UNIVERSITY OF OREGON

POLICY BRIEF

AVs IN THE PACIFIC NORTHWEST: REDUCING GREENHOUSE GAS EMISSIONS IN A TIME OF AUTOMATION

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EXECUTIVE SUMMARY

The transportation sector accounts for the largest portion of greenhouse gas (GHG) emissions compared to all other sectors, and GHGs are once again on the rise. At the same time, new mobility technologies are being introduced and fully autonomous vehicles (AVs) are anticipated to be deployed, at least to varying extents, within 5-10 years. (Waymo, Google's self-driving project, is already operating a limited robotaxi service in Phoenix, AZ with a fleet of AVs.) AVs have the potential to improve safety, reduce congestion, and increase mobility—but they could also increase congestion, increase vehicle miles/kilometers traveled (VMT/VKT), and erode transit, walk, and bike mode share, exacerbating existing conditions. The cities of Portland, OR; Seattle, WA; and Vancouver, BC have adopted climate action plans with the goal of dramatically reducing GHG emissions. This policy brief is intended to help the three cities better understand how AVs may help or hinder them in achieving their goals, and what recommended actions to take at this critical moment in time.

Research on AVs suggests that they are likely to increase VMT/VKT and congestion without policy intervention. AVs may also compete with transit since an AV trip may be cheaper than a ridehailing (e.g., Uber and Lyft) trip today as the labor costs associated with paying drivers will be dramatically reduced or eliminated.

Thus far, AV technology is being incorporated into hybrid and electric vehicles rather than gasoline-powered ones. If electric AVs replace conventional, gasoline-powered vehicles, GHG emissions may be reduced—although the fuel mix of the local energy grid should be considered. AVs will likely share the road with conventional vehicles for years to come. If AVs contribute to increased VMT/VKT and congestion overall, GHGs are likely to rise.

The compactness of the urban form is an important consideration in GHG emissions since the level of density and/or sprawl influences travel behavior. On the one hand, AVs have the potential to increase commute tolerance by freeing up time that would otherwise be spent behind the wheel. That may put additional pressure on sprawl if people are willing to commute longer distances in exchange for less expensive housing or more land. On the other hand, AVs may reduce demand for parking since passengers can be dropped off or picked up at their destination without the need to park. This could free up urban land to be redeveloped for other purposes such as affordable housing.

Realizing the opportunities that AVs and other new mobility technologies hold will require a proactive approach by cities. Cities should continue working to enact policies that reduce reliance on the automobile overall by prioritizing active modes, and adopting a people-first approach. In working with the private sector, cities may benefit from identifying the desired outcomes first and encouraging private providers to find ways to achieve those outcomes. Smaller scale pilot projects can also help reduce risk and allow cities to evaluate initial outcomes as they work to identify the most effective policies. Additionally, cities should engage in regional collaboration and coordination to enhance leverage and maximize resources.

READ MORE

This policy brief summarizes some of the key findings of two reports from Urbanism Next:

- AVs in the Pacific Northwest: Reducing Greenhouse Gas Emissions in a Time of Automation (August 2018)
- New Mobility in the Right-of-Way (February 2019)

Download at:

www.urbanismnext.com/resources

AVs+GHG EMISSIONS: WHAT TO PAY ATTENTION TO

FREIGHT AND GOODS MOVEMENT

GHG emissions are not only related to the movement of people but also the movement of goods. The growth of e-commerce in recent years has led to an increase in deliveries, contributing to urban congestion and increased VMT/VKT. Automated technology will extend to freight and local goods delivery and should be considered.

VEHICLE MILES/KILOMETERS TRAVELED

Using conventional fuel sources, an increase in VMT/VKT increases GHG emissions. AVs have the potential to increase VMT/VKT due to changes in overall demand, land use patterns and segregation of uses, and availability of other modes.

Shared Mobility: A number of shared-use mobility options, including carsharing, bikesharing, ridesharing, ridesourcing/ridesplitting, and e-scooter sharing are now available and are an important component of the discussion about VMT/VKT. AVs will have different impacts on the transportation system if they operate as single passenger vehicles vs. if they prioritize ridesharing like UberPOOL and Lyft Line.

Mode Split: Mode split, or mode share, refers to the distribution of person trips across modes. The impacts that AVs will have on mode split will be influenced by the policies, programs, and pricing (such as taxes and fees) that are implemented that encourage and/or discourage certain travel behaviors.

LAND USE/METROPOLITAN FOOTPRINT

The compactness of the urban form is an important consideration in GHG emissions since the level of density and/or sprawl influences travel behavior. The extent to which AVs will impact residential location preference is an important consideration in the discussion of GHG emissions.

SOURCE OF ENERGY

Battery-electric, plug-in electric, and hybrid vehicles are no- to low-carbon alternatives to conventional gasoline-powered vehicles. If AVs are primarily electric, they could have positive impacts on GHG emissions as conventional gasoline-powered vehicles are replaced by electric AVs, but the fuel mix of the local energy grid is also a factor.

MAIN FINDINGS

LIKE TNCs, AVs MAY EXACERBATE CONGESTION WITHOUT POLICY INTERVENTION

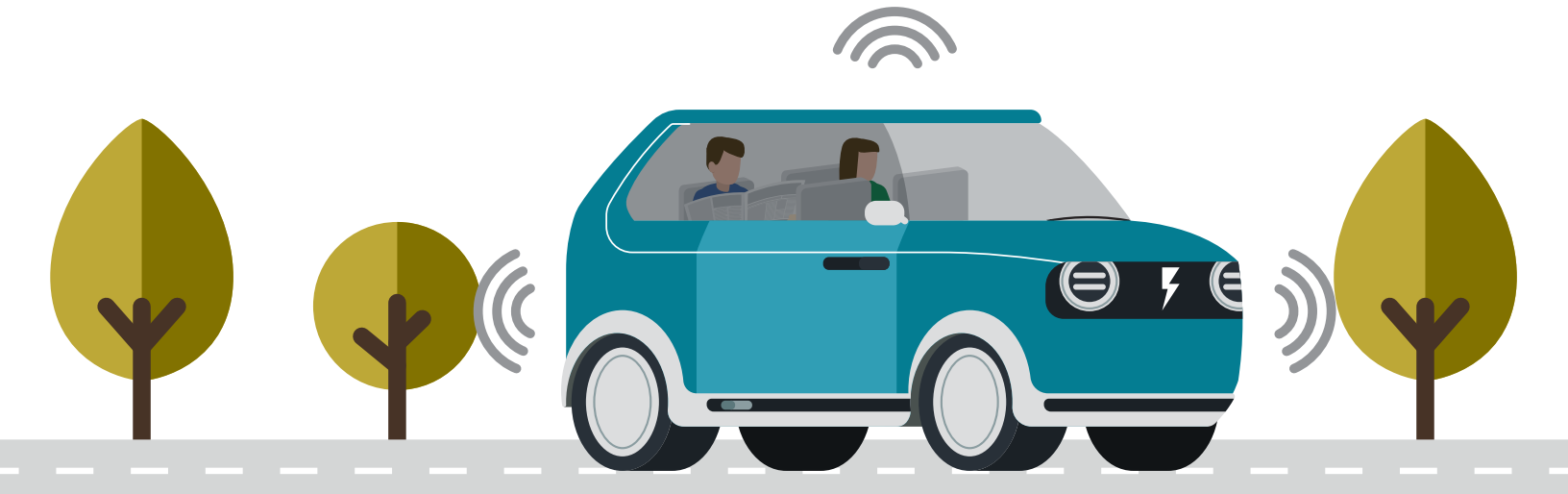
Transportation network companies (TNCs) did not cause congestion—it already existed—but there is a growing body of evidence to support the claim that TNCs are exacerbating it. In some circumstances, TNCs may also be contributing to decreased transit ridership. AVs are likely to operate similarly to TNCs today, but they may be cheaper than TNCs since the cost of the driver will be eliminated. Several studies modeling the potential impacts of AVs on VMT/VKT have found that they are likely to increase VMT/VKT due to changes in overall demand, land use patterns, segregation of uses, and availability of other modes, to name a few. The impacts that AVs will have on mode split will be influenced by the policies, programs, and pricing (such as taxes and fees) that are implemented that encourage and/or discourage certain travel behaviors.

AVs MAY PRESENT OPPORTUNITIES FOR REDEVELOPMENT OF URBAN LAND AND PUT PRESSURE ON SPRAWL

On the one hand, the deployment of AVs could significantly decrease demand for parking, increasing the opportunity for redevelopment. On the other hand, a reduction in cost and increase in comfort as well as the ability to do something other than drive during the trip may increase commute tolerance, which could lead to additional pressure on sprawl. The extent to which AVs will impact residential location preference is an important consideration in the discussion of GHG emissions.

AVS MAY BE HYBRID AND ELECTRIC VEHICLES, BUT GHGs COULD STILL INCREASE

While it appears likely that AVs will be hybrid or fully electric vehicles, we expect the transition period from conventional vehicles to AVs to be slow. If AVs contribute to an overall increase in VMT/VKT and congestion, they may increase the amount of time gas-powered vehicles are stuck in traffic, contributing to an increase in GHG emissions. The energy sources used to power electric and hybrid vehicles are also an important consideration.



KEY TAKEAWAYS

- Without policy intervention, AVs are likely to increase VMT/VKT and congestion, which could increase GHGs. AVs may also be cheap enough to compete with transit.
- AVs are likely to be hybrid or electric vehicles, but the deployment of AVs may be slow. AVs will share the road with conventional, gasoline-powered vehicles for the foreseeable future. Even if AVs are clean vehicles, they could still contribute to an overall increase in GHGs by increasing congestion. Additionally, the fuel mix of the local energy grid is an important factor.
- To reduce GHGs in the AV era, cities should focus on reducing reliance on the automobile by prioritizing active modes and transit, and using existing land use authority to promote development that is less auto-dependent.
- Different levels of automation will occur over time and the AV landscape is continually evolving. Policies will need to be responsive to change.

MAIN FINDINGS

CITIES AND PRIVATE MOBILITY PROVIDERS ARE STILL FIGURING OUT HOW BEST TO WORK TOGETHER

The new mobility landscape is changing almost daily. Private mobility providers and cities are still navigating how best to work together, including determining what data needs to be shared, how fine-grained it needs to be, and what uses should be allowed.

ADDITIONAL RESEARCH IS NEEDED TO BETTER UNDERSTAND AV GOODS DELIVERY AND POTENTIAL GHG IMPACTS

GHG emissions are not only related to the movement of people but also the movement of goods, and automated technology will extend to trucking and delivery. The growth of e-commerce in recent years has led to an increase in deliveries, contributing to urban congestion and increased VMT/VKT. This is an area where more research is needed since there is limited information about the impacts these changes are having on the overall transportation system.

The cities of Portland, OR; Seattle, WA; and Vancouver, BC have already taken a number of proactive steps towards preparing for AVs. All three cities have adopted policies that prioritize shared AVs, and all have people-first approaches to mobility. Seattle is perhaps the furthest along in terms of proactively managing new mobility with the creation of the New Mobility Playbook, as well as its adoption of the "flex zone" to refer to the curb. Portland's Central City in Motion Plan is an example of how to reallocate parking to transit and active transportation. Additionally, through its E-Scooter Pilot Program Portland was able to move quickly in permitting new mobility providers while setting up important equity, pricing, and data sharing requirements. Vancouver is already a leader in achieving mode share targets. They are also in a unique position to gather important baseline data in advance of the permitting of TNCs.

RECOMMENDATIONS

Cities that want to reduce GHG emissions when allowing AVs and other new mobility services to operate should consider the following process/procedural and policy recommendations.

PROCESS/ PROCEDURAL

INTEGRATE NEW MODES WITH CITY GOALS

While this is good practice in general, the starting point for crafting policies related to AVs should be an identification of the outcomes the policies are trying to achieve and making sure those are supportive of city goals. Cities should also identify metrics that clearly relate to the desired outcomes, such as person throughput, VMT/VKT per capita, etc.

PRIORITIZE MOBILITY EQUITY WHEN ADOPTING POLICIES

New mobility technologies have the potential to increase mobility for disadvantaged groups but without policy intervention, they could also exacerbate existing disparities. Cities should work with community partners to conduct community needs assessments before adopting AV or new mobility policies to ensure that policies mitigate existing disparities and expand opportunities. Apply a targeted universalism approach.

ENCOURAGE INNOVATION AND PILOT PROJECTS

Traditional processes that cities have used for permitting and/or for requesting proposals that clearly define the methods and services to be used may not result in the desired outcomes. Cities should encourage innovative solutions that align with city goals by clearly identifying the outcomes they want and challenging companies to find the most effective and equitable way to achieve those outcomes. Smaller scale pilot projects reduce risk and may allow the city to evaluate the outcome before a full roll-out.

LEVERAGE CITY RESOURCES THROUGH REGIONAL COORDINATION AND COLLABORATION

Cities should work together and coordinate on AV and new mobility pilot projects. Cities can share findings and lessons learned to leverage limited resources. Cities should also coordinate on their legislative agendas in order to enhance political leverage.

PROCESS/ PROCEDURAL

UTILIZE PUBLIC-PRIVATE PARTNERSHIPS

There is a general interest from both the public and private sectors to make pilots happen. However, the private sector's willingness to comply with data sharing requirements and the public sector's traditional pace of work pose challenges. Cities should consider establishing an unsolicited proposal process that enables the private sector to approach the public sector.

ESTABLISH CLEAR DATA SHARING REQUIREMENTS

Cities should require operational data from new mobility providers and establish clear data sharing requirements from the outset. Being clear about exactly what data are needed and what questions the city hopes to be able to answer with the data could help break down barriers between cities and new mobility providers.

POLICY

LEVERAGE LOCAL AUTHORITY

Cities should focus on understanding and leveraging local authority as much as possible. For instance, cities do already have jurisdiction over the street and can prioritize active modes through local regulations.

FOCUS ON MAXIMIZING UTILITY OF EXISTING INFRASTRUCTURE

Cities should focus on moving people and goods more effectively on existing city streets. The amount of space could remain constant, but how space is allocated could shift in order to achieve desired outcomes.

REDUCE RELIANCE ON AUTOMOBILES BY PRIORITIZING ACTIVE MODES AND TRANSIT

Cities should focus on prioritizing no- and low-carbon modes by incentivizing non-auto travel, such as bicycles, and experimenting with shared micromobility devices through pilot projects. Cities should also invest in infrastructure that encourages active transportation, such as bike lanes, bike corrals, and e-scooter parking, as well as infrastructure that gives transit priority, such as dedicated travel lanes.

POLICY

PRIORITIZE SHARED USE MODES AND SHARED RIDES

Cities should consider implementing an "empty seat tax" or other dynamic pricing models in order to incentivize shared rides and price the use of public space. Cites should also create mobility hubs that include real-time transit arrival information and access to shared use modes like e-scooter share, bike share, and car share.

USE EXISTING LAND USE AUTHORITY TO ENCOURAGE COMPACT DEVELOPMENT

Cities should use their existing land use authority to encourage compact development and limit urban expansion through smart growth policies.

CREATE FAIR USER FEES ACROSS MODES

Cities should create comprehensive road user fees across all modes, while including provisions for low-income populations. For example, TriMet's Reduced Fares for Low-Income Riders enables people with qualifying incomes to pay half-price transit fares in Portland, OR.

MANAGE THE CURB COMPREHENSIVELY

Cities should look at all possible uses of the curb and adopt a strategic vision that prioritizes those uses in ways that are most likely to achieve desired outcomes. Seattle, WA and London, U.K. have adopted strategic visions that can be used as reference points.

SPOTLIGHT ON THE CURB

Curb management is an important tool that cities can use to reduce GHG emissions. Free on-street parking, which has historically been plentiful, induces auto travel, and encourages drivers to "cruise" for parking. This increases VMT/VKT and can increase congestion. Cities can encourage mode shifts by dedicating curb space to transit, bike lanes, and other uses. However, many cities do not have a complete picture of the curb—how much space exists, where it is, where it is regulated and where it is not, and how the space is currently being used. As a result, cities should map and inventory curb space and collect data about current usage patterns. This information can inform decisions about how space should be allocated, and what regulatory or pricing mechanisms may need to be implemented. (More information about curb management can be found in the New Mobility in the Right-of-Way report.)

POLICY

PRIORITIZE CLEAN ENERGY SOURCES

Cities should support charging infrastructure powered by clean energy, such as through the City of Austin's Plug-In EVerywhere network which is powered by renewable wind energy via the GreenChoice Program.

ANTICIPATE AND PLAN FOR A REDUCED DEMAND FOR PARKING

Cities should evaluate the supply of parking publicly provided and managed (both off- and on-street parking), and plan for an eventual reduction in demand for parking. This may mean the redevelopment of publicly-owned parking garages in downtown locations, and the redesign of streets and the right-of-way with the reduction of on-street parking. In addition, cities should work with AV providers on siting fleet storage, electric vehicle charging, and maintenance facilities.

ADAPT TO LAND USE CHANGES OVER TIME

The redevelopment of parking is one important change in land use that AVs present. Coupled with changes in the retail landscape, brought about in part by changing consumer preferences and e-commerce, cities may need to change assumptions about the demand for retail and commercial land and enable new and different uses. Cities may need to reassess developable lands inventories and enable new uses.

ABOUT THIS PROJECT

In 2017, the cities of Portland, OR; Seattle, WA; and Vancouver, BC partnered with the Carbon Neutral Cities Alliance at the Urban Sustainability Directors Network (CNCA/USDN) on a project to better understand how each city is individually addressing policy issues related to AVs. CNCA/USDN, with support from the Bullitt Foundation, provided a grant to the Urbanism Next Center for a two-phased research project conducted between February 2018 and February 2019. This project also included a series of three workshops held between June and November 2018.

ABOUT URBANISM NEXT

The Urbanism Next Center is a research center housed within the Sustainable Cities Institute at the University of Oregon. It is a leading source for information about the potential impacts of emerging technologies — autonomous vehicles, new mobility, e-commerce, and the sharing economy — on city development, form, and design and the implications for equity, health, the economy, the environment, and governance. Additional reports and related content are available at www.urbanismnext.com/resources.