

Maximizing the Benefits of Self-Driving Vehicles

Principles for Public Policy

HIGHLIGHTS

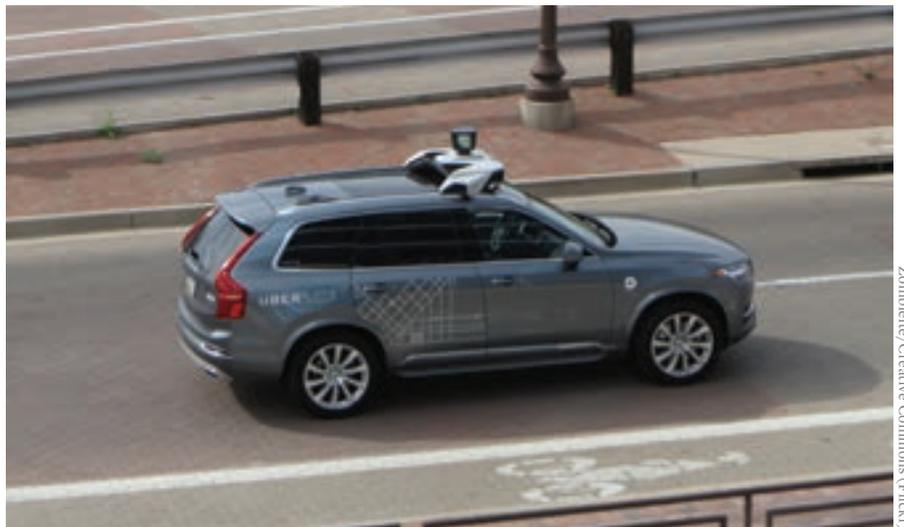
Self-driving vehicles have the potential to improve the safety, accessibility, and convenience of transportation substantially, but they also may increase energy use, transportation-related pollution, and roadway congestion. Public policy must take into account both the positive and negative potential of this emerging technology on communities and the environment. Doing so will help ensure that the introduction and use of self-driving vehicles reduce oil consumption and global warming emissions, improve public health and safety, and enhance mobility for all.

Autonomous, or self-driving, vehicle technology may be the most significant innovation in transportation since the mass introduction of automobiles in the early 20th century. Whether the widespread adoption of self-driving vehicles results in positive outcomes in the years ahead will depend largely on how public policy guides the introduction of this emerging technology today. The potential benefits include safer roads, more affordable transportation, improved access to jobs, and a cleaner, healthier environment. Without well-crafted policy, though, self-driving vehicles could increase vehicle miles traveled and global warming emissions, worsen congestion, exacerbate air pollution, and put millions of Americans out of work (Litman 2016).

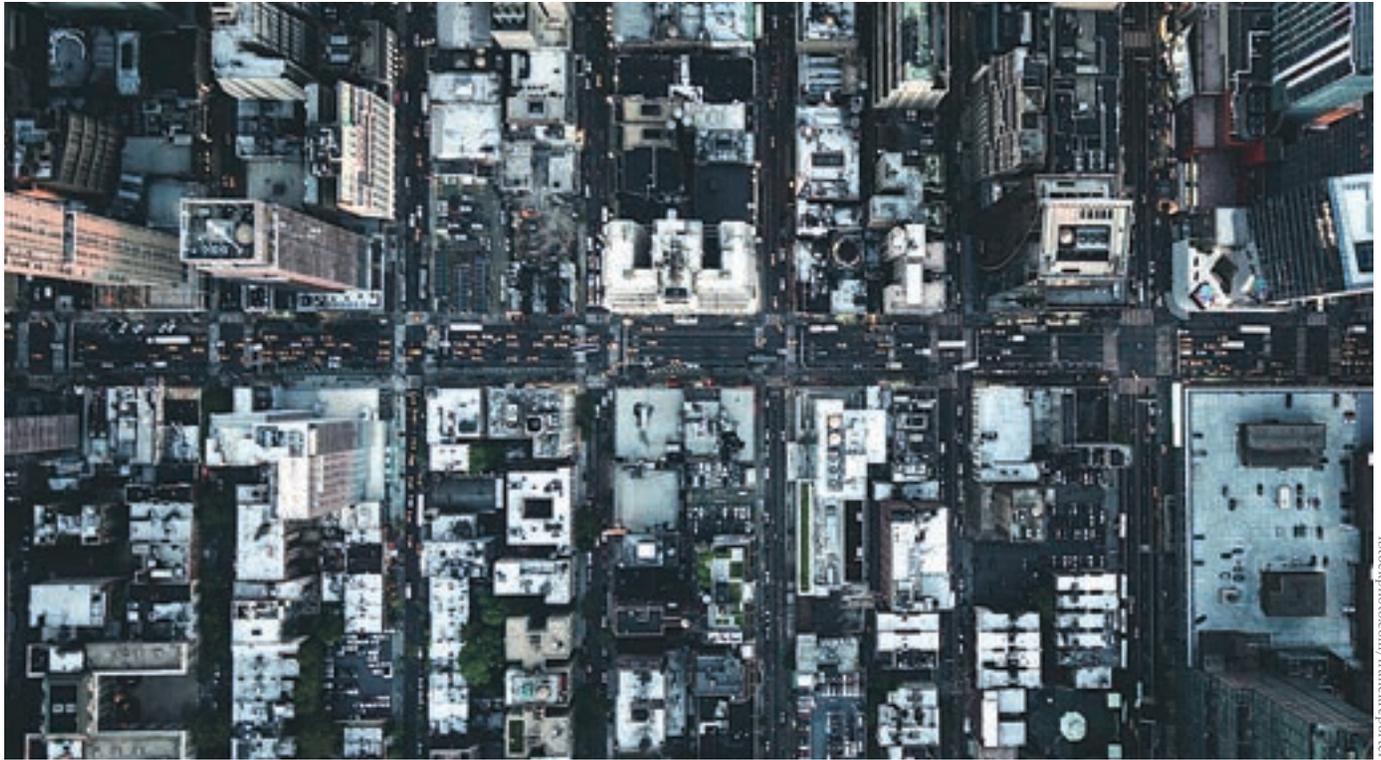
UCS has outlined a set of principles that policymakers, businesses, and other stakeholders can follow to shape the introduction of self-driving vehicles in ways that reduce oil consumption and global warming emissions, protect public health, and enhance mobility for all.

1. Make Transportation Safer for Everyone, Not Just Motorists

While self-driving vehicles have the potential to reduce vehicle-related fatalities, this is not a guaranteed outcome (Kockelman et al. 2016). Vehicle computer systems must be secure from hacking, and rigorous testing and regulatory oversight of vehicle programming are essential to ensure that self-driving vehicles protect both their occupants and those outside the vehicle. Therefore, public policy related to self-driving vehicles must improve safety for all Americans, whether they are driving, walking, or biking.



Well-crafted policy is critical to ensuring that self-driving vehicles—such as the one being tested by ride-hailing service Uber, above—make a positive contribution to the US transportation sector, including safer roads, more affordable transportation, improved access to jobs, and a cleaner, healthier environment.



istockphoto.com/francereporter

Autonomous vehicles could make driving more convenient, thus increasing the number of miles traveled as well as increasing air pollution. Pairing self-driving technology with vehicles that have a small carbon footprint (such as hybrids and electric vehicles) will help reduce transportation-related emissions.

2. Cut Transportation-Related Pollution to the Greatest Possible Extent

Transportation is the largest source of global warming emissions in the United States (EIA 2016). To help the nation avoid the worst consequences of climate change, self-driving vehicles must accelerate the reduction of emissions from this sector.

Self-driving vehicles may make driving more convenient for some Americans and increase the amount of miles people travel—consequently increasing vehicle-related pollution

Self-driving vehicles may make driving more convenient for some Americans and increase the amount of miles people travel—consequently increasing vehicle-related pollution.

(Wadud, MacKenzie, and Leiby 2016). To avoid this outcome and instead reduce transportation-related emissions, policy must ensure the pairing of self-driving technology with vehicles that have a low carbon footprint, such as plug-in electric vehicles and fuel-efficient hybrid gasoline vehicles. In addition, policy must give ride-hailing services like Uber and Lyft, which are likely to employ self-driving cars, strong incentives to operate trips that are shared among the maximum number of passengers. Similarly, policy should discourage self-driving cars from operating with no occupants.

3. Integrate Self-Driving Vehicles with Mass Transit to Reduce Congestion

Continued investment in mass transit is vital to efficient transportation networks, especially in congested urban areas. Taxis, ride-hailing services, private bus lines, and public transit systems may use self-driving technology to increase transportation choices, improve service, and reduce the cost of mobility (Litman 2016). Integration of private transportation services with high-capacity mass transit systems can make the entire transportation network more effective and efficient (Maynard 2014). By increasing access to high-capacity transportation modes like subways and bus rapid-transit systems,

new mobility services such as self-driving vehicles can alleviate congestion, improve air quality, and save people time.

4. Improve Access to Transportation on an Equitable Basis

Across the United States, transportation systems rely heavily on private vehicles, and often fail to serve all communities equally, with disadvantages arising based on income, age, race, disability, and geography (Ramey 2015). Self-driving technology can be deployed in ways that improve access to transportation, with special consideration for disadvantaged populations. But self-driving technology may also be used to justify reduced public support for transportation services (Kockelman et al. 2016). Policy must ensure that the adoption of self-driving vehicles enhances equitable access to mobility for all populations, rather than justify reduced public support for transportation services.

5. Support a Just Transition for Displaced Workers

Self-driving technology will create jobs for some, but it will change or reduce employment opportunities for others, especially in the trucking, delivery, and taxi industries (BLS 2015). Before self-driving vehicles comprise a significant share of the markets for passenger cars and heavy-duty trucks, policy must recognize the economic impact of this technology, and must

support career pathways and transitions for the Americans who will be affected by automated driving technology. In addition, jobs created in the self-driving vehicle industry should be accessible to all, with a focus on increasing career opportunities for populations historically underrepresented in transportation and technology industries.

6. Establish a Framework for Sharing Data Openly While Ensuring Data Security

Whether self-driving vehicles improve public health, decrease traffic congestion, and reduce climate change will depend on informed, science-based policy. This will require a robust research agenda and accessible data on the performance and operation of self-driving vehicles. We cannot rely on private companies to provide such data voluntarily. Instead, policymakers should seek to promote the identification of ways that self-driving technology can improve safety, reduce pollution, and serve all Americans. Policy must facilitate open data-sharing, while ensuring that appropriate privacy protections are in place.

Whether self-driving vehicles improve public health, decrease traffic congestion, and reduce climate change will depend on informed, science-based policy.

7. Foster Livable Cities and Improve the Use of Urban Infrastructure

Self-driving vehicles could increase the use of personal vehicles, exacerbating sprawl, congestion, and pollution (Anderson et al. 2016). Alternatively, the use of self-driving vehicles predominately for shared rides could reduce the need for parking and expansion of roads, creating the potential to repurpose public space for uses such as businesses, green space, and walking and bicycling infrastructure (Chapin et al. 2016). Policy must ensure that any repurposing of public roads and spaces place a high priority on the needs of the whole community, rather than focus narrowly on serving only vehicles, whether self-driving or not.



Self-driving technology could reduce employment opportunities in the trucking, taxi, and delivery industries. Policies regulating this new technology must recognize its economic impact and support career transitions for the Americans that will be displaced by automated driving.

istockphoto.com/BCSC



Autonomous vehicles could make driving more convenient, especially in urban areas, thus increasing the number of miles traveled as well as increasing air pollution. Pairing self-driving technology with vehicles that have a small carbon footprint (such as hybrids and electric vehicles) will help reduce transportation-related emissions.

Conclusion

Self-driving vehicles could change transportation in the United States dramatically. Whether the outcomes are positive or negative will depend on how policy frameworks guide the introduction of this rapidly evolving technology. To assist in the creation of informed policy, UCS developed these principles to highlight the important ramifications of self-driving vehicles that must be considered in the policymaking process. UCS is committed to partnering with stakeholders to ensure that self-driving vehicles create a better future for transportation and our communities. For more information, please visit the UCS website at www.ucsusa.org/selfdrivingtech.

REFERENCES

- Anderson, J.M., N. Kalra, K.D. Stanley, P. Sorensen, C. Samaras, and O.A. Oluwatola. 2016. *Autonomous vehicle technology: A guide for policymakers*. Santa Monica, CA: Rand Corporation. Online at www.rand.org/pubs/research_reports/RR443-2.html, accessed December 26, 2016.
- Chapin, T., L. Stevens, J. Crute, J. Crandall, A. Rokyta, and A. Washington. 2016. *Envisioning Florida's future: Transportation and land use in an automated vehicle world*. Tallahassee, FL: Florida Department of Transportation. Online at www.automatedfl.com/wp-content/uploads/2015/06/Envisioning-Floridas-Future-Final-Report-BDV30-TWO-934-10.pdf, accessed December 26, 2016.
- Kockelman, K., P. Avery, P. Bansal, S.D. Boyles, P. Bujanovic, T. Choudhary, L. Clements, G. Domnenko, D. Fagnant, J. Helsel, R. Hutchinson, M. Levin, J. Li, T. Li, L. Loftus-Otway, A. Nichols, M. Simoni, and D. Stewart. *Implications of connected and automated vehicles on the safety and operations of roadway networks: A final report*. Austin, TX: Texas Department of Transportation. Online at <http://library.ctr.utexas.edu/ctr-publications/0-6849-1.pdf>, accessed December 26, 2016.
- Litman, T. 2016. *Autonomous vehicle implementation predictions*. Victoria, British Columbia: Victoria Transportation Policy Institute. Online at www.vtpi.org/avip.pdf, accessed December 26, 2016.
- Maynard, M. 2014. *Curbing cars: America's independence from the auto industry*. New York, NY: Forbes Media.
- Ramey, C. 2015. America's unfair rules of the road: How our transportation system discriminates against the most vulnerable. *Slate.com*. Online at www.slate.com/articles/news_and_politics/politics/2015/02/america_s_transportation_system_discriminates_against_minorities_and_poor.html, accessed December 26, 2016.
- US Bureau of Labor Statistics (BLS). 2015. Occupational outlook handbook: Heavy and tractor-trailer truck drivers. Washington, DC: U.S. Department of Labor. 2015. Online at www.bls.gov/ooh/transportation-and-material-moving/heavy-and-tractor-trailer-truck-drivers.htm, accessed December 26, 2016.
- US Energy Information Administration (EIA). 2016. *Monthly energy review*. December 2016. Washington, DC: U.S. Department of Energy. Online at www.eia.gov/totalenergy/data/monthly/pdf/mer.pdf, accessed December 26, 2016.
- Wadud, Z., D. MacKenzie, and P. Leiby. 2016. Help or hindrance? The travel, energy, and carbon impacts of highly automated vehicles. *Transportation Research Part A: Policy and Practice* 86:1-18. doi:10.1016/j.tra.2015.12.001.

Union of Concerned Scientists

FIND THIS DOCUMENT ONLINE: www.ucsusa.org/avprinciples

The Union of Concerned Scientists puts rigorous, independent science to work to solve our planet's most pressing problems. Joining with people across the country, we combine technical analysis and effective advocacy to create innovative, practical solutions for a healthy, safe, and sustainable future.

NATIONAL HEADQUARTERS

Two Brattle Square
Cambridge, MA 02138-3780
Phone: (617) 547-5552
Fax: (617) 864-9405

WASHINGTON, DC, OFFICE

1825 K St. NW, Suite 800
Washington, DC 20006-1232
Phone: (202) 223-6133
Fax: (202) 223-6162

WEST COAST OFFICE

500 12th St., Suite 340
Oakland, CA 94607-4087
Phone: (510) 843-1872
Fax: (510) 451-3785

MIDWEST OFFICE

One N. LaSalle St., Suite 1904
Chicago, IL 60602-4064
Phone: (312) 578-1750
Fax: (312) 578-1751