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Autonomous Vehicle Policies Must Be Flexible to Support Deployment in Rural Regions

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POLICY BRIEF

Issue

Fully autonomous vehicles (AVs) hold the potential to significantly improve traffic safety, mobility and accessibility, and energy efficiency—longstanding challenges for rural transportation planning. Some of these benefits, such as improved mobility for non-drivers, are inherent to automation and therefore achievable through private AV ownership. Other benefits, such as the ability to right-size the vehicle used for a particular trip, can only be achieved if AVs are operated in a shared fleet through a carsharing model. AV benefits such as increased vehicle occupancy are only achieved if the AV is used for ridesharing. AVs may also significantly increase vehicle travel and associated environmental impacts. The magnitude of the changes in vehicle travel and environmental impact will depend to a significant degree on the extent to which AVs are available for individual

ownership vs. carsharing or ridesharing. As a result, shared mobility is commonly cited as an important strategy for mitigating growth in vehicle travel.

Most AV research to date has been done in an urban context. Changes in travel behavior brought about by automation will likely differ in rural areas, which are characterized by long travel distances and dispersed populations. Different policies may be needed to realize the mobility and safety benefits of vehicle automation in rural areas.

To consider these issues, researchers at the University of Vermont and University of Waterloo reviewed the existing literature on AVs in shared and private ownership scenarios and assessed the benefits inherent to AVs (regardless of ownership model) as well as of the benefits and challenges of AV-sharing in rural areas relative to urban areas.

Table 1. Applicability of potential benefits of AVs in rural environments. Green check marks indicate higher benefits and yellow check marks indicate reduced benefits.

Benefits of Automation		Relevance in Rural Environments
Mobility and Accessibility	✓ Vehicle access for individuals with driving restrictions	<ul style="list-style-type: none"> • Older population • Elevated disability rates • Car-dependent travel
	✓ Elimination of driver burden and capacity to perform errands without passengers	<ul style="list-style-type: none"> • Long distances between destinations • Limited access to goods and services
Safety	✓ Elimination of driver error	<ul style="list-style-type: none"> • Higher crash and injury fatality rates
Operations and Efficiency	✓ Improved eco-driving, traffic flows, and reduced congestion	<ul style="list-style-type: none"> • Limited traffic controls and baseline congestion
	✓ Reduced vehicle size	<ul style="list-style-type: none"> • More cargo capacity required/desired • Challenging road conditions

Key Research Findings

The mobility and safety benefits of automation are likely to be extremely significant in rural areas (Table 1). Rural areas are often more car dependent than cities, since destinations tend to be farther apart, transit options are more limited, and walking and bicycling are infeasible for many trips. AVs can provide mobility benefits to driving-restricted populations such as older residents and residents with disabilities, both of whom live disproportionately in rural areas. Moreover, potential safety benefits that could be realized by eliminating driver error are also magnified in rural areas, which experience higher rates of fatal crashes than urbanized areas.

The challenges of AV sharing are likely to be greater in rural areas. Successful carsharing and ridesharing systems require alignment between users' travel choices over time and space to provide acceptable wait times at viable costs. This alignment is harder to achieve in rural areas due to smaller user bases and longer distances between destinations. AV carsharing and ridesharing in rural areas may require a higher vehicle-to-user ratio, reducing the economic viability of this option.

The additional benefits of AV sharing are likely to be more limited in rural areas. While ridesharing and carsharing can provide significant efficiency gains by facilitating "right-size" vehicles for specific trips and increasing vehicle occupancy, these benefits are likely to be more limited with smaller, rural fleets and a smaller, more dispersed user base. Efficiency benefits will be further offset by the need for longer unoccupied repositioning trips between serving passengers.

Policy Implications

Rural residents could gain tremendous safety and mobility benefits from AVs. But policies that discourage private AV ownership could hinder AV deployment in rural regions due to the challenges of carsharing and ridesharing in these environments. Policymakers should recognize that increased vehicle miles traveled in rural areas may mean improved well-being and should exercise caution when crafting policies to promote AV sharing. Improved data collection and modeling of rural travel will be required to develop policies that balance the social benefits and environmental impacts of AVs across rural and urban areas.

More Information

This policy brief is drawn from "Consideration of Automated Vehicle Benefits and Research Needs for Rural America," a report from the National Center for Sustainable Transportation, authored by Jonathan Dowds, James Sullivan, and Gregory Rowangould of the University of Vermont and Lisa Aultman-Hall of the University of Waterloo. The full report can be found on the NCST website at <https://ncst.ucdavis.edu/project/estimating-changes-state-level-vehicle-miles-travel-autonomous-vehicle-deployment-scenarios>.

For more information about the findings presented in this brief, contact Jonathan Dowds at jonathan.dowds@uvm.edu.

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