



# AUTONOMOUS VEHICLES IN THE PACIFIC NORTHWEST

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# **BASELINE REPORT**

- **Purpose:**

To better understand how new mobility policies, programs, and pricing can help the Cities of Portland, OR; Seattle, WA; and Vancouver, BC realize GHG emission reduction goals.

# PROCESS / METHODS

- Literature review
  - Policy analysis
  - Comparative analysis
  - Workshop #1
  - Workshop #2
- 
- Phase #2: In-depth research on select topics (Fall/Winter 2018-19)

# LITERATURE REVIEW QUESTIONS

- AVs impact on travel and land use?
- Potential magnitudes of impacts?
- Effects of these changes on greenhouse gas emissions?
- Lessons we can draw from existing research and preliminary findings about new mobility technologies?

# LITERATURE REVIEW OVERVIEW

- Topics:
  - Vehicle Distance Traveled (VMT/VKT)
    - Trip Generation
    - Shared Mobility
    - Mode Split
  - Energy Sources
  - Land Use / Metropolitan Footprint
  - Freight and Goods Movement

# VEHICLE DISTANCE TRAVELED

**AVs could lead to a 14-31% increase in vehicle distance traveled (Fehr & Peers)**

- TNCs in San Francisco averaging 570,000 VMT on a typical weekday vs. 66,000 for taxis
- If AVs operate like TNCs have to consider:
  - In-service distance traveled
  - Out-of-service distance traveled (“zombie” trips)

# TRIP GENERATION

## **AVs could increase vehicle trips**

- New Users

Overall increase in vehicle trips taken as new users (e.g., youth, elderly populations, etc.) take trips

- Induced Demand

- UC Davis study about TNCs: 22% of survey respondents said they would have just made fewer trips

# SHARED MOBILITY

## **Magnitude of impact will depend on fleets vs. personal ownership**

- Carsharing contributes to reductions in vehicle distance traveled and vehicle ownership rates
- 2014 study modeled potential impacts of a fleet of AVs:
  - Shared fleet would incur 11% more travel compared to non-shared vehicles
  - Fleet could save participating users 10x numbers of cars

# SHARED MOBILITY

## **Ridesharing will also have an impact**

- Ridesharing (UberPOOL, Lyft Line) most popular in highly urbanized, dense areas and adoption is growing
- Boston study found only 1/5 of survey respondents took a shared ride and that a preference for a single passenger ride persists

# MODE SPLIT

## **AVs could pull from other modes**

- TNCs are impacting transit, walk, and bike
- Transit ridership is decreasing in most major U.S. cities
  - Boston study suggests TNCs are contributing
- UC Davis study found that only 39% of TNC trips would otherwise have been made by car

# ENERGY SOURCES

## **AVs could be more fuel efficient and E-AVs hold promise**

- AVs could reduce energy use by up to 80% from platooning, eco-driving, etc.
- Autonomous taxis could yield 87-94% reductions in GHG emissions in 2030
- Electric grid mix is factor but grids are getting cleaner
  - Driving on electricity is cleaner than a 50 MPG vehicle for 75% of US

# LAND USE/METROPOLITAN FOOTPRINT

## **AVs could put pressure on sprawl**

- Large body of evidence links sprawl with more vehicle travel, energy consumptions, and GHGs
- Pop. density is strongly and positively associated with VMT per capita
- Increasing street-network connectivity could reduce vehicle travel and emissions by ~8.8%
- Salt Lake City study found that a non-linear relationship between pop. growth and CO<sub>2</sub>

# FREIGHT AND GOODS MOVEMENT

## Important to consider AV freight/goods

- Trucking volumes expected to continue increasing
- E-commerce continues to grow
  - Shorter delivery windows
  - Use of independent contractors for goods delivery
- Some trip replacement but net increase in vehicle trips is possible

# POLICY ANALYSIS

## Case Study City Climate Policy

	Plan Name	Adoption Date	GHG Reduction Goals	VMT/VKT Reduction Goals
City of Portland	City of Portland and Multnomah County Climate Action Plan	2015	2030: 40% reduction from 1990 levels	2030: 30% reduction in daily per capita VMT from 2008 levels
			2050: 80% reduction from 1990 levels	
City of Seattle	Seattle Climate Action Plan	2013	2030: 58% reduction from 2008 levels	2030: 20% reduction in VMT from 2008 levels
			2050: 100% carbon neutral	
City of Vancouver	Greenest City 2020 Action Plan	2015	2050: 80% reduction from 2007 levels	2020: 20% reduction per resident from 2007 levels

# POLICY ANALYSIS

## Case Study City New Mobility Policy, Guidance and Reports

	Name	Date	Agency	Description
City of Portland	Resolution 37296	June 2017	City of Portland	Guidance for AV pilot projects and implementation initiatives
City of Seattle	New Mobility Playbook, Version 1.0	Sept 2017	Seattle Dept. of Transportation	New mobility policy and strategy recommendations
City of Vancouver	Future of Driving	August 2016	TransLink	New mobility policy and strategy recommendations

# POLICY ANALYSIS

## Select North America New Mobility Policy, Guidance and Reports

Jurisdiction	Name	Date	Agency/Group	Description
Atlanta, GA	Regional Transportation Technology Policy Document	Dec 2016	Atlanta Regional Commission	Policy and strategy recommendations
Austin, TX	Smart Mobility Roadmap	Oct 2017	City of Austin and Capital Metro	Policy and strategy recommendations
Chandler, AZ	Ridesharing and Autonomous Vehicles Zoning Code Amendments	May 2018	City of Chandler	Adopted parking to passenger loading ratio zoning code updates
Los Angeles, CA	Urban Mobility in a Digital Age	2016	LA Dept. of Transportation	Policy and strategy recommendations
	Mobility Plan 2035	Sept 2016	Dept. of City Planning	Adopted as part of the General Plan in 2016
NY/NJ/CT Region	New Mobility: AVs and the Region (Component of Fourth Regional Plan)	Oct 2017	Regional Plan Association	Policy and strategy recommendations included in the Fourth Regional Plan (Nov 2017)
St. Louis, MO Region	Emerging Transportation Technology Strategic Plan	June 2017	East-West Gateway Council of Governments	Policy and strategy recommendations
Toronto, ON	Preparing the City of Toronto for AVs	Jan 2018	Transportation Services	Report on steps taken and proposed next steps
Twin Cities, MN	Twin Cities Shared Mobility Action Plan	2017	Shared-Use Mobility Center	Policy and strategy recommendations

# **POLICY ANALYSIS**

## **VEHICLE DISTANCE TRAVELED**

- All case study cities identify the need to reduce vehicle distance traveled, directly or indirectly through mode shift and/or shared rides

# POLICY ANALYSIS

## VEHICLE DISTANCE TRAVELED

- **Portland:** FAVES / congestion, LOV, trips pay
- **Seattle:** People first, SECA / shift mode
- **Vancouver:** ACES
- **Los Angeles:** Decrease VMT 5% every 5 years
- **Austin:** SEAV, shared use, but no VMT reduction goal
- **Atlanta:** Use pricing and incentives to reduce VMT

# **POLICY ANALYSIS**

## **MODE SPLIT**

- Most plans focus on increasing walking, cycling, transit over vehicles (private or shared)
- Some plans primarily focus on transit

# POLICY ANALYSIS

## MODE SPLIT

- **Portland:** Walking; cycling; transit; taxi, commercial vehicle, shared; other private vehicles
- **Seattle:** Focus on public transit
- **Vancouver:** 50% of trips by active transportation
- **Los Angeles:** 90% of HH bike facilities within 1/2 mile; increase 0/1 car ownership HH from 50% to 75% (2035); reduce HH transportation costs to 10% (2035); 50% active
- **Toronto:** Focus on transit
- **NYC Region:** 80% of street space dedicated to active transportation (2040)

# POLICY ANALYSIS

## PRICING

All case study cities stated that road usage charge or congestion fee for both infrastructure AND manage demand

- Distance
- Time of day
- Location (cordon pricing)

### Less common

- Empty vehicle
- Empty seats

# POLICY ANALYSIS

## PRICING

- **Portland:** Sustainable user-pays funding mechanism for infrastructure and system management
- **Seattle:** Establish new transportation funding mechanisms
- **Vancouver:** Introduce road usage charge to manage demand
- **Los Angeles:** Infrastructure as a service
- **Atlanta:** Tolling and parking credits, no distance fee

# **POLICY ANALYSIS**

## **SOURCE OF ENERGY**

- All case study cities and most others reviewed are promoting electric vehicles
- Most building charging infrastructure (regular and fast charging)
- Many requiring charging infrastructure in new buildings

# POLICY ANALYSIS

## SOURCE OF ENERGY

- **Portland:** Adopted EV strategy
- **Seattle and Vancouver:** Adopted EV strategy with 100% carbon neutral source
- **Los Angeles:** Infrastructure
- **Austin:** Aggressive deployment of chargers (600) and fast chargers (8-10)

# **POLICY ANALYSIS**

## **LAND USE/METROPOLITAN FOOTPRINT**

- Case study cities have centers/neighborhood policies and urban containment regulations
- Not all explicitly identify them in Climate Action Plans

# POLICY ANALYSIS

## LAND USE/METROPOLITAN FOOTPRINT

- **Portland:** Centers and Corridors, UGB
- **Seattle:** Urban Villages, UGA
- **Vancouver:** Urban Centres and Frequent Transit Development Areas, UCB
- **Los Angeles:** Mixed use areas, discourage cul-de-sacs

# **POLICY ANALYSIS**

## **FREIGHT/GOODS DELIVERY**

- Few cities identify freight and goods delivery or with much detail

# POLICY ANALYSIS

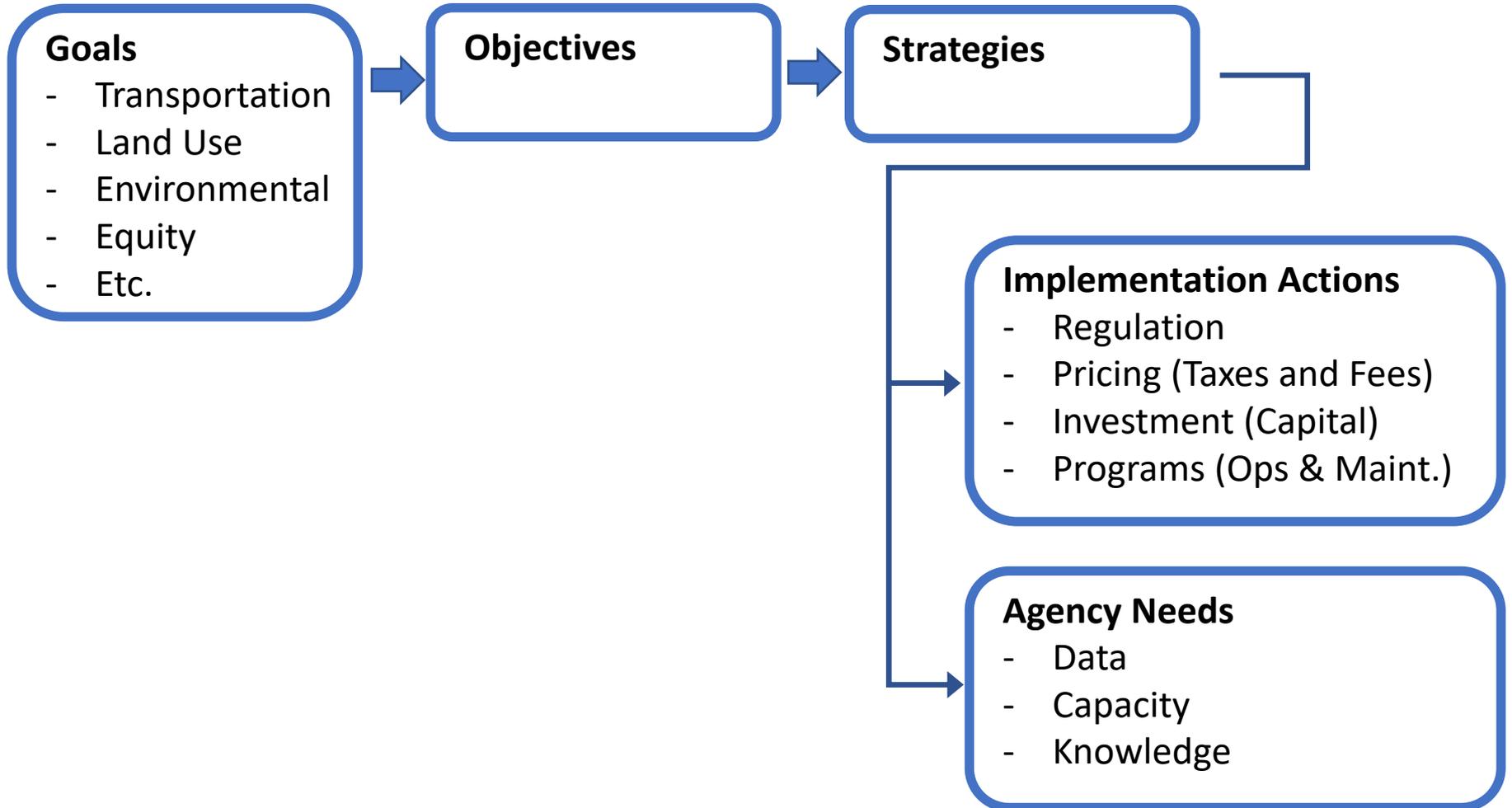
## FREIGHT/GOODS DELIVERY

- **Portland and Vancouver:** Does not identify freight/goods delivery strategies for AVs
- **Seattle:** Support efficient goods delivery
- **Los Angeles:** Limit trucks to arterials, encourage deliveries at off-peak hours, amend loading/unloading zones to reflect demand
- **Atlanta:** Provide tools to address increasing local freight deliveries

# NEW MOBILITY POLICY DEVELOPMENT STATUS



# NEW MOBILITY POLICY DEVELOPMENT



# **POLICY GOALS**

1. Maximize Accessibility
2. Enable Efficient Freight and Goods Movement
3. Prioritize Clean Energy Sources
4. Limit Metropolitan Footprint Expansion
5. Adapt to Land Use Changes

# GOVERNANCE GOALS

1. Update Structures and Facilitate Communication
2. Promote Culture of Innovation and Flexibility

# QUESTIONS AND DISCUSSION