PLAN BAY AREA 2050

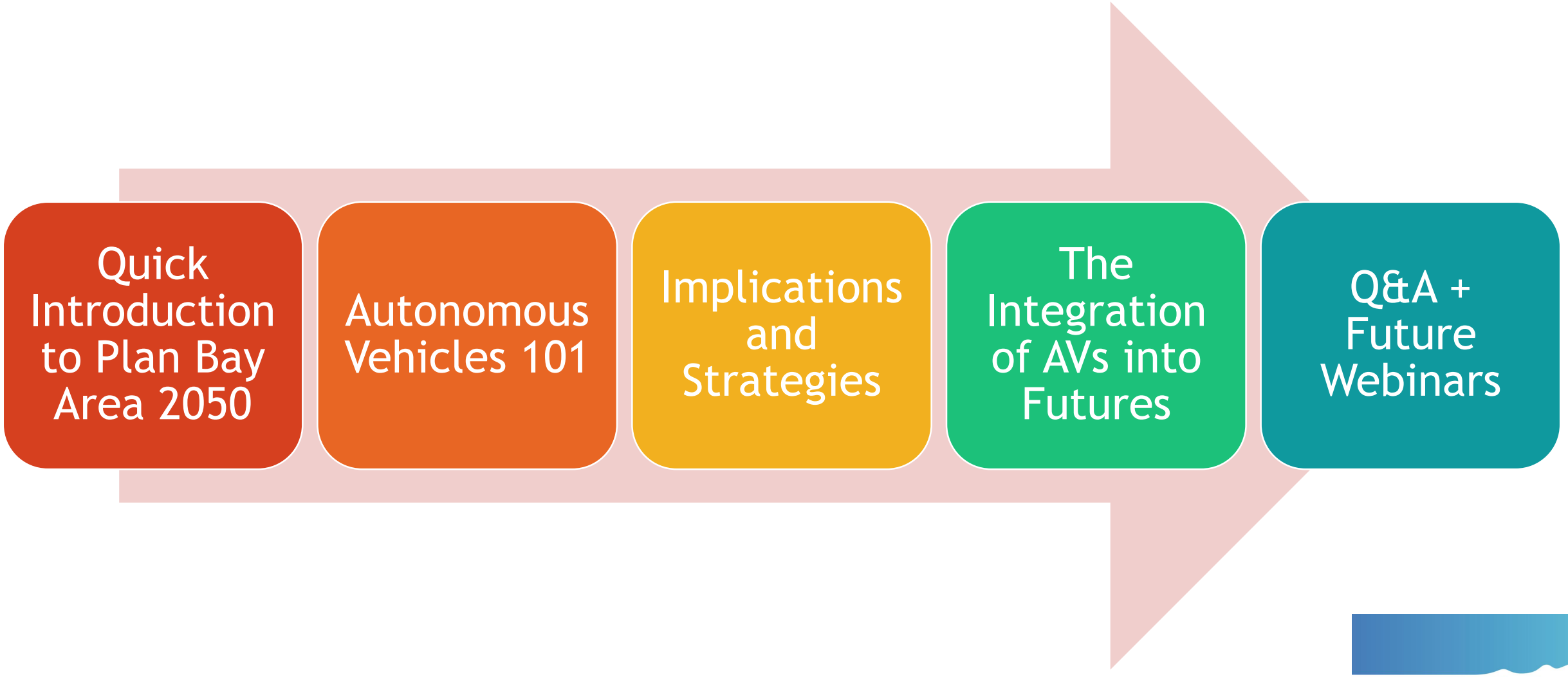
In Case You Missed It!: Horizon Perspective Paper #1 (Autonomous Vehicles)

Plan Bay Area 2050 Summer Webinar Series

Adam Noelting, MTC/ABAG

August 14, 2019

Today's Webinar



What is Plan Bay Area?

- The regional plan is **a blueprint for growth and infrastructure for the next 30 years.**
- The regional plan is **updated every four years**, with this major update due in 2021.
- The regional plan is a reflection of **the shared priorities of the diverse nine-county San Francisco Bay Area.**
- The regional plan is **fiscally-constrained**, even as it aspires to tackle the Bay Area's big challenges with specific strategies.
- The regional plan is **not an expenditure plan**; it is focused on setting priorities and over the long term and looking holistically across "silos".

Plan BayArea 2040

Spring 2015 to July 2017

February 2018 to October 2019

September 2019 to June 2021

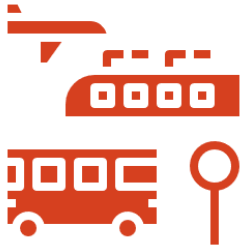
High-performing strategies and projects from *Horizon* – those that are resilient to uncertainties – **will be recommended for inclusion in the Preferred** Plan Bay Area 2050 (RTP/SCS).

What **Topic Areas** Do These Efforts Tackle?

Horizon and Plan Bay Area 2050 are addressing four core topic areas, as we work to create a long-range integrated regional vision for the next 30 years.

HORIZON

PLAN BAY AREA 2050



Transportation

Housing

NEW

Economy

NEW

Environment

More information available at:
https://www.planbayarea.org/2050-plan/plan-bay-area-2050-events

Plan Bay Area 2050: Summertime Webinar Series

Growth Framework Update

- **June 26, July 1 & July 10**
  - New Criteria and Submitting Letters of Interest/Letters of Confirmation

Target audience:
Cities, counties, and CTAs

Preparing for Plan Bay Area 2050

- **July 9**
  - Public Engagement Process Overview
- **August 6**
  - Bay Area Spatial Information System (BASIS)
- **September 5**
  - Looking Ahead: The Vision for Plan Bay Area 2050
- **September 10**
  - Exploring Policy Questions with Models
- **September *(date TBD)***
  - Horizon Perspective Paper 5: Bay Crossings

Target audience:
Stakeholders & interested public

In Case You Missed It! (ICYMI)

- **July 30**
  - ICYMI: Horizon Futures Round 1 Analysis
- **August 14**
  - ICYMI: Horizon Perspective Paper 1 - Autonomous Vehicles

Target audience:
New stakeholders/ public

PLAN BAY AREA 2050

In Case You Missed… the AV Perspective Paper!

Finalized in June 2018, the paper is available on the MTC website at:

https://mtc.ca.gov/our-work/plans-projects/horizon/perspective-papers

PLAN BAY AREA 2050

Autonomous Vehicles 101

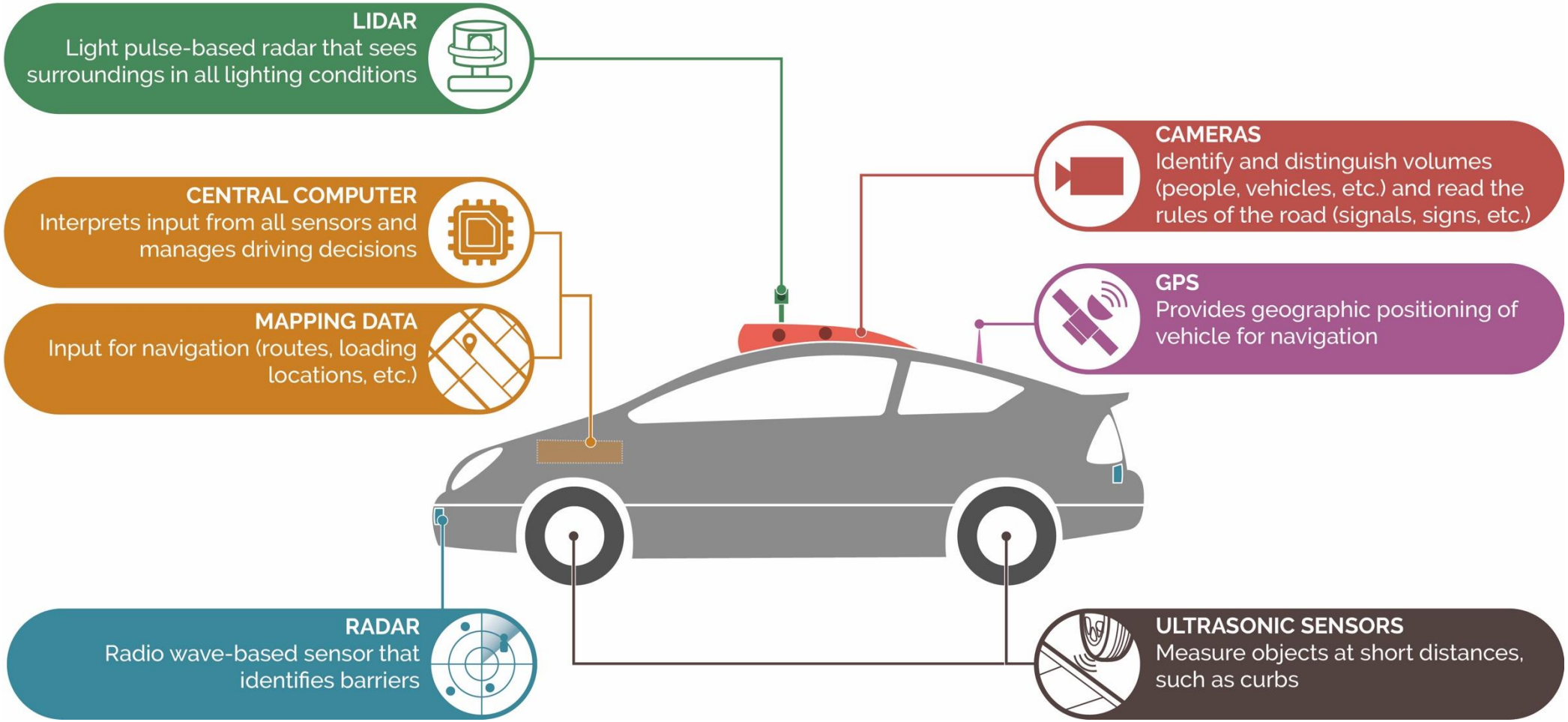
“Automated” versus “Connected”

AUTOMATED The increasing ability to drive without human assistance.

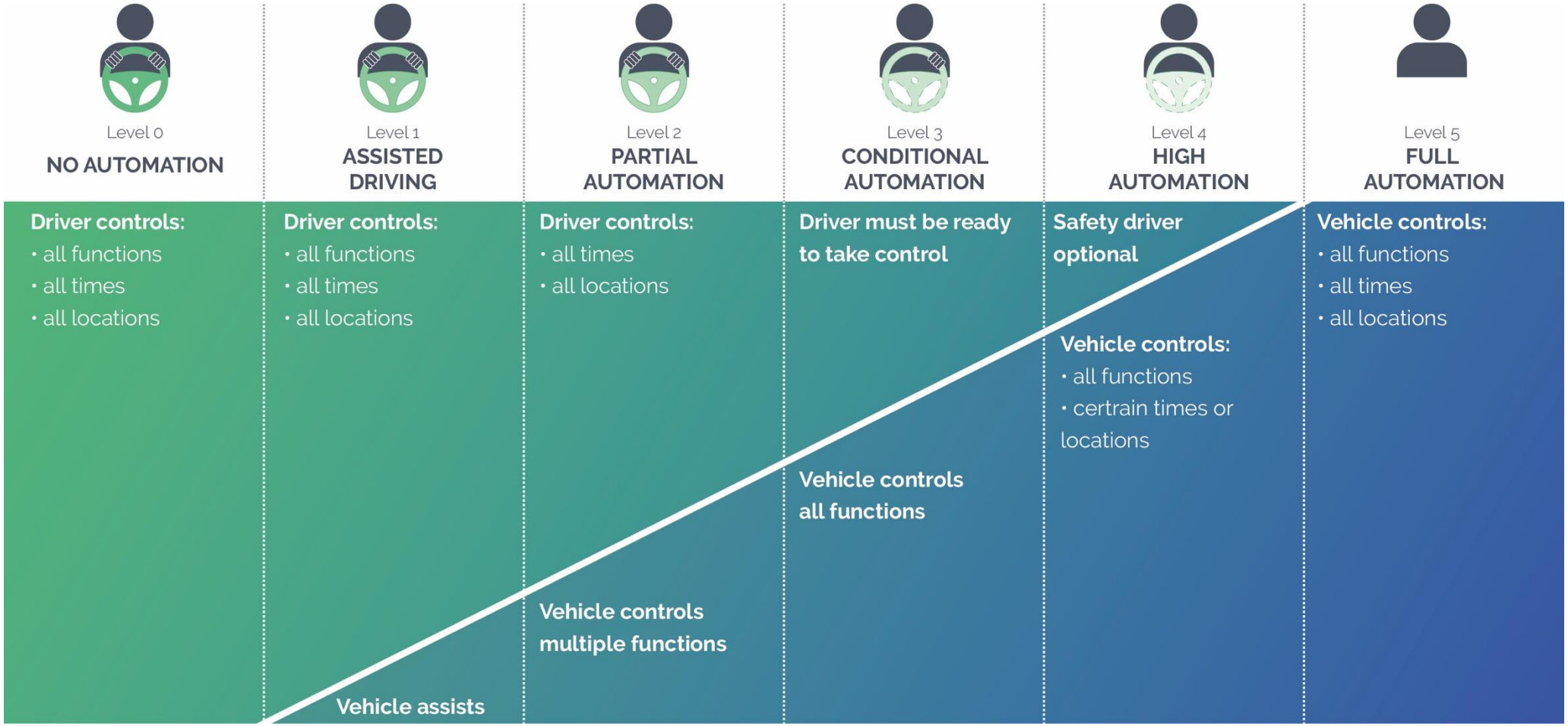
CONNECTED The increasing ability to share mobility or safety information among other vehicles, infrastructure, systems, etc.

None of the automation technologies require a vehicle to be connected.

Autonomous Vehicles Components

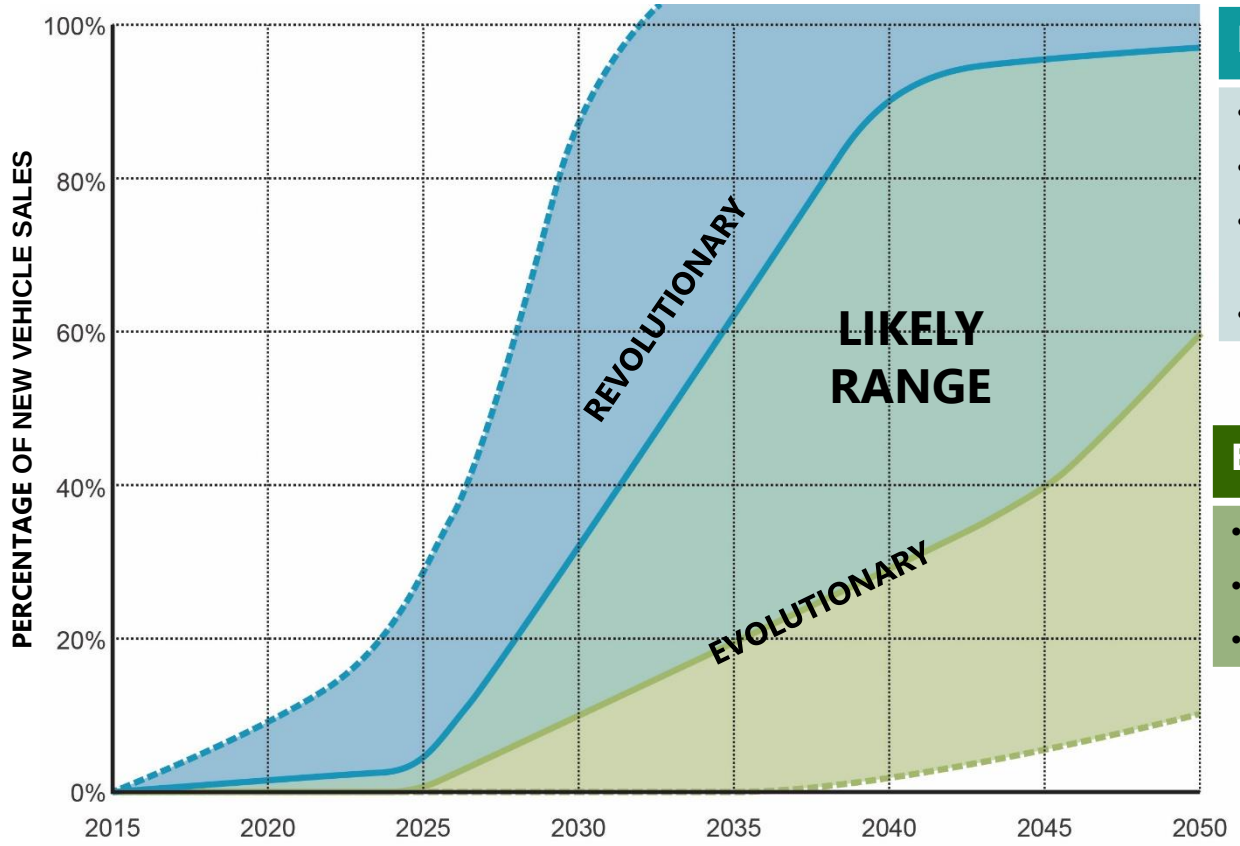


Levels of Automation



PLAN BAY AREA 2050

When might AVs become commonplace?



***Fully Autonomous* Vehicle (L4/5) uptake predictions based on high disruption scenarios, indicates possible percentage of new car sales 2016 to 2050.**

Revolutionary

- Technology breakthroughs
- Regulatory resolutions
- Shared model, at much lower cost than ownership
- Rapid adoption

Evolutionary

- Slower technology development and rollout
- Owned AV model with cost premium
- Slower adoption

The future is highly uncertain

TIMING	**3 to 13** years until L5 AVs available for purchase
SAFETY	**+40% to +90%** increase in safety
CAPACITY	**0% to +45%** increase in roadway capacity
DEMAND	**+5% to +40%** increase in VMT
ENERGY/EMISSIONS	**-50% to + 100%** change in GHGs

Bay Area Pilot Programs and Companies

Guiding Principles for Emerging Mobility, San Francisco

Lead Agency: SFCTA

Policy framework to evaluate new mobility services for all SFMTA and SFCTA decisions, including:

- Safety
- Transit
- Equitable Access
- Disabled Access
- Sustainability
- Congestion
- Accountability
- Labor
- Financial Impact
- Collaboration

Companies licensed to test AVs on California public roads

Almotive
Apex.AI
Apple
Aurora Innovation
AutoX Technologies Inc
Baidu
Bauer's Intelligent Transportation
BMW
Bosch
Continental Automotive Systems
CYNGN
Delphi Automotive
Drive.ai
Ford
GM Cruise
Jingchi CorpLyft
Mercedes Benz
NIO
Nissan
Nullmax
Nuro
NVIDIA
Phantom AI
PlusAi
Pony.AI
Qualcomm Technologies
Renovo.auto
Roadstar.Ai
SAIC Innovation Center
Samsung Electronics
SF Motors Inc.
Subaru
Telenav
Tesla Motors
Toyota Research Institute
Uber
Udacity
Valeo North America
Volkswagen
Voyage
Waymo
Zoox

GoMentum Station, Concord

Lead Agency: CCTA

- Robust testing facility with city-like road networks, tunnels, over- and under-passes, and railroad crossings that simulate real world conditions.
- Testing partners include EasyMile (low-speed electric shuttles), Honda (passenger AVs), Toyota (passenger AVs), Otto (long-haul automated trucks), and Sumitomo Electric (supplier of electronics).

Shared Autonomous Vehicle Demonstration

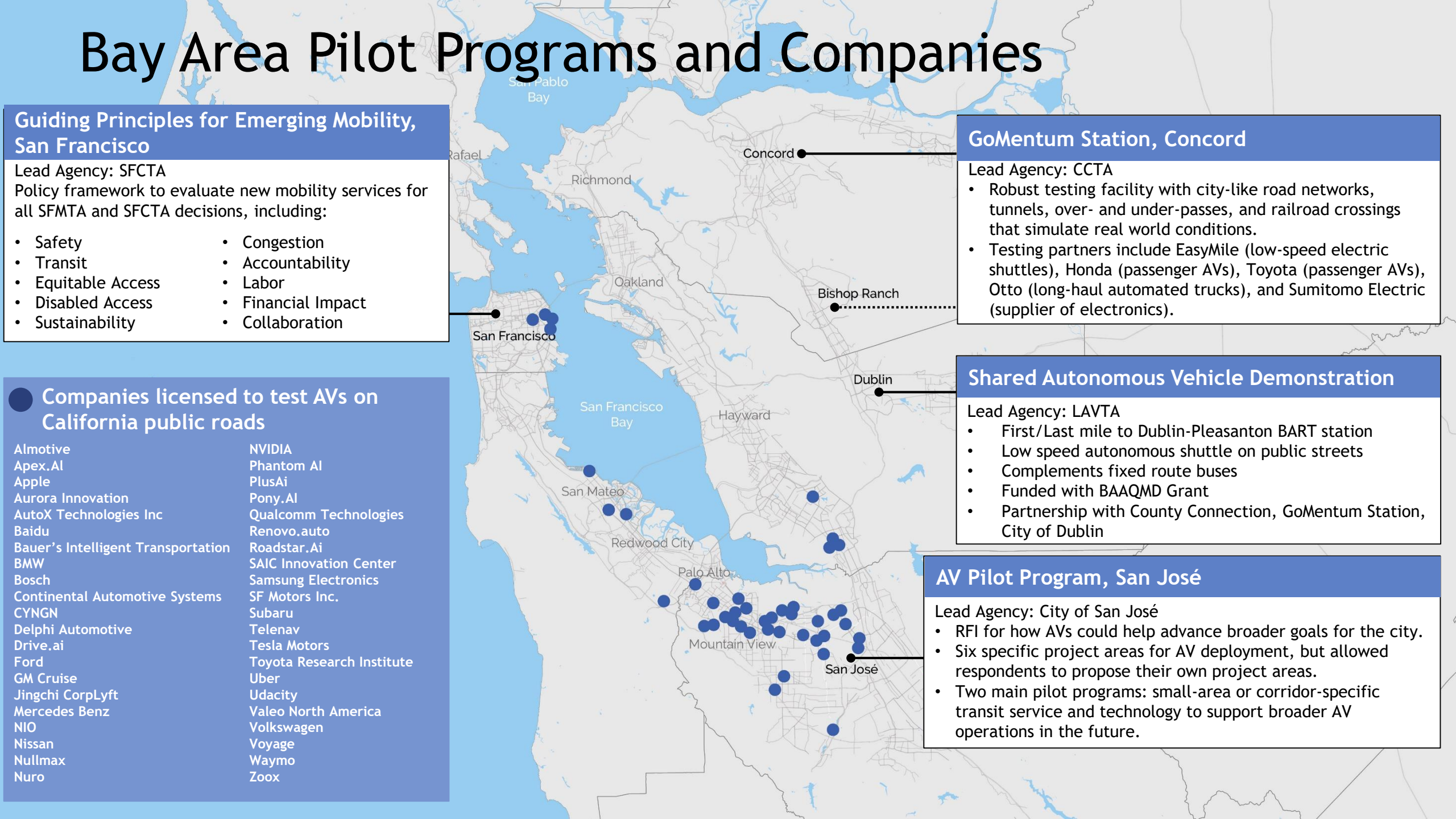
Lead Agency: LAVTA

- First/Last mile to Dublin-Pleasanton BART station
- Low speed autonomous shuttle on public streets
- Complements fixed route buses
- Funded with BAAQMD Grant
- Partnership with County Connection, GoMentum Station, City of Dublin

AV Pilot Program, San José

Lead Agency: City of San José

- RFI for how AVs could help advance broader goals for the city.
- Six specific project areas for AV deployment, but allowed respondents to propose their own project areas.
- Two main pilot programs: small-area or corridor-specific transit service and technology to support broader AV operations in the future.



PLAN BAY AREA 2050

Implications and Strategies

FINAL GUIDING PRINCIPLES

The San Francisco Bay Area Aspires To Be:

AFFORDABLE

All Bay Area residents and workers have sufficient housing options they can afford – households are economically secure.

CONNECTED

An expanded, well-functioning transportation system connects the Bay Area – fast, frequent and efficient intercity trips are complemented by a suite of local transportation options, connecting communities and creating a cohesive region.

DIVERSE

The Bay Area is an inclusive region where people from all backgrounds, abilities, and ages can remain in place – with access to the region's assets and resources.

HEALTHY

The region's natural resources, open space, clean water and clean air are conserved – the region actively reduces its environmental footprint and protects residents from environmental impacts.

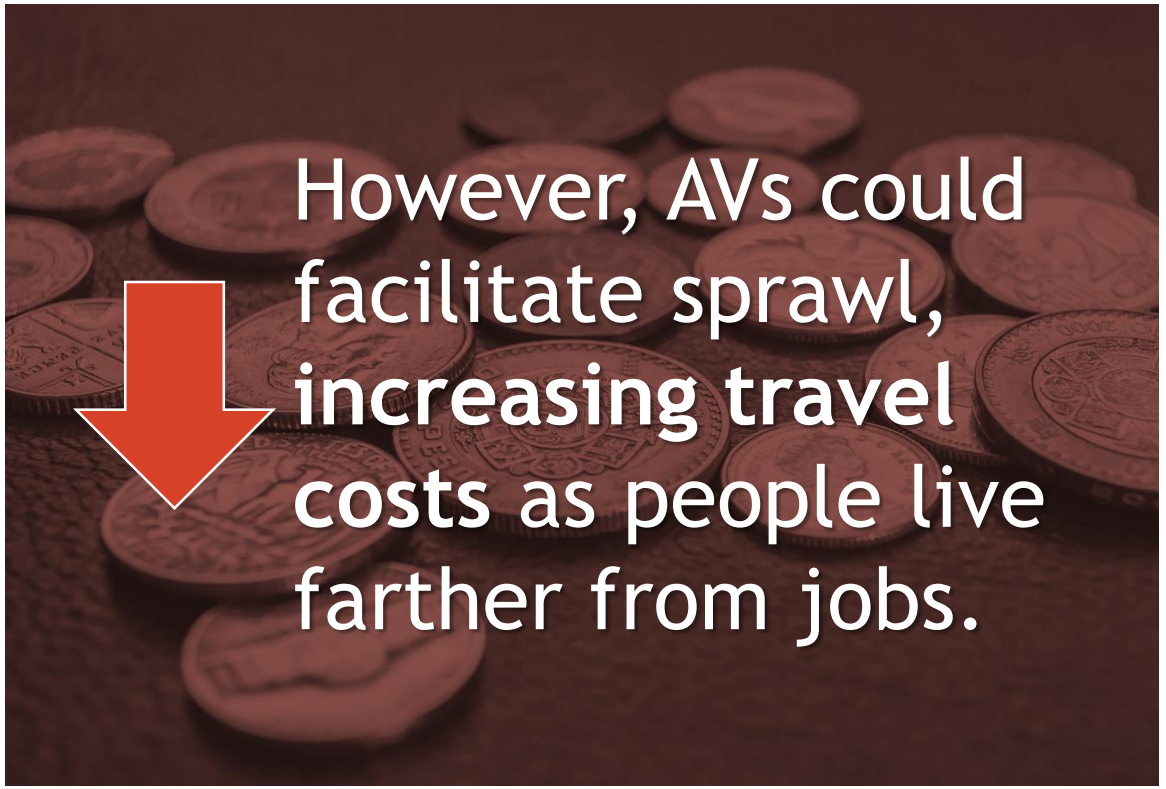
VIBRANT

The Bay Area region is an innovation leader, creating quality job opportunities for all and ample fiscal resources for communities.

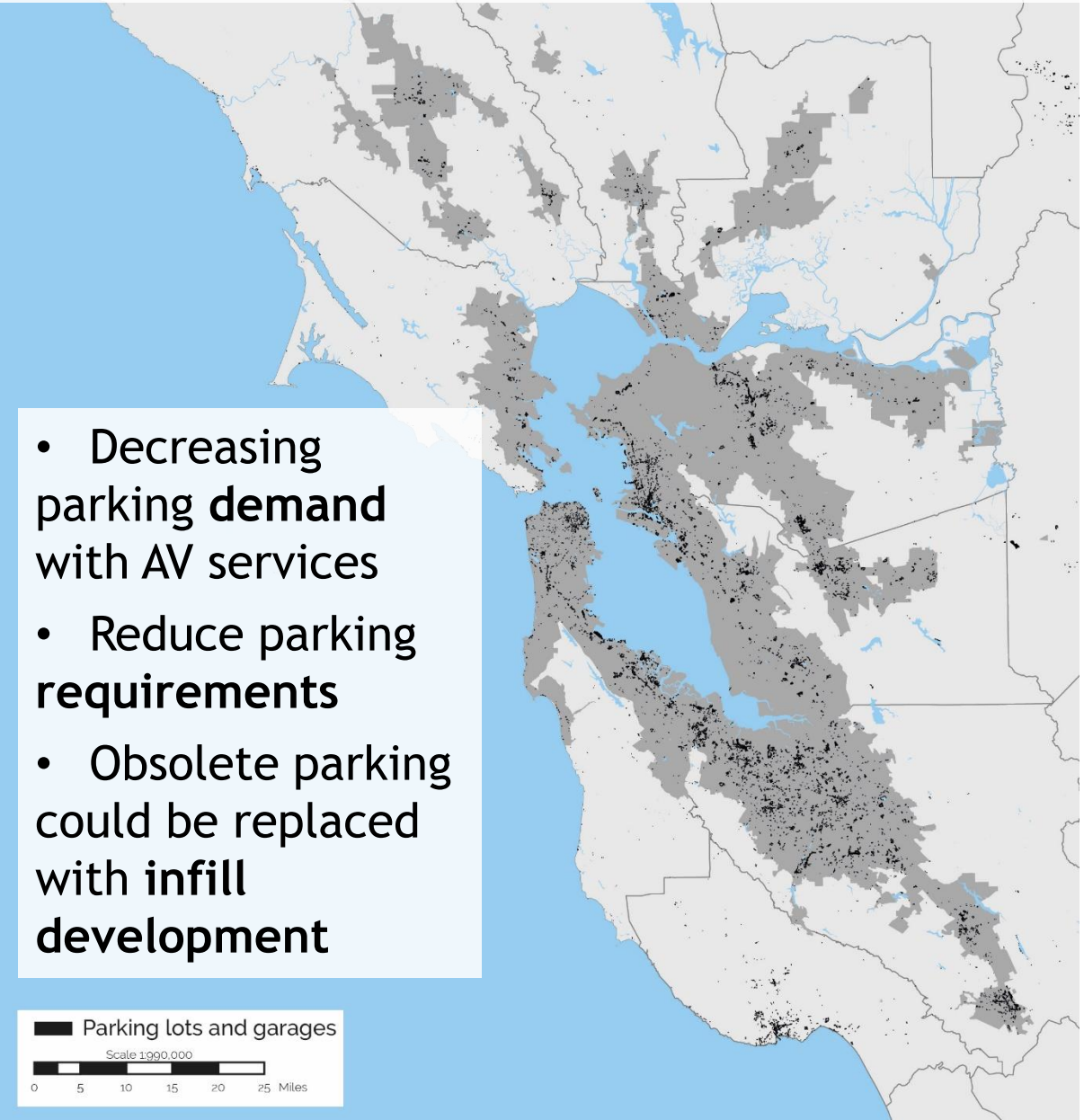
Icons Credit: The Noun Project

AFFORDABLE

Horizon Guiding Principle – All Bay Area residents and workers have sufficient housing options they can afford – households are economically secure.



Housing Opportunity Sites in an Autonomous Future



- Decreasing parking **demand** with AV services
- Reduce parking **requirements**
- Obsolete parking could be replaced with **infill development**

AFFORDABLE

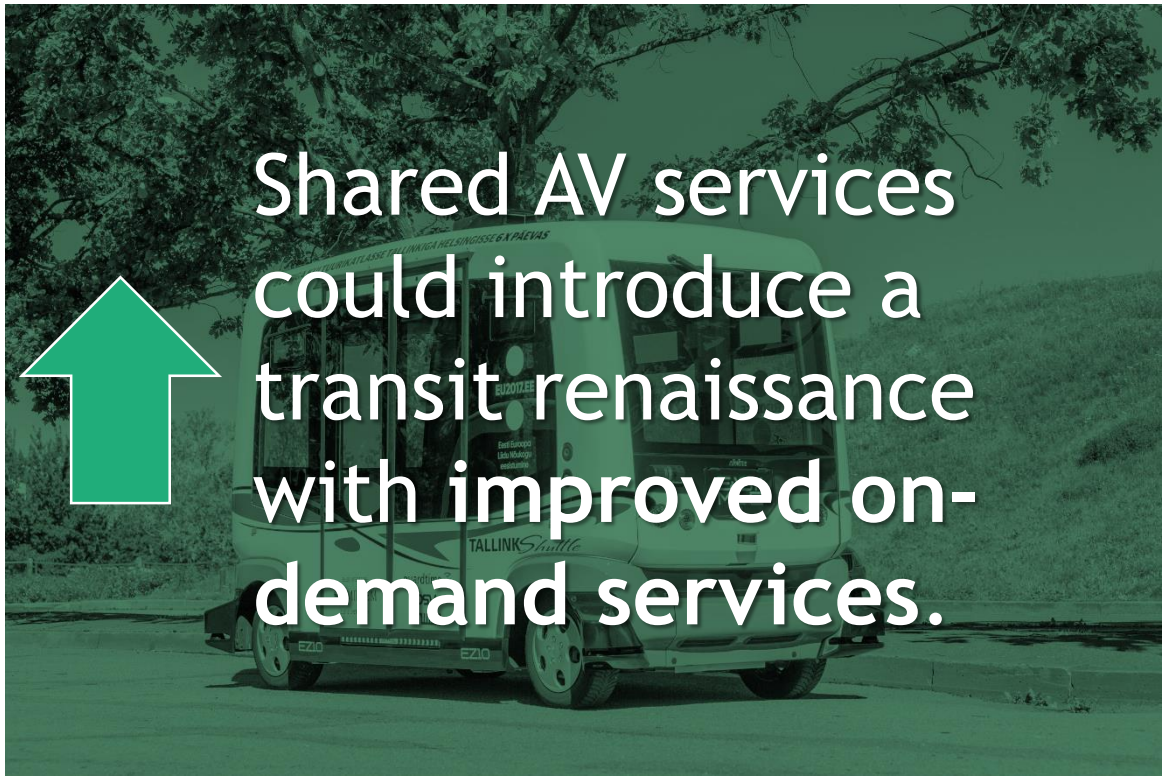
Priority Strategies

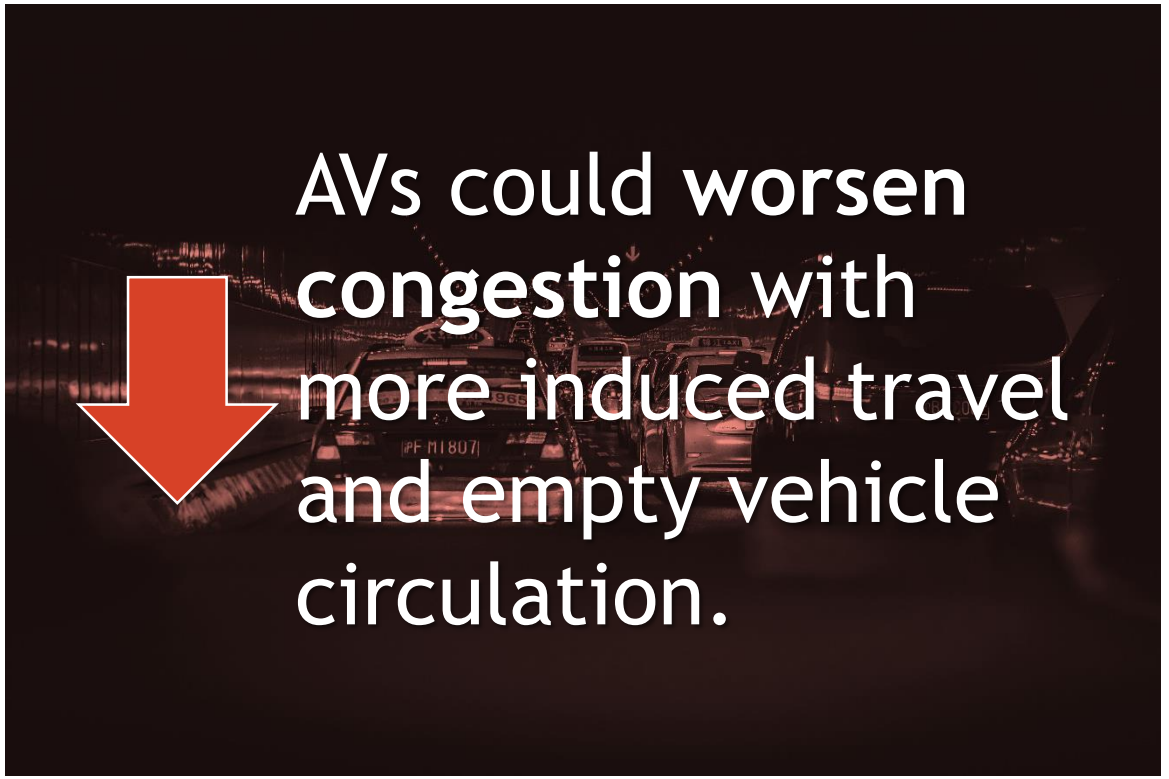
Repurpose off-street parking for **infill development**

Institute **parking maximums** for both on- and off-street parking supply

Retain or strengthen urban growth boundaries to **control greenfield development**

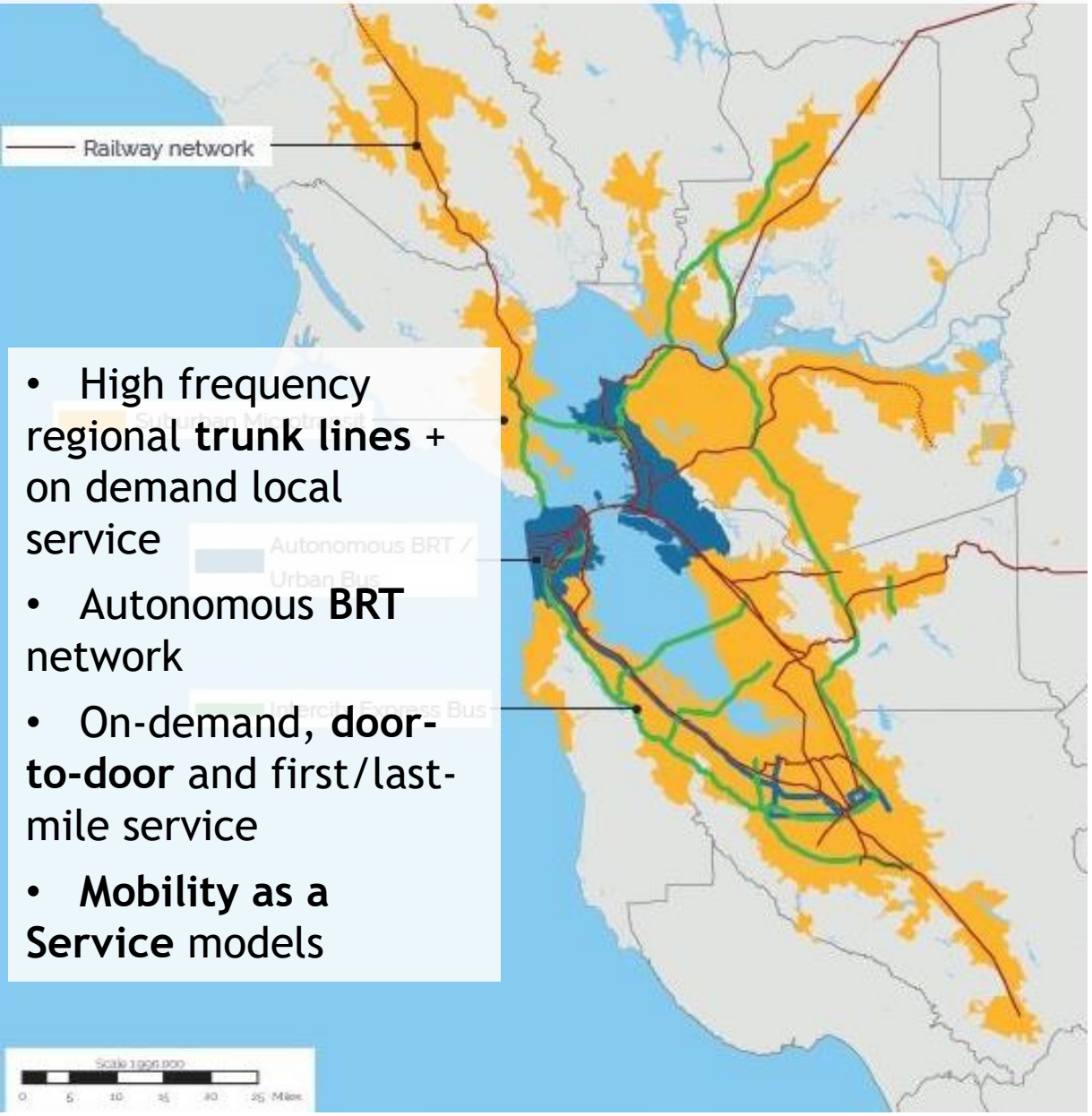
Horizon Guiding Principle – An expanded, well-functioning transportation system connects the Bay Area – fast, frequent and efficient intercity trips are complemented by a suite of local transportation options, connecting communities and creating a cohesive region.





Regional Autonomous Demand-Responsive Transit

CONNECTED



- High frequency regional **trunk lines** + on demand local service
- Autonomous **BRT** network
- On-demand, **door-to-door** and first/last-mile service
- **Mobility as a Service** models

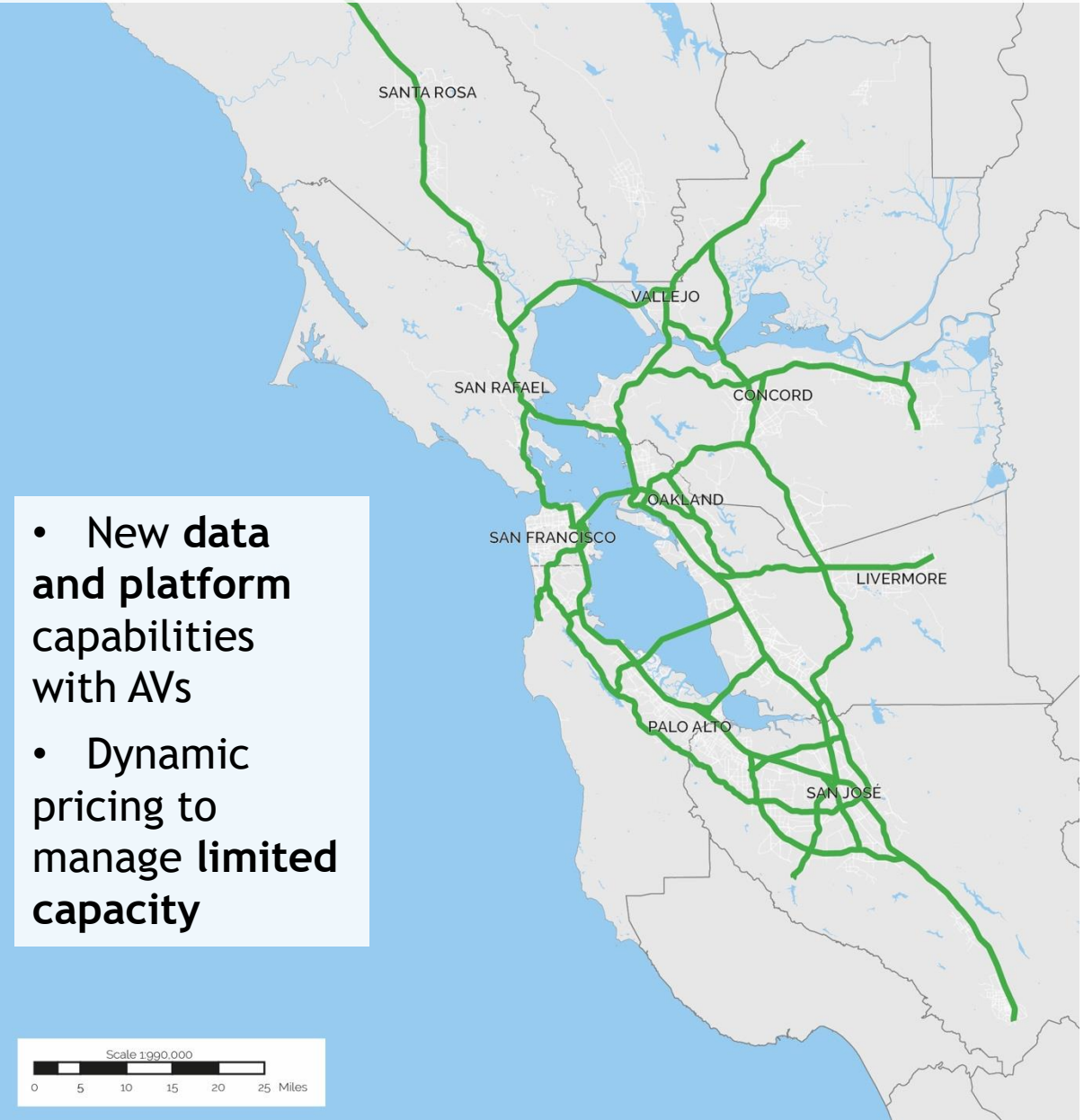
Priority Strategies

Double down on **high-capacity bus and rail corridors**

Innovate suburban transit with autonomous, **demand-responsive microtransit**

Develop a **mobility as a service** platform to provide a unified and equitable gateway to services and information

Dynamic Pricing Opportunities in an AV Future



- New **data and platform** capabilities with AVs
- Dynamic pricing to manage **limited capacity**

CONNECTED

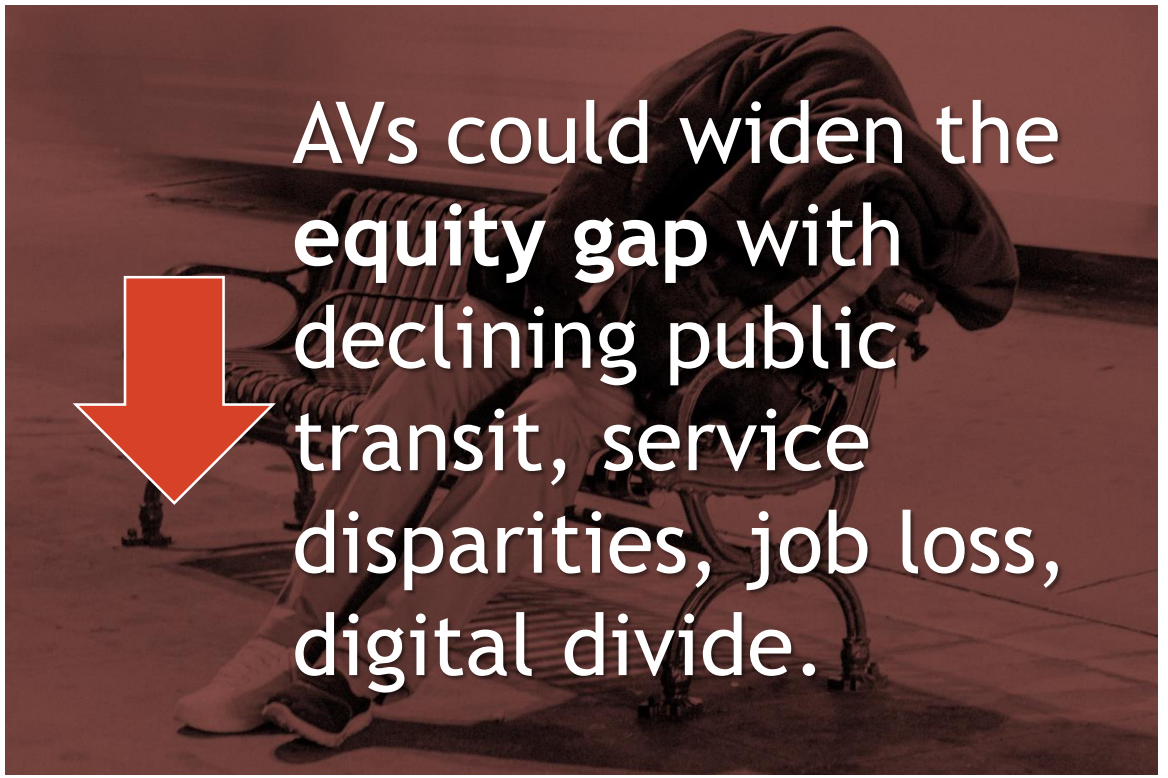
Priority Strategies

Price mobility fairly through **dynamic road pricing**

Design **smart streets** with dynamic allocation of street and curb space

Develop industry-wide **data sharing protocols** to provide real-time information to connected AVs

Horizon Guiding Principle – The Bay Area is an inclusive region where people from all backgrounds, abilities, and ages can remain in place – with access to the region's assets and resources.



Equitable AV Services

- **Require accountability**: targets, metrics, monitoring, improvement
- Target strategies for **specific equitable outcomes**.
- Focus all strategies on **inclusive prosperity**.

DIVERSE

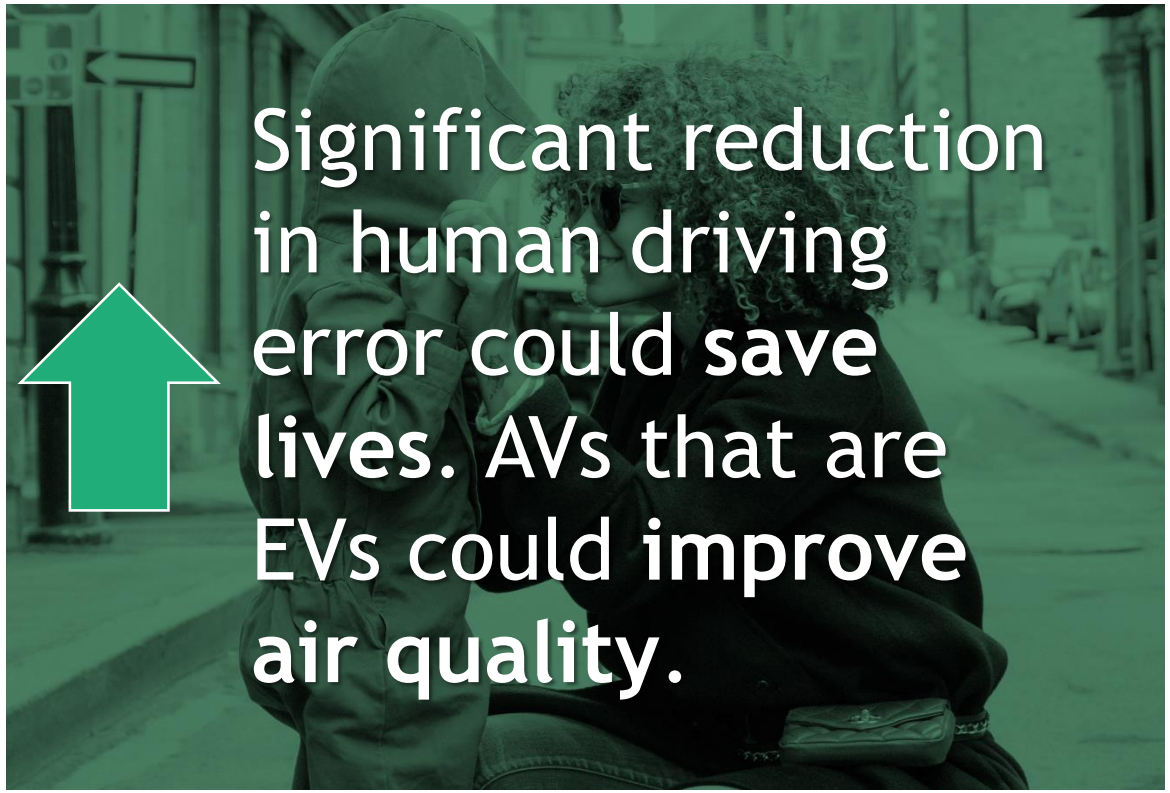
Priority Strategies

Mandate **equitable provision** of mobility services with transparent reporting

Subsidize public **transit innovations**, replacing fixed route transit in Communities of Concern

Prioritize **AV mobility services or programs** that serve Communities of Concern

Horizon Guiding Principle – The region's natural resources, open space, clean water and clean air are conserved – the region actively reduces its environmental footprint and protects residents from environmental impacts.



Hacking and cybersecurity could introduce new safety risks. AVs that are not EVs could **worsen air quality**.

Vision Zero 2.0

- **Eliminate** traffic-related deaths
- Nullify **cybersecurity** vulnerabilities
- Improve **air quality**
- Reduce transportation-related **public health** issues

HEALTHY

Priority Strategies

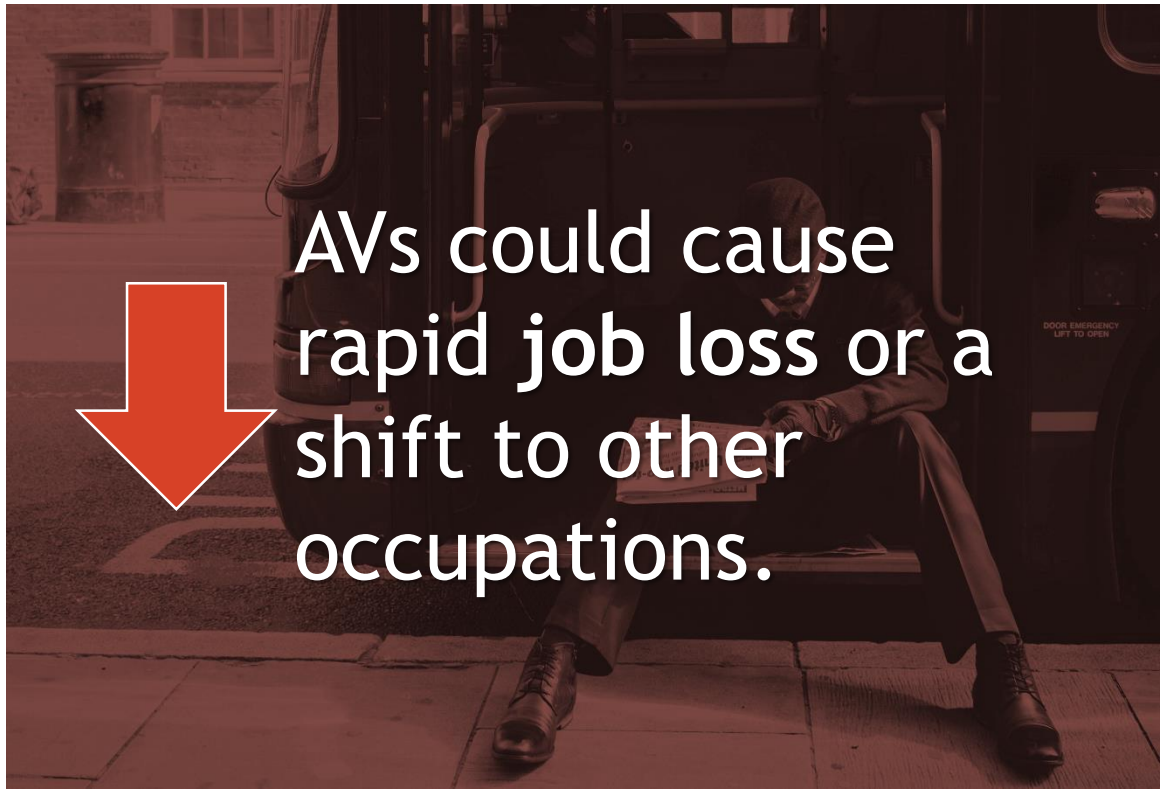
Cap **speed limits** in downtowns and neighborhoods

Mandate that **all AVs are EVs** and invest in the necessary infrastructure

Develop “bounty program” to reduce **hacking vulnerability**

Horizon Guiding Principle – The Bay Area region is an innovation leader, creating quality job opportunities for all and ample fiscal resources for communities.

AVs have the potential to reduce transportation and logistics **operating costs**.



“New Deal” for Mobility

- Comprehensive program to maximize local **economic benefits** of the AV industry
- **Workforce advancement** programs
- Related **new industries** (manufacturing, data, services, goods, repair, etc.)

VIBRANT

Priority Strategies

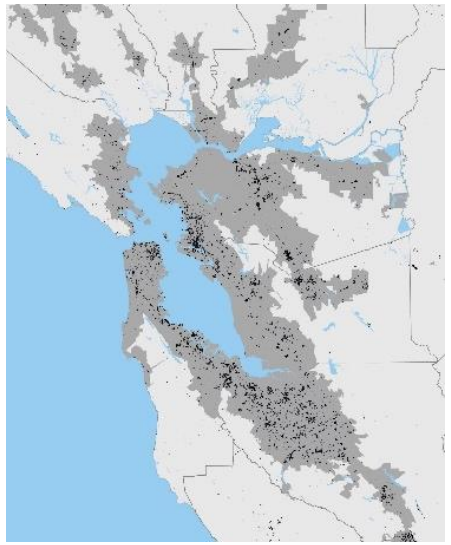
Strengthen the capacity of **training programs** to expand opportunities for workers in the AV industry

Target job clusters on **industrially-zoned land** for production, distribution, and repair

Pilot **innovative AV applications** that could spur new job opportunities

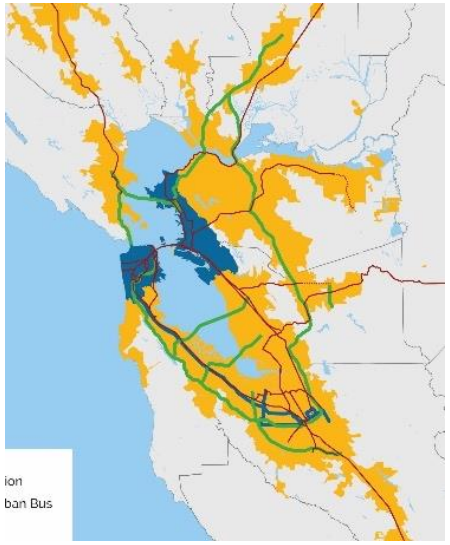
Perspective Paper #1:
Autonomous Vehicles Priority Strategies

Affordable



Housing Opportunity Sites

Connected



Fair Pricing

Autonomous Transit

Diverse

Equitable Outcomes

Healthy

Vision Zero 2.0

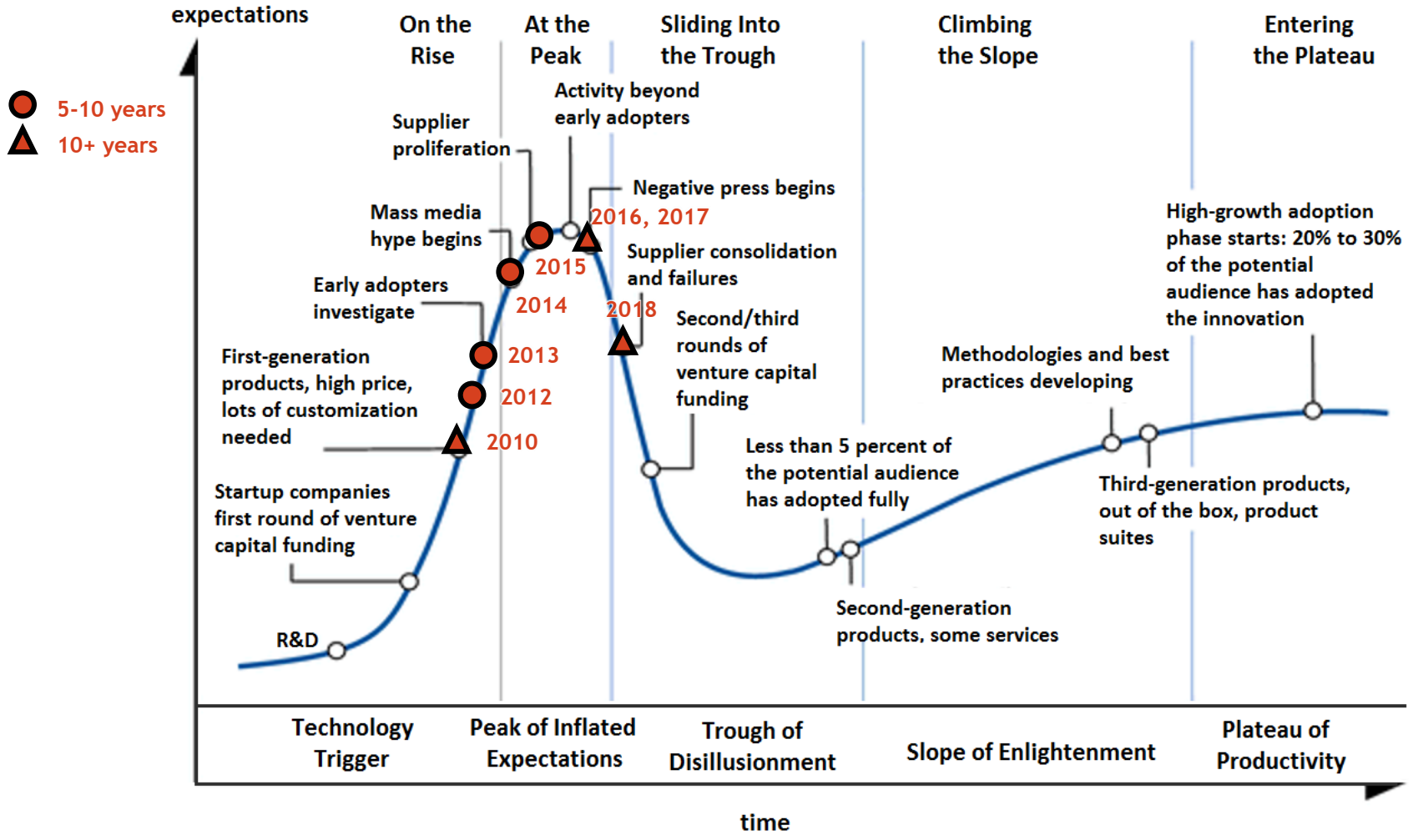
Vibrant

New Deal for Mobility

PLAN BAY AREA 2050

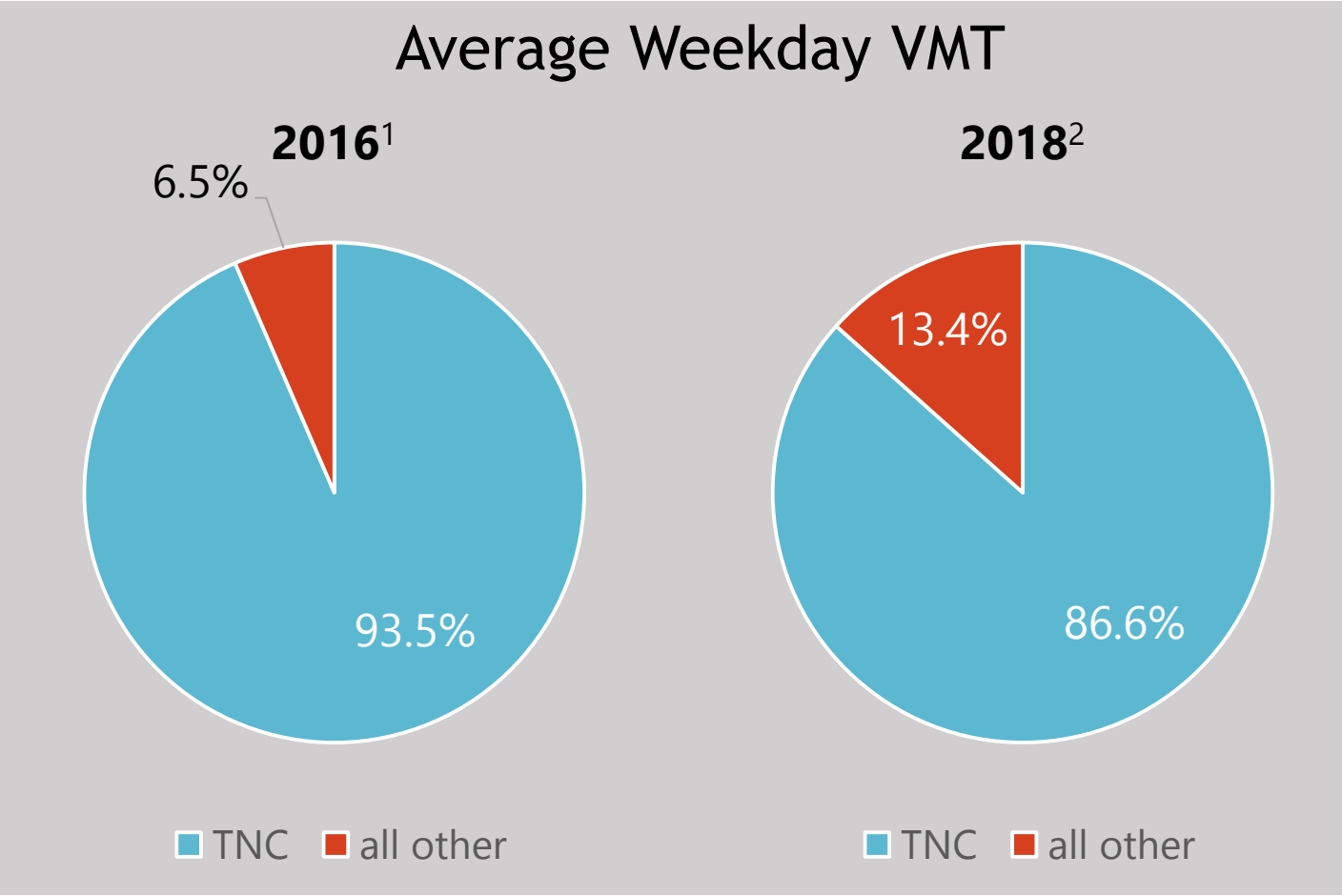
Recent Developments + Horizon Futures Analysis

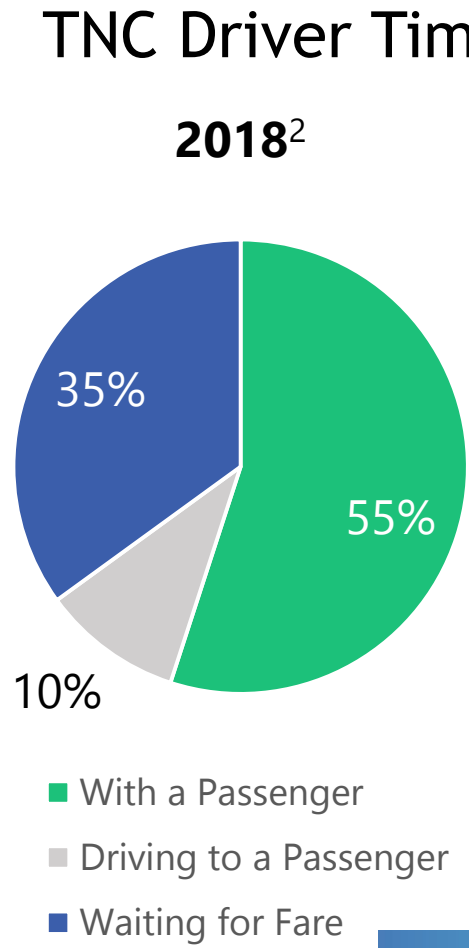
Changing Expectations - Gartner Hype Cycle



https://www.gartner.com/smarterwithgartner/

Traffic Impacts - TNCs as a Proxy for AVs?





1. SFCTA, TNCs Today, https://www.sfcta.org/projects/tncs-today
2. Fehr & Peers, Estimated TNC Share of VMT in Six US Metropolitan Regions (Revision 1), https://drive.google.com/file/d/1FIUskVkj9lsAnWJQ6kLhAhNoVLjfFdx3/view

Futures - “What If?” Scenarios

A

Clean and Green

What if... new technologies and a national carbon tax enabled greater telecommuting and distributed job centers?

B

Rising Tides, Falling Fortunes

What if... the federal government cuts spending and reduces regulations, leaving more policy decisions to states and regions?

C

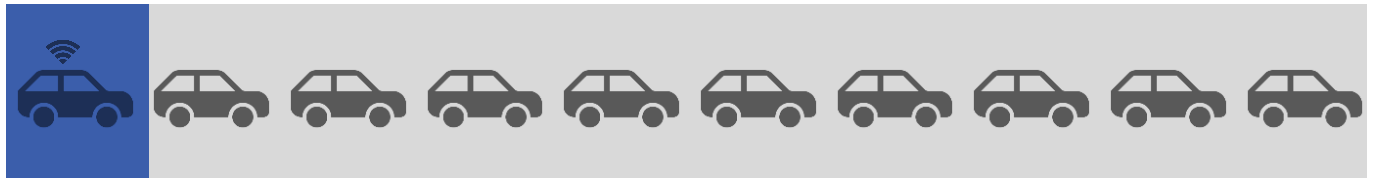
Back to the Future

What if... an economic boom and new transportation options spur a new wave of development?

Potential Market Shares - AVs & EVs in 2050

Rising Tides, Falling Fortunes

10%



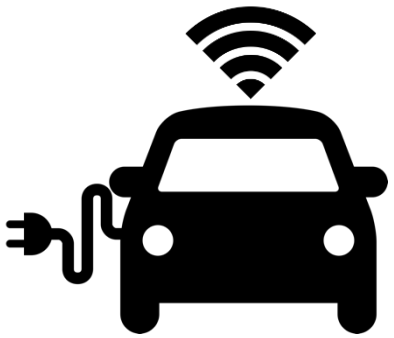
Clean and Green

95%

Back to the Future

75%

Assumptions for Analysis



If the AV fleet penetration is high enough, AVs can drive slightly closer together on freeways

< 75%

>= 75%

The in-vehicle time "feels" slightly less negative than in non-AVs

For HIRE

TNCs would likely be early adopters of AV technology in order to reduce labor costs

ZERO

For every 1 mile driven with a passenger, a TNC will drive just under a mile without a passenger

Potential Impacts of AVs

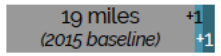
Futures Interim Report: Opportunities and Challenges (March 2019)

Rising Tides, Falling Fortunes
Cost to drive one mile - $0.20
Autonomous vehicle share - 10%

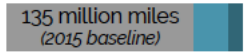
Vehicle Miles Traveled (VMT) per day

- *2015 VMT*
- *2050 VMT change in auto travel with passengers.*
- *2050 VMT change in auto travel without passengers.*

Per-Capita VMT (2050 - 21 miles)



Total VMT (2050 - 175 million miles)

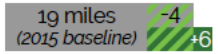


Clean and Green
Cost to drive one mile - $0.40
Autonomous vehicle share - 95%

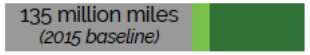
Vehicle Miles Traveled (VMT) per day

- *2015 VMT*
- *2050 VMT change in auto travel with passengers.*
- *2050 VMT change in auto travel without passengers.*

Per-Capita VMT (2050 - 21 miles)



Total VMT (2050 - 225 million miles)

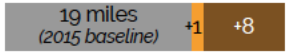


Back to the Future
Cost to drive one mile - $0.10
Autonomous vehicle share - 75%

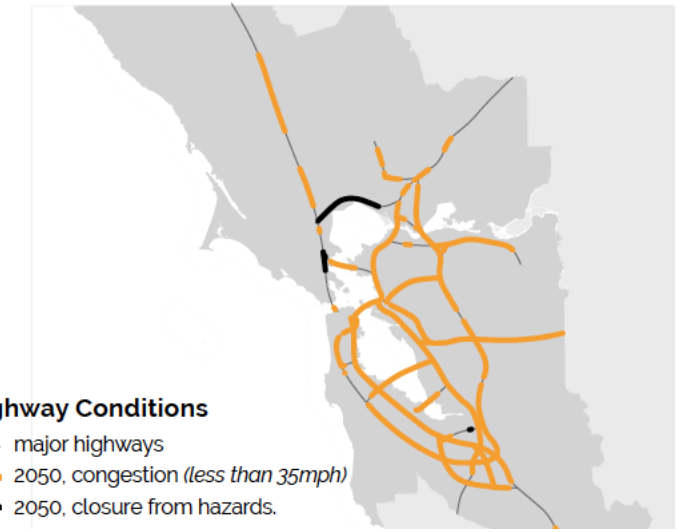
Vehicle Miles Traveled (VMT) per day

- *2015 VMT*
- *2050 VMT change in auto travel with passengers.*
- *2050 VMT change in auto travel without passengers.*

Per-Capita VMT (2050 - 28 miles)



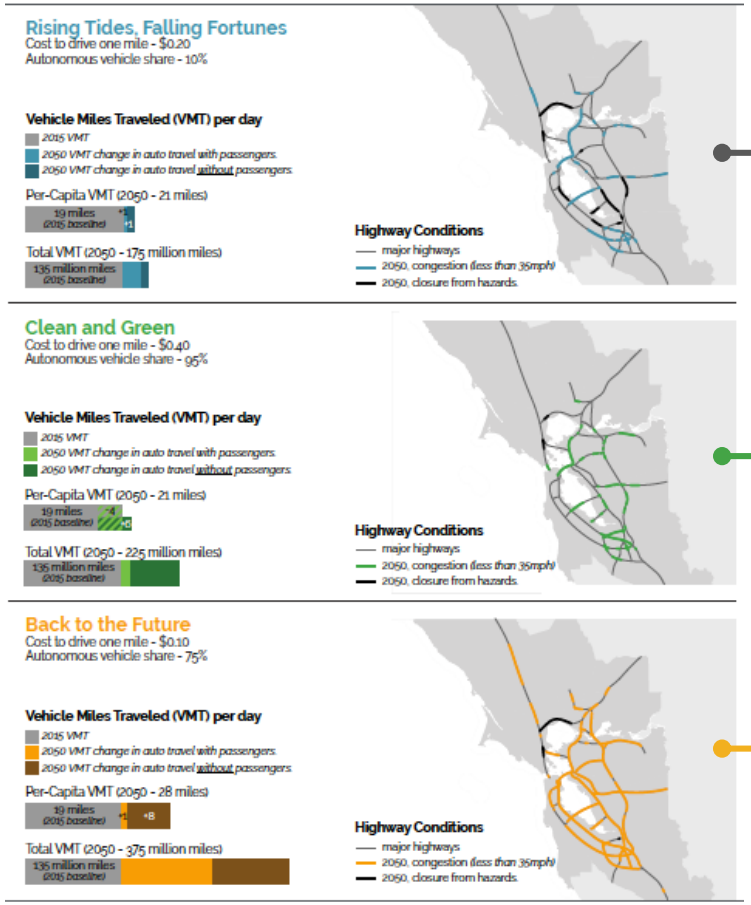
Total VMT (2050 - 375 million miles)



https://mtc.ca.gov/our-work/plans-projects/horizon/futures-planning

PLAN BAY AREA 2050

Futures Round 1
Opportunities and Challenges



Transit demand increases in all Futures, but commute times are worse

Pricing is an appropriate strategy to mitigate some of the adverse impacts of autonomous vehicles

Traffic congestion could reach new extremes, in part due to the high level of individual ownership for autonomous vehicles

Futures Round 2 - Transportation Strategies

Improve Access, Speed, and Reliability of Transportation

Build a next-generation transit network for the 21st century.

PBA-6	Operate and Maintain the Existing System
PBA-5*	Build Carpool Lanes & Address Interchange Bottlenecks
PBA-4	Make Strategic Transit Modernization/Expansion Investments
C-4	Build a Next-Generation Bus Rapid Transit Network
C-10**	Increase Capacity/Frequency by Modernizing Existing Rail
C-9**	Extend the Regional Rail Network
C-7**	Build a New Transbay Rail Crossing

Prioritize Active Modes

Make active modes safer and more accessible.

D-4	Invest in Free Short-Trip Service
NEW!	Implement Vision Zero Speed Reduction Measures
C-3	Build a Complete Micromobility Network

Price Transportation Services

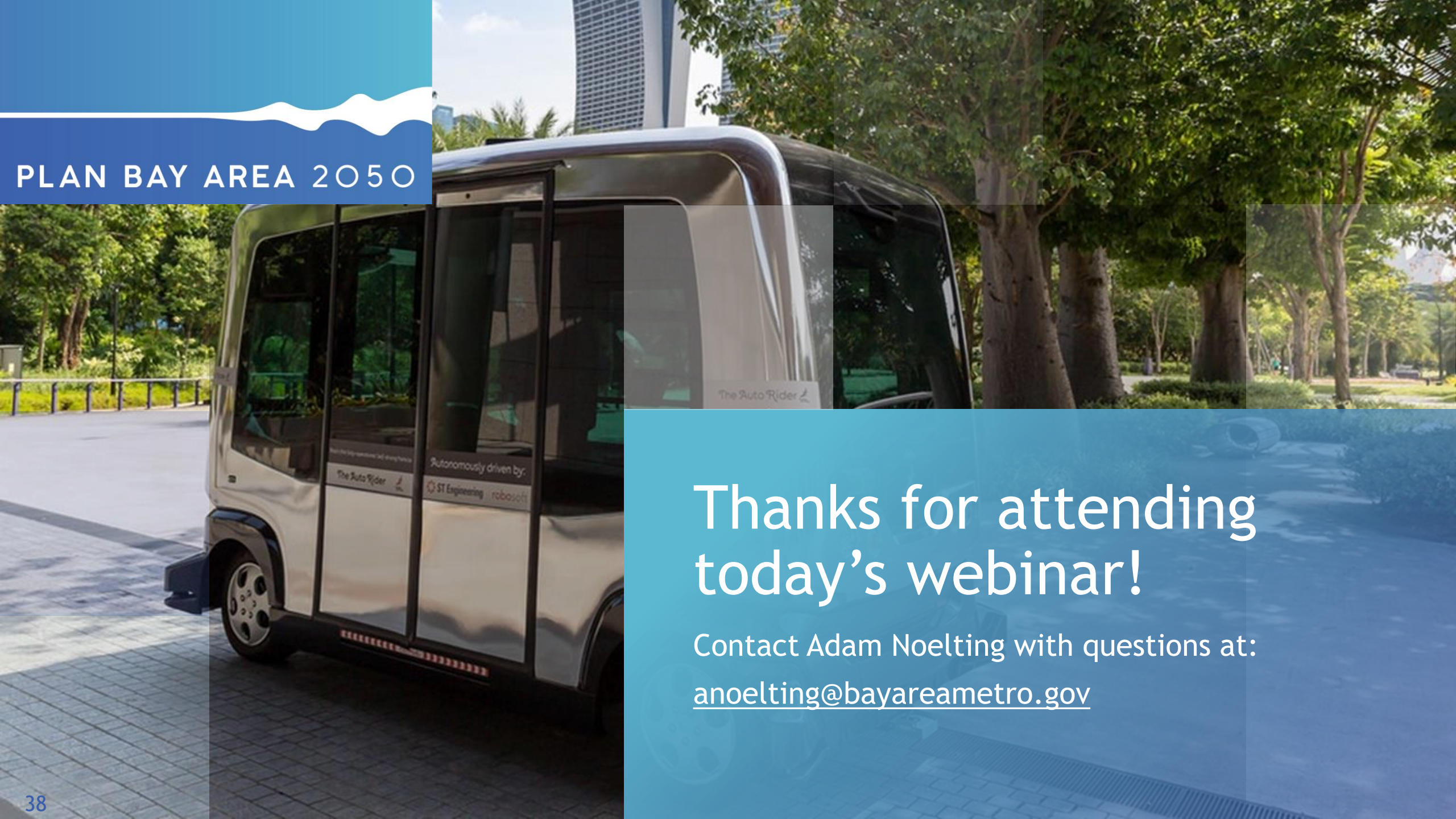
Price freeways to drive different mode choices and advance equitable outcomes.

C-1	Develop a Single Platform to Access & Pay for all Mobility
C-6	Apply Time-of-Day Tolls on All Freeways
A-3**	Provide Free Transit to Lower-Income Riders

* = modifications have been made to Plan Bay Area 2040 strategy

** = included only in two higher-growth, higher-resource Futures

PLAN BAY AREA 2050



Thanks for attending today's webinar!

Contact Adam Noelting with questions at:

anoelting@bayareametro.gov

More information available at:
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Reminder: Upcoming Webinars

Growth Framework Update

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  - Looking Ahead: The Vision for Plan Bay Area 2050
- **September 10**
  - Exploring Policy Questions with Models
- **September *(date TBD)***
  - Horizon Perspective Paper 5: Bay Crossings

Target audience:
Stakeholders & interested public

In Case You Missed It! (ICYMI)

- **July 30**
  - ICYMI: Horizon Futures Round 1 Analysis
- **August 14**
  - ICYMI: Horizon Perspective Paper 1 - Autonomous Vehicles

Target audience:
New stakeholders/ public