



# To Tackle Climate Change, We Must Reform Land Use

By Kevin DeGood | July 22, 2021

*“We have to begin to look at alternatives. You can’t pave over the whole country.”*  
– U.S. House Committee on Transportation and Infrastructure Chairman Peter DeFazio (D-OR)<sup>1</sup>

Global climate change is an existential threat to human civilization. Greenhouse gas (GHG) levels in the atmosphere are higher now than at any other time in the past 4 million years.<sup>2</sup> Beginning in 2016, the transportation sector surpassed electricity generation to become the largest source of GHGs in the United States<sup>3</sup>—and within transportation, surface transportation is the biggest emitter, releasing 1.6 billion metric tons of carbon dioxide (CO<sub>2</sub>) equivalents each year.<sup>4</sup> If the U.S. surface transportation sector were a country, it would be the fifth-largest emitter on Earth, ranking just ahead of Japan.<sup>5</sup> Simply stated, this is unsustainable. The United States must adopt policies and make investments to achieve net-zero GHG emissions by midcentury.

There are two key strategies for decarbonizing the transportation sector: electrifying vehicles and reducing the automobile dependence of communities. Both are essential. President Joe Biden’s excellent American Jobs Plan includes billions of dollars to modernize American manufacturing to speed the transition to electric vehicle (EV) production.<sup>6</sup> The plan also calls for big investments in EV charging infrastructure, renewable energy generation and transmission, and incentives for consumers to purchase zero-emission vehicles. Rapid electrification of transportation powered by renewable energy is urgently needed.

In addition to electrification, the federal government needs to substantially reform its transportation policies to reduce auto dependence by directing funds to projects that expand transportation choice—including transit, biking, and walking—and encourage infill development. For example, Congress should pass the Investing in a New Vision for the Environment and Surface Transportation (INVEST) in America Act, which tackles issues both within the current transportation system and stemming from climate change. Taken together, more mobility choice and denser land use would reduce both the frequency and distance of trips made by driving alone. Moreover, these changes would significantly reduce the pace of new development on greenfield land, which provides essential environmental services, including absorbing CO<sub>2</sub>,

providing wildlife habitat, and mitigating flood risks, among other critical services. Climate change cannot be addressed without reforming land use, and land use cannot be changed without reforming transportation.

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## Transportation systems, land use, and travel choice

Policymakers often overlook the extent to which the transportation system influences individual transportation choices—and, by extension, total driving and land use. According to the Federal Highway Administration, Americans drove a stunning 3.2 trillion miles in the 12-month period ending in January 2020.<sup>7</sup> This number is often treated as a natural state of affairs, but in reality, it is the result of decades of policy choices that have locked most Americans into driving to meet their daily mobility needs.

How states and regions design their transportation systems has important implications for not only driving and mobile emissions but also the economic productivity of those facilities and the long-term cost burden associated with maintenance. A comparison between Ohio and Washington, D.C., highlights how systems shape these measures. Given the vast difference in geographic size and population, the comparison will focus on per capita measures.

### Comparing the transportation systems in Washington, D.C., and Ohio

The state of Ohio has 11.7 million residents and more than 262,000 lane miles of roadway. This total includes everything from local streets to interstates and works out to roughly one lane mile of roadway per 45 residents. Ohio ranks near the middle nationally with the 17th-highest number of residents per lane mile. By comparison, the District of Columbia has 706,000 residents and a little more than 3,400 lane miles of roadway, or one lane mile per 205 residents.

This means that every lane mile of roadway in Washington, D.C., supports, on average, 4 1/2 times as many residents as in Ohio. On a daily basis, every lane mile of roadway in Washington facilitates more movement of people and commerce than the equivalent lane mile in Ohio, making Washington's roads fundamentally more productive than Ohio's on a per-mile basis. Stated differently, every dollar spent on building and maintaining the roadway network in Washington is providing a larger economic return on investment than the equivalent dollar spent in Ohio. At any given moment, a larger share of Ohio's roadway network is sitting idle, slowly deteriorating due to the passage of time and the stress caused by weather.

Importantly, this is not an argument that the residents of Washington are more productive than their Ohio counterparts, but rather a measure of system efficiency. The economic production function of Washington requires far less linear infrastructure per unit of output. And Ohio's transportation system is not an outlier. Fast-growing Texas has 42 residents per lane mile, while Georgia, Indiana, and Missouri have 39, 33, and 22 residents per lane mile, respectively.

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When it comes time to repair or expand the roadway network, the higher population density of Washington means the per-mile cost is spread out over 4 1/2 times as many residents as Ohio. This is not a trivial matter: According to data from the Federal Highway Administration, in major urban areas, the average cost to reconstruct or to add one lane mile of interstate is \$8.4 million or \$70 million, respectively.<sup>8</sup>

Yet the biggest difference between the transportation systems in Washington and Ohio is how people use them. According to data collected by the U.S. Census Bureau on commuting choices, 83 percent of Ohio adults drive to work alone, while only 4 percent take transit, bike, or walk.<sup>9</sup> In Washington, only 34 percent of residents drive alone, while 53 percent take transit, bike, or walk.<sup>10</sup> The climate effects of these mobility choices are enormous. The average Ohio driver travels 10,300 miles per year compared with 5,300 miles for the average Washington driver.<sup>11</sup> This means that the average driver in Ohio is responsible for emitting approximately 4.2 metric tons of CO<sub>2</sub> each year compared with roughly 2.2 metric tons for the average driver in Washington.<sup>12</sup>

These stark differences are not the result of Washington residents' moral virtue or extreme dedication to combating climate change. District residents drive less and take transit more because the city invests heavily in transit service, making it both extensive and frequent—though certainly not perfect. For instance, in fiscal year 2019, the last full budget cycle prior to the coronavirus pandemic, Washington, D.C., provided an operating subsidy of more than \$369 million to the Washington Metro Area Transit Authority.<sup>13</sup> By comparison, the state of Ohio spent just \$6.5 million in total on transit from its General Revenue Fund in FY 2019.<sup>14</sup>

Washington's robust transit system supports greater residential and commercial density than the largest cities in Ohio. According to Census Bureau data, Washington has a population density of more than 9,850 resident per square mile, compared with 5,100 in Cleveland, 3,800 in Cincinnati, and 3,600 in Columbus.<sup>15</sup> While dense, Washington is also very livable, and the built environment is human-scaled due to a federal law that restricts the height and width of buildings within the city. Residential buildings are limited to "the width of the street, avenue, or highway in its front, increased by 20 feet," while buildings on commercial streets are limited to "the height of 130 feet on a business street."<sup>16</sup> As a result of this restriction, Washington has a diverse mix of housing located in walkable, low-intensity neighborhoods. Contrary to what might be expected with high overall density, Washington has more than 114,000 single-family homes and nearly 89,000 small apartment buildings with between two and 19 units.<sup>17</sup> Collectively, these units account for 63 percent of all housing in Washington, with the remainder being buildings with 20 units or more.<sup>18</sup>

The point is not that municipal or county jurisdictions should adopt a height restriction, but rather that achieving a sustainable transportation and land use system does not require a local community to look like the steel canyons of Midtown Manhattan.

New York City has long served as a useful, though deeply cynical, boogiemaster for opponents of transportation and land use reform. Yet Washington illustrates that cities and towns can achieve a sustainable, human-scaled form while still zoning for single-family homes and keeping multifamily buildings to five or six stories.

### Unpriced highway expansion is not the solution to metropolitan congestion

Not only does building new highways run counter to national climate goals, but decades of heavy federal investment in unpriced highway expansion have produced disappointing performance results. From 2000 to 2019, the United States dramatically expanded its highway network, adding 104,000 lane miles of mostly unpriced interstates, freeways, and other arterial roadways in urban areas—an increase of 34 percent.<sup>19</sup> In fact, the rate of highway expansion has been double the rate of overall population growth, which is 16.5 percent since 2000. However, even with this level of expansion, annual hours of delay per auto commuter have increased by 42 percent from 38 hours to 54 hours over the same period.<sup>20</sup> In constant 2017 dollars, over the past two decades, the annual cost of congestion has risen from \$75 billion to \$178 billion. Endlessly building unpriced highways is both unsustainable and ineffective; it does not reduce congestion in growing metropolitan regions.

The hours of delay measure—and, by extension, the overall cost of congestion—is based on the difference between travel speeds under free-flow highway conditions and observed travel speeds, which are often slower due to varying levels of congestion. Using free-flow speed as the baseline for calculating performance is highly problematic because building a highway system that delivers consistent free-flow travel speeds is less productive and efficient (vehicle spacing increases at higher speeds, meaning a lane is actually more productive and carries more cars per hour as congestion rises and speeds drop). Only 15 percent of daily trips nationwide are spent commuting, and a highway network designed to maximize free-flow conditions during the morning and evening peak travel period would result in a wasteful overbuild.<sup>21</sup> Having said that, vehicle speed and delay are the most widely used industry performance measures. Thus, sustained highway expansion has failed by the industry’s own favored metric.

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### The INVEST Act

Congress is currently debating the reauthorization of federal highway, transit, and passenger rail programs. The U.S. House of Representatives has passed the INVEST Act, which contains several key policy reforms to address climate change and improve overall system performance.<sup>22</sup> When asked about the reforms in the bill, Committee Chairman Peter DeFazio stated, “We have to begin to look at alternatives. You can’t pave over the whole country.”<sup>23</sup> This statement was a frank admission by the chairman that Congress cannot advance a transportation bill that would extend the status quo.

This section highlights three provisions of the INVEST Act that—if implemented in accordance with congressional intent and enforced—would start to push the surface transportation system in a more sustainable and productive direction: Section 1403, Section 1201, and Section 1213.

### Section 1403

Section 1403 makes changes and additions to the 23 U.S.C. 150 national goals and performance management measures, which Congress established in 2012 to hold states and metropolitan regions accountable for achieving national policy goals.<sup>24</sup> Under 23 U.S.C. 150, states and regions are required to adopt performance targets for each of the performance measures set in law, including measures for asset condition, safety, and mobile source emissions, among others.<sup>25</sup>

The current form of 23 U.S.C. 150 contains two problematic provisions that hamper its effectiveness. First, it permits states and regions to set any target, including regressive ones that would represent failing performance. For instance, a state or region could establish a target of increasing roadway injuries and fatalities or increasing disrepair of highway pavement and bridges. Second, opponents of measures to address climate change have argued that the language around mobile source emissions refers to criteria pollutants under the Clean Air Act and excludes greenhouse gases.<sup>26</sup>

Section 1403 would remedy both issues. The bill would prohibit “regressive targets,” meaning states would have to set a per capita GHG target that represented “constant or improved performance.”<sup>27</sup> The prohibition on regressive targets would also apply to the performance measures for serious injuries and fatalities. The act does not prescribe how states must achieve improved performance, allowing them to adopt the project mix that best meets their unique system characteristics. Section 1403 would also clearly implement new GHG measures, instructing the U.S. secretary of transportation to “establish, in consultation with the Administrator of the Environmental Protection Agency, measures for States to use to assess . . . carbon dioxide emissions per capita on public roads” and “any other greenhouse gas emissions on public roads that the Secretary determines to be appropriate.”<sup>28</sup>

### Section 1201

Section 1201 amends the National Highway Performance Program (NHPP), the main funding account in support of highway capacity expansion projects. The bill would require states to meet several thresholds before they can use NHPP money for any expansion project that would serve single-occupant vehicles. Specifically, states would have to demonstrate to the U.S. Department of Transportation (DOT) that they are making progress on achieving a state of good system repair, that the proposed highway expansion project is more cost effective than an operational improvement or transit, and that the state has a financial plan for long-term maintenance of the new lanes.<sup>29</sup> As a result, states would have to demonstrate to the secretary of transportation’s satisfaction that a proposed expansion project is truly the best alternative—not a small hurdle to clear.

Additionally, Section 1201 recognizes the social damage caused by highway construction and adds a new project eligibility category to improve community connectivity. The bill authorizes “the removal, retrofit, repurposing, remediation, or replacement of a highway on the National Highway System that creates a barrier to community connectivity to improve access for multiple modes of transportation.”<sup>30</sup>

### Section 1213

Finally, Section 1213 establishes a new carbon pollution reduction program. The program would be the first in DOT history exclusively dedicated to reducing GHG emissions. Eligible projects include those that are “expected to yield a significant reduction in greenhouse gas emissions from the surface transportation system” and “will help a State meet the greenhouse gas emissions performance targets.”<sup>31</sup> Furthermore, the section states that “[n]one of the funds provided under this section may be used for a project that will result in the construction of new capacity available to single occupant vehicles,” with certain narrow exceptions as defined by 23 U.S.C. 166.<sup>32</sup>

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## Conclusion

Continuing to build new unpriced highway capacity will only result in the same poor performance, divided communities, and excess pollution as in the past. Instead, structural policy reforms are necessary to build back better from the coronavirus pandemic and to combat climate change. The provisions in the INVEST Act, for example, are a strong step in a new direction, pushing states and regions to make different, more sustainable, and more productive investments with federal dollars. The status quo is not an option.

*Kevin DeGood is the director of Infrastructure Policy at the Center for American Progress.*

## Endnotes

- 1 Sam Mintz, @samjmintz, June 9, 2021, 4:43 p.m. ET, Twitter, available at <https://twitter.com/samjmintz/status/1402728096764211200>.
- 2 Eric McDaniel, "Carbon Dioxide, Which Drives Climate Change, Reaches Highest Level in 4 Million Years," NPR, June 7, 2021, available at <https://www.npr.org/2021/06/07/1004097672/atmospheric-carbon-dioxide-fueling-climate-change-hits-a-four-million-year-high>.
- 3 U.S. Environmental Protection Agency, "Inventory of U.S. Greenhouse Gas Emissions and Sinks, 1990–2019" (Washington: 2021), available at <https://www.epa.gov/sites/production/files/2021-04/documents/us-ghg-inventory-2021-main-text.pdf>.
- 4 Result based on author's calculation from U.S. Environmental Protection Agency, "Inventory of U.S. Greenhouse Gas Emissions and Sinks 1990–2019."
- 5 Union of Concerned Scientists, "Each Country's Share of CO2 Emissions," available at <https://www.ucsusa.org/resources/each-country-share-co2-emissions> (last accessed June 2021).
- 6 The White House, "FACT SHEET: The American Jobs Plan," Press release, March 31, 2021, <https://www.whitehouse.gov/briefing-room/statements-releases/2021/03/31/fact-sheet-the-american-jobs-plan/>.
- 7 Federal Highway Administration, "Historical Monthly VMT Report," available at [https://www.fhwa.dot.gov/policyinformation/travel\\_monitoring/historicvmt.cfm](https://www.fhwa.dot.gov/policyinformation/travel_monitoring/historicvmt.cfm) (last accessed June 2021).
- 8 Federal Highway Administration, "Status of the Nation's Highways, Bridges, and Transit: Conditions and Performance, Appendix A: Highway Investment Analysis Methodology" (Washington: 2020), available at <https://www.fhwa.dot.gov/policy/23cpr/appendixa.cfm>.
- 9 U.S. Census Bureau, "Commuting Characteristics by Sex," available at <https://data.census.gov/cedsci/table?t=Commuting&g=0100000US.04000.001&tid=ACSS5Y2019.S0801> (last accessed June 2021).
- 10 Ibid.
- 11 U.S. Office of Energy Efficiency and Renewable Energy, "FOTW #1113, December 23, 2019: Average Annual Highway Vehicle Miles Traveled Per Capita Varies by State," available at <https://www.energy.gov/eere/vehicles/articles/fotw-1113-december-23-2019-average-annual-highway-vehicle-miles-traveled> (last accessed June 2021).
- 12 Result based on author's calculation from U.S. Environmental Protection Agency, "Greenhouse Gas Emissions from a Typical Passenger Vehicle," available at <https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P100U8YT.pdf> (last accessed July 2021).
- 13 Washington Metropolitan Area Transit Authority, "Rebuilding, Reforming and Improving Regional Transit: FY2019 Approved Budget" (Washington: 2018), available at [https://www.wmata.com/about/records/public\\_docs/upload/FY2019-Approved-Budget.pdf](https://www.wmata.com/about/records/public_docs/upload/FY2019-Approved-Budget.pdf).
- 14 Legislative Budget Office of the Legislative Services Commission, "Transportation Budget in Brief: House Bill 62 – As Enacted," available at <https://www.lsc.ohio.gov/documents/budget/133/transportation/FI/budgetinbrief-hb62-en.pdf> (last accessed June 2021).
- 15 U.S. Census Bureau, "Quick Facts: Columbus city, Ohio; Cleveland city, Ohio; Washington city, District of Columbia; Cincinnati city, Ohio," available at <https://www.census.gov/quickfacts/fact/table/columbuscityohio,clevelandcityohio,washingtoncitydistrictofcolumbia,cincinnati-cityohio/PST045219> (last accessed June 2021).
- 16 District of Columbia, "Code of the District of Columbia, Chapter 6: Zoning and the Height of Buildings," available at <https://code.dccouncil.us/dc/council/code/titles/6/chapters/6/> (last accessed June 2021).
- 17 U.S. Census Bureau, "Selected Housing Characteristics," available at <https://data.census.gov/cedsci/table?t=Housing%20Units&g=0400000US11&tid=ACSDP1Y2019.DP04> (last accessed June 2021).
- 18 Result based on author's calculation from U.S. Census Bureau, "Selected Housing Characteristics."
- 19 Result based on author's calculation from Federal Highway Administration, "Functional System Lane-Length – 2019 Lane-Miles Table HM-60," available at <https://www.fhwa.dot.gov/ohim/hs00/hm60.htm> (last accessed June 2021); Federal Highway Administration, "Functional System Lane-Length – 2019 Lane-Miles Table HM-60," available at <https://www.fhwa.dot.gov/policyinformation/statistics/2019/hm60.cfm> (last accessed June 2021).
- 20 Result based on author's calculation from David Schrank and others, "2021 Urban Mobility Report" (College Station, TX: 2021), available at <https://mobility.tamu.edu/umr/report/>.
- 21 U.S. Bureau of Transportation Statistics, "National Household Travel Survey Daily Travel Quick Facts," available at <https://www.bts.gov/statistical-products/surveys/national-household-travel-survey-daily-travel-quick-facts> (last accessed June 2021).
- 22 INVEST in America Act, H.R. 3684, 117th Cong., 1st sess. (June 4, 2021), available at <https://www.congress.gov/bill/117th-congress/house-bill/3684/text?q=%7B%22search%22%3A%5B%22defazio%22%5D%7D&r=79&s=2>.
- 23 Sam Mintz, @samjmintz, June 9, 2021, 4:43 p.m. ET.
- 24 Moving Ahead for Progress in the 21st Century Act, Public Law 112-141, 112th Cong., 2nd sess. (July 6, 2012), available at <https://www.govinfo.gov/content/pkg/PLAW-112publ141/html/PLAW-112publ141.htm>.
- 25 Cornell University, "23 U.S. Code § 150 - National goals and performance management measures," available at <https://www.law.cornell.edu/uscode/text/23/150> (last accessed June 2021).
- 26 Jim Inhofe, "Congress Did Not Intend Greenhouse Gases to Be Measured for Highway Performance," Eno Center for Transportation, August 18, 2016, available at <https://www.enotrans.org/article/guest-op-ed-congress-not-intend-greenhouse-gases-measured-highway-performance/>.
- 27 INVEST in America Act.
- 28 Ibid.
- 29 Ibid.
- 30 Ibid.
- 31 Ibid.
- 32 Ibid.