP Process

- What we learned informed project scoring.
- Projects submitted through our call were assembled into scenarios and run through various modeling processes.
- Based on desired outcomes, we prioritized projects as high, medium, or low in MTP.



Resources

Check out [ConnectedKC.org](https://connectedkc.org)

How we developed the plan?



Modeling scenarios story map



Forecast methodology and results





Thank you!

Martin Rivarola, AICP
Assistant Director of Transportation and Land Use
Mid-America Regional Council
mrivarola@marc.org

LUNCHTIME!

The next session will start promptly at 1:15
PM. Thank you.

PEER PRESENTATION 2: ASSESSING AND IMPLEMENTING SCENARIOS

Featured Speakers:

Dale Stith, Hampton Roads Transportation
Planning Organization

Martin Rivarola, Mid-America Regional
Council

Assessing and Implementing Scenarios

Hampton Roads Perspective

Dale M. Stith, Principal Transportation Planner
Hampton Roads Transportation Planning Organization

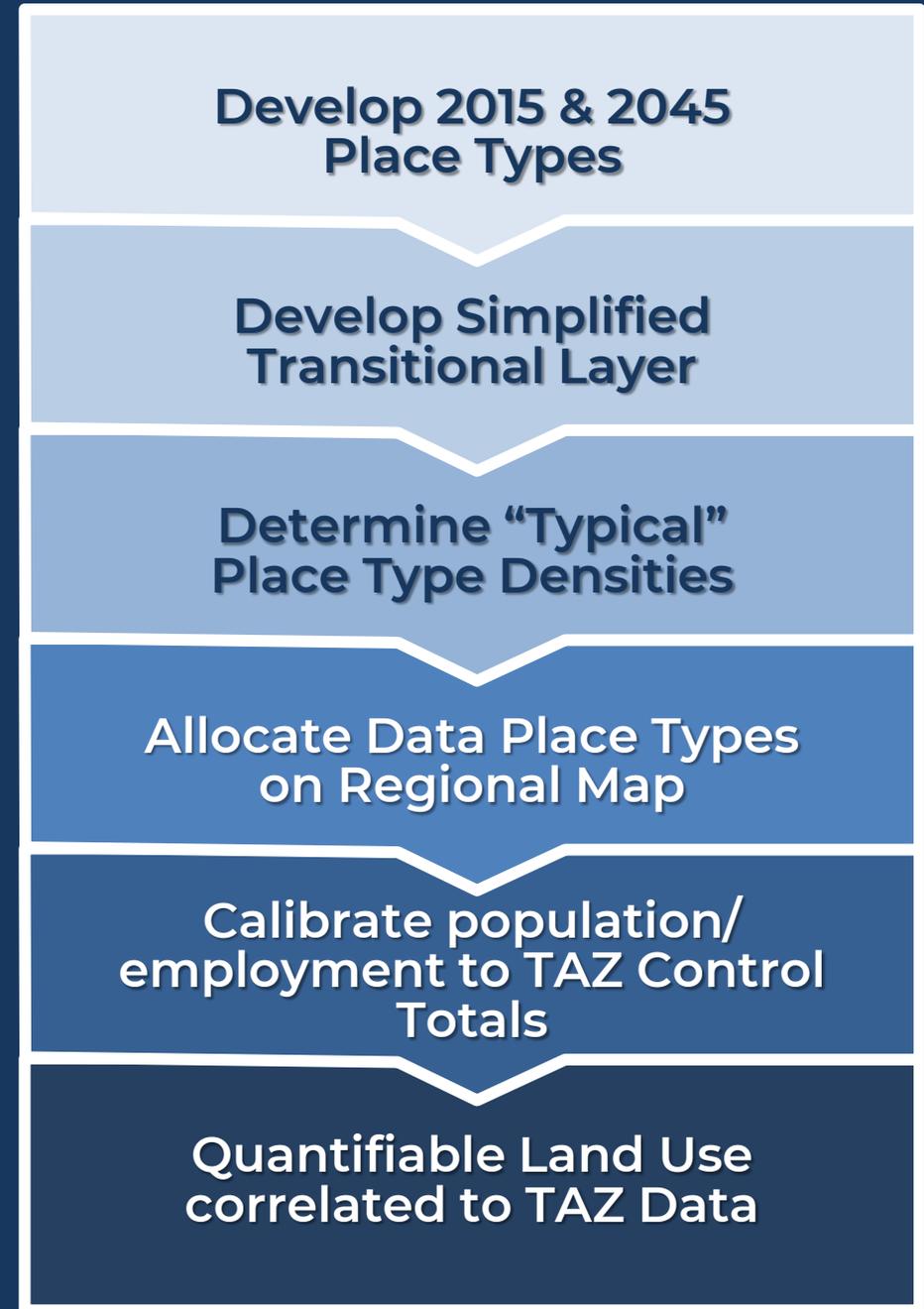
Presented to the Piedmont Authority for Regional Transportation
Scenario Planning Peer Exchange
May 3, 2023

Scenario Modeling *Across all Scenarios*



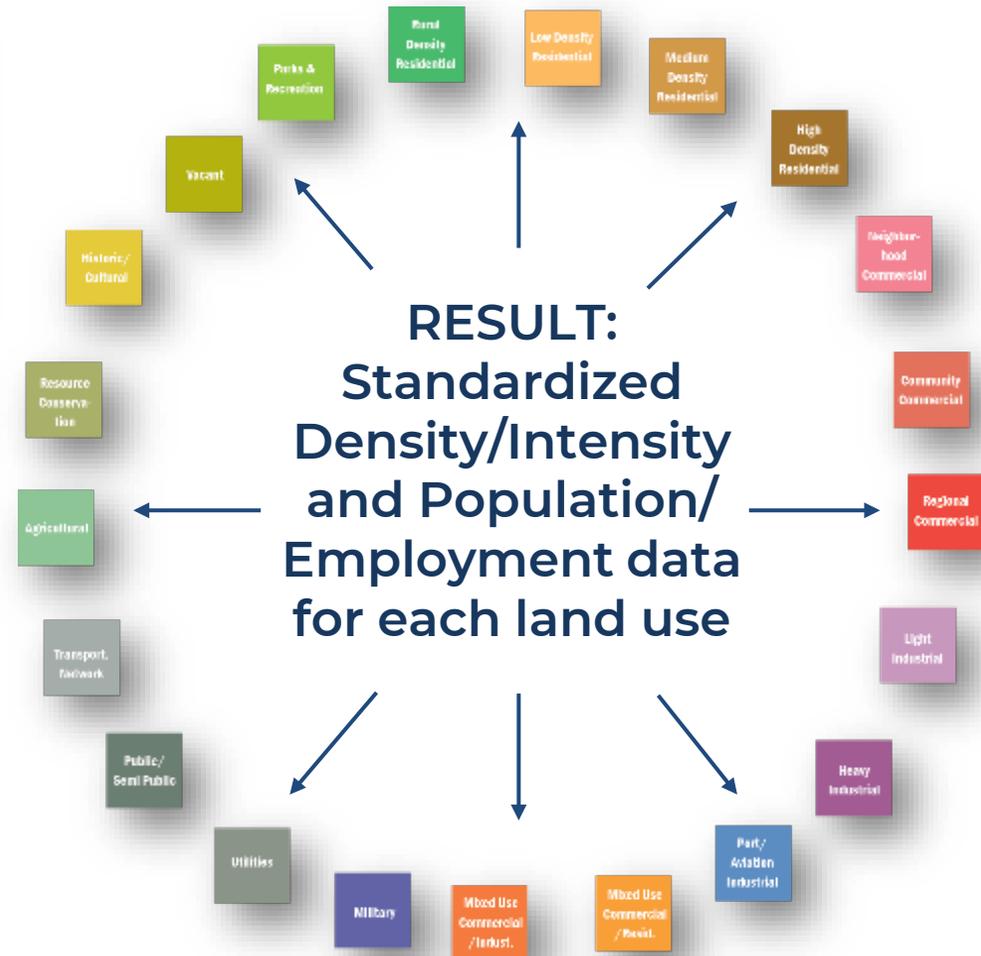
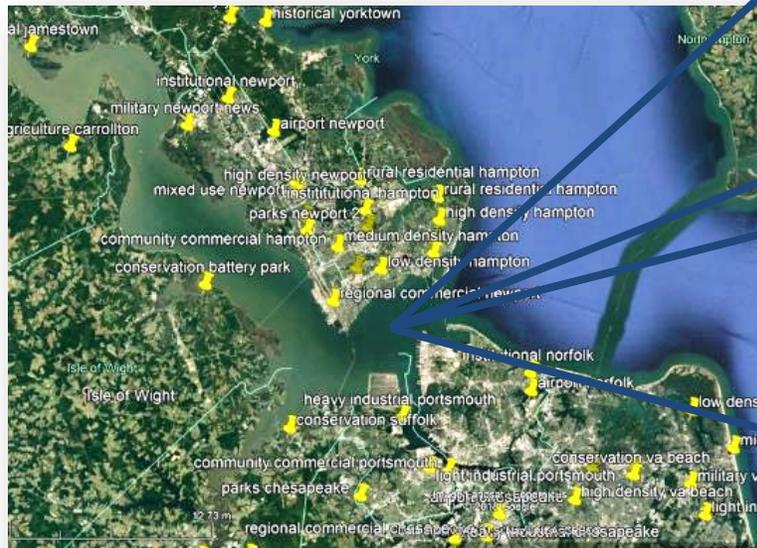
Developing Place Types

- Simplify parcel-based land use
 - Translational layer with simpler geography
- Associate Place Types to Transportation Analysis Zones (TAZs)
 - Population and Employment density/intensities developed by sampling and averaging Place Types in region
 - TAZ data used as Control Totals for reconciling Place Types densities
- Result is a unified base map that correlates Place Type socioeconomic data with TAZ socioeconomic data



Quantifying Place Types

Each Place Type was sampled with multiple locations to determine the average/typical population & employment data for each.



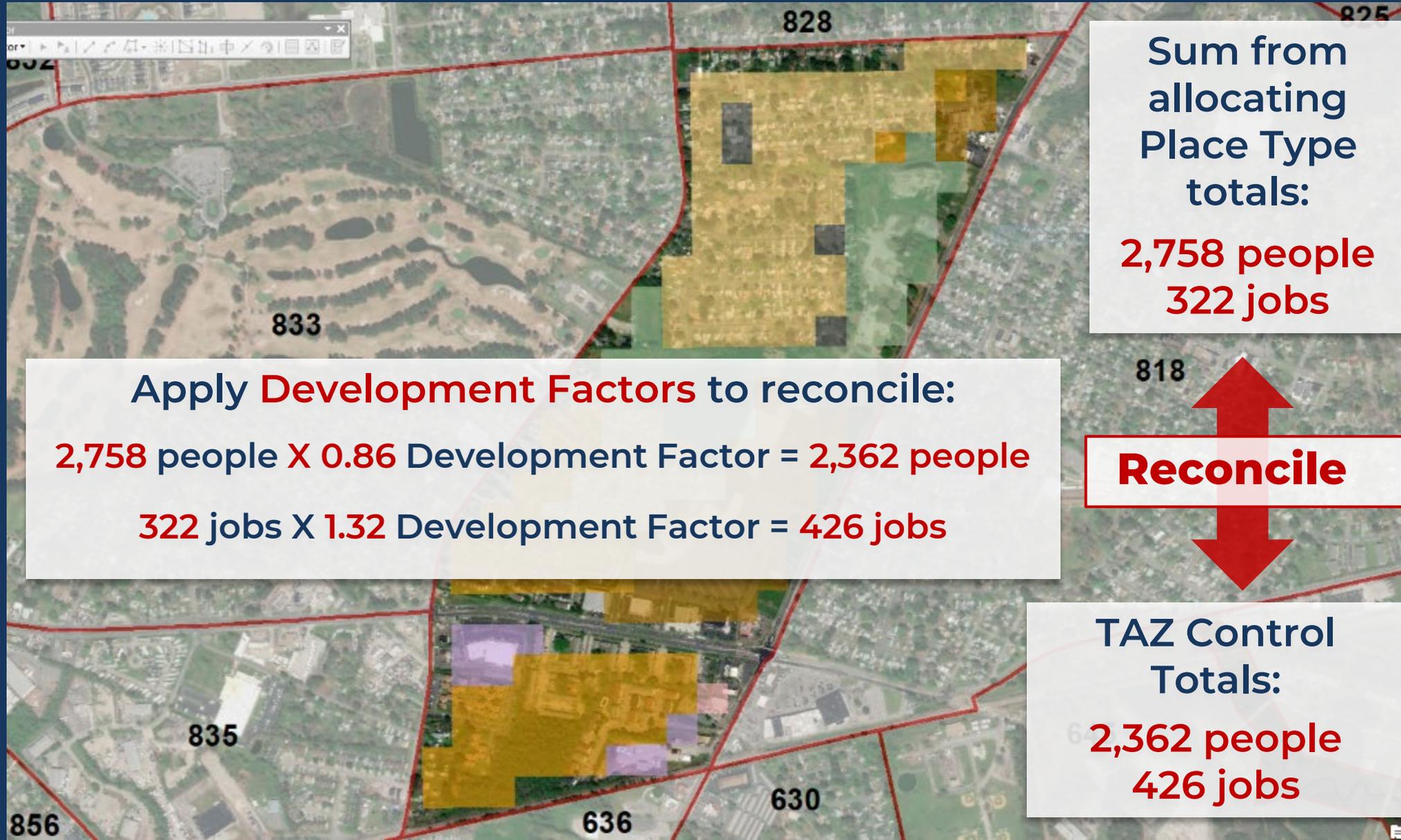
Allocating Place Types

Applied average **Jobs & Population** totals for each Place Type



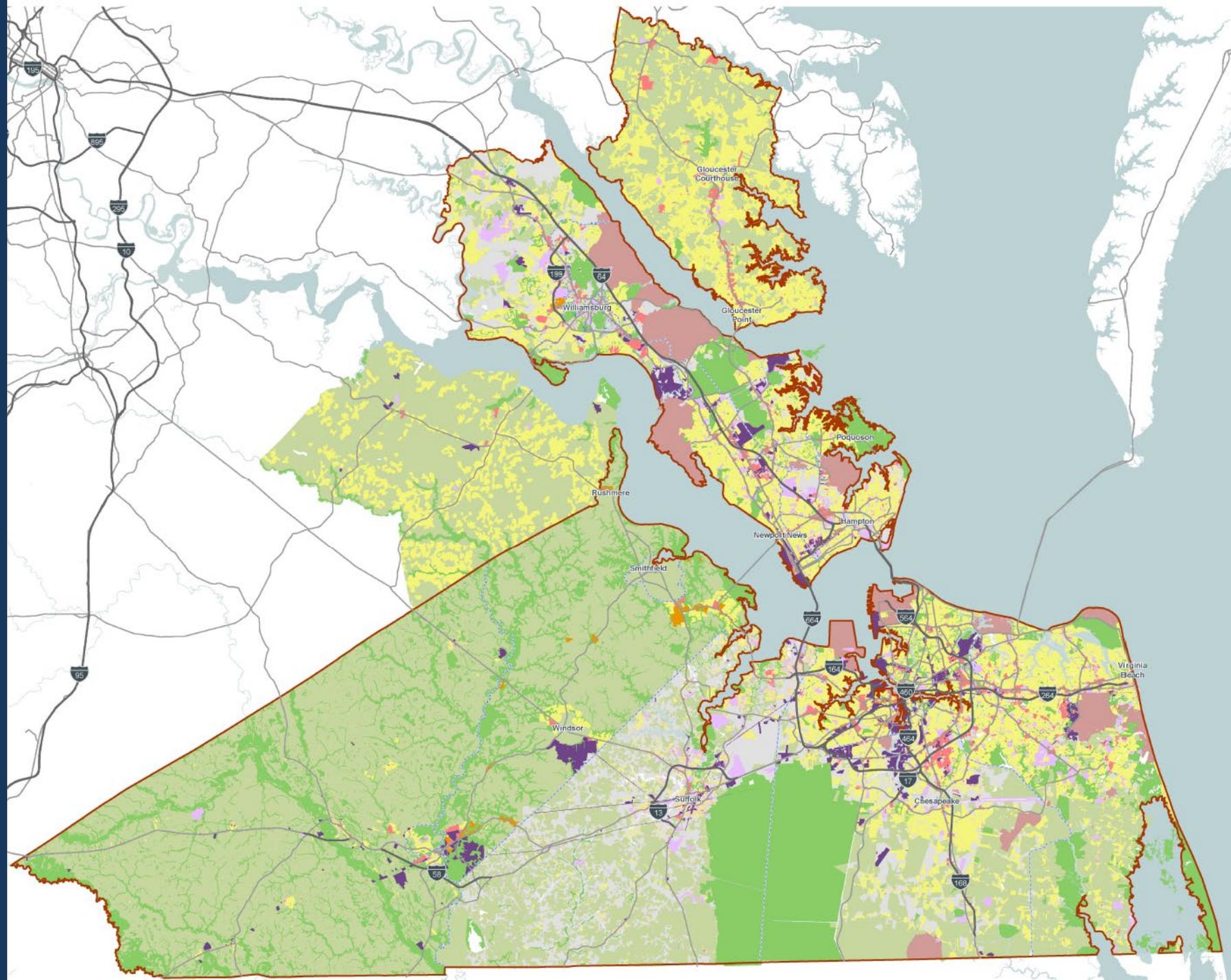
Allocating Place Types

Development Factor is the ratio between “typical” Place Type development and actual TAZ development



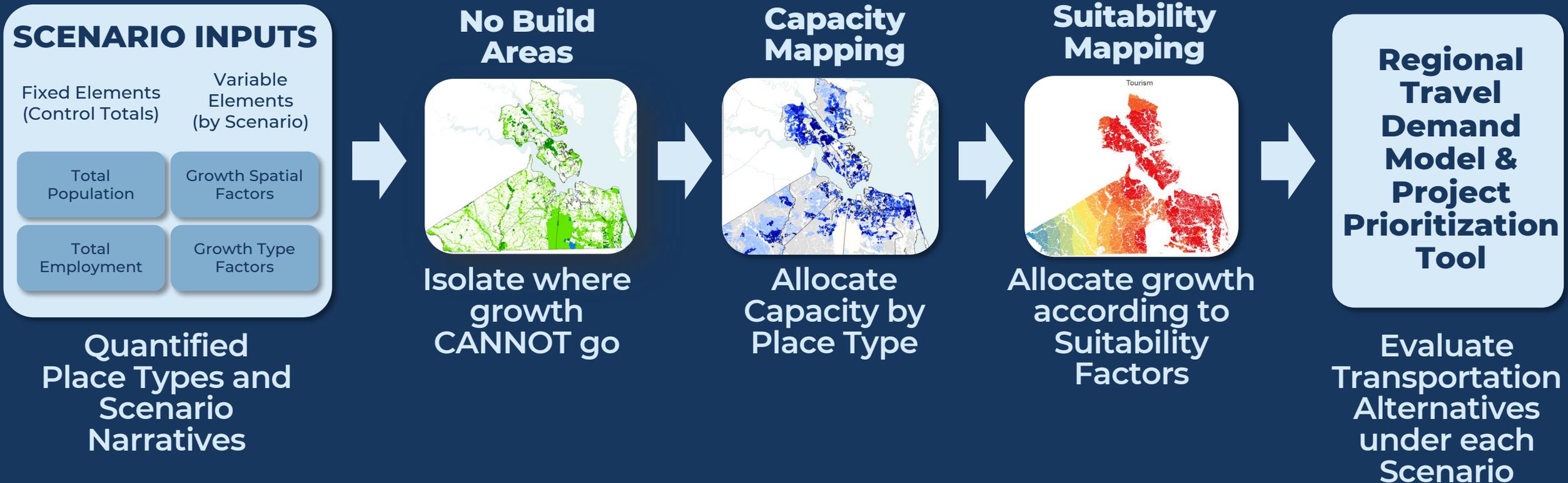
Result

- “Virtual Present” and “Virtual Future” maps of the region
- Quantified Land Uses reconciled to TAZ control totals for the Regional Travel Demand Model



Modeling the Scenarios: Land Use Model

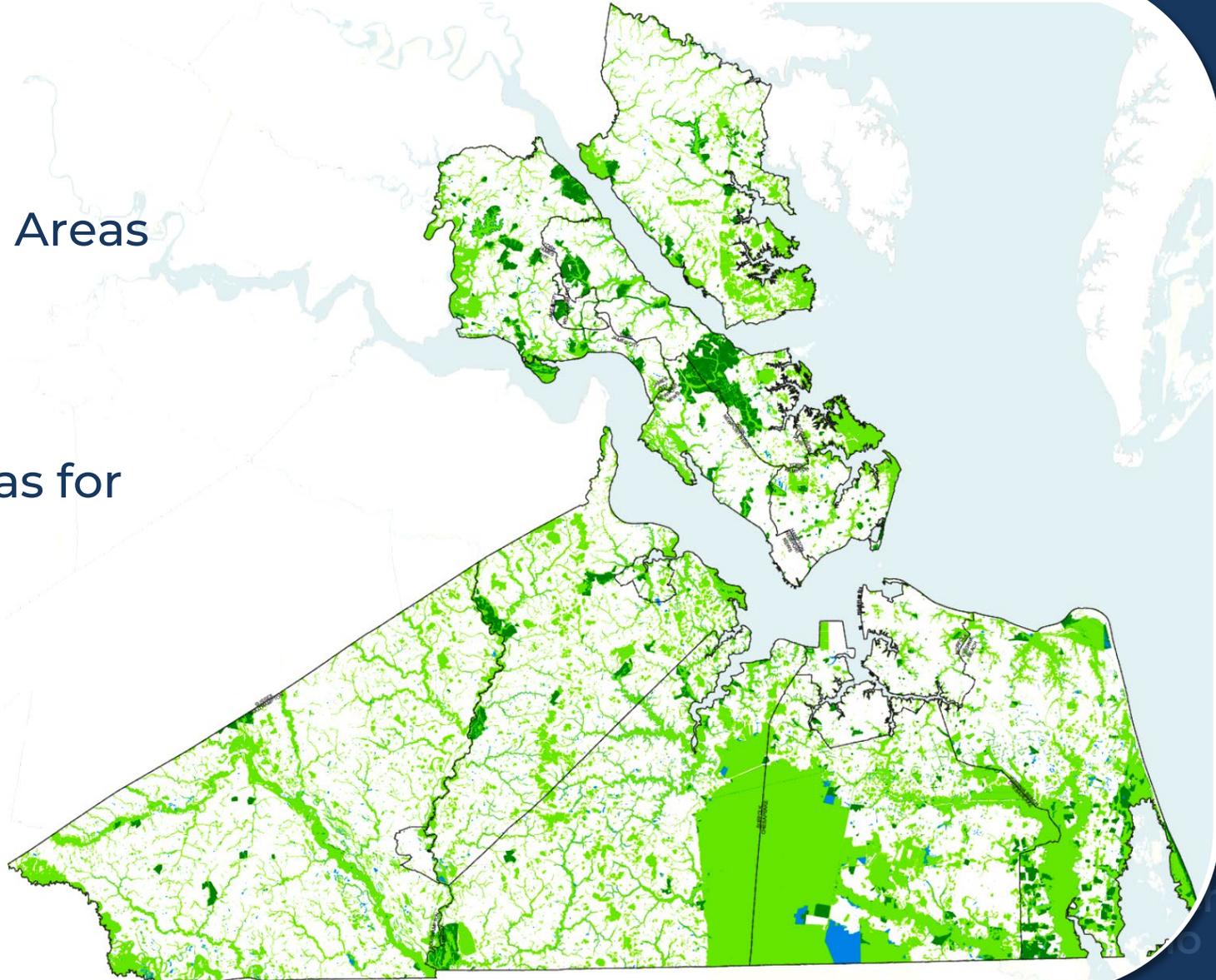
Produce three distinctly different patterns of growth based on scenario narratives and drivers.



Modeling the Scenarios: Land Use Model

No Build Areas

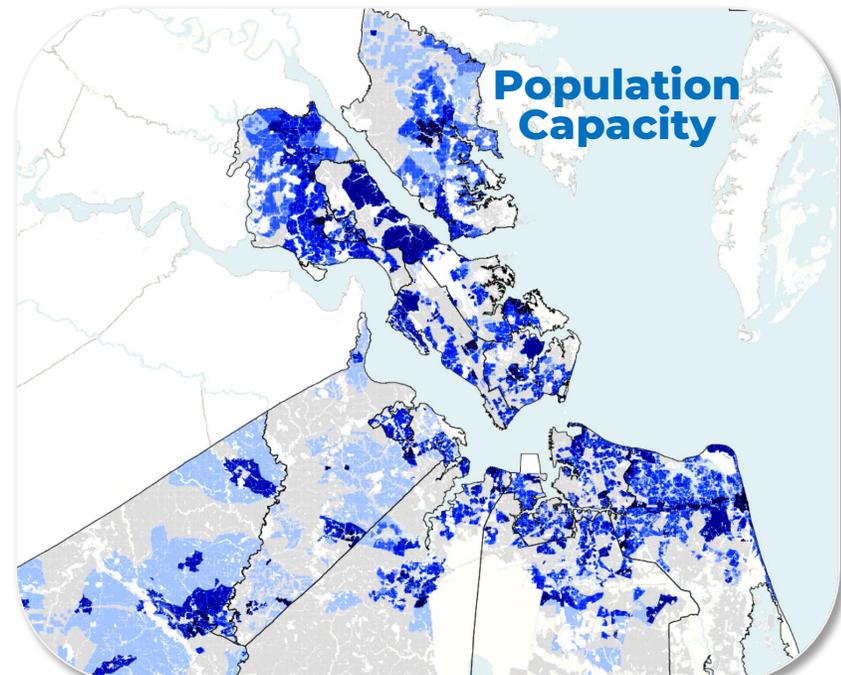
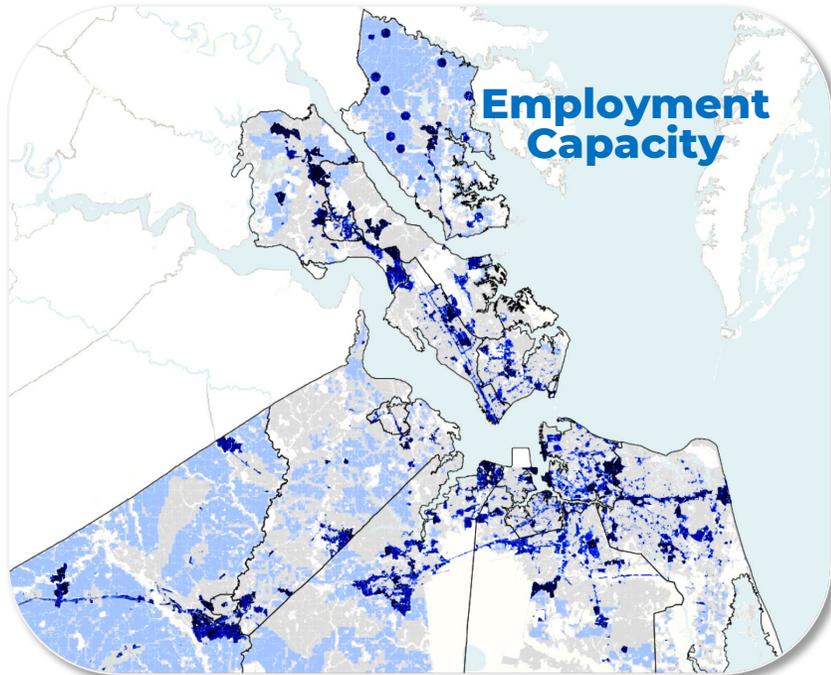
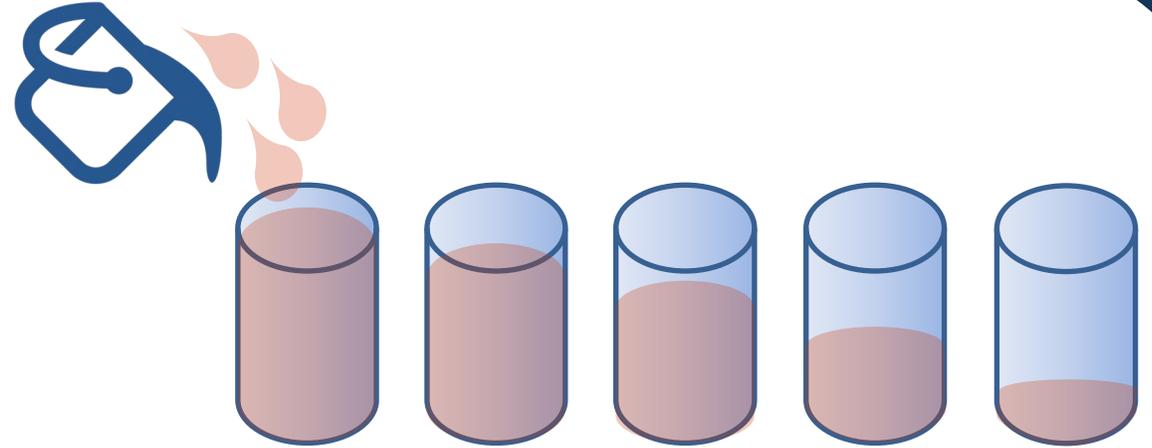
- Water and Wetlands
- Parks and Other Protected Areas
- Chesapeake Bay Resource Protection Areas
- Roadways
- Forecasted inundation areas for 3-foot Sea Level Rise



Modeling the Scenarios: Land Use Model

Capacity Mapping

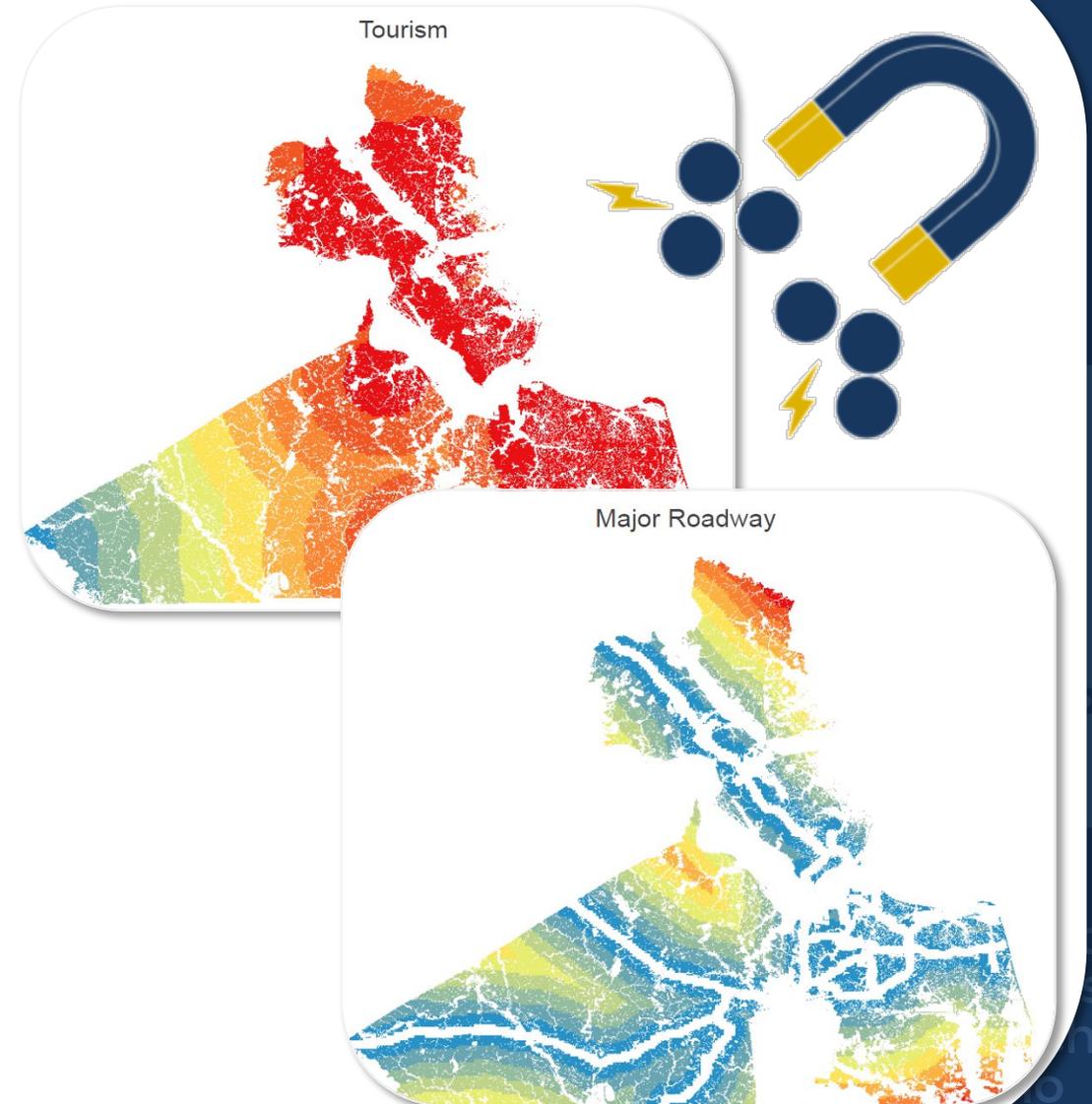
- Capacity controls HOW MUCH GROWTH can be allocated in a location (central to scenario planning process)



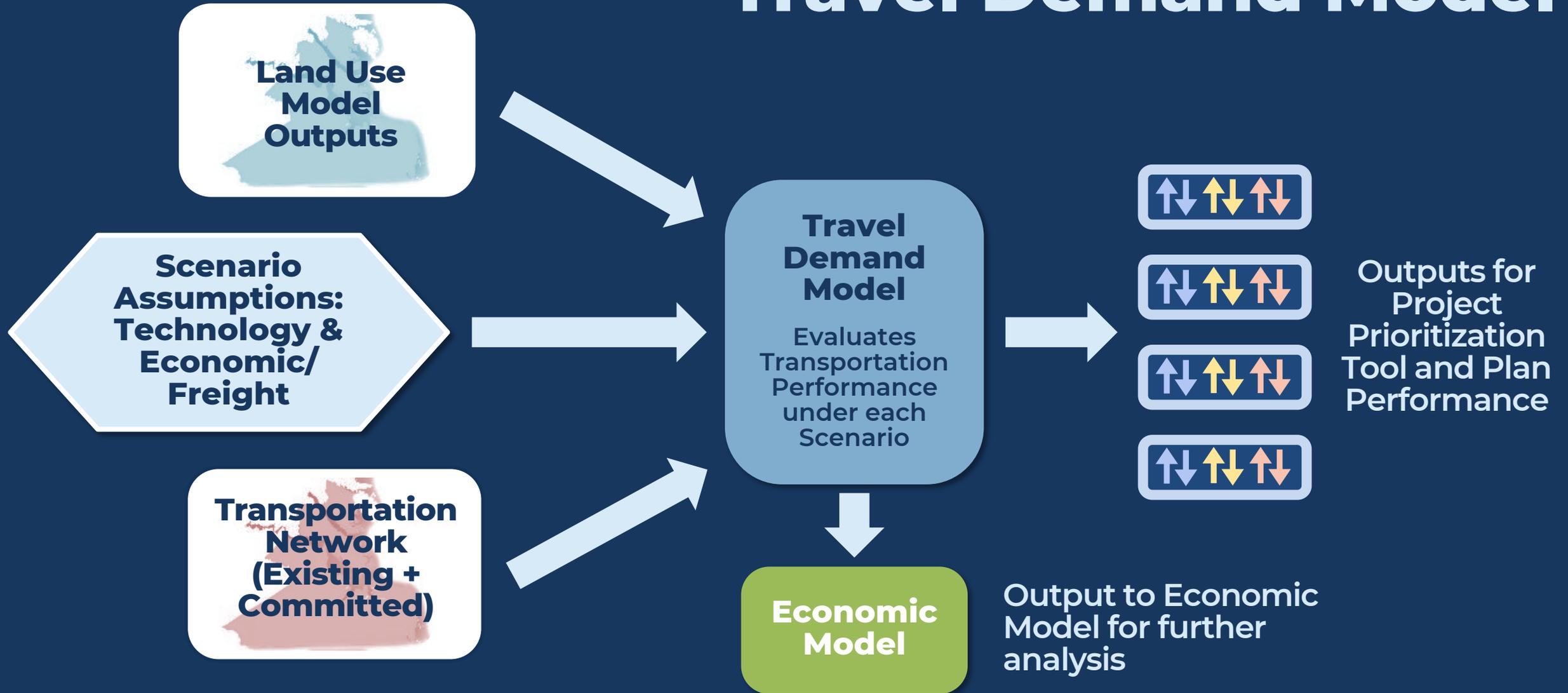
Modeling the Scenarios: Land Use Model

Suitability Mapping

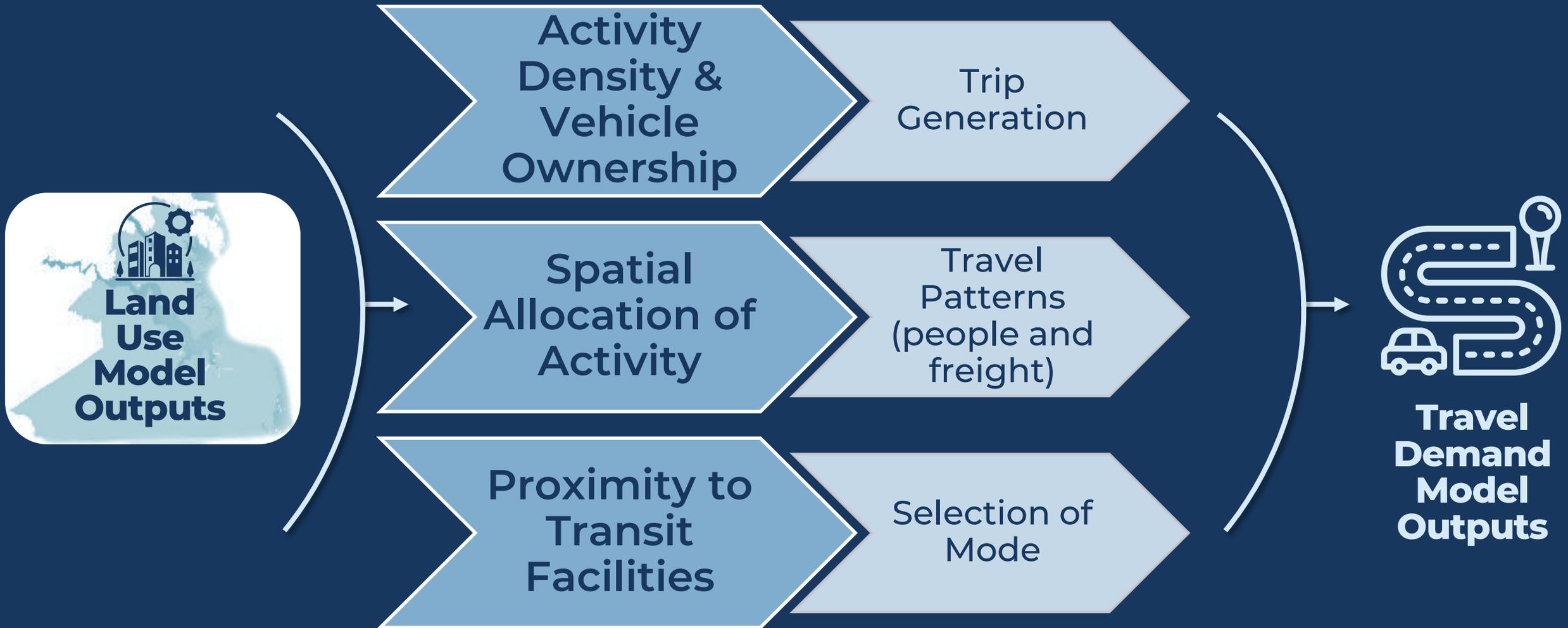
- Suitability Factors act as magnets for growth
- Controls WHERE GROWTH will be allocated FIRST (most desirable)
- Can be in the form of:
 - Specific Spatial Features (e.g., port access, proximity to institutions of higher education, etc.)
 - Specific Place Types (e.g., industrial, residential, etc. that act as attractors/detractors to growth)
- Suitability Weighting Factors fine tune attractiveness



Modeling the Scenarios: Travel Demand Model



Land Use Outputs Effect on Travel Behavior



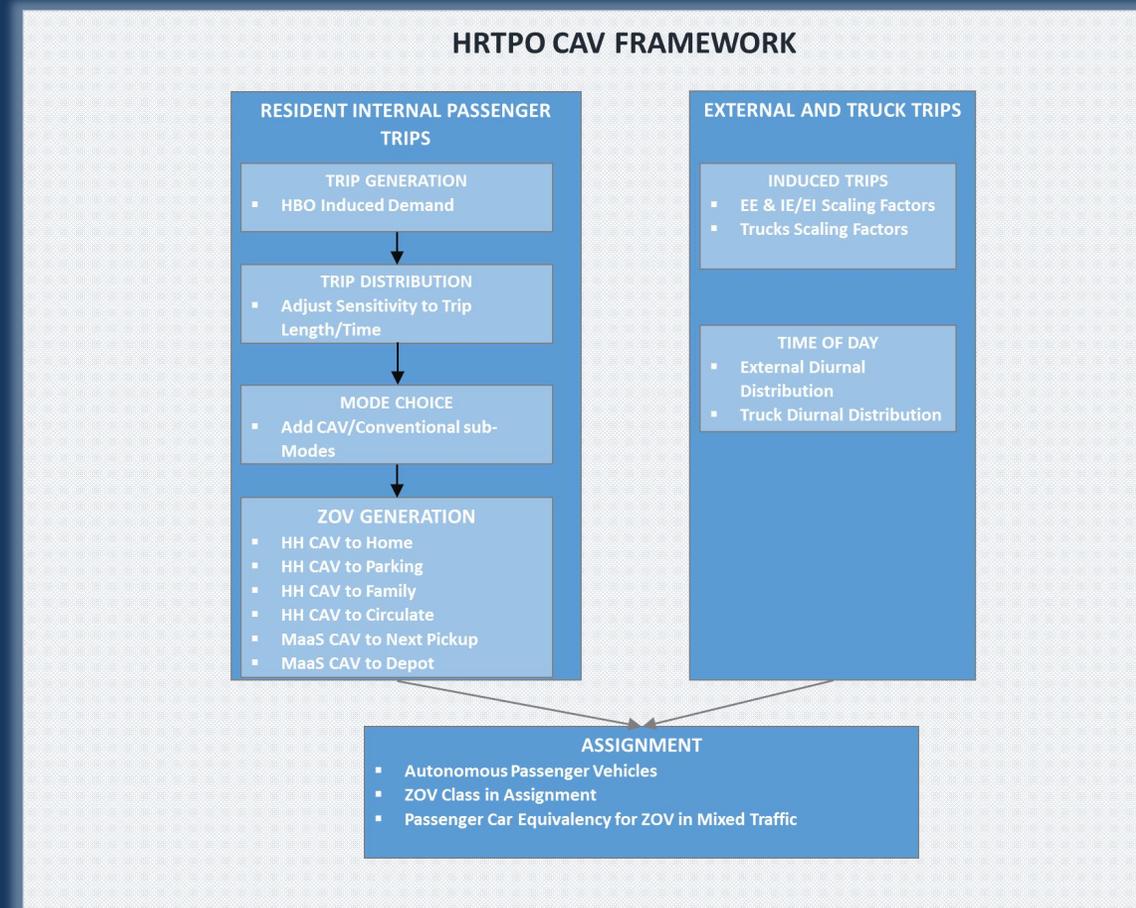
Port and Freight Assumptions

- Scenarios consider magnitude of goods movement through port and opportunities for mode shift away from roadway network
- Primarily focused on containerized volumes as there is a lever in Travel Demand Model (TDM)

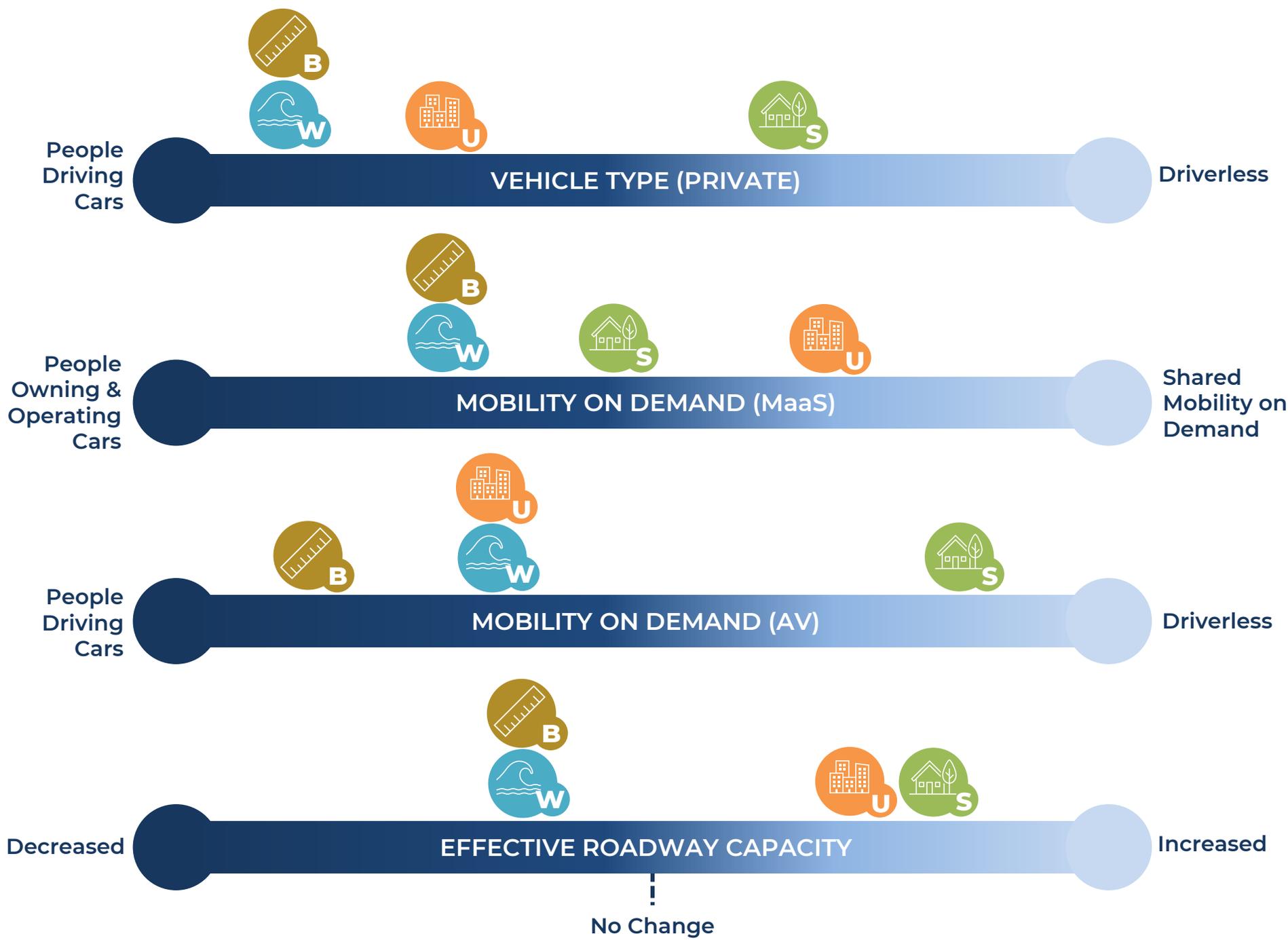
Port Driver	Greater Growth on the Water	Greater Growth in Urban Centers	Greater Suburban/ Greenfield Growth
Containerized Volumes (TEUs)	↑	—	↑
Rail Mode Share	↑↑	↑	↓
Barge Mode Share	↑	—	—
Truck Mode Share	↓	↓	↑↑

HRTPO CAV Modeling

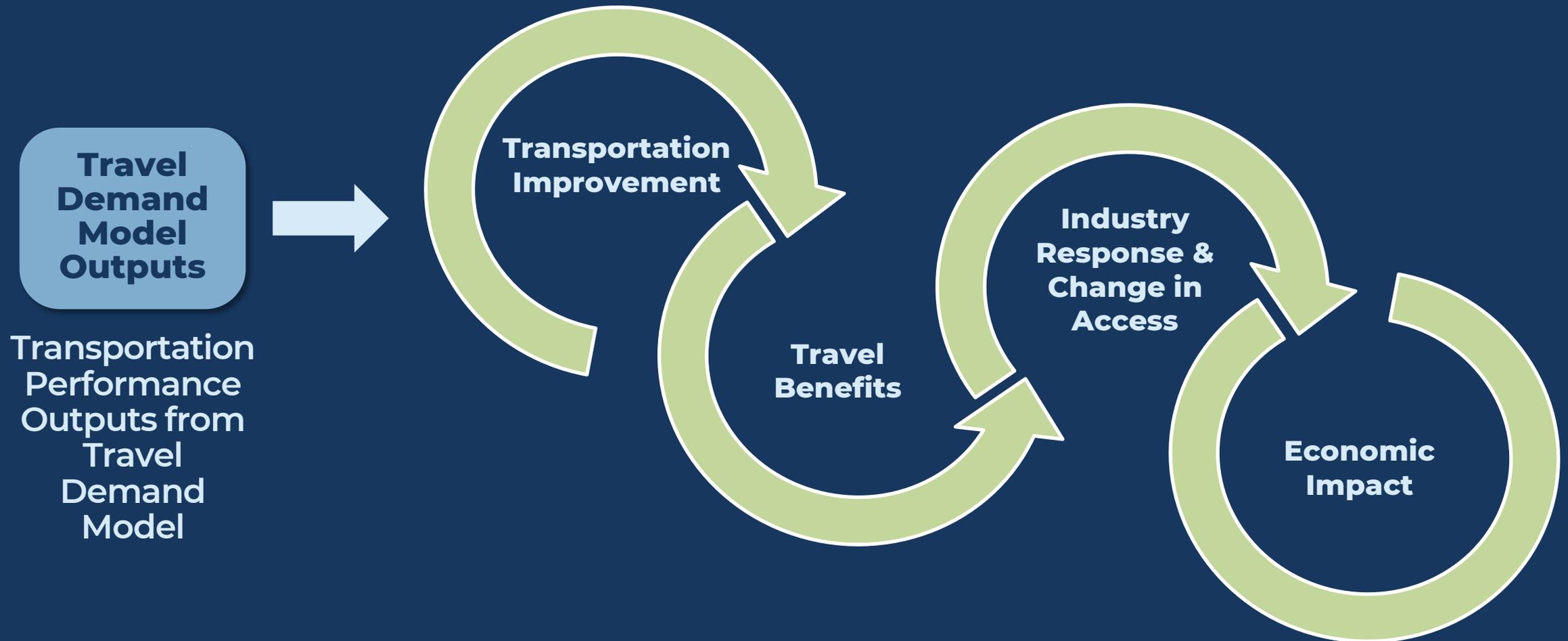
- HRTPO TDM includes a framework for addressing Connected and Autonomous Vehicles (CAVs)
- Levers in TDM related to technology impact on behavior choices:
 - Time of Day factors
 - Induced demand
 - Split between CAV and conventional auto types
 - ZOV trips by occupancy, trip purpose, and time period
 - ZOV parking assumptions (CAV returns home, circulates, etc.)
 - Depot capacities for shared CAVs by TAZ
 - Effective Roadway Capacity (result of spacing and platooning)



-  2045 Baseline
-  Growth on the Water
-  Growth in Urban Centers
-  Suburban/Greenfield Growth



Modeling the Scenarios - Economic Model



Economic Modeling Summary



Performance from Travel Demand Model

Change (Build minus Base)

- Trips (by Mode, Purpose)
- Vehicle Miles Traveled
- Vehicle Person Hours
- Fraction in Congestion
- Accessible Labor Market (population withing 40 minutes)



Economic Measures

Monetized user & non-user costs

- Travel Time
- Reliability
- Vehicle Operating Cost
- Safety
- Emissions
- Market Access
- Changes in the Economy
- Jobs, Wages, Gross Regional Product, Income

Scenario Modeling

Across all Scenarios



HRTPO Project Prioritization Tool

PROJECT CATEGORIES



Bridge/Tunnel



Highway



Interchange/Intersection



Intermodal/Freight



Transit



Active Transportation



Systems/Demand
Management

PROJECT UTILITY

Ability to Solve a
Transportation
Problem

- Congestion
- Travel Time Reliability
- System Continuity and Connectivity
- Safety and Security
- Modal Enhancements
- Infrastructure Condition

ECONOMIC VITALITY

Potential for
Economic Gain

- Travel Time and Delay Impacts
- Labor Market Access
- Address Needs of Basic Sector Industries
- Increased Opportunity
- Economic Distress Factors

PROJECT VIABILITY

Project
Readiness and
Compatibility

- Project Readiness (funding commitment and design)
- Land Use/Future Development Compatibility
- Environmental Quality/Impacts
- Cost Effectiveness

Scenario Analysis Example

2045 Project ID	BASELINE TAZ employment within 1/2 mile of project alignment	WATER TAZ employment within 1/2 mile of project alignment	URBAN TAZ employment within 1/2 mile of project alignment	SUBURBAN TAZ employment within 1/2 mile of project alignment
A	52,946	54,676	56,680	54,683
B	59,504	60,030	60,411	67,811
C	74,529	78,237	76,693	79,542
D	133,974	142,627	141,433	146,051
E	123,252	124,577	126,200	128,217
F	54,604	55,528	56,568	61,436
G	40,637	43,247	45,355	45,838
H	76,039	82,256	83,581	82,817

2045 Project ID	BASELINE 2045 Forecasted Volume	WATER 2045 Forecasted Volume	URBAN 2045 Forecasted Volume	SUBURBAN 2045 Forecasted Volume
A	146,804	159,476	151,364	151,761
B	169,701	174,042	168,901	176,934
C	140,836	150,390	141,014	147,884
D	88,794	95,741	88,797	92,033
E	32,673	37,050	30,262	35,558
F	80,260	84,749	79,927	83,820
G	77,754	7,895	90,014	86,479
H	76,113	94,488	89,933	93,428

Scenario Analysis Example

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Baseline Ranking

C

A

B

D

Water Ranking

B

C

D

A

Urban Ranking

C

B

D

A

Suburban Ranking

C

B

A

D

Scenario Analysis Example

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Baseline Ranking

C

A

B

D

Water Ranking

B

C

D

A

Urban Ranking

C

B

D

A

Suburban Ranking

C

B

A

D

C

B

MOST RESILIENT



Looking Ahead to 2050 LRTP



2050 BASELINE

Based on locality
comprehensive plans



GREATER GROWTH URBAN

Tests more urban
and multimodal
travel patterns



GREATER GROWTH SUBURBAN

Tests more overall
regional travel
patterns



RESILIENCE RESPONSE???

Work with stakeholders
and public to define
new scenario

- Re-examine “drivers of change” and trends
- Factor in other considerations as part of 2050 scenario narratives
 - e.g., Potential impacts of westward migration due to affordable housing issues and Sea Level Rise; also explore impacts of remote work
- Incorporate new tools (e.g., Volpe RDR Tool, TREDIS) and more robust/efficient approaches (advanced GIS, resiliency, equity analysis, etc.)

THANK YOU!



L RTP RESOURCES:

2045 L RTP WEBPAGE

https://www.hrtpo.org/page/2045-long_range-transportation-plan/

2045 L RTP SCENARIO PLANNING

https://www.hrtpo.org/page/2045-long_range-transportation-plan:-scenario-planning/



HRTPO PROJECT PRIORITIZATION

<https://www.hrtpo.org/page/project-prioritization/>

2050 L RTP WEBPAGE

https://www.hrtpo.org/page/2050-long_range-transportation-plan/

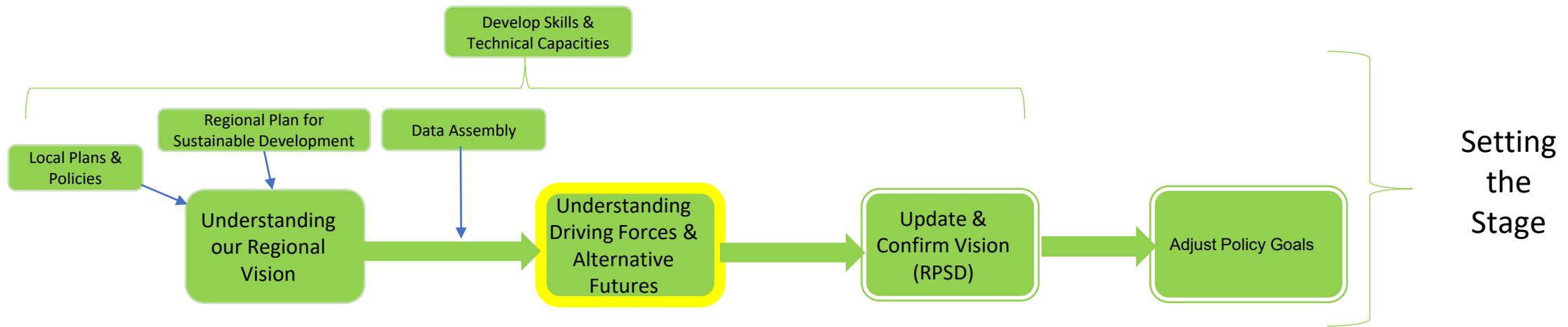
DALE M. STITH
HRTPO PRINCIPAL TRANSPORTATION PLANNER
DSTITH@HRTPO.ORG
WWW.HRTPO.ORG



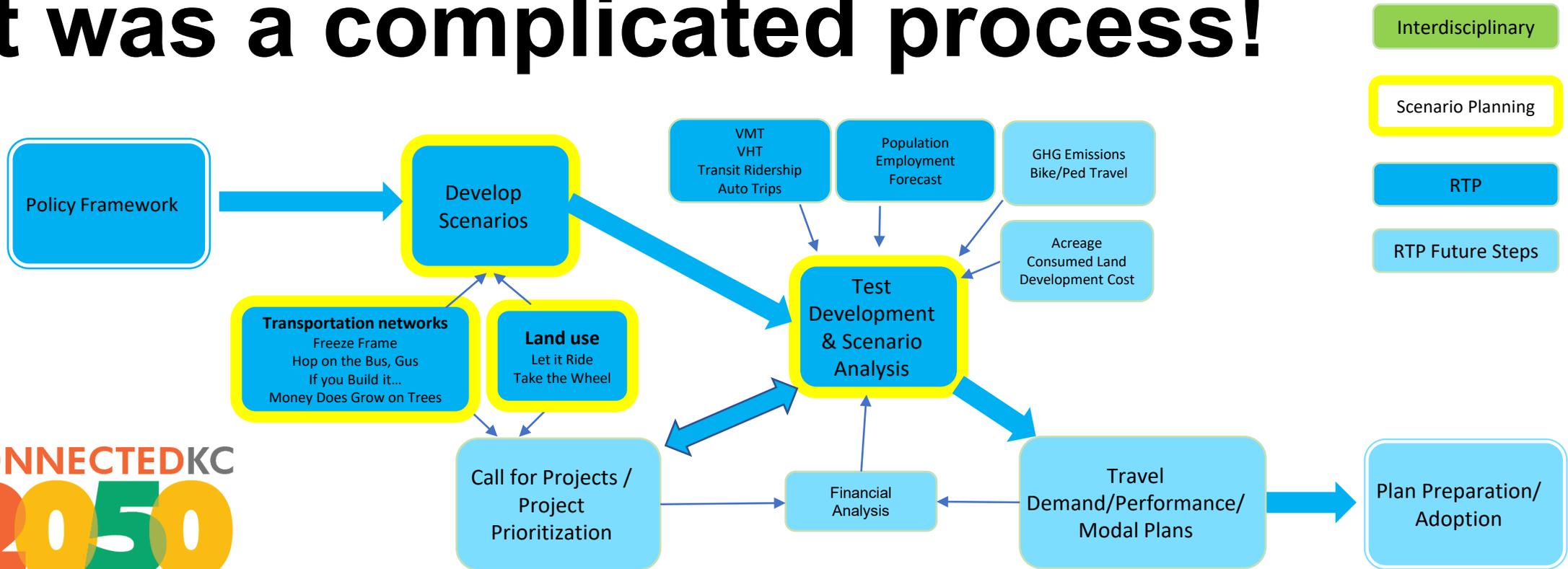
Scenario planning at the Mid-America Regional Council

Presented to the Piedmont Authority for Regional Transportation
May 3, 2023

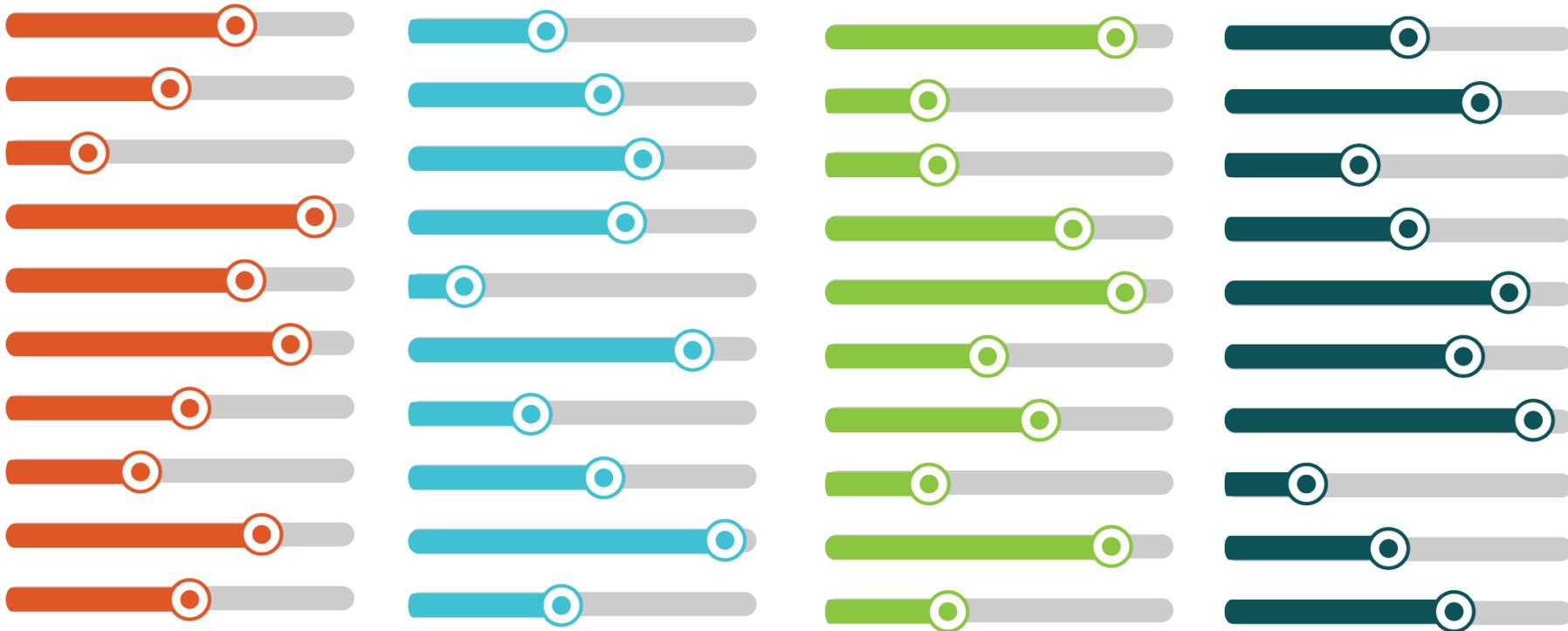
Martin Rivarola, AICP
Assistant Director of Transportation and Land Use



It was a complicated process!



For each scenario, we evaluated potential impact on a series of issues important to the region — will things stay the same, improve or worsen?



All driving forces are likely to have an impact, but each scenario has a dominant force that drives change — presenting both challenges and opportunities.



Using what we learned about driving forces and their impacts during our driving forces workshops, we identified four possible futures for the region.





SLOW AND STEADY



WILD WEATHER



TECH CITY



RISING PHOENIX

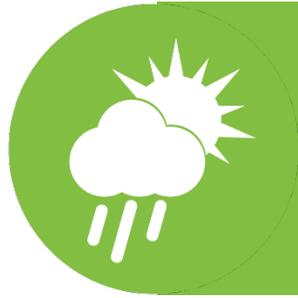


SLOW AND STEADY



- Population growth slows slightly.
- White, non-Hispanic people become the minority.
- Development balanced between urban and suburban areas while rural communities shrink.
- Automated vehicles are a novelty.
- Personal car ownership the norm, creating demand for infrastructure improvements.
- Lack of innovative funding sources leaves roads and bridges in disrepair.

**HOW REALISTIC ARE THESE SCENARIOS?
HOW CAN WE AS A REGION BE PREPARED TO RESPOND?**

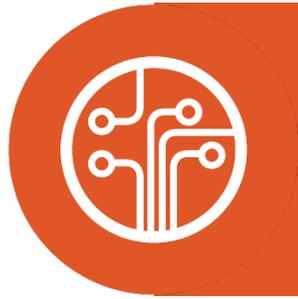


WILD WEATHER



- Super storms and rising seas ravage both coasts, driving people to solid, dry ground.
- Kansas City sees more severe weather events, taxing critical infrastructure.
- Public consciousness and political will shift toward innovative solutions.
- Energy costs increase; production shifts to renewables.
- Development of dense, walkable communities for all ages, incomes and races means more active lifestyles and improved health outcomes.

**HOW REALISTIC ARE THESE SCENARIOS?
HOW CAN WE AS A REGION BE PREPARED TO RESPOND?**

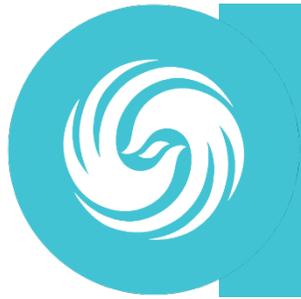


TECH CITY



- Technology advances quickly, creating rapid economic growth.
- Unemployment rises due to automation of most jobs.
- Autonomous vehicles make roads safer, cleaner, more energy efficient.
- Telecommuting is the norm.
- Density decreases as people no longer need to travel.
- Society becomes disconnected and isolated.

**HOW REALISTIC ARE THESE SCENARIOS?
HOW CAN WE AS A REGION BE PREPARED TO RESPOND?**



RISING PHOENIX



- Rising energy prices lead to 21st Century's Great Depression.
- Overall population growth stagnates due to declining birth rates, resistance to immigration.
- Social inequality declines.
- Labor shortage lead to rising wages.
- Summers grow hotter and drier while rainy seasons grow longer.
- Entrepreneurial spirit rises.

**HOW REALISTIC ARE THESE SCENARIOS?
HOW CAN WE AS A REGION BE PREPARED TO RESPOND?**

Transportation modeling

Decisions we make about transportation infrastructure today can have a big impact well into the future.

Modeling demonstrates how choices we make today might:

- Affect the system in the future.
- Help us meet our goals.
- Have unintended consequences.

Two central land use scenarios — *trend vs. focused growth*

What we can learn

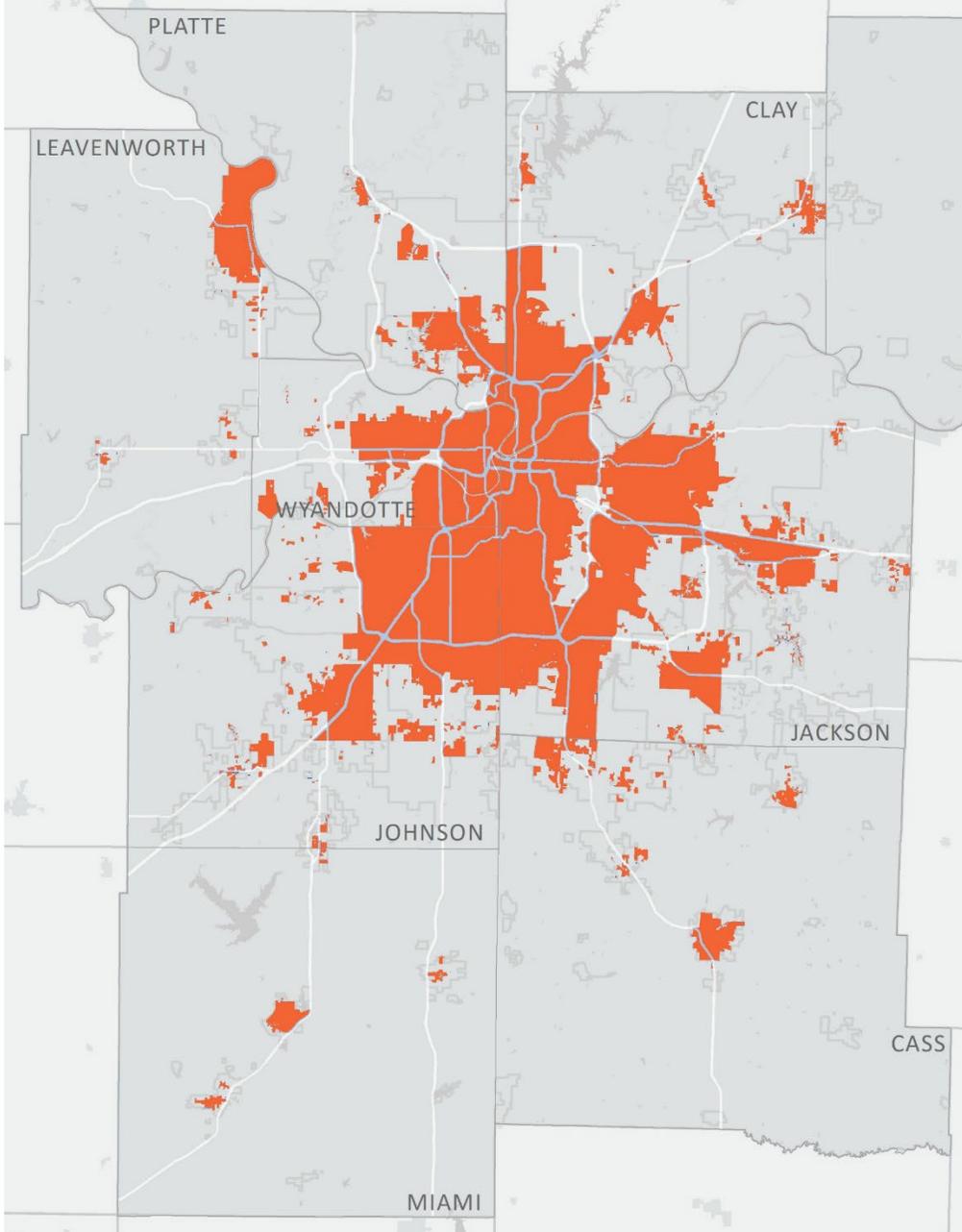
Modeling these scenarios, we can see how decisions today may or may not impact:

- Land consumption.
- Cost to develop infrastructure and maintain in state of good repair.
- Vehicle miles traveled.
- Vehicle hours traveled.
- Transit and active transportation.
- Connected and autonomous vehicles.
- Greenhouse gas emissions.

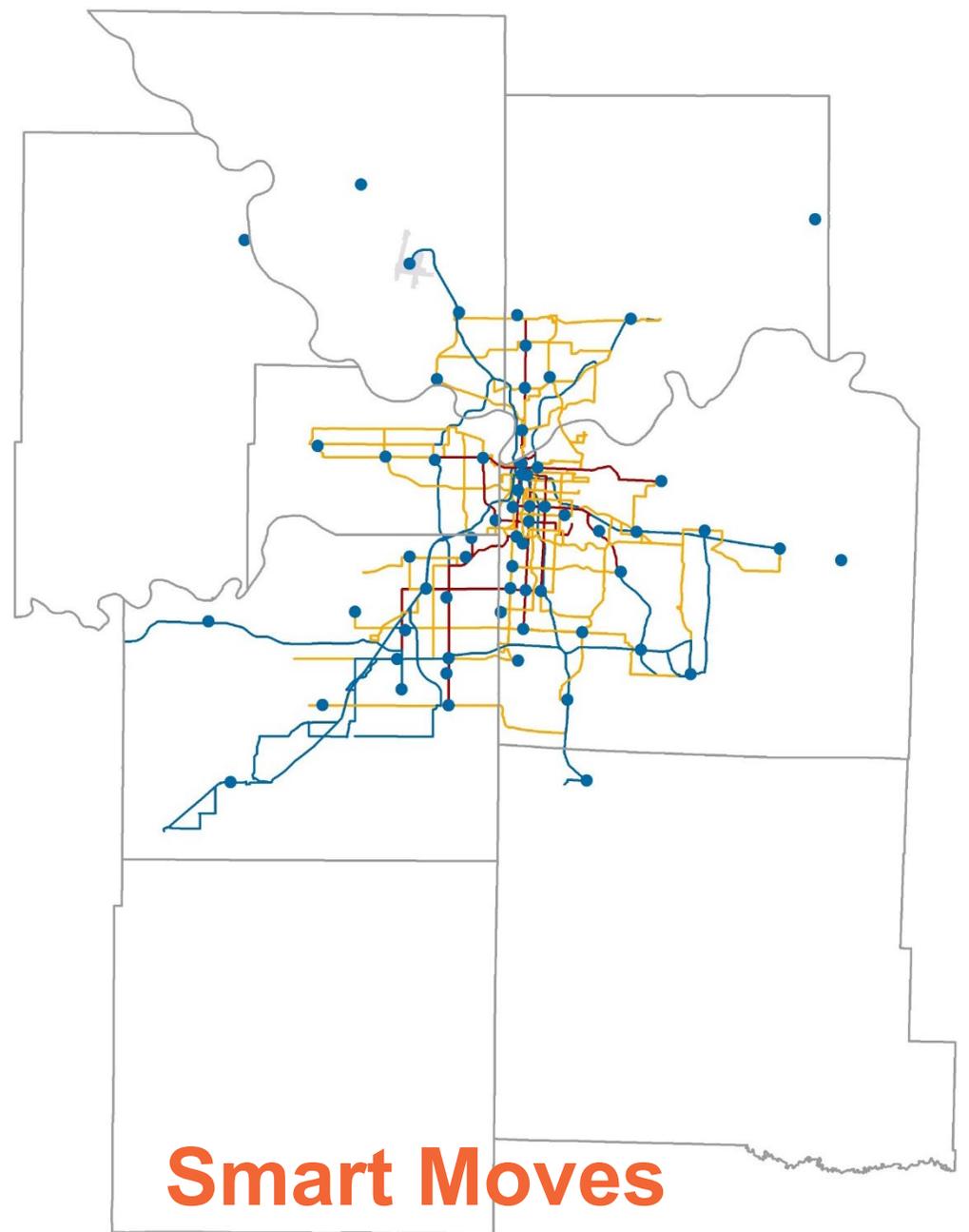
Scenario Analysis tools

We used a variety of modeling tools:

- Regional Economic Models (REMI)
 - Land use, population, employment growth forecasts
- Paint the Town
 - Land use change model to assign growth to TAZs. Developed in house based on original concept by Criterion, Inc.
- EMME
 - Travel Demand Model
- EPA Moves Model
 - Evaluate emissions
- Other spreadsheet-based tools



Redevelopment area



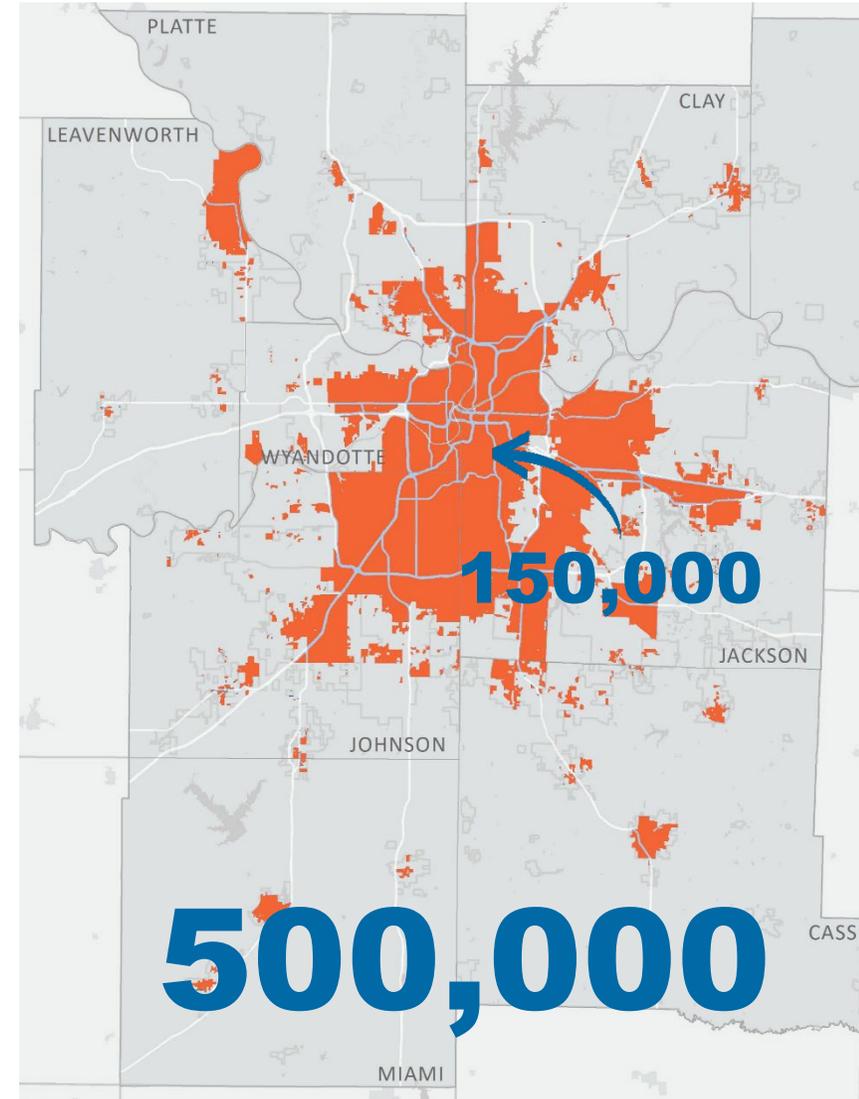
**Smart Moves
corridors and hubs**

Let it ride

Trend growth scenario

Within redevelopment area

- Population growth: 30%
(150k out of 500k)
- Job growth: 50%
(150k out of 300k)

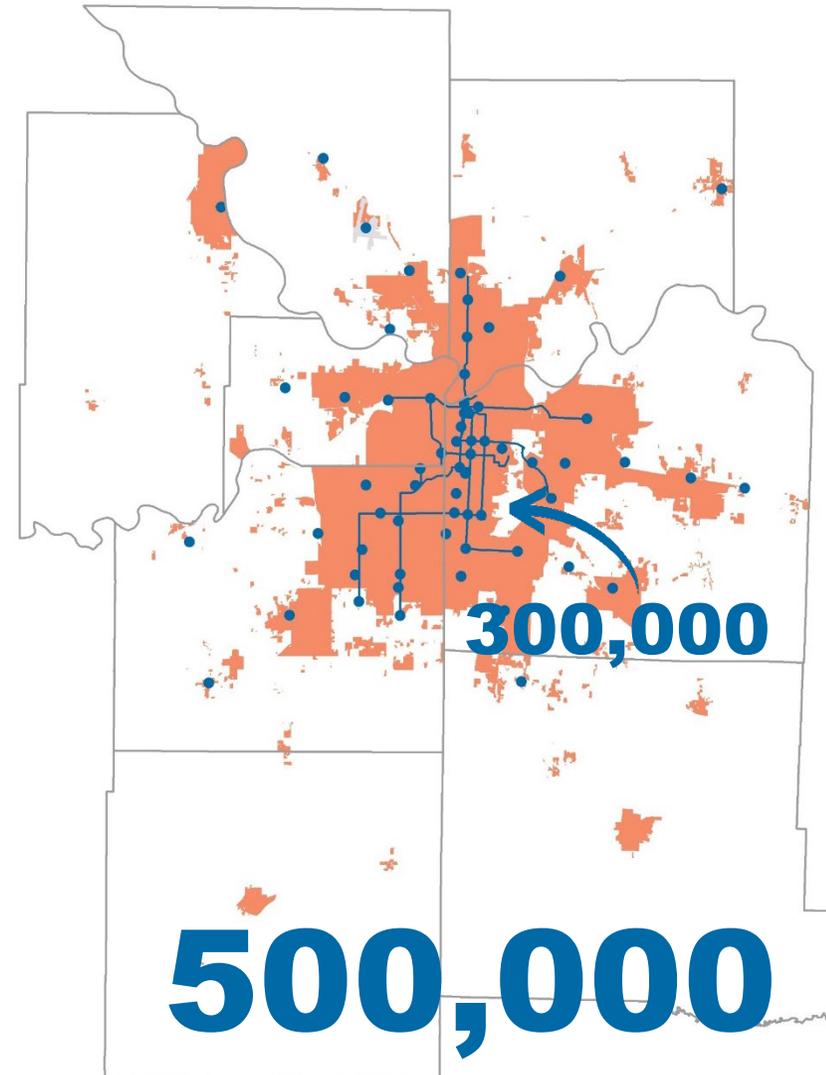


Take the wheel

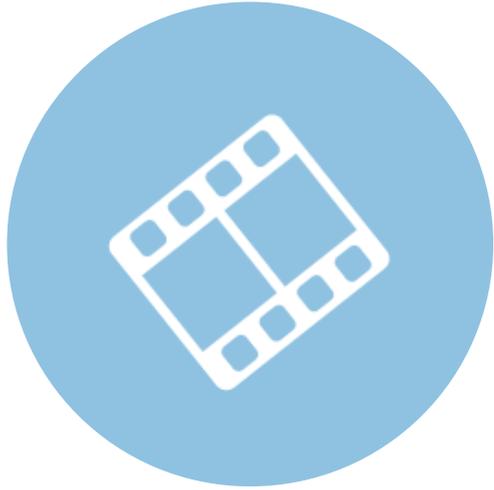
Focused growth scenario

Within redevelopment area

- Population growth: 60%
(300k out of 500k)
- Job growth: 80%
(240k out of 300k)



Transportation scenarios



Freeze frame
•TIP only



If you build it...
•Transportation
Outlook 2040



**Hop on the
bus, Gus**
•Focus on
transit



**Money DOES grow
on trees**
•Focus on roadway
capacity

Travel model results

		 Let it ride Trend growth				 Take the wheel Focused growth			
		VMT	VHT	Transit ridership	Auto use	VMT	VHT	Transit ridership	Auto use
 Freeze frame		56,430,000	1,498,000	100,000	7,047,000	56,408,000	1,498,000	168,000	6,960,000
 Hop on the bus, Gus		56,286,000	1,492,000	120,000	7,013,000	56,231,000	1,490,000	198,000	6,922,000
 If you build it...		56,437,000	1,487,000	100,000	7,047,000	56,421,000	1,493,000	168,000	6,960,000
 Money DOES grow on trees		56,870,000	1,440,000	100,000	7,046,000	56,841,000	1,437,000	168,000	6,960,000

Cars, bikes, walking and transit

Percent change between 2018 and 2050

	Trend	Focused
Vehicle miles traveled	31%	30%
Vehicle hours traveled	34%	34%
Auto trips	26%	25%
Transit trips	84%	215%
Bike trips*	21%	28%
Ped trips*	28%	30%

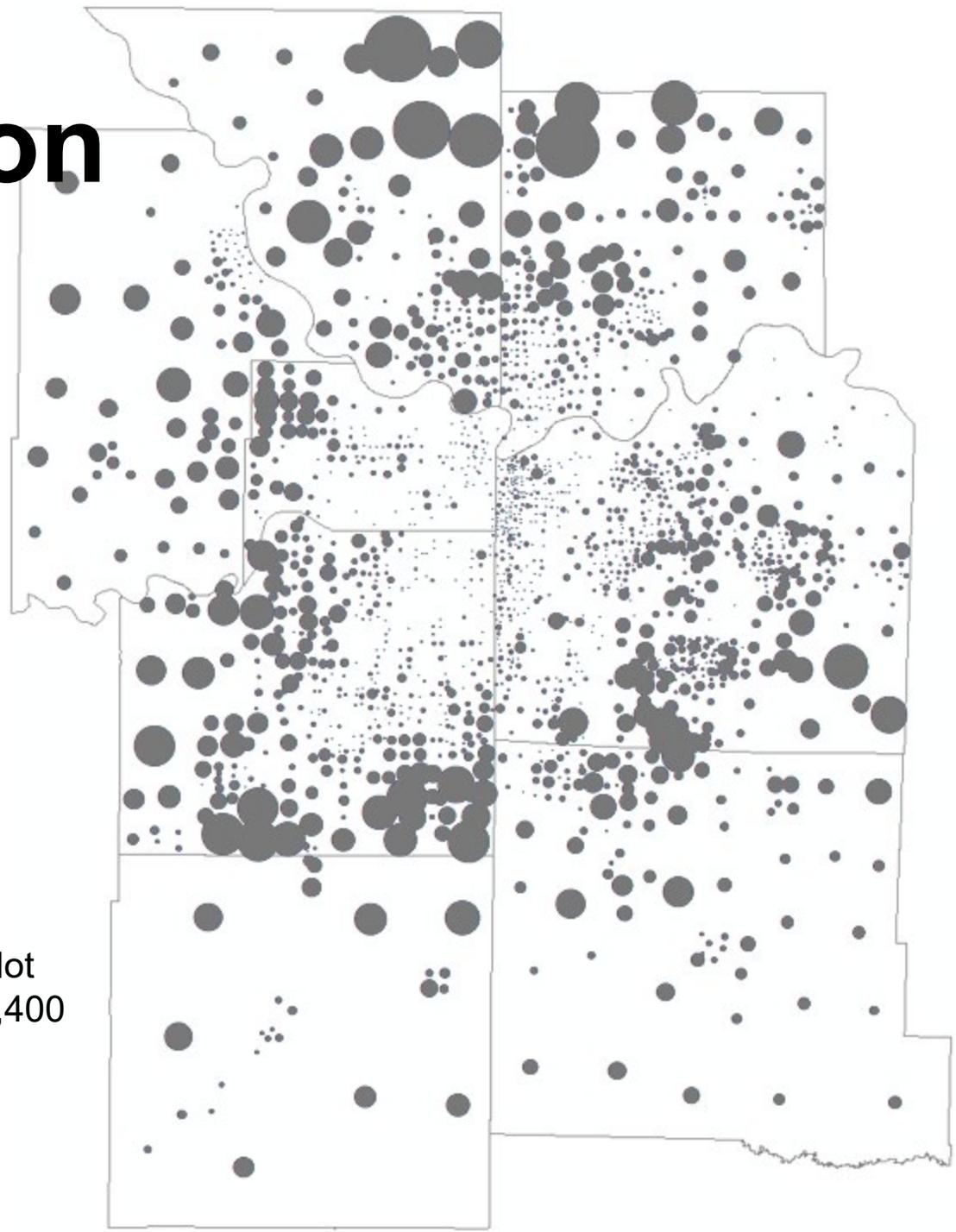
- VMT, VHT and auto trips are very stable under both scenarios, although they grow at slightly slower rate under focused growth.
- Bike and pedestrian trips grow at a faster clip under focused growth scenario. **Transit trips grow more than three times.**

Land consumption

TREND growth

- Acres of land consumed by development: 418 total square miles

 The largest dot represents 6,400 acres of land consumed



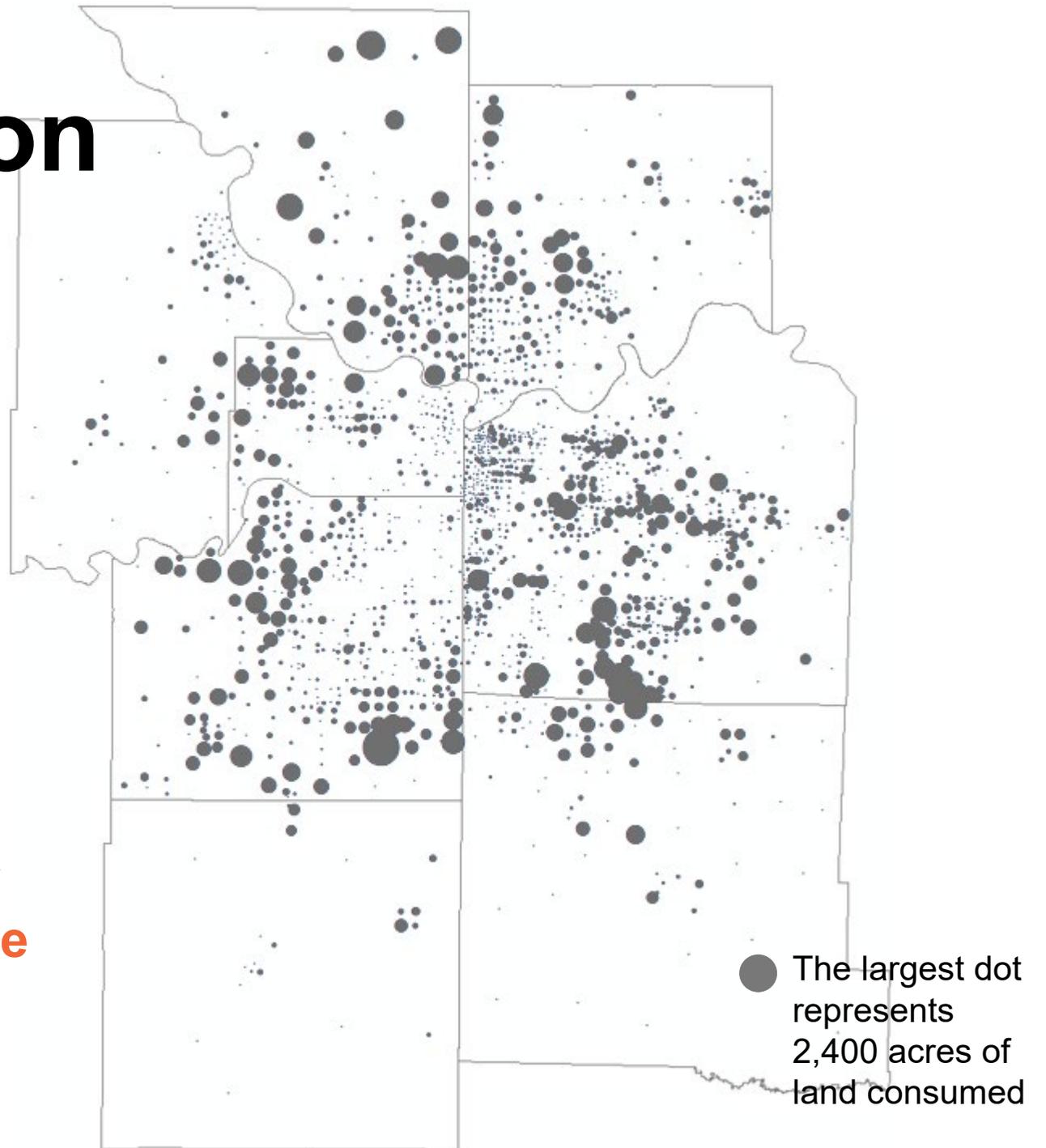
Land consumption

FOCUSED growth

- Acres of land consumed by development: 199 total square miles

Trend development consumes **more than double** the vacant or agricultural land than focused growth.

It's a difference of 219 square miles, or just over **two-thirds of land area of the city of Kansas City, Missouri.**



Cost of development

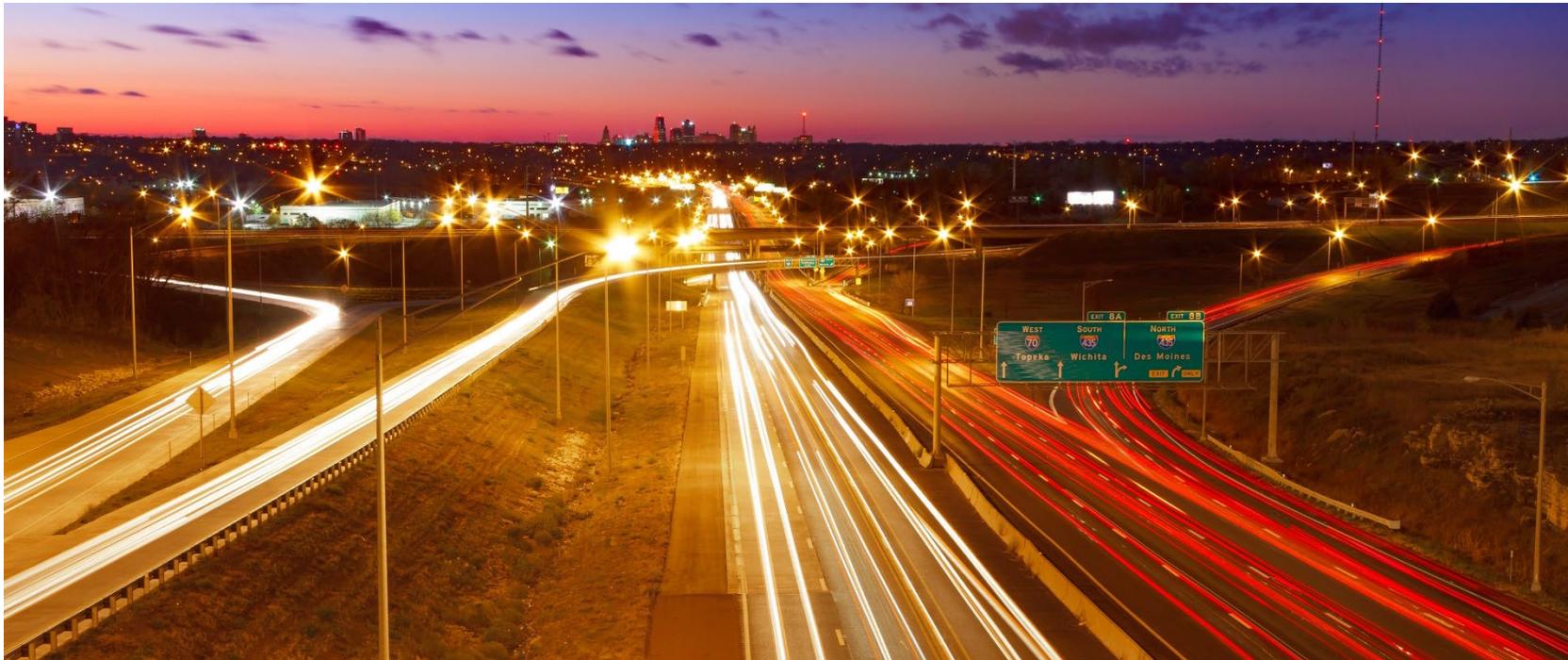
We can estimate costs to build out roadways and other supporting infrastructure for land development through 2050.

	Trend	Focused	Difference
Cass	\$1,689,342,128	\$567,361,152	\$1,121,980,976
Clay	\$3,029,884,890	\$1,360,367,425	\$1,669,517,465
Jackson	\$4,415,409,780	\$4,103,673,490	\$311,736,290
Johnson	\$4,943,326,859	\$2,492,464,005	\$2,450,862,854
Leavenworth	\$1,213,313,930	\$248,078,438	\$965,235,492
Miami	\$606,383,378	\$90,459,317	\$515,924,061
Platte	\$2,939,808,087	\$1,342,556,332	\$1,597,251,755
Wyandotte	\$915,538,380	\$ 778,953,757	\$136,584,624
Region	\$19,753,007,433	\$10,983,913,915	\$8,769,093,517

Focused growth can save our region close to **\$9 billion in infrastructure costs** through 2050.

What did we learn?

➔ Growth scenarios had the greatest impact on travel demand.



What did we learn?

➔ Better transit resulted in a shift away from autos.



What did we learn?

➔ More capacity resulted in more VMT, less VHT (per capita).



What did we learn?

Highway system plus few anticipated network changes resulted in minor change in outcomes.



What did we learn?

➔ Transit system plus more opportunity for network changes resulted in more significant change in outcomes.



What did we do next?

Expanded performance measures to align with policy framework.

RTP 2050 Policy Framework

- ✓ CENTERS AND CORRIDORS FOCUS
- ✓ EQUITY
- ✓ ECONOMIC VITALITY
- ✓ TRANSPORTATION CHOICES
- ✓ SAFETY & SECURITY
- ✓ SYSTEM CONDITION & PERFORMANCE
- ✓ PUBLIC HEALTH
- ✓ ENVIRONMENT
- ✓ CLIMATE/ENERGY
- ✓ DATA & TECHNOLOGY
- ✓ FINANCIAL SUSTAINABILITY

More scenario modeling...

Considered wild cards

Impact of autonomous and connected vehicles.

- What if autonomous vehicles get full penetration into vehicle fleet by 2050?
- How would this impact the system?
- EMME model runs.
- Developed two scenarios.



Connected and autonomous vehicle scenarios

We created scenarios to demonstrate **upper and lower** bounds of uncertainty, in context of regional vision/goals

Fleet



Take the Wheel

Private



Let it Ride

Private ownership

- All cars on the road are autonomous.
- All cars are privately owned.
- Moderate performance due to fragmented ownership, privacy concerns.
- Access not dependent on mobile device.
- Low shared mobility.
- High need for parking.
- Owner maintains entire costs for maintenance, upgrades.



Fleet ownership

- All cars on the road are autonomous.
- All shared, no private ownership.
- High performance optimization (platooning, routing).
- Lots of shared mobility, including transit and carpooling.
- Access depends on owning mobile device.
- No parking required.
- Cost is subscription-based.



Modeling parameters

Private

- Double freeway capacity.
- Generate 20 percent more zero occupant trips.
- Let it Ride — trend growth.
- Maintain current transit.
- Vehicle occupancy rate, parking and operation costs stay on trend.

Fleet

- Double freeway capacity.
- Increase vehicle occupancy rate by 30 percent.
- Double parking costs.
- Double operation cost.
- Take the Wheel — focused growth.
- Fully implement transit vision.

Travel model results

	2015	No build	Let it ride + Private ownership		Take the wheel + Fleet ownership	
VMT	44,244,464	56,396,956	59,993,684	+6.4%	53,582,448	-5%
VHT	1,143,724	1,539,745	1,550,753	+0.7%	1,364,814	-11.4%
Auto trips		7,048,695	7,336,291	+4.1%	6,687,764	-5.1%
Transit trips	45,934	77,403	83,704	+8.1%	156,384	+102%

Percentage of growth is calculated by comparing each scenario to TO2040 No Build.

Travel model results (per capita)

	2015	No build	Let it ride + Private ownership		Take the wheel + Fleet ownership	
VMT	22.39	23.32	24.80	+4.1%	22.15	-1.0%
VHT	0.58	0.64	0.64	+10.0%	0.56	-2.5%
Auto trips	2.88	2.91	3.03	+1.2%	2.76	-3.9%
Transit trips	0.02	0.03	0.03	+37.7%	0.06	+178.2%

Percentage of growth is calculated by comparing each scenario to 2015 baseline.

What did we learn?

➔ Growth scenarios still had the greatest impact on travel demand.



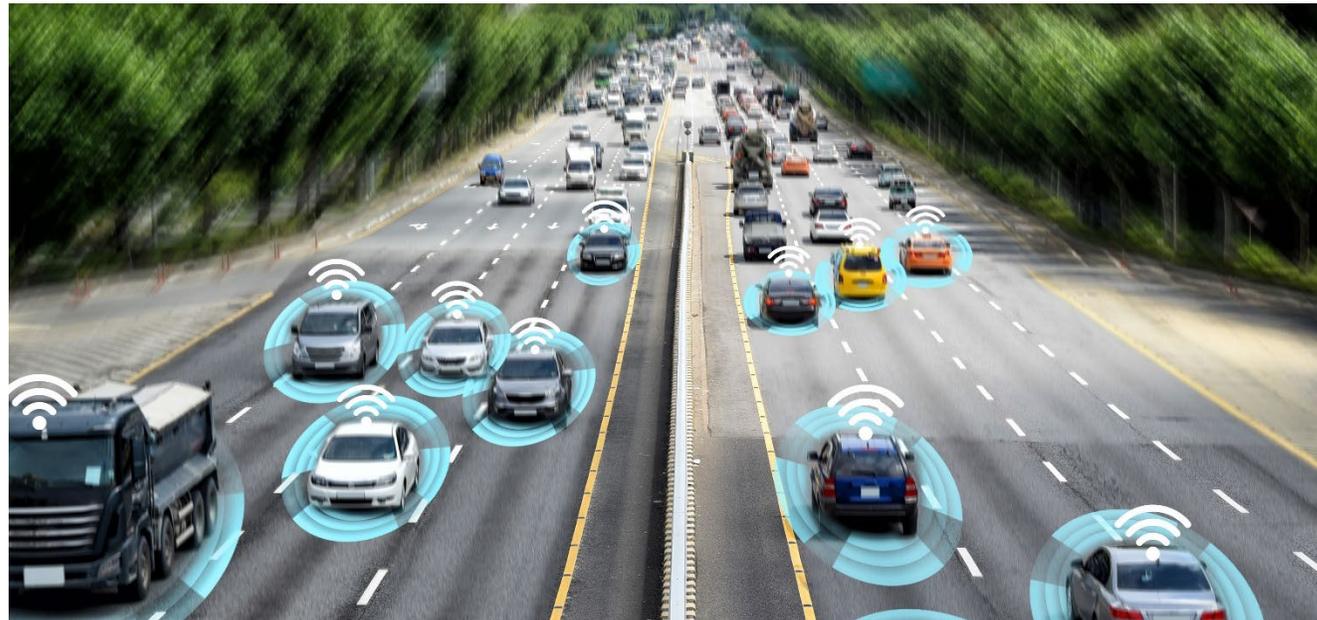
What did we learn?

➔ Different scenarios shows greater relative changes in transit ridership and VHT. Not much appears to impact VMT.



What did we learn?

Confirmed assertion in AV policy framework that fleet-based ownership model has more desirable impacts.



What did we learn?

➔ Fleet based AV and compact land use scenario resulted in per capita drop in VMT, VHT, auto trips and very large increase in transit trips. This was the only scenario where we saw this.

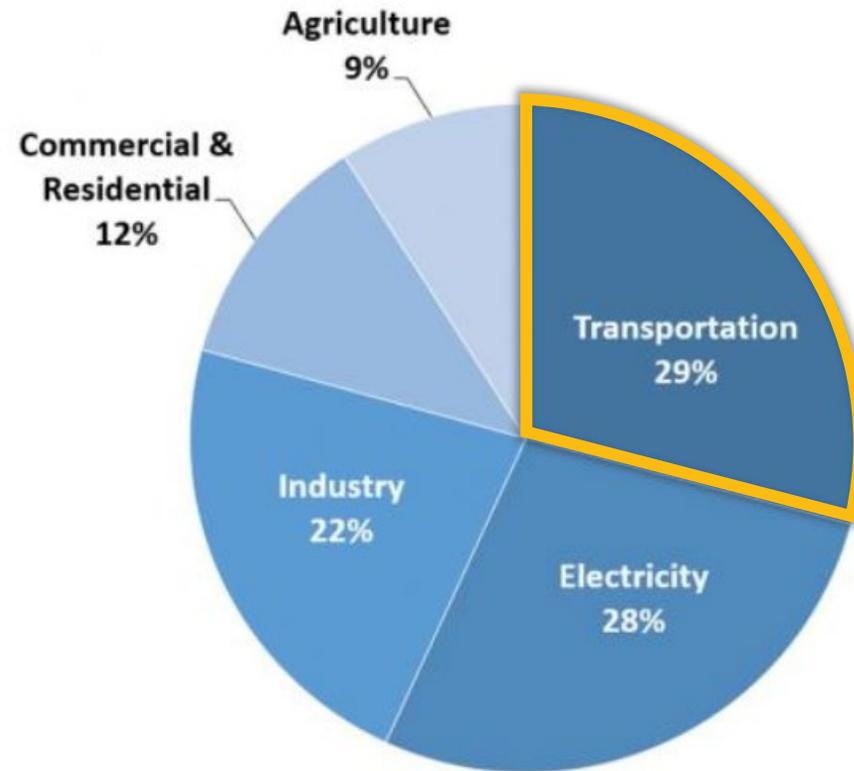


Considered wild cards...

Greenhouse gas emissions and climate change

As of 2017, the largest share of greenhouse gas emissions comes from transportation.

Total U.S. Greenhouse Gas Emissions by Economic Sector in 2017



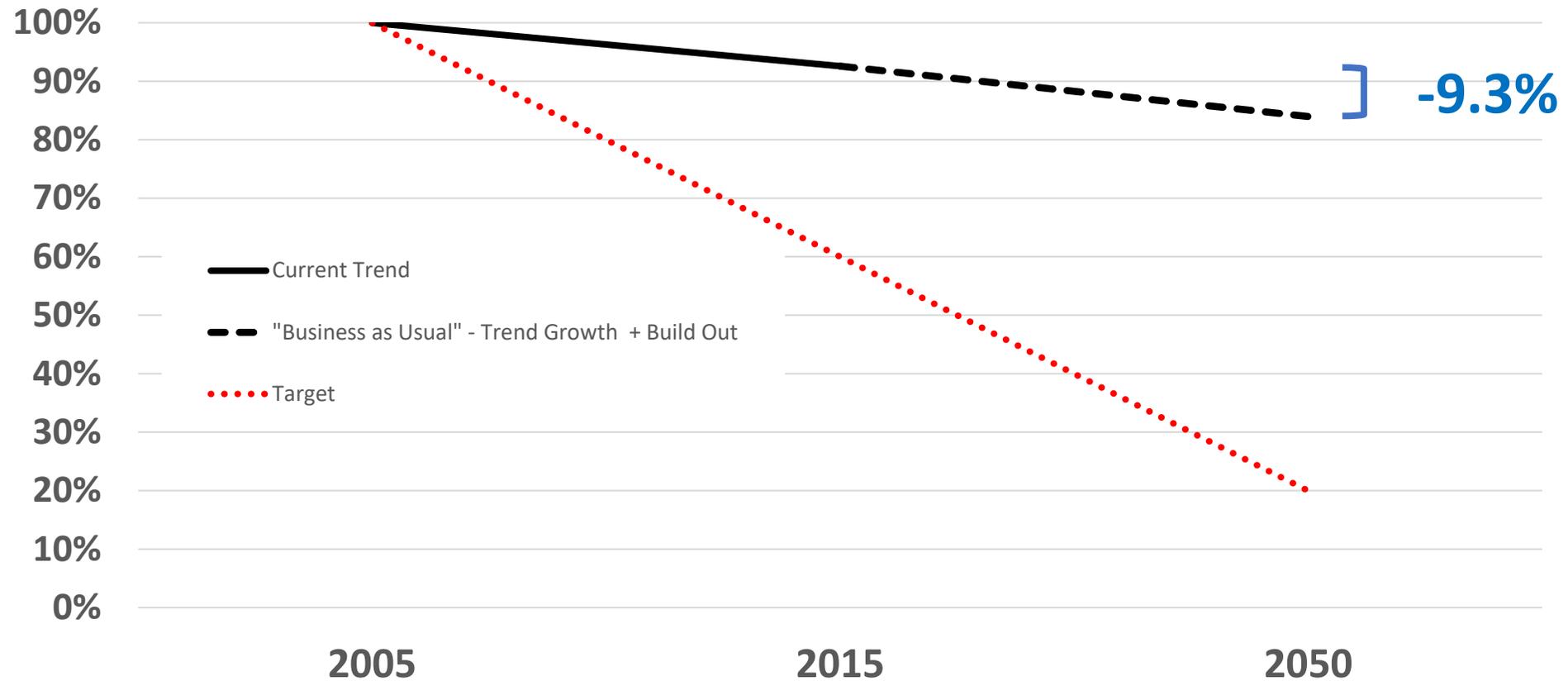
New GHG emissions scenario

Tested parameters

- Focused land use.
- Electric vehicle adoption at more than 75%.
- Build Smart Moves transit network with no other transportation improvements.
- Double operational cost (VMT fee).
- Add parking cost at mobility hubs.
- Reduce speed limit to 55 miles per hour on state highway system.

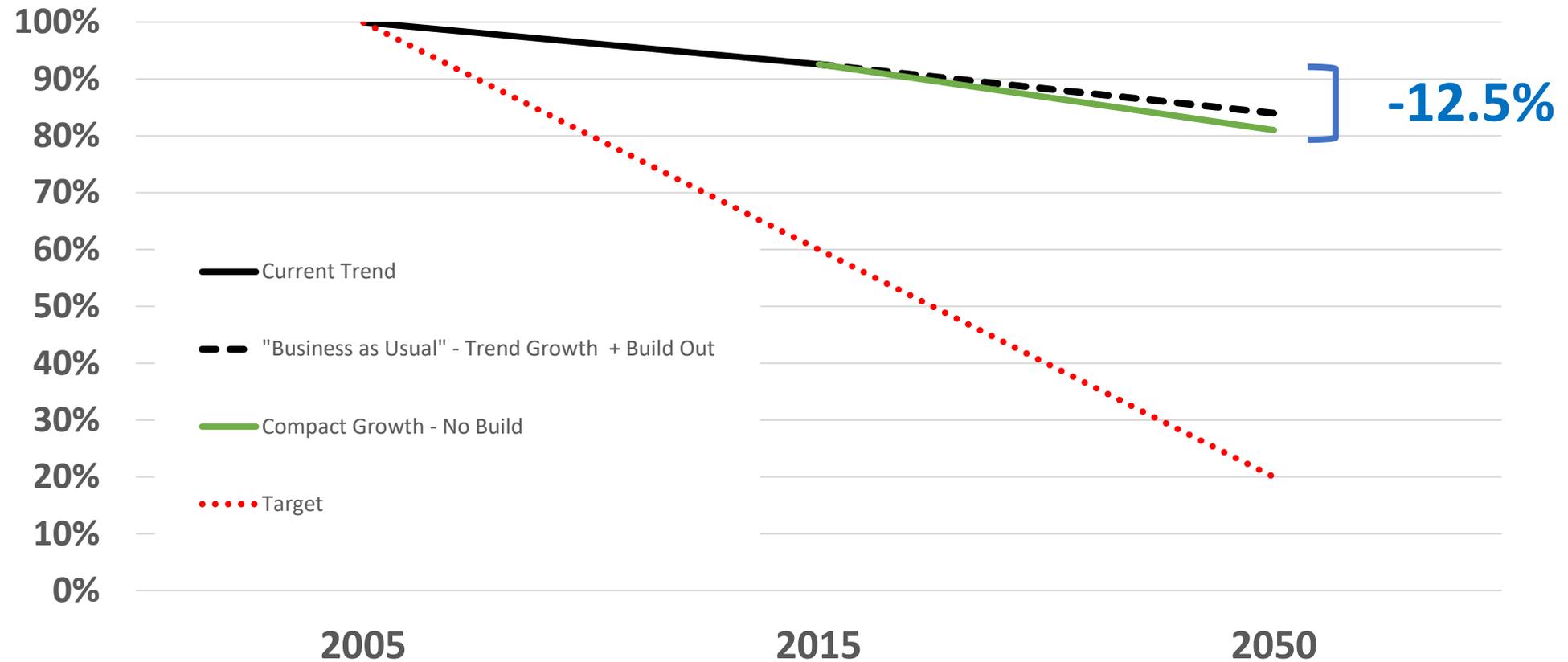
Greenhouse gas emissions

Transportation Greenhouse Gas Emissions by Scenario



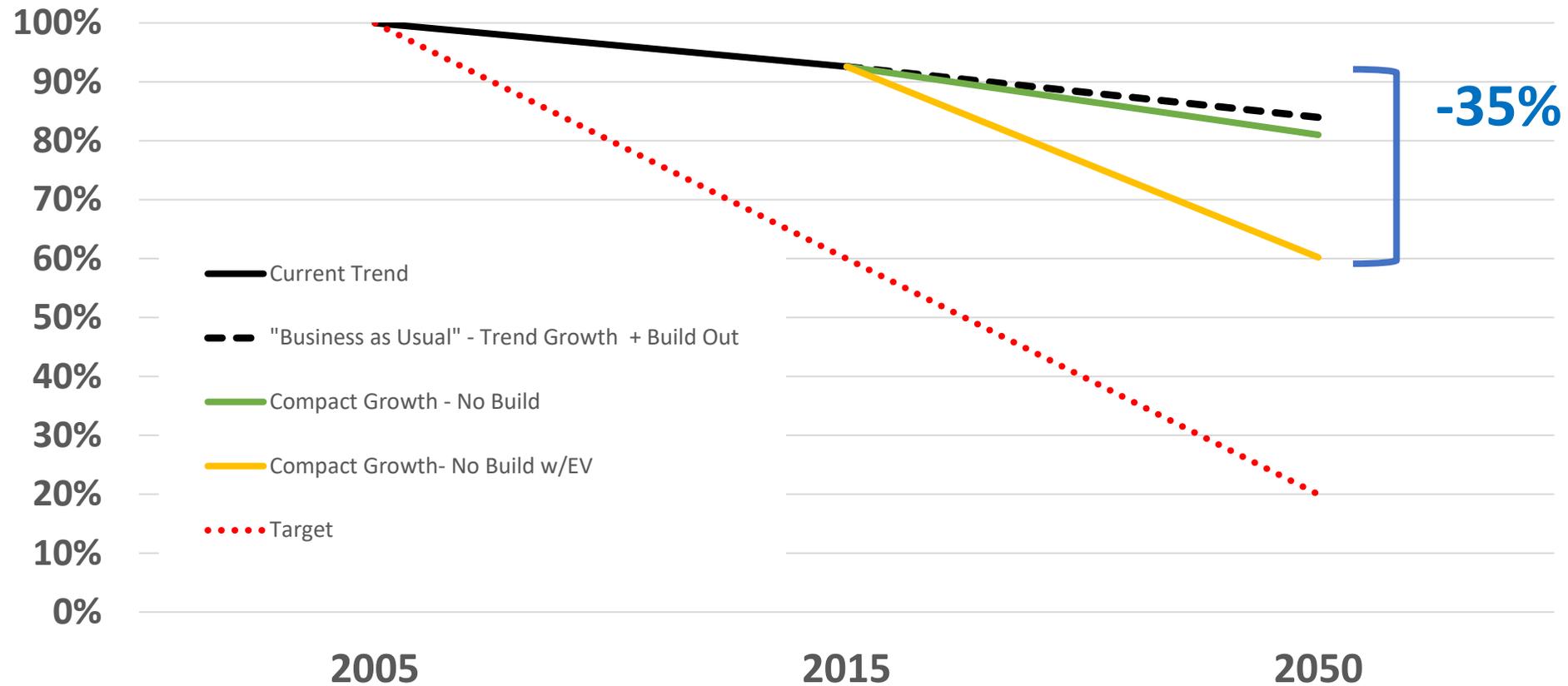
Greenhouse gas emissions

Transportation Greenhouse Gas Emissions by Scenario



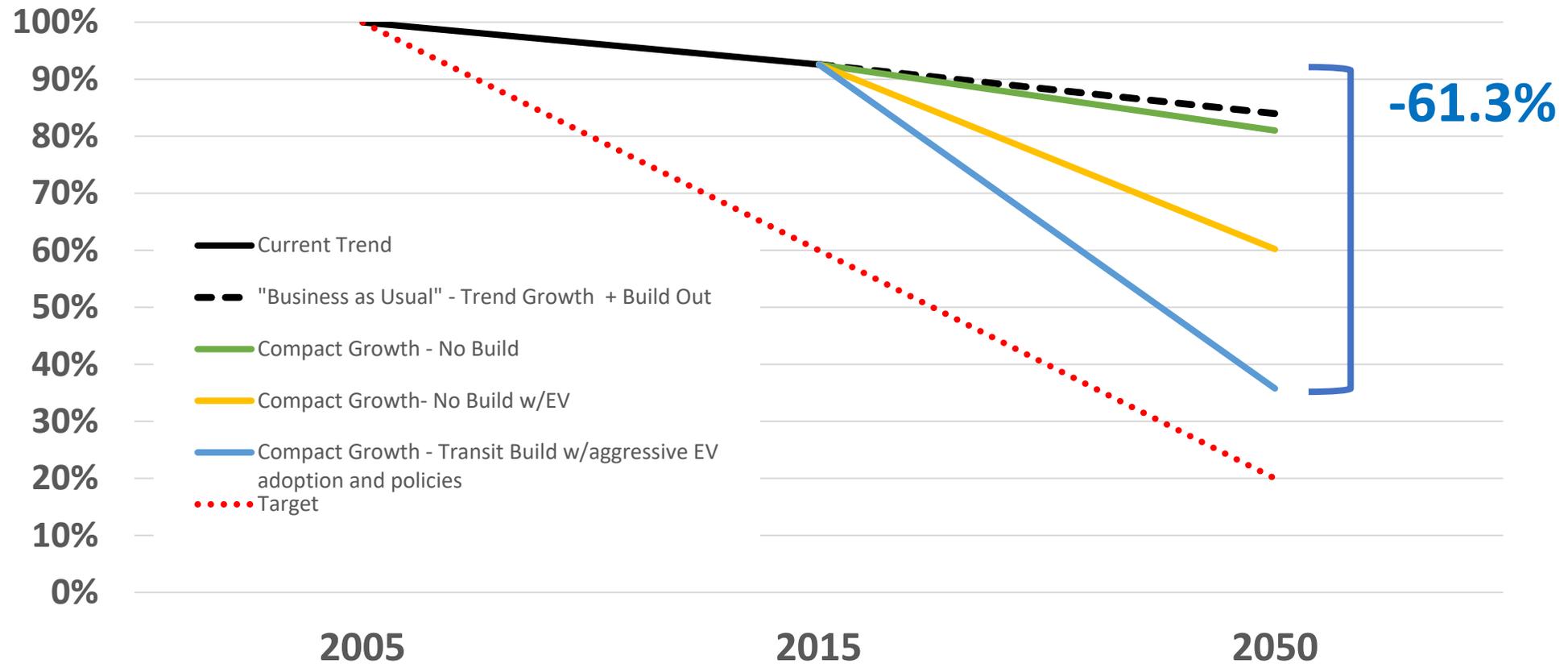
Greenhouse gas emissions

Transportation Greenhouse Gas Emissions by Scenario



Greenhouse gas emissions

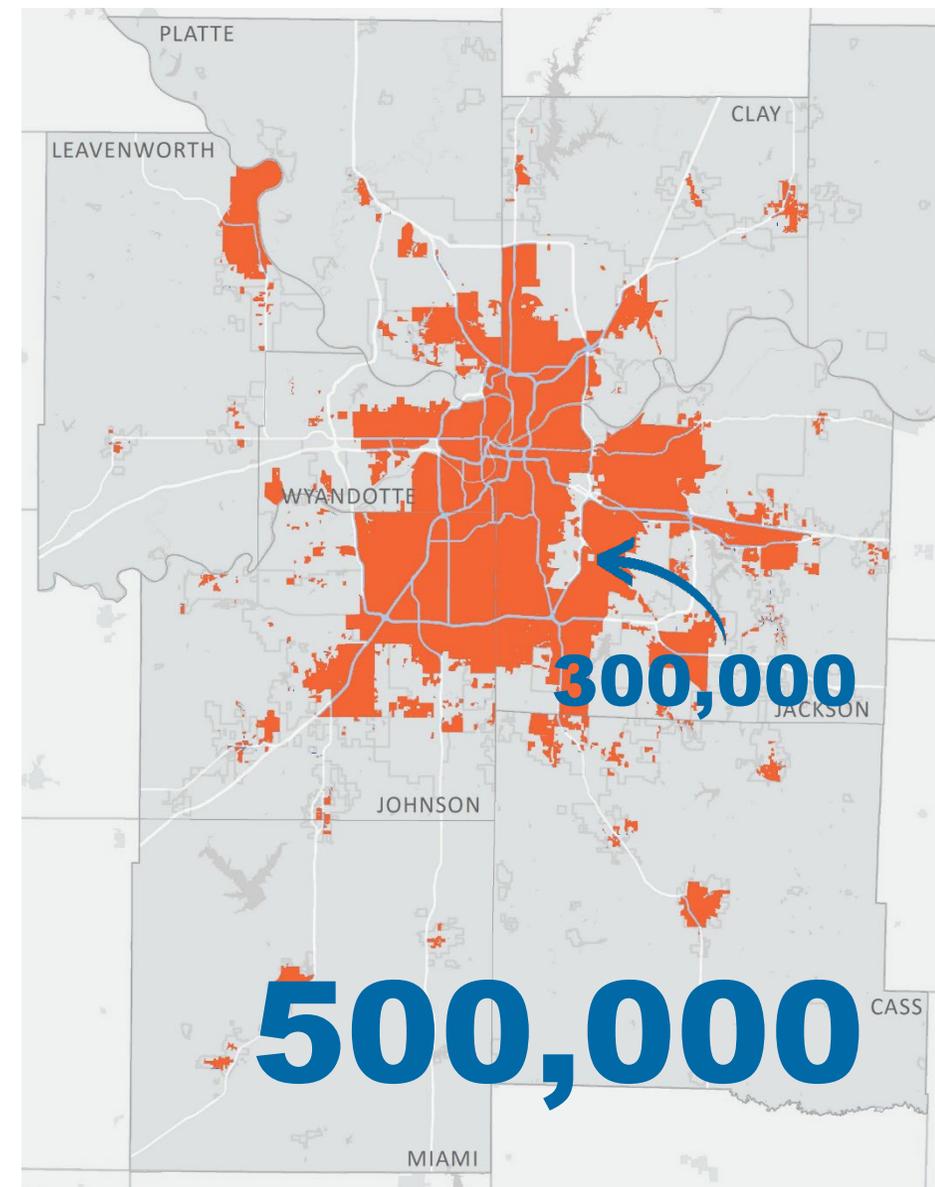
Transportation Greenhouse Gas Emissions by Scenario



What it all means

Strategies that promote **focused growth** are the best way to accommodate our needs, meet our goals and achieve our vision.

Electric vehicle adoption and pricing strategies, combined with **focused growth** and **multimodal (transit) investments**, appear to be the best way to make significant reductions in greenhouse gas emissions.



Impact on MTP process

- What we learned informed project scoring.
- Projects submitted through our call were assembled into scenarios and run through various modeling processes.
- Based on desired outcomes, we prioritized projects as high, medium, or low in MTP.



Roadblocks & Outcomes

Be willing to finish building the plane as you fly it.

- Refreshed vision statement
- Additional MTP policy goals
- Tested and modeled transportation network investment packages



Resources

Check out ConnectedKC.org

How we developed the plan?



Modeling scenarios story map:



Forecast methodology and results





Thank you!

Martin Rivarola, AICP
Assistant Director of Transportation and Land Use
Mid-America Regional Council
mrivarola@marc.org

SCENARIO PLANNING PEER EXCHANGE

Sponsored by:

FHWA Office of Planning

Hosted by:

Piedmont Authority for Regional Transportation

May 3, 2023

VIRTUAL PRESENTATION AND Q&A: INTRODUCING A NEW TRANSPORTATION PLANNING PARADIGM

Featured Speaker:

Todd Litman, Victoria Transport Policy Institute



Introducing a New Transportation Planning Paradigm

Todd Litman

Victoria Transport Policy Institute

Presented to the

Piedmont Triad Planning Workshop

Greensboro

3 May 2023

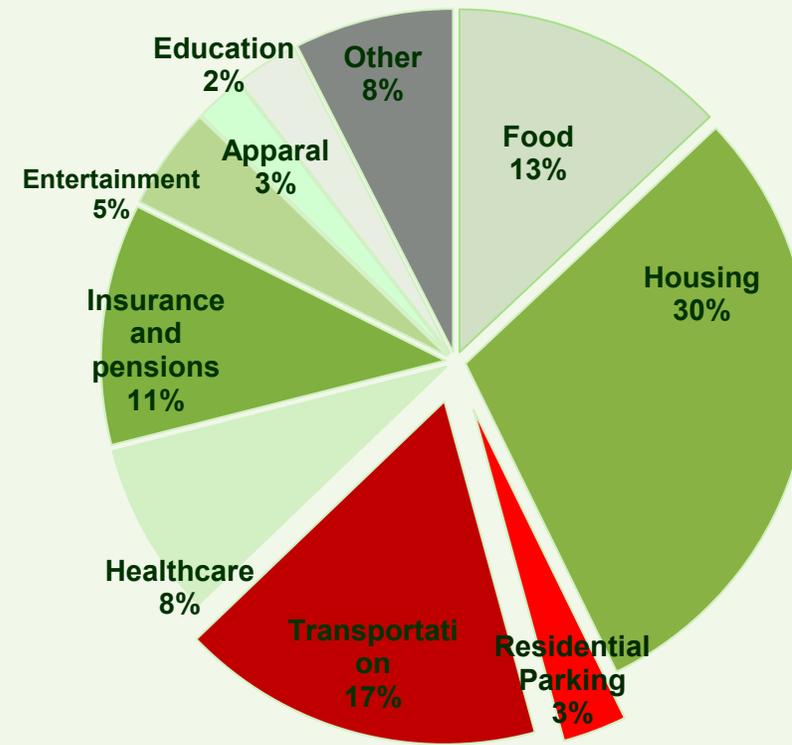
A New Planning Paradigm

	Old	New
Modes	Automobile-oriented. Assumes that automobile travel is preferred and better than other modes	Multimodal. Recognizes the unique and important roles of non-auto modes.
Ultimate Goal	Maximize <i>mobility</i> (travel speed and distance). Minimize vehicle operating costs.	Maximize <i>accessibility</i> (people's ability to obtain desired services and activities). Minimize total costs.
Performance Indicators	Roadway level-of-service. Average traffic speed and delay. Per-mile crash and emission rates.	Multimodal levels-of-service. Per capita transportation costs, crash and emission rates.
Parking goals	Maximize parking supply and minimize price (costs are borne indirectly)	Maximize parking efficiency. Optimize supply. As much as possible, charge users directly and minimize subsidies.

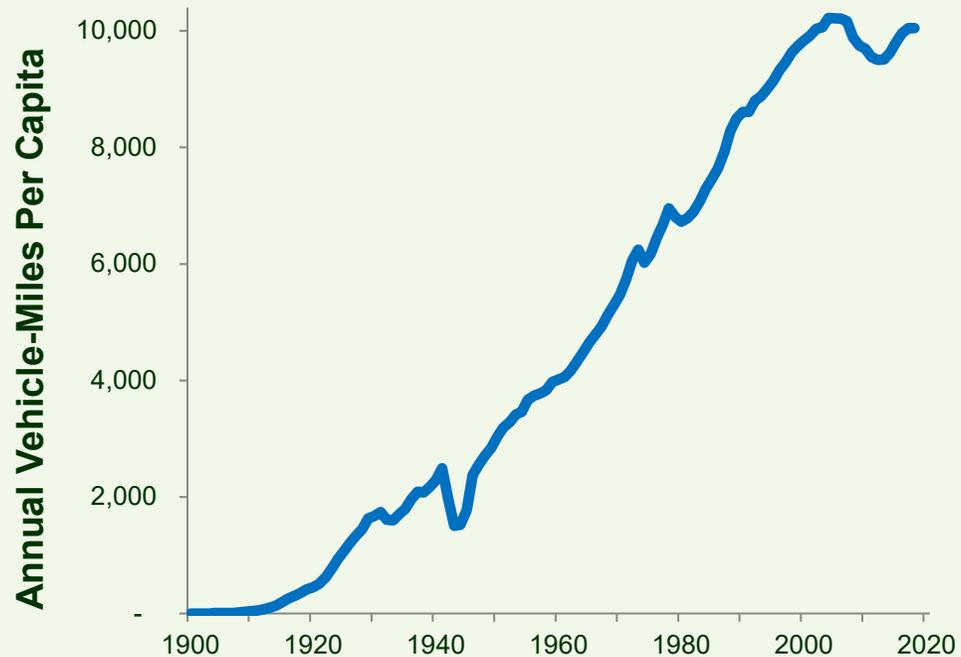
Transportation Impacts

Transportation affects people in many ways

- 60-90 minutes of our day (10-30% of uncommitted time)
- 15-25% of household budgets.
- Affects economic opportunities
- Housing affordability and development patterns (compact or sprawled)
- Affects health and safety
- Public realm and community livability.
- Affects local economic development.
- Public expenses
- External costs (public infrastructure, congestion, crash risk and pollution)



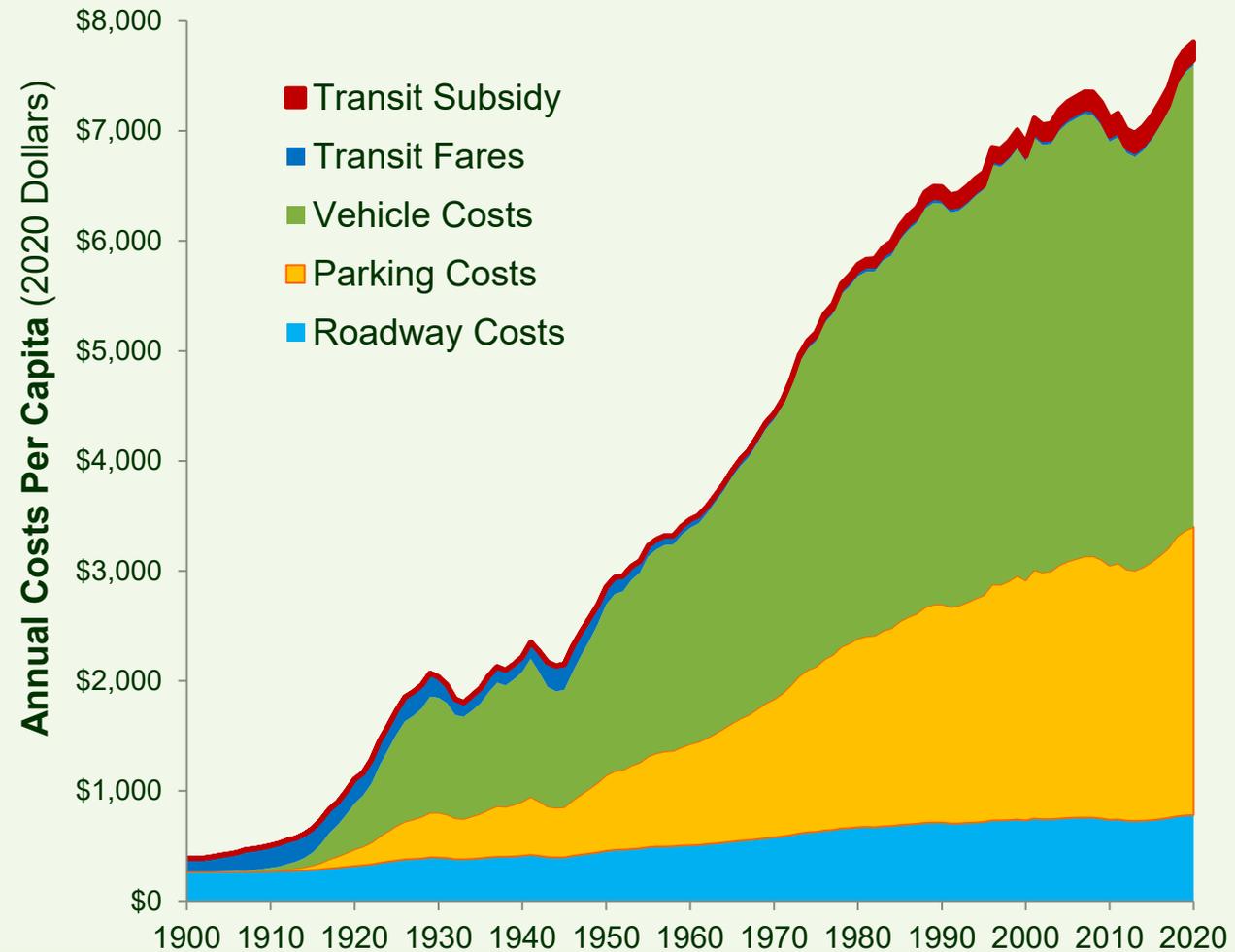
Changing Travel Demands



- Aging population
- High fuel prices
- Increasing poverty
- Affordability
- Increasing urbanization
- Changing consumer preferences
- Health and environmental concerns
- Resilience planning
- New technologies and modes

Previous Mobility Costs

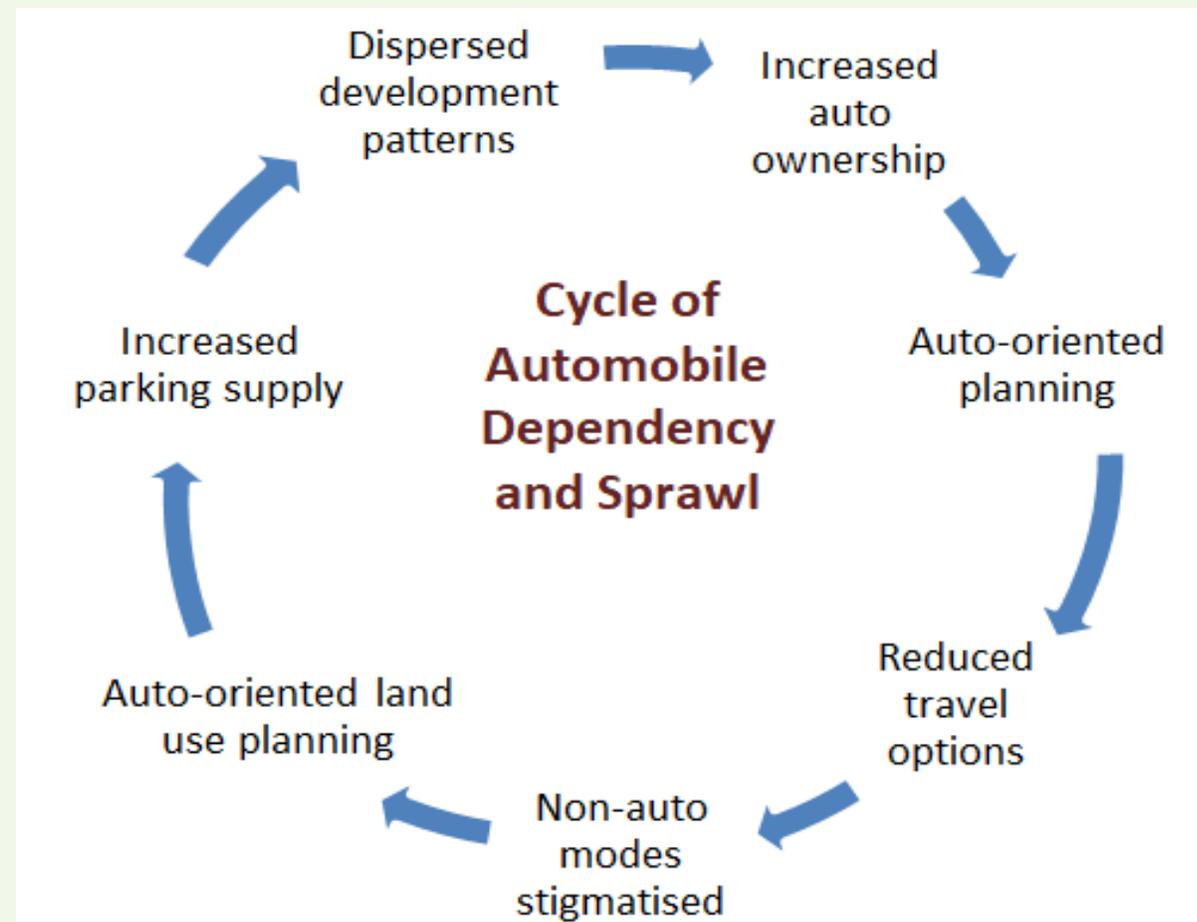
As automobile travel grew during the last 120 years, per capita vehicle, road and parking facility costs increased significantly.



A Century of Automobile Planning

During the last century, transportation planning focused on automobile demands to the detriment of other modes.

What comes next?



Mobility to Accessibility

Mobility (physical movement)

- Favors faster modes and longer trips
- Ignores land use impacts
- Supports highway expansion and sprawl



Accessibility (ability to reach desired services and activities)

- Favors multi-modalism. Recognizes the roles of non-motorized and public transport.
- Recognizes land use impacts on accessibility
- Supports comprehensive, integrated planning and smart growth development



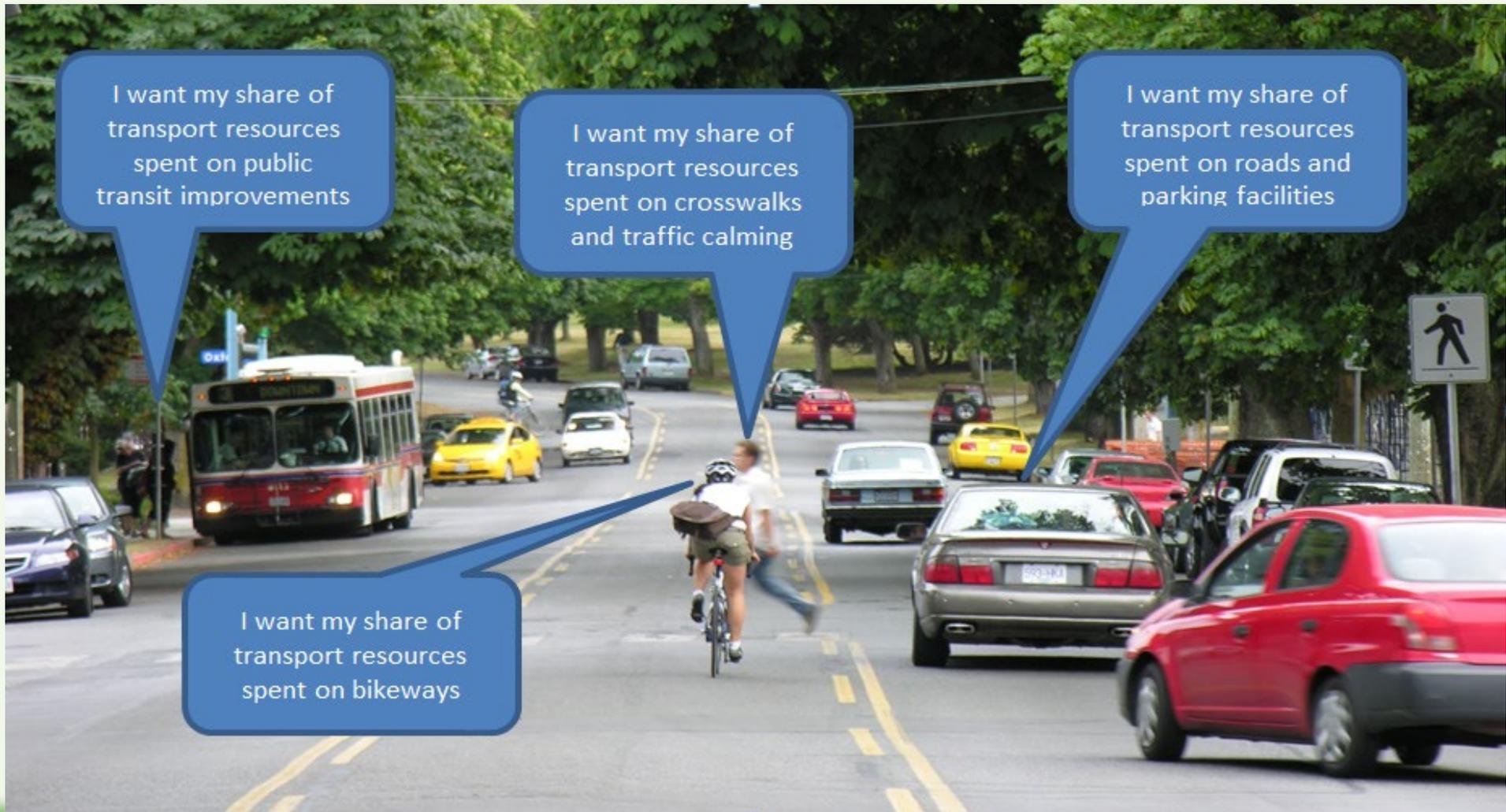
Emerging Planning Goals

Older Goals	Emerging Goals
<p>Increase traffic speeds and reduce congestion delays.</p> <p>Increase parking convenience.</p> <p>Reduce traffic accident rates.</p>	<p>Increase affordability (cost burdens on lower-income households).</p> <p>Improve disadvantaged people's economic opportunities.</p> <p>Create more attractive and vibrant streets.</p> <p>Support local economic development.</p> <p>Increase public safety, fitness and health.</p> <p>Protect local environments (reduce air, noise and water pollution).</p> <p>Encourage more compact development.</p> <p>???</p>

Transport Equity Analysis

Type	Description	Metrics
Horizontal Equity - Treats Everybody Equally		
Fair Share	Each person receives a fair share of public resources.	Per capita share of transportation resources (money, road space, etc.).
External costs	Travellers minimize and compensate for external costs.	Infrastructure costs, congestion, crash risk and pollution that travellers impose on other people.
Vertical Equity - Favors Disadvantaged Groups		
Inclusivity	Transportation systems provide basic mobility to disadvantaged groups.	Quality of travel for people with disabilities and other special needs. Disparities between groups.
Affordability	Lower-income households can afford basic mobility.	Transportation costs relative to incomes. Quality of affordable modes.
Social Justice	Policies address structural inequities.	Whether organizations address inequities such as racism and classism.

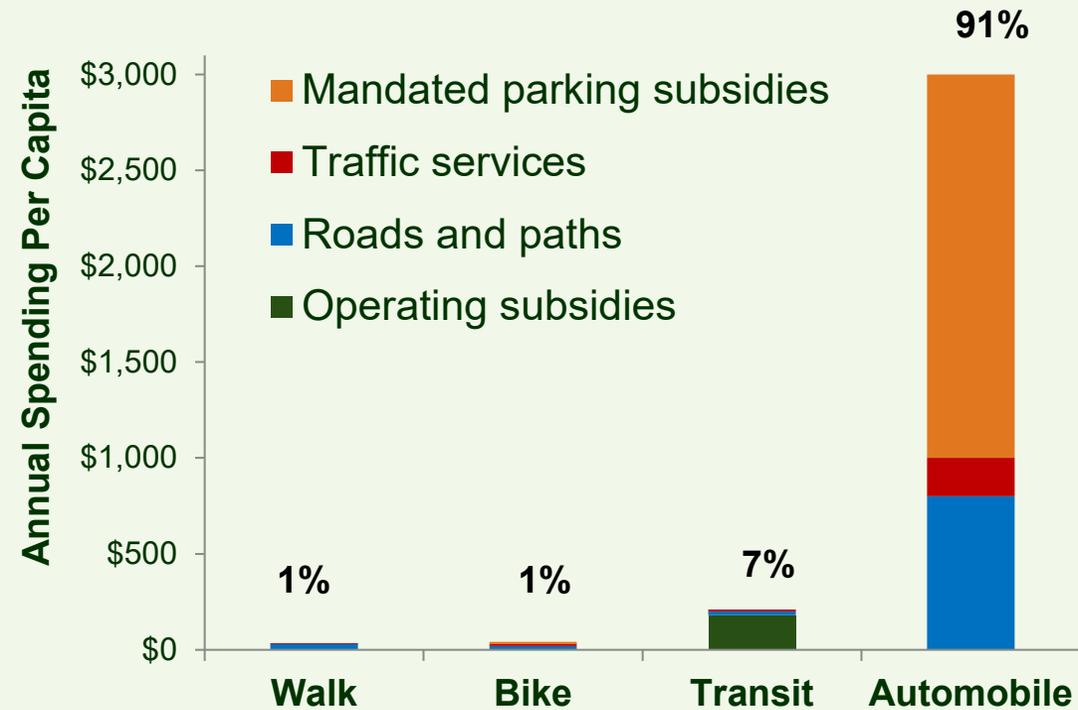
Fair Share Transportation Planning



Public Infrastructure Costs

Considering expenditures on roads and traffic services, government-mandated parking facilities, and transit operating subsidies, the majority of transportation funding is devoted to automobile transportation.

As a result, people who cannot, should not or prefer not to drive receive far less public investment than motorists.



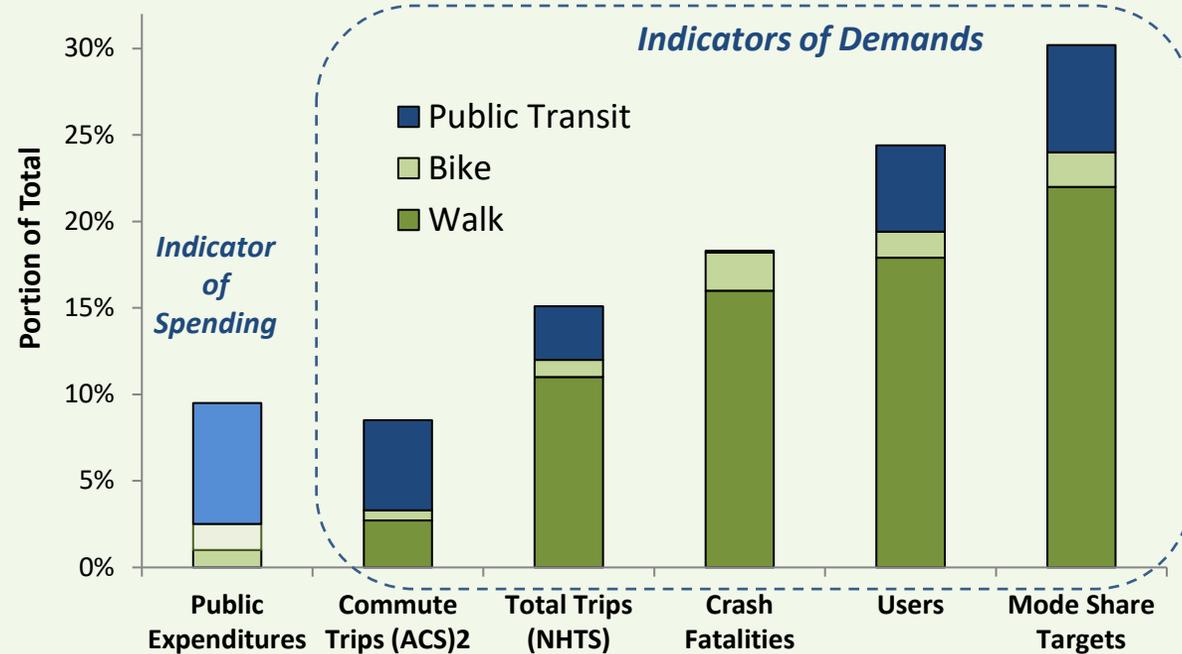
Investments Verses Demands

In a typical community non-auto travel represent less than 10% of infrastructure investments.

But

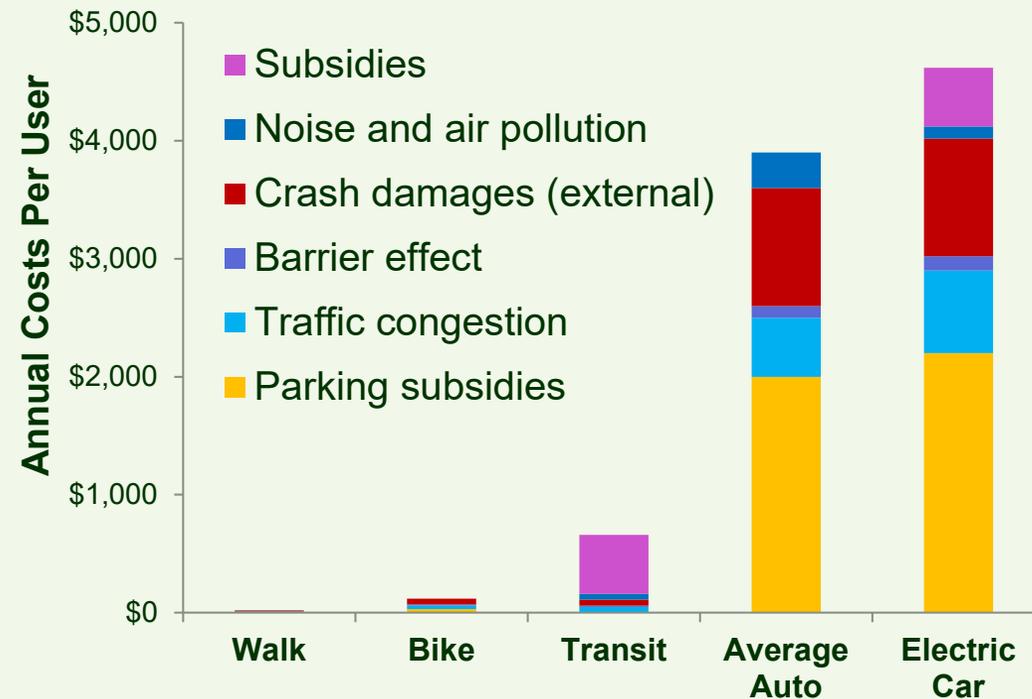
- 10-15% of current trips.
- 15-25% of traffic deaths.
- 25-35% of travellers.
- 20-40% of future targets.

This is unfair and inefficient – if fails to respond to non-drivers' travel demands, creating automobile-dependent transport systems.



External Costs

- Because they are large, fast and resource intensive, automobiles require more facility, congestion, risk and pollution costs than other modes.
- People who drive more than average impose net external costs on people who drive less than average.
- Since vehicle travel tends to increase with income, the external costs that automobiles impose on non-drivers tend to be regressive.

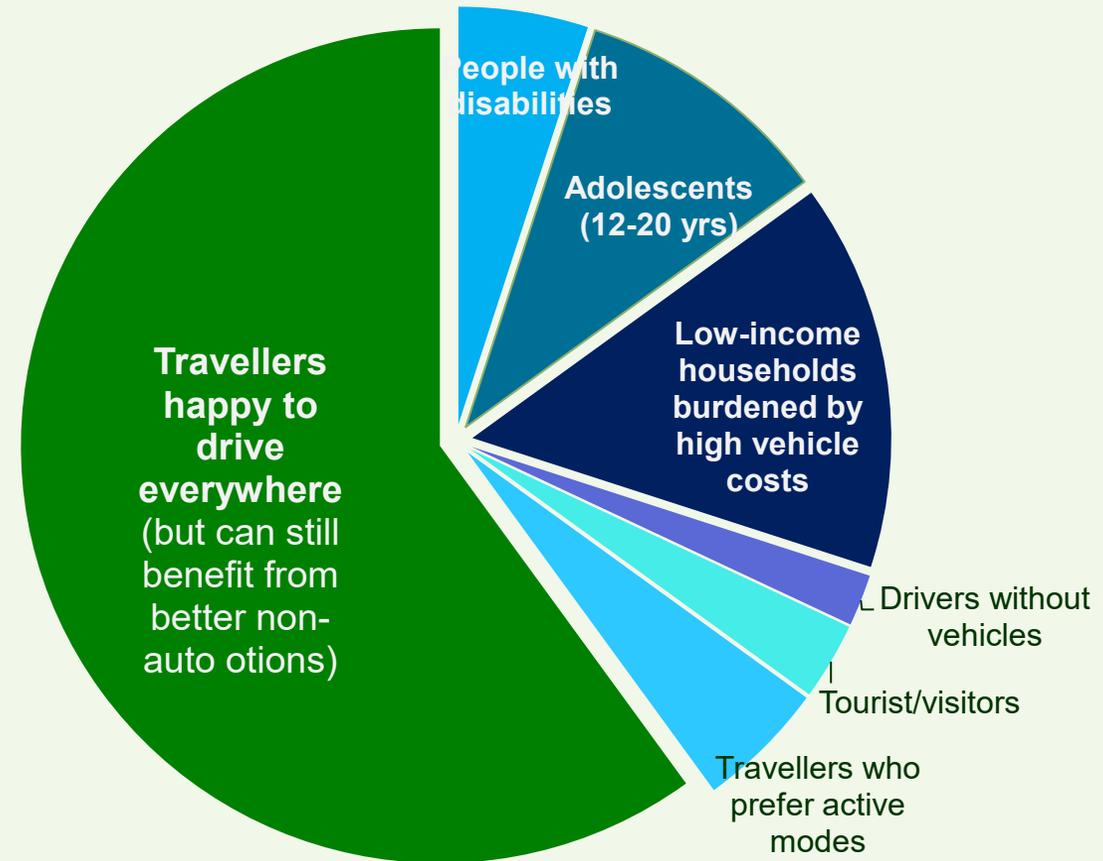


Inclusivity: Serving Non-Drivers

In a typical community 20-40% of residents cannot, should not or prefer not to drive for most trips.

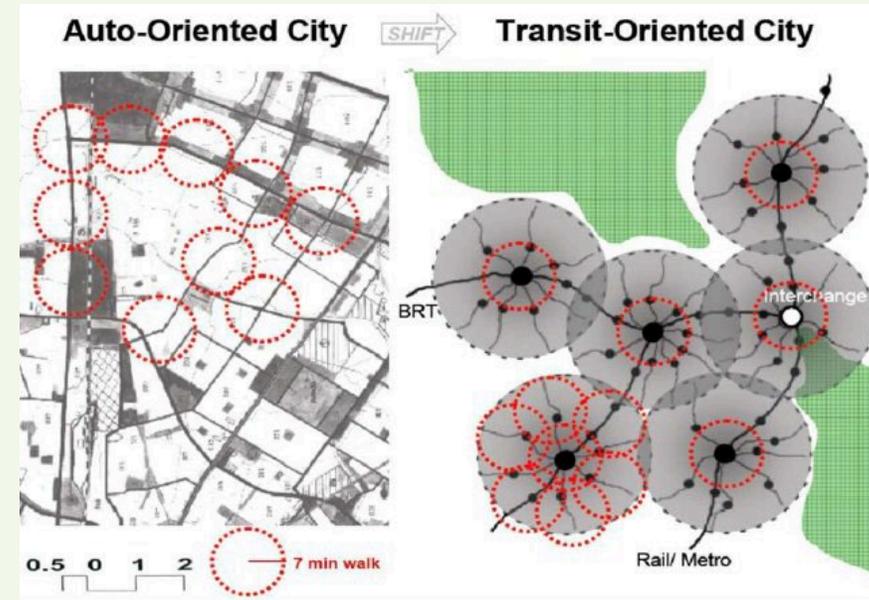
Without suitable travel options non-drivers lack independent mobility, require chauffeuring, bear excessive costs, or move to another community that offers better mobility option.

Travel Demands



Non-Drivers' Accessibility

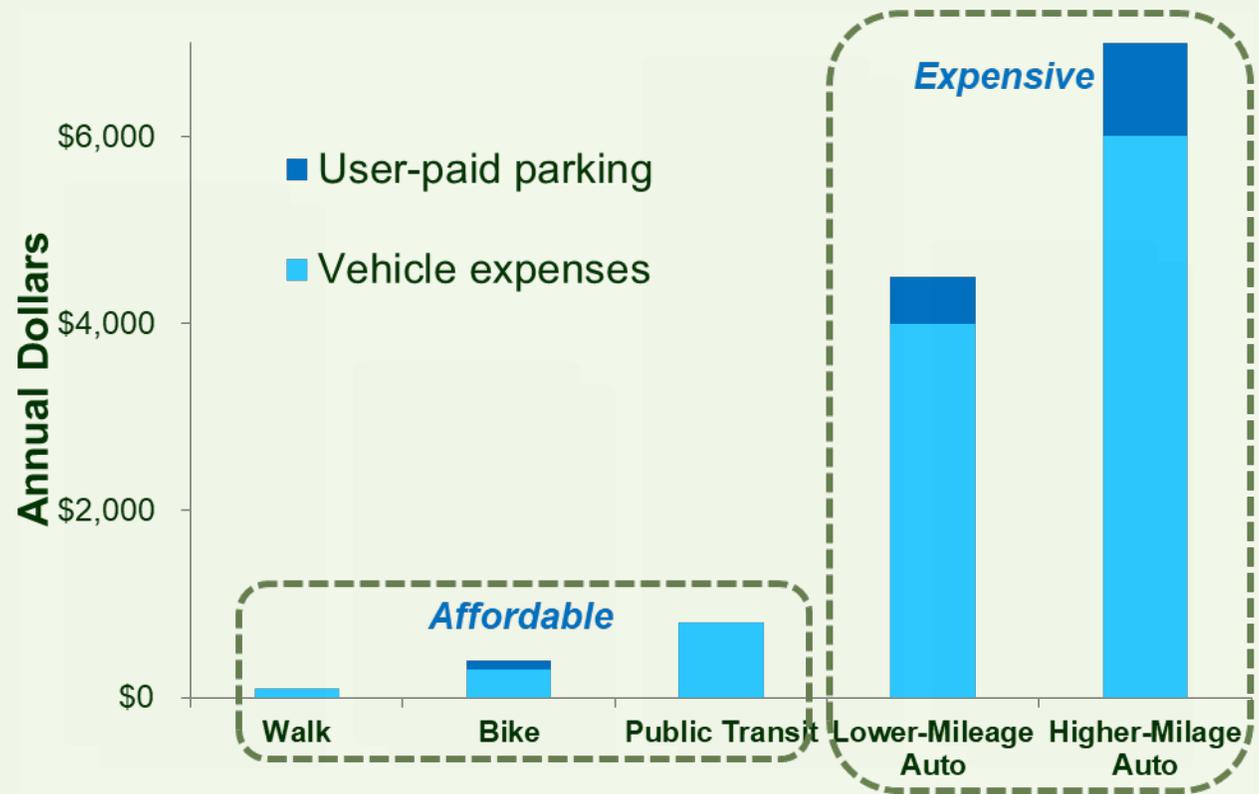
- Universal design (accommodate people with mobility impairments)
- Walking and bicycling conditions (sidewalks, crosswalks, bicycle facilities, traffic speeds, Walk Score).
- Public transit service quality (coverage, frequency, convenience, comfort, safety, affordability, connectivity).
- Neighborhood accessibility (services and activities available within 15-minutes without driving).
- Housing affordability in high-access neighborhoods.



Affordability

It is difficult to legally operate a vehicle for less than \$4,000 annually, or \$6,000 if it is driven high annual miles, and automobile travel sometimes imposes large unexpected costs due to mechanical failures, crashes or traffic violations which can cause household financial crises.

Equity requires improving and favoring affordable mobility and accessibility options.

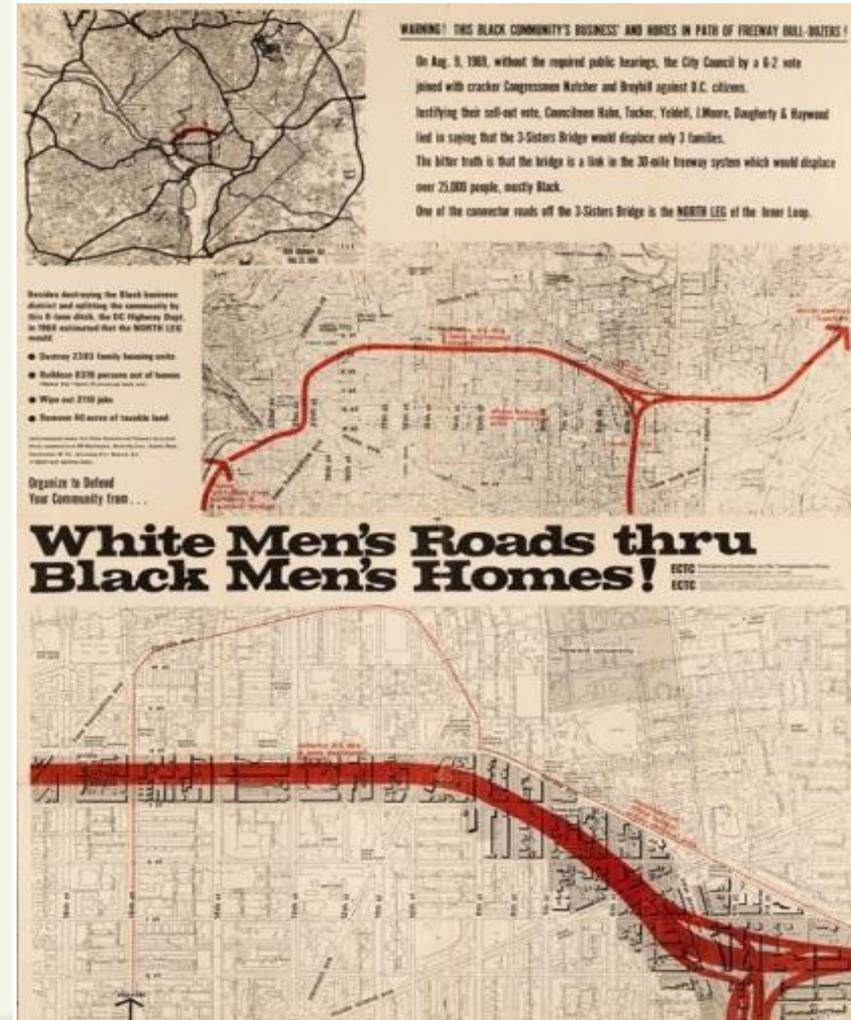


Social Justice

Social justice considers structural inequities such as racism, sexism, and classism.

It can be evaluated by measuring benefit and cost disparities between advantaged and disadvantaged groups.

During the Twentieth Century highways displaced many low-income, largely minority urban neighborhoods. This is an example of how incomplete and biased planning can lead to unfair and harmful outcomes.



Valuing Multi-Modalism

An efficient and equitable transportation system is diverse so users to choose the best mode for each trip:

- Walking and cycling for local errands
- High quality public transit when travelling on busy corridors
- Automobile travel when it is truly most efficient, considering all impacts

Current planning does a poor job of valuing this diversity.



“A developed country is not where the poor drive cars, it is where the rich use public transportation”

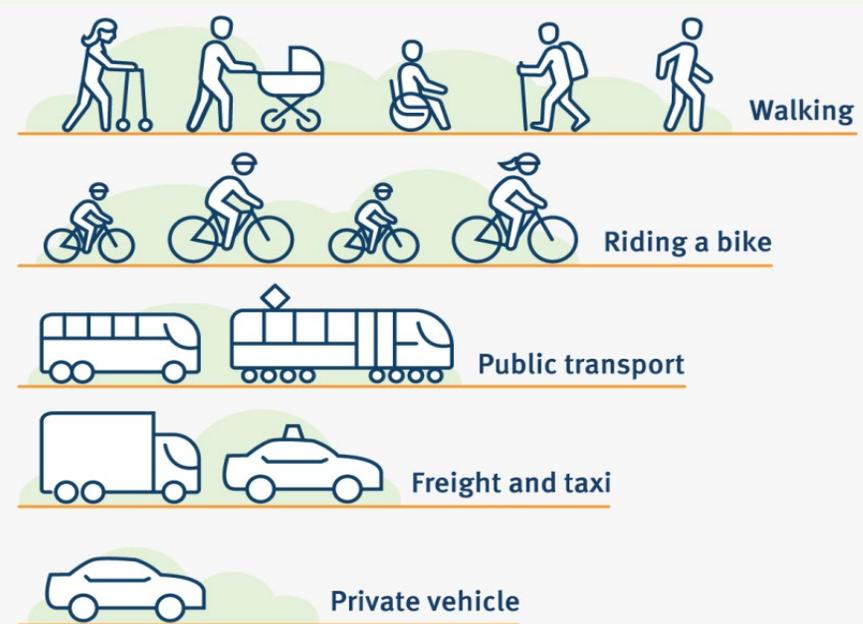
- Enrique Peñalosa, Bogota Mayor

Many Potential Benefits

Improved Travel Options →	More Non-Auto Travel →	Reduced Auto Travel →	More Compact Communities
<ul style="list-style-type: none"> • Improved user convenience and comfort • More independent mobility for non-drivers, which supports equity objectives • Option value • More attractive public realm • Higher property values • Increased safety and security 	<ul style="list-style-type: none"> • User enjoyment • Improved public fitness and health • More local economic activity • Increased community cohesion (positive interactions among neighbors, improved security) 	<ul style="list-style-type: none"> • Reduced traffic and parking congestion • Road and parking facility cost savings • Consumer savings • Reduced chauffeuring burdens • Reduced crashes • Energy conservation • Pollution reductions • Local economic development 	<ul style="list-style-type: none"> • Improved accessibility, particularly for non-drivers • Transport cost savings • Reduced sprawl costs • Openspace preservation • More livable communities • Higher property values • Increased security

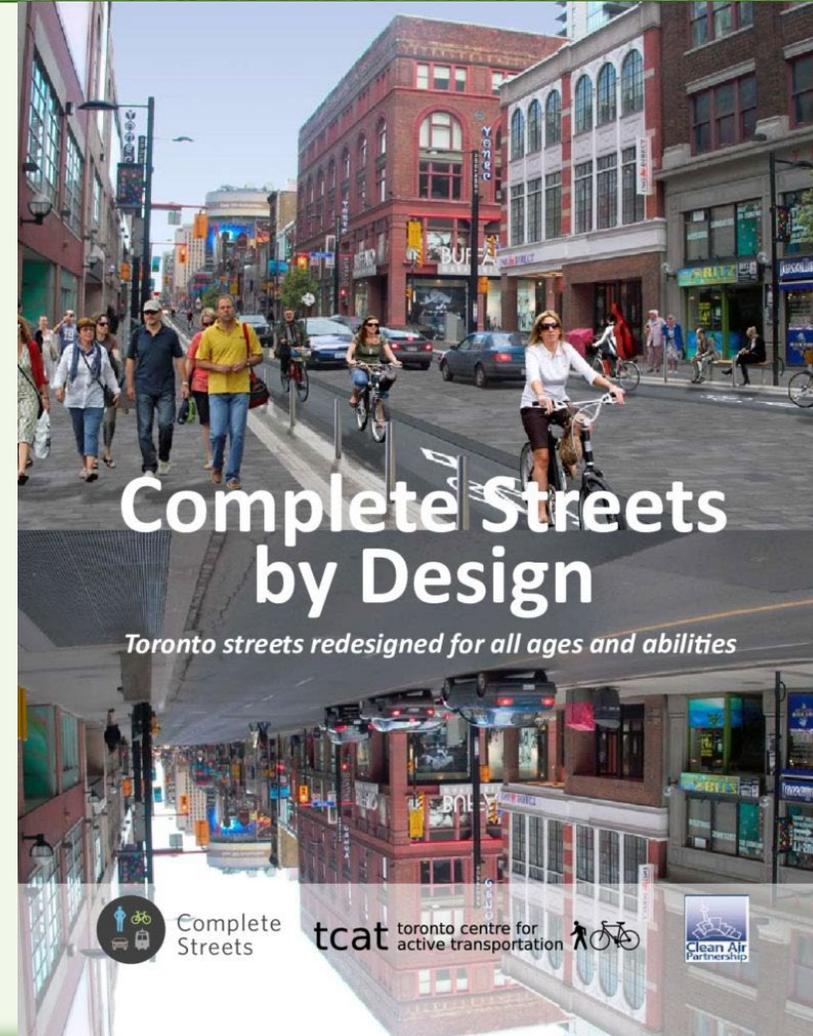
Prioritizing Inclusive/Affordable Modes

An equitable transportation hierarchy favors inclusive, affordable, low-external-cost modes such as walking, bicycling, micromodes (e-bikes) and public transportation over expensive, exclusive and higher-cost modes in planning and funding decisions.



Complete Streets

A Complete Street is designed for all activities, abilities, and travel modes. Complete Streets provide safe and comfortable access for pedestrians, cyclists, transit users and motorists, and a livable environment for visitors, customers, employees and residents in the area.



Public Transit Improvements

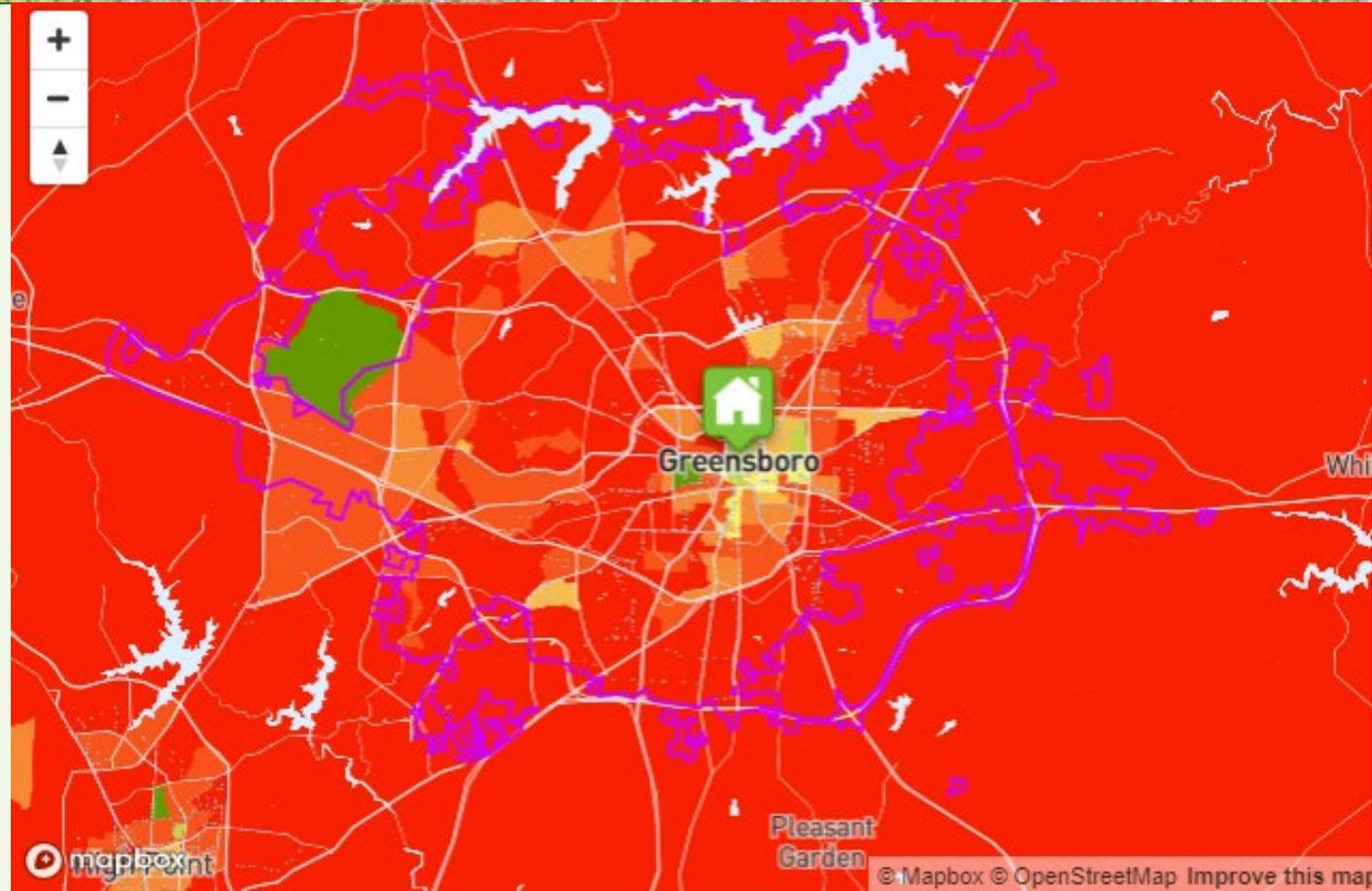
What would make bus travel the high point of your day?

- Convenient navigation and payment apps
- Not crowded
- On-board wi-fi and fold-down tables at each seat
- Nicer vehicles, stops and stations
- Fare discounts and financial incentives
- Fun and sociable on-board activities



Transportation Affordability

H+T Affordability Index
<https://htaindex.cnt.org/>

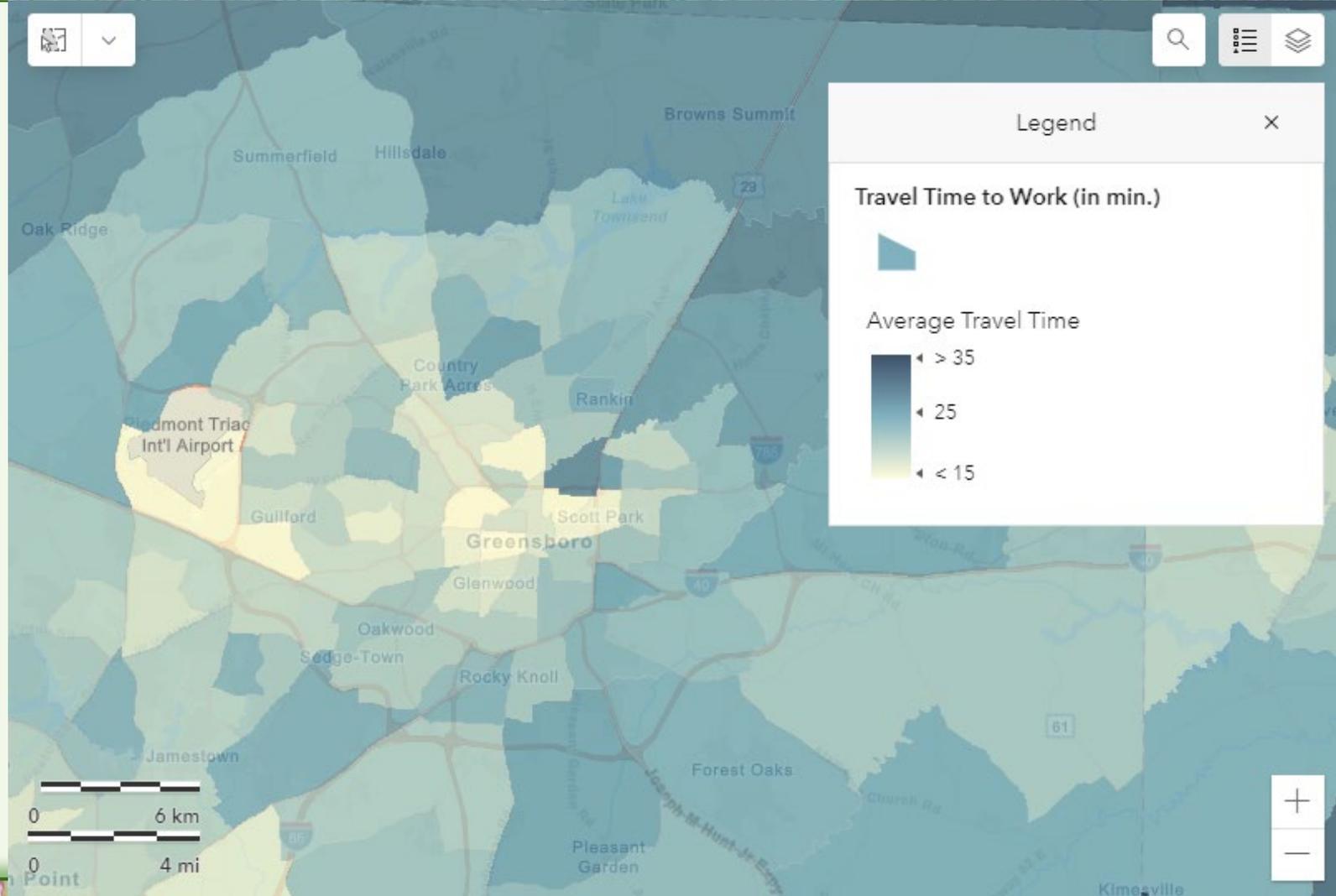


Total Annual Driving Costs

< \$7,920 \$7,920-8,880 \$8,880-9,840 \$9,840-10,800 \$10,800-11,760 \$11,760-12,720 \$12,720-13,680

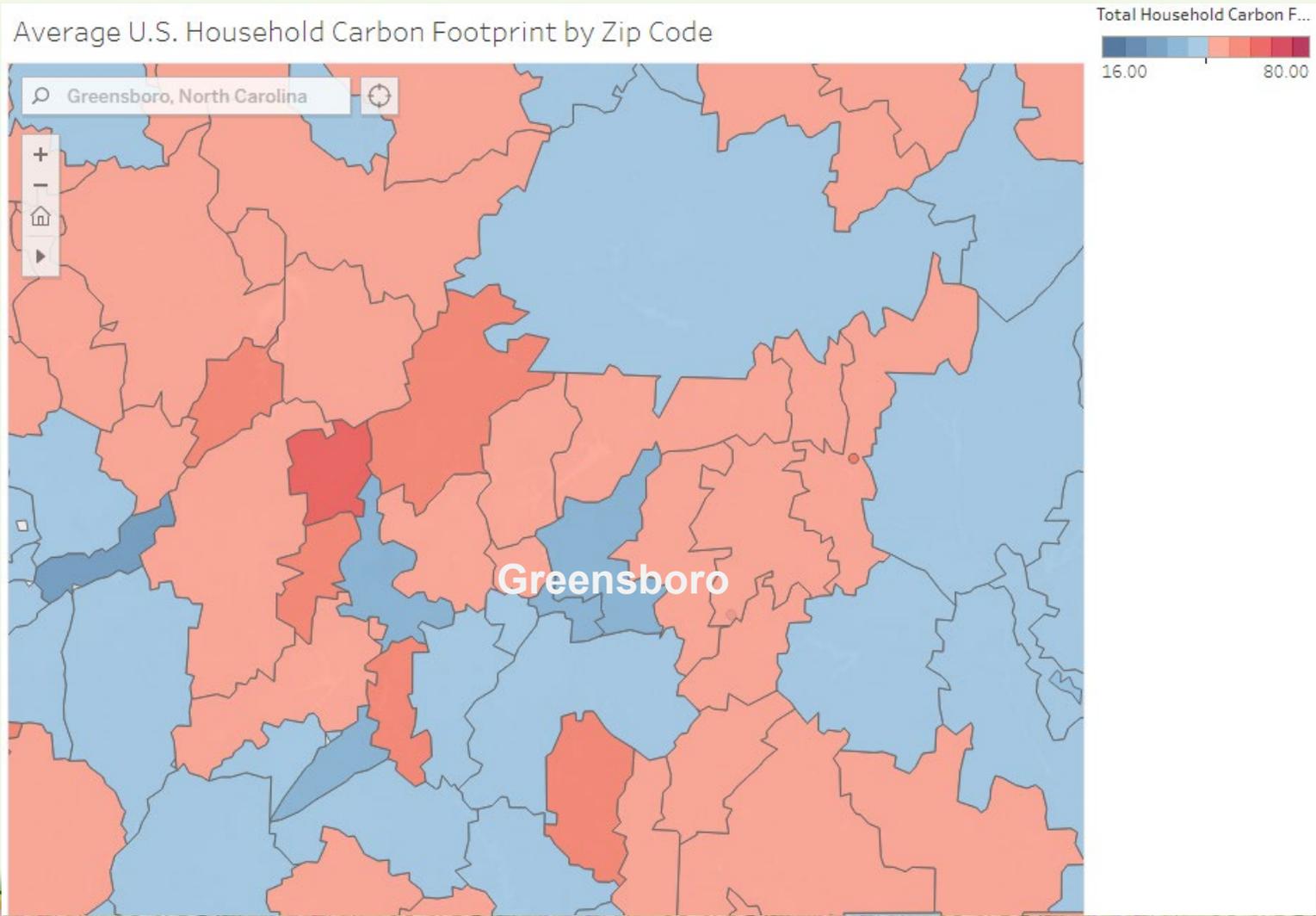
Commuter Duration Dashboard

<https://transweb.sjsu.edu/research/2064-Commuter-Duration-Dashboard-Guide>



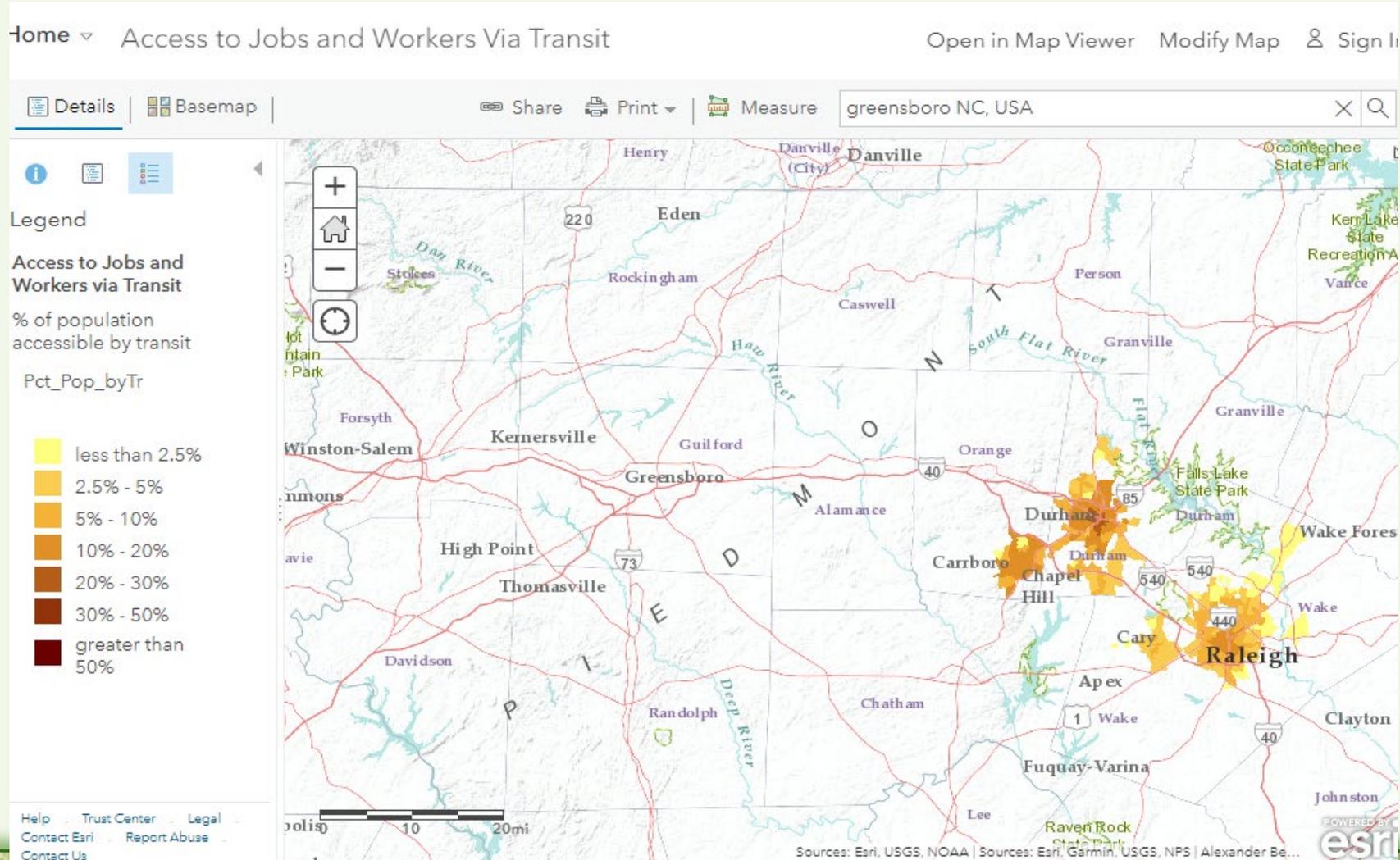
Climate Emissions (Cool Climate)

<https://coolclimate.org/maps>

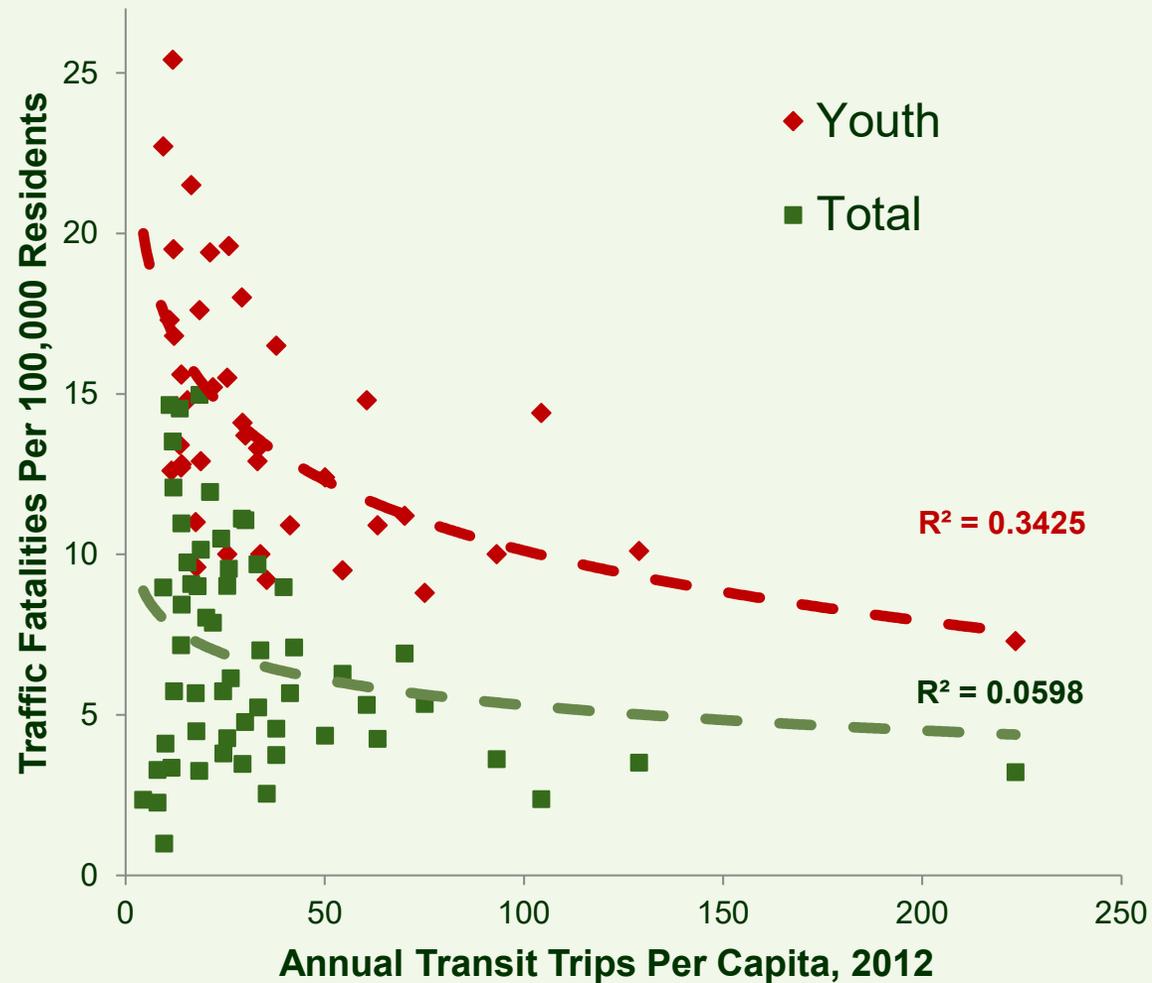


Transit Access to Jobs

<https://epa.maps.arcgis.com/home/webmap/viewer.html>



Traffic Fatalities

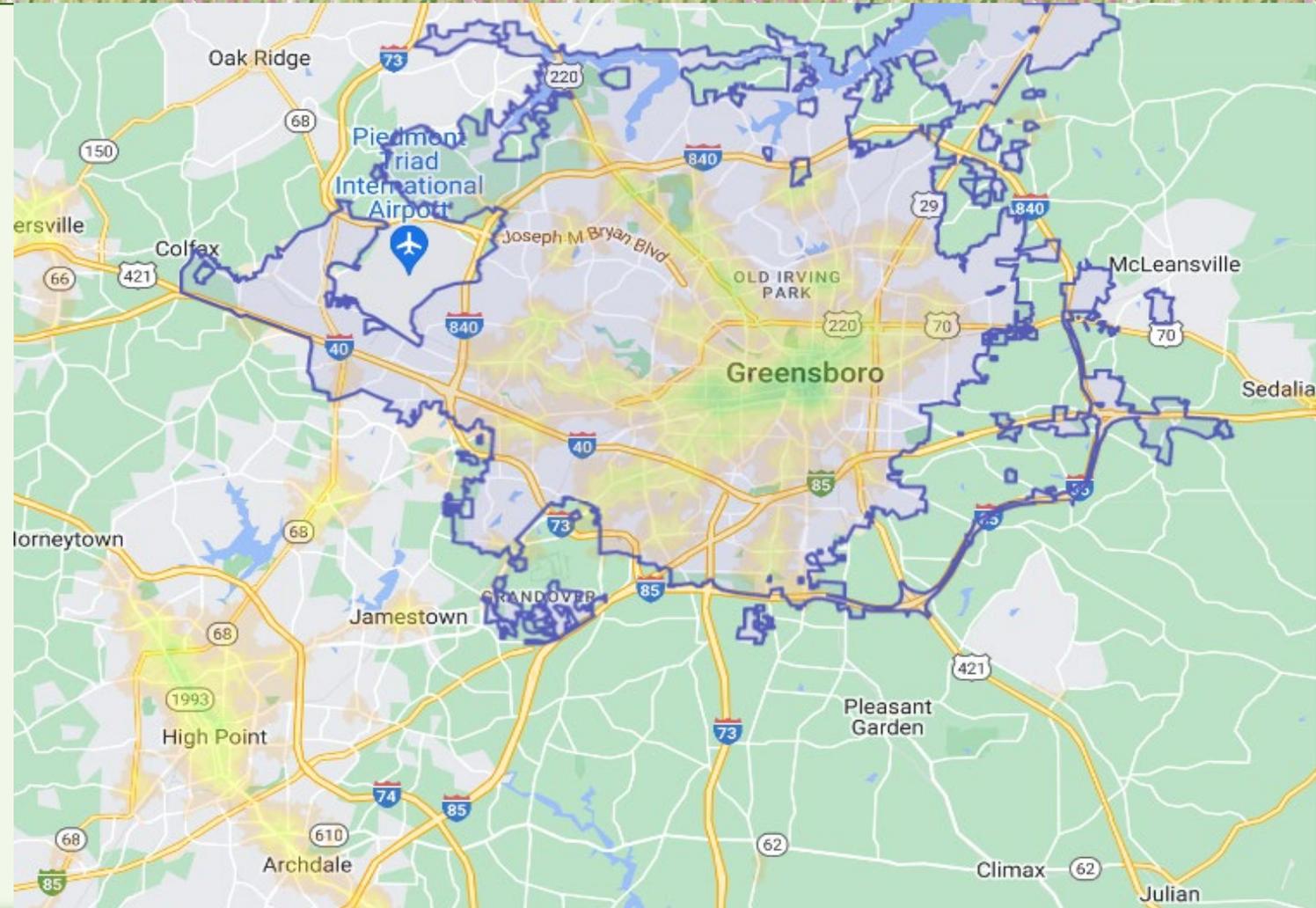


Both total and youth fatality rates decline with increased transit ridership. Transit-oriented cities have about half the average Youth and Total traffic fatality rates as more automobile-oriented cities.

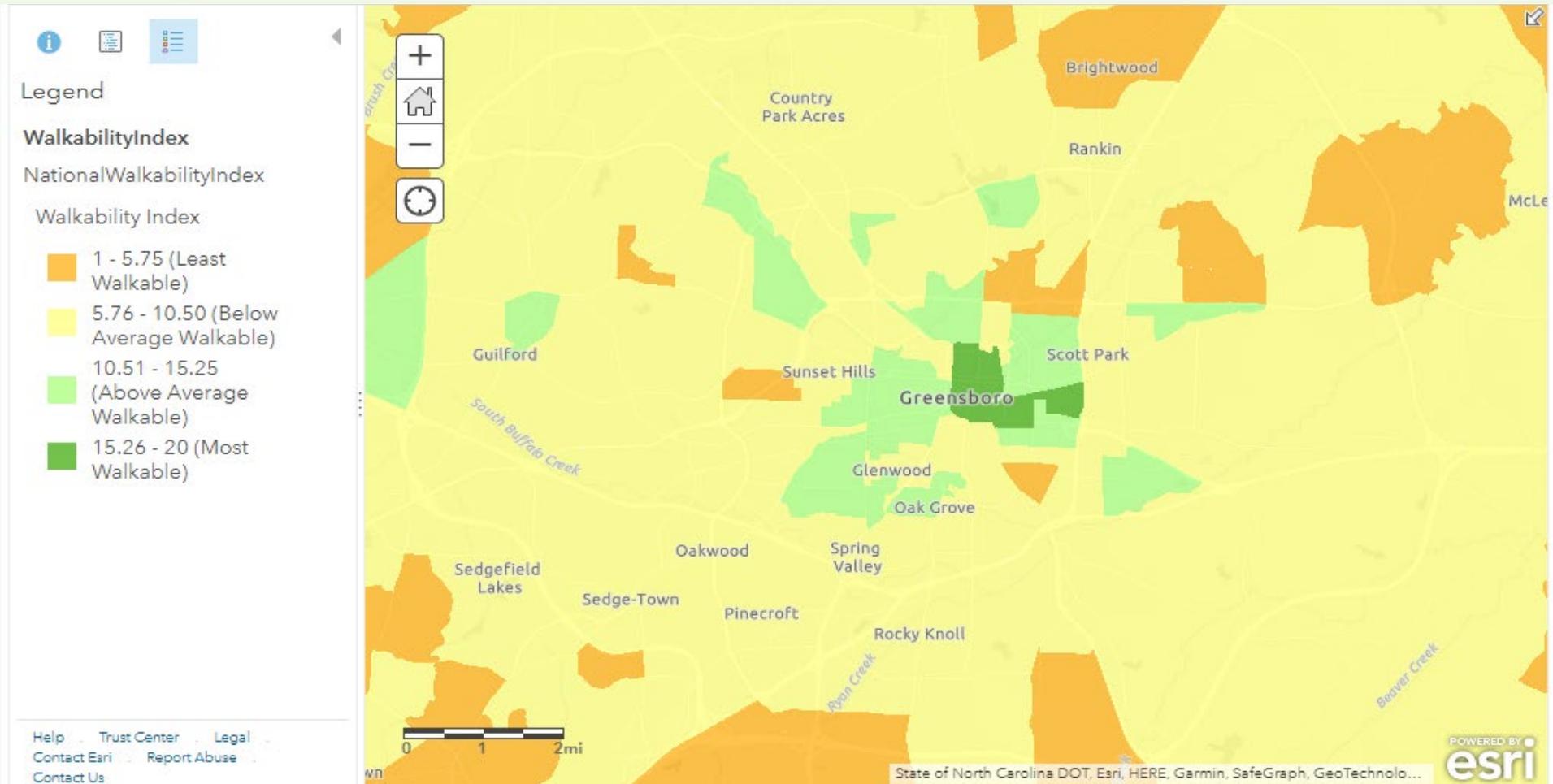
Youths (15-25 years old) have about twice the traffic fatality rates as the total population average.

Walkscore

<https://www.walkscore.com/score/loc>



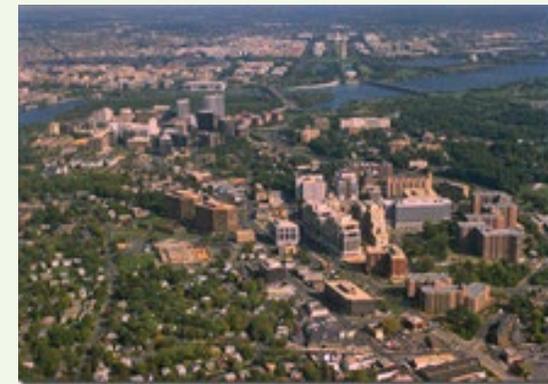
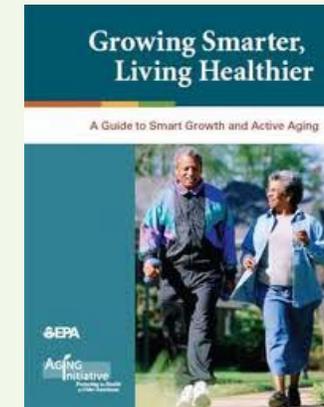
Walkability Index



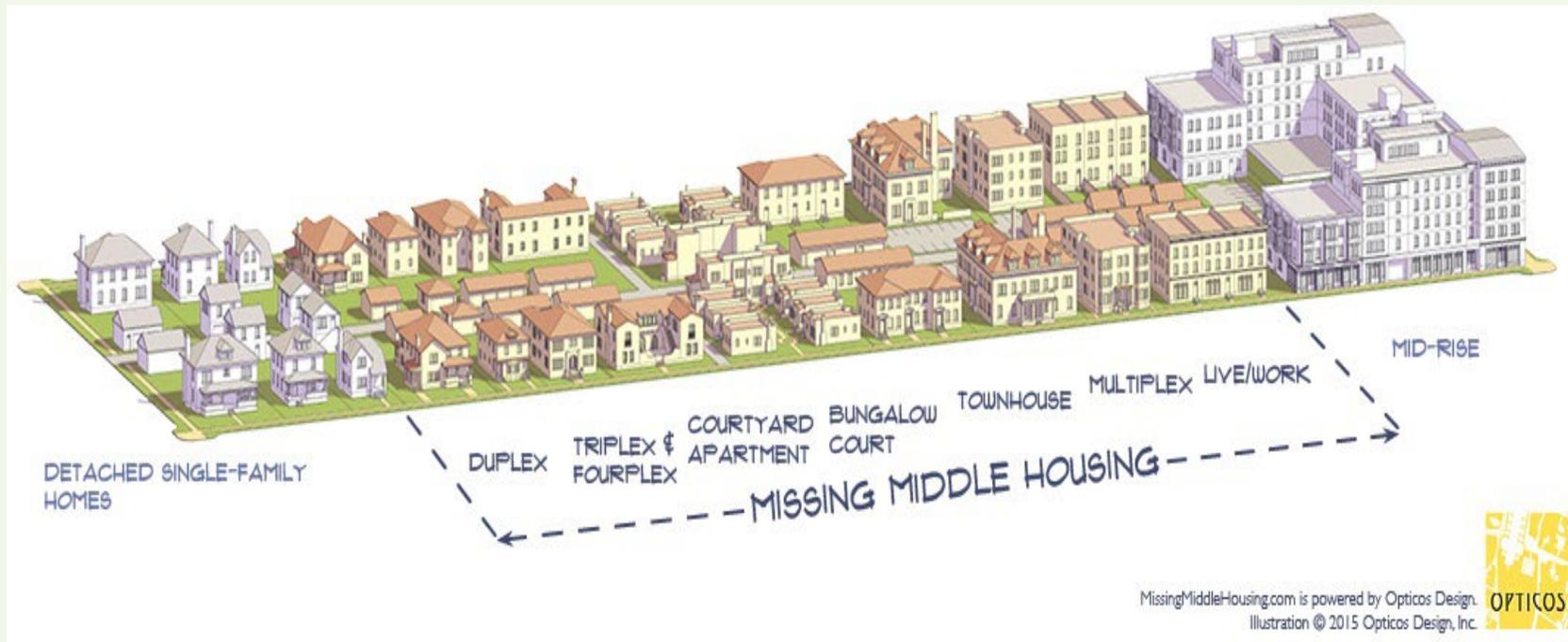
<https://epa.maps.arcgis.com/home/webmap/viewer.html?webmap=f16f5e2f84884b93b380cfd4be9f0bba>

Smart Growth

- Compact (higher density)
- Mixed use
- Diverse housing types
- Connected roads
- Multi-modal
- Good walking and cycling conditions
- Good public transit services
- Efficient parking management
- Emphasis on the public realm (public places where people interact)



Missing Middle Housing



The most affordable housing types include townhouses, multi-plexes and low-rise apartments, called missing middle housing since they are denser than single-family housing but less dense than high-rise, and so are suitable for urban neighborhoods.

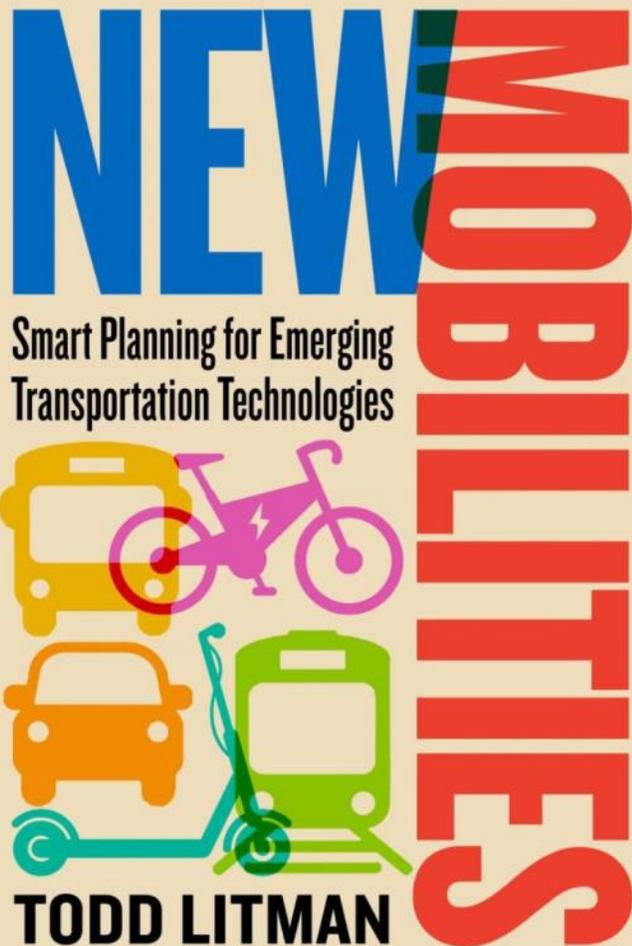
Support Affordable Infill

Support policy changes that significantly increase affordable infill in walkable urban neighborhoods:

- Increase allowable densities and heights.
- Reform project approval and fee structures to reduce development costs and risks.
- Reduce fees and approval requirements for smaller and moderate-priced developments.
- Reduce or eliminate parking minimum.
- Support land use policies that incentivize consolidation of smaller parcels.



New Mobilities



New Mobilities: Smart Planning for Emerging Transportation Technologies

New Mobilities have tantalizing potential. They allow people to scoot, ride, and fly like never before. They can provide large and diverse benefits. However, they can also impose significant costs on users and communities.

Decision-makers need detailed information on their impacts.

*Island Press 30% Discount Code: **WEBINAR***

New Mobility Innovations



Active & Micro Modes



Bike- and Carsharing



Ridehailing



Electric Autonomous Cars



Transit Improvements



Aviation Innovations



Tunnel Roads



Pneumatic Tube Transport



Mobility as a Service



Telework



Mobility Prioritization



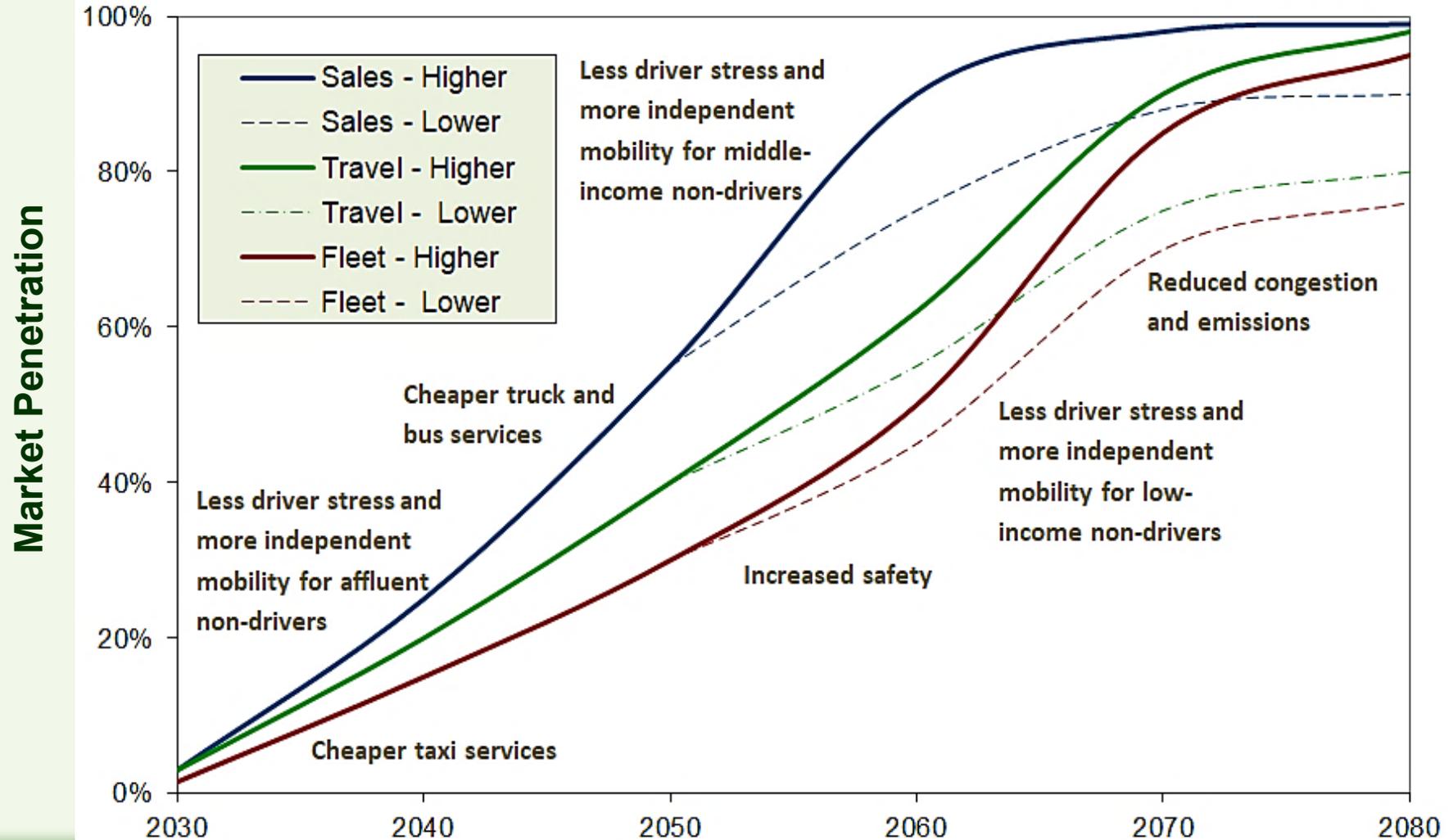
Logistics Management

Autonomous Vehicle User Benefits

- Less stress.
- Cost savings compared with paid human drivers.
- More productivity during travel.
- Independent mobility for non-drivers.



Projected AV Benefits



Questions for Communities

- What are their costs and benefits?
- Who is impacted?
- What is fair?
- Who should bear their costs and risks?
- How should we integrate them into our transportation system?
- *Which should be mandated, encouraged, regulated, restricted, or forbidden?*



Policy Recommendations

- Test and regulate new technologies for safety and efficiency.
- Critically evaluate all impacts, including indirect and long-term effects.
- Support active and micromodes for local trips and high quality public transit on major travel corridors.
- Reduce parking requirements to take advantage of shared vehicles.
- Plan and price to favor efficient modes and prevent induced vehicle travel and sprawl.





“Not So Fast: Better Speed Valuation for Transport Planning”

“Evaluating Active Mode Emission Reduction Potentials”

“Autonomous Vehicle Implementation Predictions”

“Are Vehicle Travel Reduction Targets Justified?”

“Fair Share Transportation Planning”

“Evaluating Transportation Equity”

“Transportation Affordability ”

“Online TDM Encyclopedia”

and more...

www.vtppi.org

BREAKOUT GROUP DISCUSSION

Breakout Group Discussion Questions

1. Identify three takeaways from the peer presentations that resonate with your respective group.
2. How would you approach planning for your “future self”?
3. Is there a “driver” of change in your community that has not been mentioned today? What does the future look like when an individual “driver” of change is dominant?

Breakout Group Report Outs

1. What was one key takeaway you discussed in your group?
2. What “drivers” did you discuss, and why did you choose to discuss these?
3. Once you’ve identified “drivers” of change, what are your proposed next steps? How do you share this information with stakeholders?

RECAP OF DAY / NEXT STEPS

Featured Speakers:

Jeremy Raw, FHWA Office of Planning

Mark Kirstner, PART

TPCB Program

- Following today's meeting, the TPCB team will develop a high-level summary of the meeting, highlighting themes and topics discussed.
- A draft summary will be shared with presenters for review prior to being finalized.
- The final summary will be available on the TPCB website at:
www.planning.dot.gov

PLEASE COMPLETE A SHORT SURVEY TO HELP US IMPROVE FUTURE TPCB PEER EVENTS

