

TOWARD A

GREEN NEW DEAL

FOR

TRANSPORTATION

Establishing New Federal Investment Priorities to Build

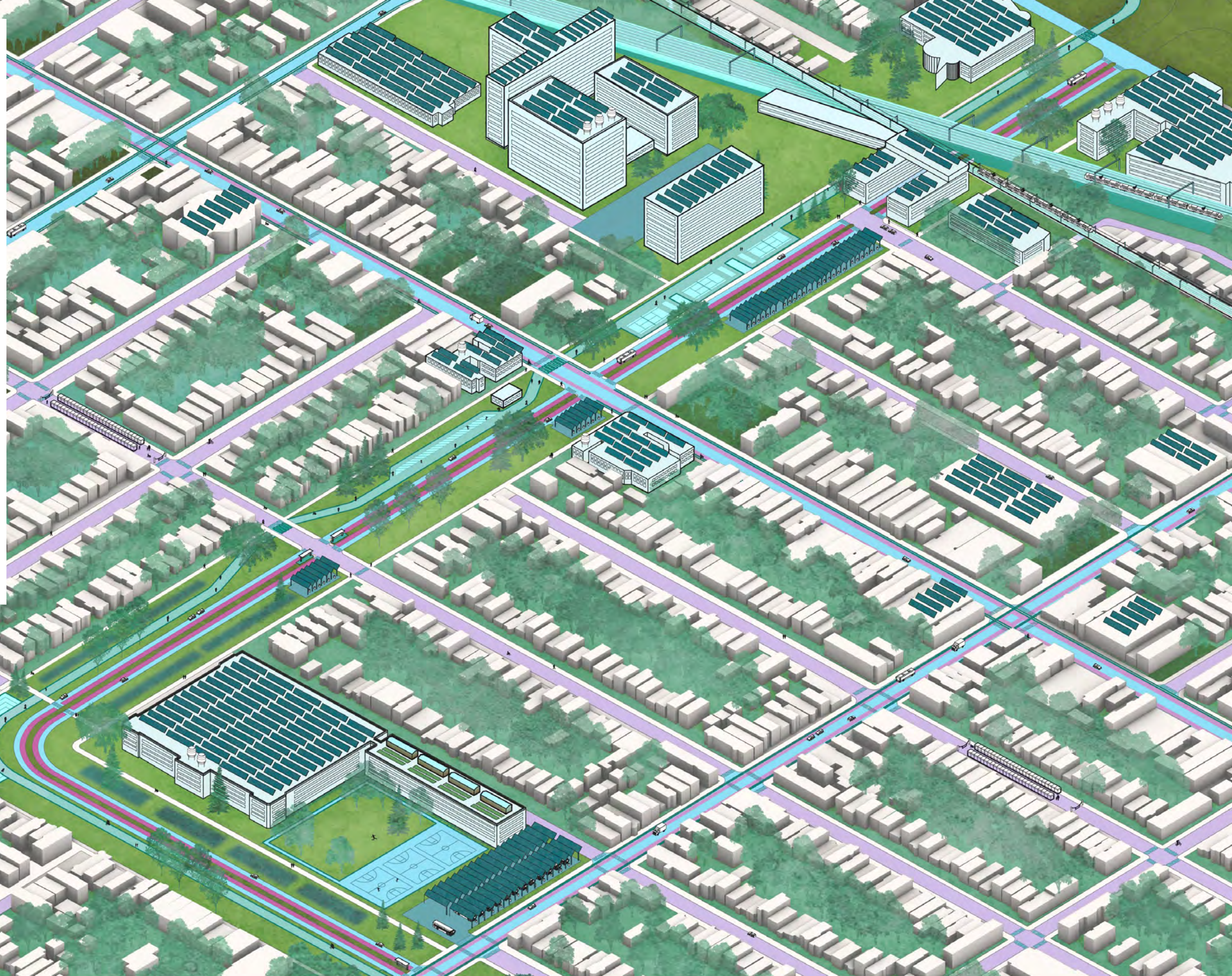
Just and Sustainable Communities

February 2022

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 The McHarg Center

“ The transportation system should be viewed as a strategic lever for investing in good-paying low-carbon jobs, justice, and a decarbonized economy. ”





TOWARD A GREEN NEW DEAL FOR TRANSPORTATION

February 2022

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The **Climate and Community Project (CCP)** works to connect the demands of the climate justice movement to the policy development process. We aim to do this by developing new, investment-forward public policy proposals under the framework of the Decade of the Green New Deal that target the intersection of climate justice and the built environment. We support efforts to address the climate emergency at the scale, scope, and pace needed to confront our overlapping crises.

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EXECUTIVE SUMMARY

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A climate-safe future requires a swift and just decarbonization of the transportation sector, a major expansion of public and active transportation, and the parallel decarbonization of the electricity sector.

”

The transportation system is the connective tissue that transforms pockets of communities into a networked society. It links home, school, work, and play. It drives economic growth, social mobility, and employment opportunities.

The transportation sector currently emits more carbon pollution than any other sector in the US economy. The automobiles we drive, the trucks, trains, and ships that deliver our goods, the airline flights we take, and other transportation activities account for about 28 percent of US greenhouse gas emissions.¹ The passage of President Biden’s Infrastructure Investment and Jobs Act is replete with new funding for state and local highway expansion, and seems likely to further exacerbate the sector’s emissions. More than 120 years after electric vehicles briefly achieved popularity in the 1900s, petroleum products still power over 91 percent of today’s transportation system.² Americans collectively drive more than three trillion vehicle miles per year, most of those as a single driver in an automobile.³ Life in the United States is organized around personal automobiles powered by petroleum. For a Green New Deal in transportation to be possible, that has to change. A climate-safe future requires a swift and just decarbonization of the transportation sector, a major expansion of public and active transportation, and the parallel decarbonization of the electricity sector.

Transportation often exacerbates social inequity and racial injustice within and between communities. Its infrastructure speeds the movement of those who are better off, to the detriment of those who are most in need. In far too many communities, governments, planners, and engineers prioritize vehicles over people and efficiency in travel time at the cost of quality of life.⁴ Choices made by elected officials and transportation agencies about how funds are allocated

1. US Environmental Protection Agency, “Sources of Greenhouse Gas Emissions,” accessed March 20, 2021, <https://www.epa.gov/ghgemissions/sources-greenhouse-gas-emissions>

2. US Department of Energy. *The History of the Electric Car*, September 15, 2014, <https://www.energy.gov/articles/history-electric-car>; U.S. Energy Information Administration, Monthly Energy Review, October 2020, <https://www.eia.gov/totalenergy/data/monthly/>

3. Federal Highway Administration, Traffic Volume Trends, 2020 https://www.fhwa.dot.gov/policyinformation/travel_monitoring/tvt.cfm

4. Sarah Seo, *Policing the Open Road: How Cars Transformed American Freedom* (Cambridge, MA: Harvard University Press, 2019).

at the federal, state, and local levels have played a major role in reinforcing these outcomes over the past century.

In 2021, Congress passed the Infrastructure Investment and Jobs Act – the centerpiece of President Biden’s Bipartisan Infrastructure Framework. It provides substantial new funds for intra-city public transit, intercity passenger rail, and new electric vehicle charging infrastructure. It also includes \$7.5 billion in new discretionary funding for innovative transit projects in the RAISE program (formerly BUILD and TIGER), along with new incentives for roadway repair and maintenance. However, the bill also allocates \$350 billion towards new road and highway projects that will be administered by state and local departments of transportation. Much of this funding is likely to be spent on highway expansion projects. In short, the Infrastructure Investment and Jobs Act is poised to invest in a small number of innovative, low-carbon public transit projects alongside a massive new investment in roads and highways – locking in higher emissions for the sector than those that predated the bill. In other words, the Infrastructure Investment and Jobs Act could invest dramatically more on highway expansion than on innovative, low-carbon public transit projects. That dynamic has to change.

In this report, we propose a series of critical opportunities for new transportation-related policies to improve equal access, mobility, and opportunity in our transportation system, reduce emissions, support global climate cooperation, and develop long-lasting infrastructure and workforce development strategies on a changing planet. We argue for a move away from past policies that encouraged the release of greenhouse gases and other air pollutants while furthering social inequity. Crucially, this report aims to shift the conversation surrounding the transportation sector and decarbonization from focusing exclusively on electric vehicles and high-speed rail to addressing the many disparate parts of America’s transportation system. This includes a focus on intra- and intercity rail in addition to high-speed rail; an approach to electric vehicles that pairs supply-side policies (e.g. manufacturing tax credits) with a more progressive demand-side approach that benefits low- and middle-income households with few public transit options instead of wealthy, coastal city residents who tend to purchase high-end luxury electric vehicles (e.g. Tesla).

Instead, the transportation system should be viewed as a strategic lever for investing in good-paying low-carbon jobs, justice, and a decarbonized economy. We build on the important progress Congress members have made through their introduction of bills such as the Moving Forward Act to identify a series of policies that would further that ambition. A new approach to transportation at the federal level is an essential element of the Green New

Deal and a mechanism to achieve a lasting recovery from the COVID-19 crisis. To remake the US transportation system into a strategic lever in the fight for climate, economic, and racial justice, the surface transportation reauthorization bill must adhere to the following three goals, which we describe in more detail in subsequent sections:

1. Eliminate the use of fossil fuels by vehicles for surface passenger and freight transport, with public-sector electrification complete by 2030, relying on a zero-emissions energy grid.

RECOMMENDATIONS:

- **Allocate \$300 billion for the full electrification of publicly owned buses, school buses, cars, trucks, vans, postal vehicles, railroads, sanitation vehicles, and other fleets by 2030.** Allocate funds by formula to states, local governments, and special authorities based on population size and existing service provided. The electrification of our transportation system offers an ideal opportunity to create new, clean jobs throughout the country.
- **Rapidly reduce the use of fossil fuels in privately owned vehicles.** Provide universally available funds for bike purchases, with added incentives for e-bikes and companies replacing local freight delivery with cargo e-bikes. Create a \$300 billion Clean Mobility for Clunkers program that enables consumers, along a sliding income scale, to trade in older gasoline vehicles for a credit toward a new or used electric vehicle, an electric bicycle, annual passes for transit or micro-mobility, or a combination of these options. Deploy 10,000 miles of protected bike lanes coupled with green infrastructure.
- **Rapidly reduce the use of fossil fuels in freight vehicles.** Assist freight providers with a transition to electricity. Require 50 percent of new light-duty vehicles sold in the United States to be plug-in electric by 2025, and 100 percent by 2030. Provide substantial new tax credits, low-interest loans, and other assistance to automobile manufacturers to drive production in this sector. Impose similar requirements on taxi and ride-hailing providers. Require 50 percent of deliveries of materiel purchased by the US government to be made by a zero-emissions vehicle by 2025, and 100 percent by 2030.
- **Decarbonize the transportation sector with a 100 percent clean electric grid by 2030.** Require 100 percent clean electricity for federal facility purchases by 2025. Provide grants to assist state and local governments and transit agencies in

deploying electric vehicle charging infrastructure and training a new local, low-carbon workforce.

affordable, and convenient means to travel for all.

2. Reduce the resource intensity of the transportation sector by 2030, with the goal of increasing public transit use five-fold, reducing drive-alone commuting share by a third, and reducing per capita vehicle-miles traveled by 25 percent, all while minimizing the environmentally destructive elements of electrification technology. Encourage the creation of walkable, accessible, transit-oriented communities accessible to all and cease the spread of development onto greenfield areas.

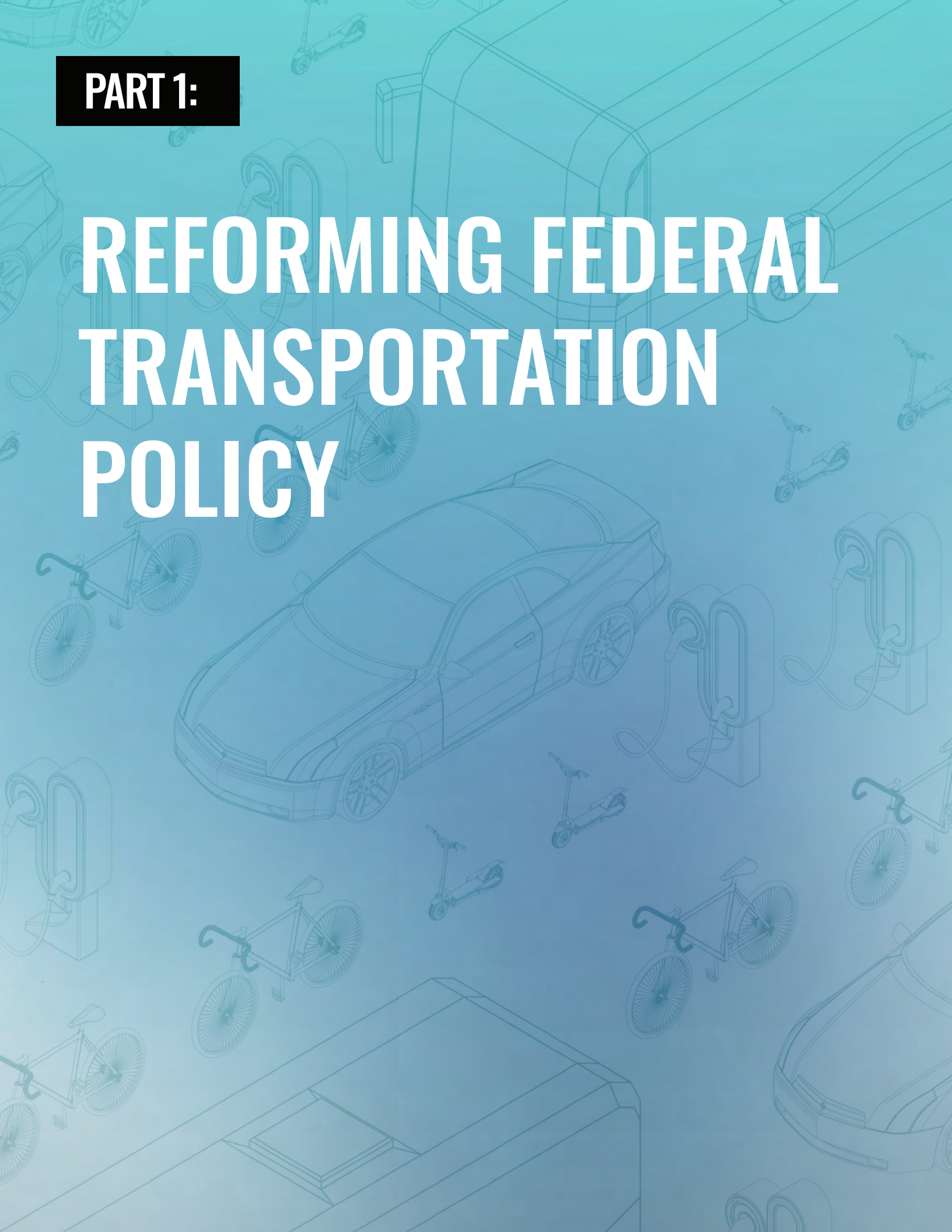
RECOMMENDATIONS:

- **Reduce the total volume of extraction for battery materials in sensitive ecosystems and disadvantaged communities.** Subject imported materials and components to the highest standards for labor rights, human rights, and Indigenous rights, as well as for environmental sustainability and emissions. Policies should maximize recycling capacity for lithium-ion batteries and require manufacturers to use recovered materials, as well as incentivize second-life re-use for stationary applications.
- **End the use of federal infrastructure funding for new highway infrastructure, except for focused opportunities that improve equity.** Provide immediate funds for a quick-start infrastructure program for walking and cycling. Vastly expand support for transit and metropolitan network planning.
- **Appropriate \$250 billion over 10 years, or \$25 billion annually, in federal funding bill to support transit operations funding throughout the United States.**
- **Increase federal support for transit and intercity rail to \$400 billion over 10 years, or \$40 billion annually,** providing funds for new lines, maintenance of existing infrastructure, and upgrades designed for equitable accessibility.
- **Require metropolitan planning organization voting systems to be proportional to resident population.** Mandate adjustments to local zoning policy to enable more dense, affordable housing near transit in exchange for federal aid. Implement regional commuter benefits throughout the nation.

3. Use transportation policy and programs as mechanisms to develop a more equitable society that ensures system-wide accessibility by 2025 and safe,

PART 1:

REFORMING FEDERAL TRANSPORTATION POLICY



1. REFORMING FEDERAL TRANSPORTATION POLICY

1.1 A century of auto-dominated surface transportation investments

For more than a century, a central function of the federal government has been to fund surface transportation. Authorized in the US Constitution, the investment in post roads created the US highway system. Interspersed with local and state roads, this investment supported the nationwide paved road network that connected towns from coast to coast. It also contributed infrequently to transit investments, supporting the construction of a few subway lines in cities like Chicago and New York during the Great Depression.

Until World War II, this commitment was limited, and it largely supported, rather than displaced, the privately owned streetcar and intercity railroads that dominated motorized movement in the country well into the 1920s and 1930s. But with the passage of the Interstate Highway Act under President Dwight Eisenhower in 1956, the government committed to a vast increase in funding for highways—specifically grade-separated freeways designed to move private cars and trucks at high speeds. Enthusiastic about the infusion of federal funds, states and cities allowed their landscapes to be reconstructed around the car, which meant broad swaths of communities wiped out for pavement, new cul-de-sac and strip-mall development, and the slow but steady decline of historic town centers that had been built up around walking and transit.⁵

Through this process, the federal government used infrastructure investment as a system of wealth redistribution from cities, where Black residents were finally gaining access to jobs through the second Great Migration, to newly developed suburbs, which were often exclusively white. Quality housing stock, access to employment, and effective public services were reallocated from center cities outward. Many of the jobs for highway construction

were reserved for white people. And basic elements of a healthy life, like moving around one's neighborhood, were slowly eliminated and replaced by automobility.

Over the course of the next six and a half decades, federal transportation policy has overwhelmingly focused on funding highway construction and maintenance. Between 1956 and 2014, the federal government committed a total of \$2.2 trillion (2014 dollars) to highways, almost four times as much as it spent on transit and rail infrastructure. In the formative period before 1970, when the first stages of the Interstate Highway System were being completed, the federal government spent almost 80 times as much on road construction as on transit projects.⁶

State and local governments, which collectively spend about three times as much on surface transportation as the federal government, made similar choices. Using funds they collected themselves, often from locally assessed fuel taxes as well as general funds from income and property taxes, these lower levels of government spent a total of \$7.8 trillion on surface transportation during the same time period, of which almost 80 percent went to highways.⁷ In other words, governments at all levels in the United States worked in unison to create a national roadway system that worked most effectively for car-owning, suburban white Americans. Racism is embedded in the transportation system.

Despite the fact that the federal government's transportation funding is putatively self-funded by a "user fee" motor fuel tax, recent decades have seen significant shortfalls in revenues from these sources. Since the mid-2000s, Congress has authorized the federal government to repeatedly transfer tens of billions of dollars to the Highway Trust Fund from general tax revenue to continue supporting road construction despite inadequate gas-tax income. Because the federal gasoline tax has remained at the same 18.4 cents per gallon level since 1993, inflation has eroded much of the investment capacity the tax provided. In order to keep up with inflation, the gasoline tax would

5. Robert M. Fogelson, *Downtown: Its Rise and Fall* (New Haven, CT: Yale University Press, 2001); Tom Lewis, *Divided Highways*. (Ithaca, NY: Cornell University Press, 1997); Earl Swift, *The Big Roads*. (New York, NY: Houghton Mifflin Harcourt, 2011).

6. US Congressional Budget Office, *Public Spending on Transportation and Water Infrastructure, 1956 to 2014*, March 2, 2015, <https://www.cbo.gov/publication/49910>

7. Ibid; Pew Charitable Trusts, *Transportation Report*, 2014, https://www.pewtrusts.org/-/media/assets/2014/09/ff-transportation-report-horizontal-graphics_v3_123114.pdf

need to be nearly doubled to 33 cents per gallon to match 1993 levels.⁸ At the state and local level, only 53 percent of road costs are supported by fuel taxes and tolls—with the rest supported by other sources of funds, like sales taxes, regardless of whether, or how much, taxpayers drive.⁹

The 2015 FAST (Fixing America's Surface Transportation) Act, included \$226 billion for highway spending by states over five years—with no requirement that those funds be allocated to fix broken infrastructure first or ensure adequate funding for non-automobile modes. In August 2021, Congress reauthorized the act under the Surface Transportation Reauthorization Act of 2021 as part of the Bipartisan Infrastructure package, which included provisions for hundreds of billions of dollars in income-tax-supported debt to cover shortfalls in gas tax revenues.

In contrast, between 1992 and 2012, just \$7.2 billion was spent on bicycling and pedestrian infrastructure by all levels of government.¹⁰ There is no question that the government is subsidizing infrastructure for private cars and trucking. In some ways, the US transportation system is a form of soft industrial policy: a mechanism to stimulate road use, which, in turn, encourages exurban greenfield development and a massive automobile manufacturing industry, all of which challenge the country's ability to respond effectively to climate change.

Over-investment in automobile infrastructure has deprived Americans of alternatives. Americans became reliant on cars and adapted their lives to the automobile. The share of Americans driving alone to work increased from 54 percent in 1970 to more than 75 percent in 2000—a rate that has plateaued since. As of 2018, there were 0.91 vehicles per US resident, up from 0.73 in 1994.

Overall, driving in the country increased by more than 50 percent between 1991 and 2020—despite the country's population increasing by only 30 percent over that period.¹¹ A 2020 survey of voters found that, lacking other options, they have no choice but to use their cars to get around.¹²

These trends are supported by a vicious circle of transportation policy and responses by individuals who are simply trying to live their lives. Federal, state, and local governments subsidize automobile use, making it cheaper to use personal automobiles for day-to-day needs. People choose to buy cars and drive them on short trips, rather than walking or biking, and in the process, they pollute. Transit networks lose passengers and political support for new investment. New developments, jobs, and even places of learning are designed to primarily serve drivers, thereby cutting off people who do not drive from employment and other needs.¹³ This type of development, plus political support from carbon-emitting industries and an automobile-dependent public,¹⁴ encourages more government subsidies for highways. Thus more automobile and truck use follows.

American cities have transformed from places where it was feasible—even desirable—to live and move without using a car, to places where such opportunities are made difficult not only by the transportation system itself, but also by the way the world is constructed around such transportation. In 1969, 48 percent of children walked to school; as of 2009, that figure had fallen to just 13 percent. Of the 41 percent of US trips that are three miles or less, more than two-thirds are made by personal vehicle. Shipping by truck has increased considerably more than shipping by rail since 1980, and trucking now accounts for more than 50 percent of all cargo volume shipped. No wonder

8. US Bureau of Labor and Statistics, Consumer Price Index Inflation Calculator, accessed March 20, 2021, https://www.bls.gov/data/inflation_calculator.htm

9. Pew Charitable Trusts, *Transportation Report*, 2014, https://www.pewtrusts.org/-/media/assets/2014/09/ff-transportation-report-horizontal-graphics_v3_123114.pdf; Janelle Cammenga, "How Are Your State's Roads Funded?" *The Tax Foundation*, 2019, <https://taxfoundation.org/states-road-funding-2019/>

10. US Federal Highway Administration, Fixing America's Surface Transportation Act or "FAST Act," December 5, 2019, <https://www.fhwa.dot.gov/fastact>; US Department of Transportation, Use of Federal Funds for Bicycle and Pedestrian Efforts, August 24, 2015, <https://www.transportation.gov/mission/health/use-federal-funds-bicycle-pedestrian-efforts>

11. Yonah Freemark, *The Transport Databook*, 2020, <https://www.thetransportpolitic.com/databook>

12. John Ray et al., *Voters Want a Better Transit System for America*, Data for Progress, March 2020 <https://filesforprogress.org/memos/gnd-for-transit-polling.pdf>

13. Adie Tomer, *Transit Access and Zero-Vehicle Households*, Brookings, 2011, https://www.brookings.edu/wp-content/uploads/2016/06/0818_transportation_tomer.pdf

14. Robinson Meyer, "A Major but Little-Known Supporter of Climate Denial: Freight Railroads," *The Atlantic*, December 13, 2019; Giulio Mattioli, Cameron Roberts, Julia K. Steinberger, and Andrew Brown, "The Political Economy of Car Dependence: A Systems of Provision Approach," *Energy Research & Social Science* 66 (2020).

our highways are packed with tractor-trailers from coast to coast.¹⁵ No wonder so many people breathe polluted air.

The federally supported transportation system in the United States is largely dependent on fossil fuels. The entirety of the freight system—save a few dozen miles of railroad in Arizona, Colorado, and Iowa¹⁶—uses trucks and trains that release greenhouse gases. Only about two percent of new automobiles sold in the United States are electric.¹⁷ Alternatives to automobiles are much less used than in other countries. Americans rode one-third as many miles by train as French or German residents overall, despite Americans outnumbering each by more than four times.¹⁸

This dependence on gas-powered private automobiles has had a number of nefarious effects. First among them is the fact that the transportation sector in the United States contributes almost a third of overall greenhouse gas emissions nationally—and those figures have been rising since the Great Recession, even as the rest of the economy has shifted toward renewable electricity.¹⁹ Second, particulate pollution released by gas-powered automobiles (through tailpipe emissions, but also tire wear, brakes, and asphalt) is increasing and sickening more people.²⁰ Third, America's car-dependent transportation system excludes full participation by young people, older people, and people with disabilities. People who cannot afford the high costs of car ownership and maintenance are

forced to spend a high share of their incomes just to get around. Drivers are borrowing more money over longer terms for vehicles. In March 2020, the average loan term for a new car exceeded 70 months for the first time on record, and the average monthly payment was \$573.²¹ For those who do not have access to cars, long commutes only worsen their structural disadvantage. More car-dependent regions are also found to have higher income inequality.²²

Moreover, federal transportation policy has further entrenched the racial inequities that persist in America. Black Americans are far more likely to commute by transit than white Americans; according to US Census data, Black people take transit to work at three times the rate of white people. Moreover, about 15 percent of households headed by people of color have no access to cars, compared to just 6.5 percent of white households.²³ Yet federal support is far greater for automobile-based modes than buses or trains. Families of color, too, are more likely to suffer the brunt of the pollution impacts of automobile transportation—exposure to higher levels of particulates—which leads to higher rates of lung disease.²⁴ Meanwhile, among pedestrians, people of color are more likely to be hit and killed by cars—and Black people are much more likely to be killed in routine encounters with the police, such as in traffic stops.²⁵

US policy has failed to produce a mobility system that works for everyone and that encourages movement in

15. Pedestrian and Bicycle Information Center, *The Decline of Walking and Biking*, 2020, http://guide.saferoutesinfo.org/introduction/the_decline_of_walking_and_bicycling.cfm; Melissa S. Kearney, Brad Hershbein, and Greg Nantz, *Racing Ahead or Falling Behind? 6 Economic Facts about Transportation Infrastructure in the United States*, Brookings, 2015 <https://www.brookings.edu/research/racing-ahead-or-falling-behind-6-economic-facts-about-transportation-infrastructure-in-the-united-states/>; Todd Litman, *Short and Sweet: Analysis of Shorter Trips Using National Personal Travel Survey Data*, Victoria Transport Policy Institute, July 18, 2017, https://www.vtpi.org/short_sweet.pdf

16. Iron Compass (blog), *Electric Freight Railroads in the US*, June 12, 2013, <https://web.archive.org/web/20161014003953/https://ironcompass.wordpress.com/2013/06/12/electric-freight-railroads-in-the-us/>

17. EVAdoption, *New Electric Vehicle Sales Market Share for 2016, 2017 and Forecast for 2018 (full year) for Selected Markets*, accessed March 20, 2021, <https://evadoption.com/ev-market-share/>

18. OECD, *Passenger Transport (indicator)*, November 11, 2020, <https://data.oecd.org/transport/passenger-transport.htm>

19. US Environmental Protection Agency, *Sources of Greenhouse Gas Emissions*, 2020, <https://www.epa.gov/ghgemissions/sources-greenhouse-gas-emissions>

20. Christopher Ingraham, "Air Pollution Is Getting Worse, and Data Show More People Are Dying," *Washington Post*, October 23, 2019.

21. Edmunds, *Auto Loan Interest Rates See a Slight Lift in March*, According to Edmunds, April 1, 2020 <https://www.edmunds.com/industry/press/auto-loan-interest-rates-see-a-slight-lift-in-march-according-to-edmunds.html>

22. Giulio Mattioli and Matteo Colleoni, "Transport Disadvantage, Car Dependence and Urban Form," in P. Pucci P and M. Colleoni (eds.), *Understanding Mobilities for Designing Contemporary Cities: Research for Development* (Cham: Springer, 2016); Chad Frederick and John Gilderbloom, "Commute Mode Diversity and Income Inequality: An Inter-urban Analysis of 148 Midsize US Cities," *Local Environment* 23, no.1 (2018): 54–76.

23. See a summary in Yonah Freemark, @yfreemark, thread on Twitter, June 9, 2020, <https://twitter.com/yfreemark/status/1270362572781477888>

ways that minimize carbon emissions. To a large degree, US policy has done the opposite, creating a society that is affixed to the “carbon form” of automobility and freight trucking.²⁶ Justice demands we create a different sort of society. Advancing federal transportation legislation that prioritizes sustainability and equity to its very core, rather than the continuation of a problematic roads-based transportation system, is vital for a just decarbonizing of the United States.

1.2 Concepts for reform

In 2020, the US House of Representatives passed H.R. 2, the Moving Forward Act, legislation that would reauthorize surface transportation funding while also allocating hundreds of billions of dollars for other priorities, like energy infrastructure, education, affordable housing, hospitals, and more.²⁷ The legislation took important steps toward making federal support for transportation more focused on sustainability and equity. For example, it would significantly increase the share of overall surface transportation funding going to transit. In the FAST Act, 3.4 times as much funding was allocated to highways as transit; in H.R. 2, this ratio declined to two times as much. H.R. 2 would also require states to first spend money on fixing existing infrastructure before expanding the roadway system. It would provide a major uptick in funding for Amtrak and new intercity rail corridors, and it would double funds for transit expansion projects. It would also dedicate new funding for electrification of bus fleets, while measuring greenhouse gas emissions at the state level. These investments would spur new jobs and eventually result in more transportation options and better health for Americans.

24. Ihab Mikati, Adam Benson, Thomas Luben, Jason Sacks, and Jennifer Richmond-Bryant, “Disparities in Distributions of Particulate Matter Emission Sources by Race and Poverty Status,” *American Journal of Public Health* 108, no. 4 (2018): 480-485.

25. See Danielle Haynes, Study: Black Americans 3 times more likely to be killed by police, UPI, June 24, 2020, https://www.upi.com/Top_News/US/2020/06/24/Study-Black-Americans-3-times-more-likely-to-be-killed-by-police/6121592949925/; Lindsey Cook, The Inequality of Who Gets Hit By Cars, *US News*, October 19 2015, <https://www.usnews.com/news/blogs/data-mine/2015/10/19/the-inequality-of-who-gets-hit-by-cars>

26. John Urry, “The ‘System’ of Automobility,” *Theory Culture & Society* 21, no. 4–5 (2004): 25–39; Elisa Iturbe (ed.), *Overcoming Carbon Form*, *Log* 47 (2019).

Unfortunately, the legislation included a number of drawbacks. It would expand funding for highways compared to the previous legislation. It would also authorize a \$145 billion transfer of general funds—derived from the income tax rather than fuel taxes—to the Highway Trust Fund, meaning the continuation of the significant additional subsidy to expand highways that has existed since the late 2000s.²⁸ And it would offer only \$1.4 billion for alternative fuel charging infrastructure—less than a dollar per year per person for this issue of vital importance. In other words, H.R. 2 wouldn’t go nearly far enough. That’s just as well, since the legislation died in the Republican-controlled Senate.

As part of his presidential campaign platform, President Joe Biden released a major infrastructure proposal that intended to play an important role in influencing future federal transportation legislation.²⁹ The plan’s goal was to achieve a zero-emissions economy by 2050 (2035 for the power sector), beginning with \$2 trillion in investments over ten years. The plan offered several specific ideas about transportation, including funding zero-emissions transit systems for all cities with at least 100,000 residents; expanding the railway system; and electrifying the remainder of the transportation network, including all new buses (transit and school) by 2030.²⁹ Biden also proposed deploying 500,000 public charging stations by 2030 and an electric vehicle tax credit, combined with improved fuel-economy requirements. Finally, he suggested governance reforms that would encourage unionization among workers and give state and local governments more flexibility in spending—allowing them, for example, more ability to use their highway funding on transit. Through a new executive order signed at the end of January, the White House has taken the first step toward a more

27. US House Transportation and Infrastructure Committee, Led by Chair DeFazio, House Democrats Approve Transformational Infrastructure Bill to Rebuild America, July 1, 2020, <https://transportation.house.gov/news/press-releases/led-by-chair-defazio-house-democrats-approve-transformational-infrastructure-bill-to-rebuild-america>

28. Kevin DeGood, @kevin_degood, Tweet, June 22, 2020, https://twitter.com/kevin_degood/status/1275070593642033154

29. The Trump campaign has not released an equivalent infrastructure platform. Biden Harris Campaign, The Biden Plan to Build a Modern, Sustainable Infrastructure and an Equitable Clean Energy Future, 2020, <https://joebiden.com/clean-energy/>; Biden Harris Campaign, The Biden Plan for a Clean Energy Revolution and Environmental Justice, 2020, <https://joebiden.com/climate-plan/>

sustainable mobility system—creating a task force to plan for the electrification of the government vehicle fleets.³⁰

In 2021, Congress passed the Infrastructure Investment and Jobs Act – the centerpiece of President Biden’s Bipartisan Infrastructure Framework. It provides substantial new funds for intra-city public transit, intercity passenger rail, and new electric vehicle charging infrastructure. It also includes \$7.5 billion in new discretionary funding for innovative transit projects in the RAISE program (formerly BUILD and TIGER), along with new incentives for roadway repair and maintenance. However, the bill also allocates \$350 billion towards new road and highway projects that will be administered by state and local departments of transportation. Much of this funding is likely to be spent on highway expansion projects. In short, the Infrastructure Investment and Jobs Act is poised to invest in a small number of innovative, low-carbon public transit projects alongside a massive new investment in roads and highways – locking in higher emissions for the sector than those that predated the bill. In other words, the Infrastructure Investment and Jobs Act could invest dramatically more on highway expansion than on innovative, low-carbon public transit projects. That dynamic has to change.

As passed, President Biden’s Bipartisan Infrastructure bill aligns with many of his platform’s job and economic growth goals while ignoring or undermining those tied to carbon emissions and frontline communities. It will create new jobs and localized economic development through the more than \$350 billion earmarked for new highway construction projects. But those projects will also create a short-term spike in carbon emissions (concrete production is an exceptionally high-carbon industrial activity) and, if history is any guide, many of those projects will be sited in low-income communities of color—bringing with them new pollutants and dangerous, high-speed traffic patterns as the new highways are completed. On the more positive side, the \$110 billion set aside in the bill

for “climate resilience” infrastructure is targeted toward critical facilities—a category that includes hospitals and wastewater treatment plants, alongside prisons, oil and gas refineries, and other fossil fuel infrastructures.

We are also encouraged in our pursuit of a more just, sustainable mobility system by other recent changes proposed in Congress. The 2020 House resolution introduced by Representatives Jesús G. “Chuy” García, Ayanna Pressley, and Hakeem Jeffries recommends that federal investment in public transit be put on an equal playing field with spending on highways. Representatives Andy Levin and Alexandria Ocasio-Cortez’s Electric Vehicle Freedom Act would fund a network of high-speed vehicle charging stations. Similarly, members of the House recently introduced the CLEAN Future Act, which targets reducing the nation’s greenhouse gas emissions by 2030 to 50 percent of what they were in 2005, an admirable and ambitious goal that would require a revamped and decarbonized transportation system.³¹ If passed, these policies would represent a sea change in the way the United States invests in and uses the mobility network.

30. Executive Order 14008, Tackling the Climate Crisis at Home and Abroad (Jan. 27, 2021), <https://www.whitehouse.gov/briefing-room/presidential-actions/2021/01/27/executive-order-on-tackling-the-climate-crisis-at-home-and-abroad/>

31. US Congressman Jesús G. “Chuy” García, “Reps. García, Pressley, and Jeffries Introduce Transit Parity Resolution,” December 10, 2020, <https://chuygarcia.house.gov/media/press-releases/rebs-garcia-pressley-and-jeffries-introduce-transit-parity-resolution>; U.S. Representative Andy Levin, “Reps. Andy Levin, Ocasio-Cortez Introduce Transformative Bill to Create Electric Vehicle Charging Infrastructure,” February 6, 2020, <https://andylevin.house.gov/media/press-releases/rebs-andy-levin-ocasio-cortez-introduce-transformative-bill-create-electric>; Rachel Frazin, “House Democrats Reintroduce Road Map to Carbon Neutrality by 2050,” *The Hill*, March 2, 2021, <https://thehill.com/policy/energy-environment/541228-house-democrats-reintroduce-roadmap-to-carbon-neutrality-by-2050>

LESSONS FROM ABROAD

In the following sections, we lay out several proposals essential for ensuring that new federal transportation legislation produces a truly sustainable and equitable mobility system—and leads to a just and equitable society as well. Before we turn to these proposals, we explore successful transitions that other countries have undertaken as examples of what a transition in the United States could accomplish.

Consider the steps certain countries have taken to electrify their transportation systems. In Norway, the national government exempted electric automobiles from registration fees and value-added taxes, bringing their purchase prices down to those of fossil fuel-powered cars. People have been able to take advantage of the almost entirely renewables-derived electric grid in that country. Today, a majority of new cars sold in Norway are plug-in electric vehicles—up from almost none in 2012.³²

Electrification of the shared-vehicle fleet accelerates the electric vehicle market and brings local benefits. In Montréal, the city transit agency plans to electrify the entire local bus network; all new buses will be electric by 2025, and a fully electric line has recently been launched.³³ Down the road in Toronto, Metrolinx, the transit operator, is electrifying diesel commuter rail lines and ensuring that they provide frequent all-day service to customers throughout the region; the plan is expected to massively increase ridership as it improves air quality.³⁴ And in China, government officials recently announced plans to move long-distance freight on high-speed electrified rail lines, taking advantage of that country's massive rail system.³⁵

The creation of a sustainable, equitable mobility system, however, requires more than simply electrifying motorized vehicles. Several countries have pioneered new approaches to encouraging human-powered mobility. In the Netherlands, for example, biking was a primary mechanism of moving through Amsterdam until the 1950s, but in the 1960s and '70s, automobile use expanded exponentially as residents took advantage of cheap car access. The result was an epidemic of road deaths, traffic congestion, and pollution. In response, city leaders led a massive reconstruction of city streets to add space for bicyclists and pedestrians; now the city has some of the highest levels of bicycling in the world, accounting for more than 20 percent of daily trips.³⁶ This story demonstrates how infrastructure changes can play an essential role in promoting a shift away from greenhouse-gas-emitting vehicles to pollution-free, low-cost walking and biking. Shifting a trip in a personal automobile powered with an internal combustion engine to an electrified one is a first step in cutting greenhouse gas emissions, and would reduce GHGs by about 66 percent compared to a current average gasoline vehicle in the US.³⁷ Shifting out of a motorized car altogether is a second, even more promising step for decarbonization.

Infrastructure improvements in the Netherlands have been supported by significant public assistance. Hoping to increase biking even further, the country recently committed \$390 million over three years to bicycling infrastructure, much of which will be used to build “cycling freeways” and new bike parking spaces.³⁸ In a similar vein, in the Paris metropolitan area in France, the regional government is supporting a major expansion in bike rentals, including for short-distance freight movement. Both

32. EVA Adoption, New Electric Vehicle Sales Market Share for 2016, 2017 and Forecast for 2018 (full year) for Selected Markets, 2020, <https://evadoption.com/ev-market-share/>

33. Lena Stanisky, Montreal Will Soon Have the First Fully-Electric Public Bus Line In Canada, *MTL Blog*, 2020, <https://www.mtlblog.com/news/canada/qc/montreal/montreals-stm-will-soon-have-the-first-fully-electric-public-bus-line-in-canada>

34. Metrolinx, Going Electric, 2020, <http://www.metrolinx.com/en/electrification/electric.aspx>

35. Matt Ho, “China Planning High-Speed Rail Freight Network to Help e-Commerce Sector,” *South China Morning Post*, August 23, 2020.

36. Cornelia Dinca, How Amsterdam Became Bike Friendly (Again), Sustainable Amsterdam (blog), April 7, 2015, <http://sustainableamsterdam.com/2015/04/how-amsterdam-became-bike-friendly/>; Project for Public Spaces, What Can We Learn about Road Safety from the Dutch? (blog), February 28, 2010, <https://www.pps.org/article/what-can-we-learn-about-road-safety-from-the-dutch>

37. Abdullah F. Alarfaj, W. Michael Griffin, and Constantine Samaras, “Decarbonizing US Passenger Vehicle Transport under Electrification and Automation Uncertainty Has a Travel Budget,” *Environmental Research Letters* 15, no. 9 (2020): 0940c2.

38. Andrea Lo, “The Netherlands Is Paying People to Cycle,” *CNN*, December 21, 2018.

LESSONS FROM ABROAD

regional and national governments provide individuals and companies up to €500 in assistance for the purchase of electric bikes. The results have been speedy: cycling in Paris has almost doubled between 2019 and 2020.³⁹ In Lithuania, the Environmental Project Management Agency rolled out a 2020 program that trades in old cars for a one-time payment, a yearly public transit pass, or subsidies for the purchase of a moped, electric or regular bicycle, or electric scooter.⁴⁰ With 8,518 applications, the program has proven to be so popular that the budget was nearly doubled again less than six months after it was initiated.

Finally, a transition to more sustainable infrastructure needs to be matched by changes in how we build our communities. In France, the government plans to achieve zero net land development by 2030, preventing land the size of the entire state of Rhode Island from being developed. This policy, combined with the planned densification of existing land, is designed to reduce sprawl and encourage more livable, walkable communities. The result will be fewer drivers and more people walking, on bike, or in transit.⁴¹

These are compelling examples of what could be accomplished in the United States if the federal government took the initiative to develop a streamlined plan to reshape the transportation system. If these ideas seem far off, consider that—despite the problems accumulated over time—the United States once led the world in streetcar ridership. It pioneered new railroad technologies up until the 1950s. It even was in the avant-garde of automated train technologies in the 1960s. Rather than fall back on the automobile dependence the country acquired in the second half of the 20th century, America

must reassert its ingenuity when it comes to creating livable, sustainable, and equitable places connected with a modern transportation system. In the next sections, we lay out what is needed to make such changes possible.

39. Région Île-de-France, En 2020, le vélo passe à la vitesse supérieure en Île-de-France, January 16, 2020, <https://www.iledefrance.fr/en-2020-le-velo-passe-la-vitesse-superieure-en-ile-de-france>

40. Paulius Vaitekėnas, LRT.lt. “Lithuanians Splash Out on Electric Scooters in Cash-for-Clunkers Programme,” Lrt.lt, October 29, 2020, <https://www.lrt.lt/en/news-in-english/19/1260026/lithuanians-splash-out-on-electric-scooters-in-cash-for-clunkers-programme>

41. Julien Fosse, Objectif « zéro artificialisation nette » : quels leviers pour protéger les sols ?, France Stratégie, July 23, 2020, <https://www.strategie.gouv.fr/publications/objectif-zero-artificialisation-nette-leviers-protoger-sols>

PART 2:

PROPOSAL: DECARBONIZE THE SURFACE TRANSPORTATION SECTOR



2. PROPOSAL: DECARBONIZE THE SURFACE TRANSPORTATION SECTOR

2.1 Electrify the public fleet

RECOMMENDATIONS:

- **Allocate \$300 billion for the full electrification of publicly owned buses, school buses, cars, trucks, vans, postal vehicles, railroads, sanitation vehicles, and other fleets by 2030.**
- **Allocate funds by formula to states, local governments, and special authorities based on population size and existing service provided.**

The first priority for public investment in decarbonizing the US transportation sector is electrifying the fleet of public buses and transit vehicles. Today, the vast majority of such buses run on diesel, which not only releases carbon dioxide, but also produces air pollution linked to lung disease and premature death. Since low-income and minority individuals are more likely to be exposed to such pollution, remediating this problem would produce a more sustainable transportation system overall and a system that has fewer inequitable effects.⁴²

42. Christopher Tessum et al., “Inequity in Consumption of Goods and Services Adds to Racial–Ethnic Disparities in Air Pollution Exposure,” *PNAS* 116, no. 13 (2019): 6001–6006.

43. White House, Executive Order on Tackling the Climate Crisis at Home and Abroad, 2021, January 27. <https://www.whitehouse.gov/briefing-room/presidential-actions/2021/01/27/executive-order-on-tackling-the-climate-crisis-at-home-and-abroad/>

44. Skibell, Arianna. “Federal Fleet Electrification Faces Delays.” *E&E News - Climate Wire*. Politico LLC, August 27, 2021. [https://www.eenews.net/articles/federal-fleet-electrification-faces-delays/#:~:text=In%20January%2C%20Biden%20signed%20an,28\)](https://www.eenews.net/articles/federal-fleet-electrification-faces-delays/#:~:text=In%20January%2C%20Biden%20signed%20an,28)).

45. National School Transportation Association, *The Yellow School Bus Industry*, 2013, <https://s3-us-west-2.amazonaws.com/nsta/6571/Yellow-School-Bus-Industry-White-Paper.pdf>; Wendell Cox, School Buses: America’s Largest Transit System, *New Geography*, December 16, 2014, <https://www.newgeography.com/content/004801-school-buses-america-largest-transit-system>; Julia Pypers, “Teenager’s Invention Saves Fuel

President Biden took an important first step in this direction with his January 27, 2021, executive order on tackling the climate crisis. In that document, he reaffirmed the goal of moving the nation toward a carbon-free energy sector by 2035, and established a new federal task force to develop a plan to ensure “clean and zero-emission vehicles for Federal, State, local and Tribal government fleets, including vehicles of the United States Postal Service” and that “the United States [retain] the union jobs integral to and involved in running and maintaining clean and zero-emission fleets, while spurring the creation of union jobs in the manufacture of those new vehicles.”⁴³ This order should be used as a baseline for immediate federal climate action—coupling decarbonization with the vast expansion of good-paying jobs. As of late August 2021, less than 1% of the fleet was electrified. However, supply chain disruptions are partially to blame.⁴⁴

The public fleet running on fossil fuels in the United States is large. About 480,000 school buses operate throughout the country, making a total of about 52 million trips a day.⁴⁵ On top of this fleet are the roughly 70,000 buses and 70,000 demand-response vehicles (like vans or smaller shuttles) operated or contracted out by transit agencies. In addition, there are several thousand commuter rail cars and locomotives, most of which operate using diesel (light and metro rail services run on electricity). Finally, there are more than 645,000 cars and trucks in the federal

for School Buses,” *Scientific American*, August 15, 2012, <https://www.scientificamerican.com/article/teenagers-invention-saves-fuel-for-school-buses/>; American Public Transportation Association, 2020 *Public Transportation Fact Book*, March 2020, <https://www.apta.com/wp-content/uploads/APTA-2020-Fact-Book.pdf>; Jerry Hirsch, Postal Service to Start Negotiations for Giant Mail Truck Contract, Trucks.com, August 11, 2020, <https://www.trucks.com/2020/08/11/postal-service-mail-truck-replacement-contract/>; Ben Everts and Gary P. Stein, *US Fire Department Profile 2018*, NFPA Research, February 2020, <https://www.nfpa.org/-/media/Files/News-and-Research/Fire-statistics-and-reports/Emergency-responders/osfdprofile.pdf>

46. This estimate does not include any of the federally funded, owned, and operated maritime vessels that rely on diesel and heavy fuel oil used for maritime law enforcement, scientific research, or the military.

47. US General Services Administration, Federal Fleet Report, July 9, 2020, retrieved September 17, 2020, from <https://www.gsa.gov/policy-regulations/policy/vehicle-management-policy/federal-fleet-report>

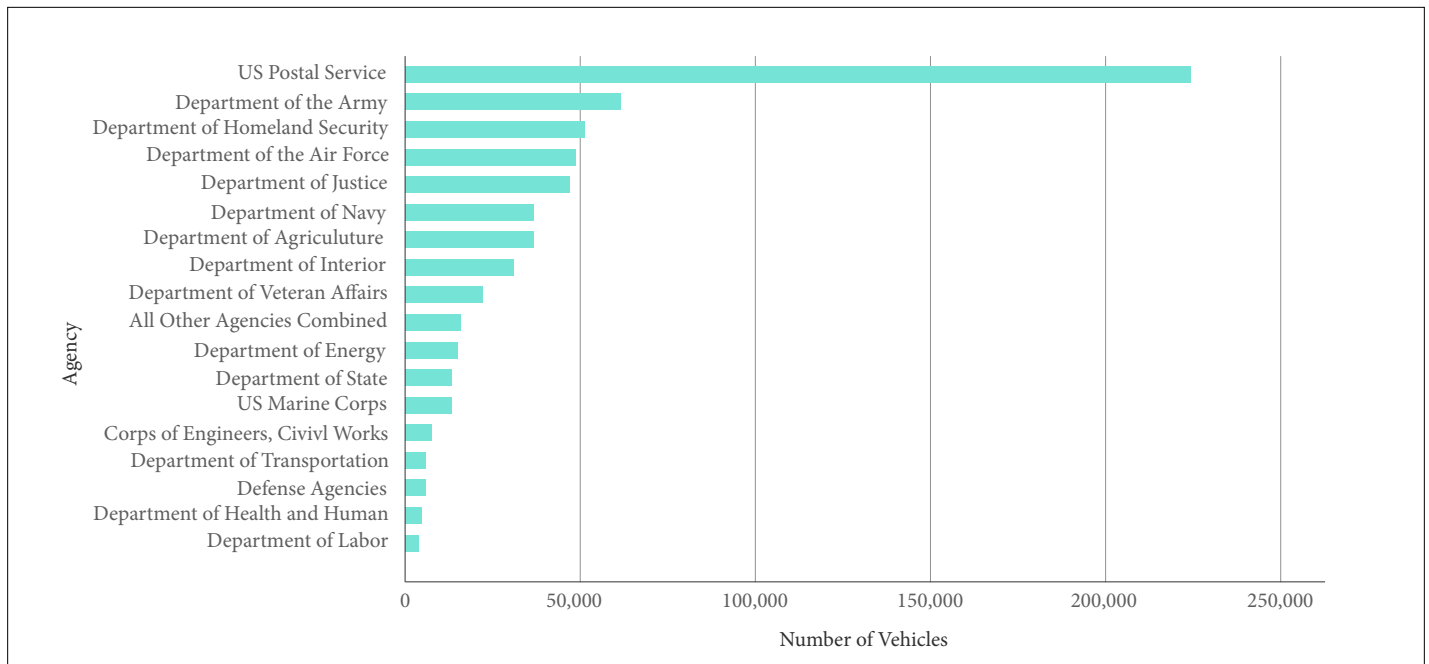


FIGURE 1. US Federal Fleet Cars and Trucks By Department. Source: GSA (2020). Note: Includes owned and leased cars and trucks

vehicle fleet.⁴⁶ These include 225,000 Postal Service vehicles, 173,000 Defense Department vehicles, and 245,000 other federal government agency vehicles, as shown in Figure 1.⁴⁷ The Postal Service is currently considering awarding a \$6.3 billion contract for thousands of new vehicles, which are unlikely to be electric-powered⁴⁸—but there is still time to alter the process to encourage electrification.⁴⁹

These federal cars and trucks travel nearly 4.5 billion miles per year, and the United States spends nearly \$3.6 billion annually to own and lease them, plus another nearly \$800 million per year on fuel costs. Nearly all of these vehicles are powered by gasoline and diesel—consuming more than 187 million gallons annually. Only about 5,000 vehicles in the federal fleet are currently electric or plug-in hybrid. Then there is the much larger fleet of state, county, and local government cars and trucks, which comprise another 2.3 million vehicles.⁵⁰ Many of the petroleum-powered vehicles

operated by all levels of government could be electrified,⁵¹ and instead powered with US low-carbon electricity.

Together, these vehicles produce a very large amount of emissions. Consider the buses. The school buses alone likely release about 7.9 million metric tons of carbon dioxide annually. The transit buses and commuter trains add another 7.3 million metric tons. In total, that’s 15.2 million metric tons from just the transit fleet—equivalent to the entire carbon emissions of countries like Ethiopia and Slovenia, or states like Maine and South Dakota.⁵² If we added the emissions produced by those other public vehicles, the greenhouse gas release of these vehicles would be significantly larger.

In other words, there is a compelling and immediate need to decarbonize this fleet within a decade. And that’s feasible: buses are replaced every 10 to 15 years on average, and commuter rail trains about every 25 years;

48. Aaron Gordon, “Don’t Expect the USPS Fleet to Go Electric,” VICE, January 28, 2021. <https://www.vice.com/en/article/3an4k8/dont-expect-the-usps-fleet-to-go-electric>

49. Gary Gastelu, “U.S. Postal Service to Award \$6.3B Contract for New Mail Truck This Year. See the Finalists,” Fox Business, August 13, 2020, <https://www.foxbusiness.com/lifestyle/u-s-postal-service-new-mail-truck>

50. US Department of Transportation, U.S. Automobile and Truck Fleets by Use, Bureau of Transportation Statistics, 2020, <https://www.bts.gov/content/us-automobile-and-truck-fleets-use>

51. Avi Chaim Mersky and Constantine Samaras, “Environmental and economic trade-offs of city vehicle fleet electrification and photovoltaic installation in the US PJM interconnection,” *Environmental science & technology* 54, no. 1 (2019): 380–389.

52. Calculated using the following assumptions: Average of 1,625 gallons of diesel fuel used per school bus per year; one diesel gallon equals 22.38 pounds of carbon dioxide emissions; one natural gas gallon equivalent equals 9.67 pounds of carbon dioxide emissions. European Commission, Emissions Database for Global Atmospheric Research, 2017, <https://edgar.jrc.ec.europa.eu/#>

currently, commuter trains in the United States are on average 22 years old. Publicly owned vehicles would be replaced with the electric equivalent; for privately owned contracted vehicles (the case for many school buses), and requirements for electrification would be written into contracts and tax credits given to assist the transition of buses from fossil fuels to electric. The commissioning of thousands of new transit vehicles would produce new, good-paying union jobs in manufacturing. The shift to electric transit vehicles would affect maintenance requirements, and the Department of Transportation must ensure the mechanic and operator workforce is fully prepared for the electric transition through workforce retraining assistance. This may require retraining, such as encouraging mechanics to retrain as electric vehicle charging installers.

In addition to transit vehicles, there is a major opportunity to reduce emissions by electrifying government passenger vehicle fleets. President Obama's 2009 Executive Order 13514 required agencies to incrementally reduce gas and diesel consumption annually through 2020. He also issued a Presidential Memorandum on Federal Fleet Performance in 2011, which required all new light-duty vehicles leased or purchased by agencies to be alternative fueled vehicles (hybrid or electric, compressed natural gas, or biofuel) by December 31, 2015. The Executive Order also required agencies to publicly disclose information about their fleets, determine their optimal fleet inventory, and create fleet management plans to achieve targets.⁵³

The Obama Administration's efforts to reduce emissions from the federal government culminated in Executive Order 13693 in 2015, which required agencies to reduce fleet-wide per-mile greenhouse gas emissions by 30 percent (relative to 2014) by 2025, deploy vehicle telematics within two years, and ensure that 50 percent of new agency vehicles is zero-emissions vehicles or plug-in hybrids by 2025. This order was revoked by President Trump in Executive Order 13834 on May 17, 2018, which directed agency heads to review existing federal

vehicle fleet requirements and report on opportunities to optimize fleet performance, reduce associated costs, and streamline reporting and compliance requirements. But the recent CHARGE Act, a bipartisan law that makes it easier for agencies to pay for the charging of federal electric vehicles, took incremental progress in the direction of encouraging a more environmentally friendly federal fleet.⁵⁴

In light of past efforts and the pause in progress, we propose the federal government develop new funding programs and set more ambitious goals, building on the information collected during the Obama Administration to decarbonize the federal fleet by 2030.⁵⁵ The electrification of the public fleet will also drive private electrification through public-private contracts and the decrease in cost of electrification realized by procurement. The federal government can serve as a prime mover in the broader market to ramp up electrification.

One question is how electrification would occur. Most diesel buses could be replaced with rapidly improving battery-electric vehicles, though in colder climates it may be more reliable to use trolley buses powered by overhead catenary wires. The latter investment would require new infrastructure along the street, which may cost up to several million dollars a mile. But assuming that most new electrified systems rely on battery-electric buses, present purchasing costs are roughly \$120,000 to \$290,000 for school buses, and \$500,000 to \$750,000 for transit vehicles. To replace the entire public bus fleet nationwide with battery electric vehicles would thus cost between roughly \$10 and \$20 billion per year over ten years (though much of that money would be extended anyway to replace existing fleets), depending on whether costs decline over time (because new technology is available or because of economies of scale related to the high level of equipment purchasing).⁵⁶ To put those figures in perspective, they are roughly on par with the entirety of proposed allocations to transit in the infrastructure law passed by congress in 2021.

53. The White House, Presidential Memorandum—Federal Fleet Performance. May 24, 2011; US Federal Register, Federal Leadership in Environmental, Energy, and Economic Performance, October 5, 2009.

54. US Environmental Protection Agency, Executive Order 13693, Planning for Federal Sustainability in the Next Decade, March 2, 2018 <https://www.epa.gov/greeningepa/executive-order-13693-planning-federal-sustainability-next-decade>; US Federal Register, Efficient Federal Operations, May 17, 2018; Senator Gary Peters, Peters Bipartisan Bill to Save Taxpayer Dollars on Federal Vehicles Signed into Law, October 1, 2020, <https://www.peters.senate.gov/newsroom/press-releases/peters-bipartisan-bill-to-save-taxpayer-dollars-on-federal-vehicles-signed-into-law>.

55. US Federal Register, Planning for Federal Sustainability in the Next Decade, March 19, 2015.

56. Phillip Burgoyne-Allen and Bonnie O'Keefe, *From Yellow to Green, Bellwether Education Partners*, August 2019, https://bellwethereducation.org/sites/default/files/Bellwether_WVPM-YellowToGreen_FINAL.pdf; James Horrox and Matthew Casale, *Electric Buses in America: Lessons from Cities Pioneering Clean Transportation*, US PIRG and Frontier Group, October 2019, https://uspirg.org/sites/pirg/files/reports/Electric-BusesInAmerica/US_Electric_bus_scrn.pdf

Electrifying existing diesel railways would require overhead catenary electrical wires to be useful for electrified trains (though the trains themselves actually cost less than diesel vehicles). The cost of railway electrification infrastructure alone is between roughly \$1 and \$5 million per mile. There are roughly 6,600 miles of non-electrified commuter rail in the United States, plus roughly 20,800 miles of non-electrified Amtrak service (with some overlap between the two). Amtrak's routes are mostly owned by freight rail companies, but we suggest joint electrification that includes both passenger trains and freight trains, using this program for Amtrak and another we lay out below for the freight lines.⁵⁷ To electrify the national passenger rail network of existing lines would cost between \$27 and \$137 billion. In addition, new trains would have to be purchased to run on these electrified lines.

Not included in the above calculations is the cost of electrifying police vehicles, postal vehicles, fire trucks, garbage trucks, and the many other vehicles owned by local, state, and national governments. States own more than three million cars and trucks.⁵⁸ Many states have adopted fuel efficiency standards, fuel consumption reduction mandates, and/or mandates to procure a greater percentage of hybrid, electric, or hydrogen-fuel vehicles.⁵⁹ Policies vary by state and range from no policy at all to California's mandate that at least half of light-duty vehicles purchased by the state government be zero emissions.⁶⁰ Transitioning state and local vehicle fleets to plug-in electric vehicles is squarely within state and local authority. Fleet transition efforts immediately reduce greenhouse gas emissions and make progress toward decarbonization goals, allowing states and local governments to demonstrate feasibility and leadership.

We thus propose a new, \$300 billion program for public fleet electrification and charging infrastructure to ensure an immediate ramp-up. To ensure that

decarbonization creates and retains good-paying jobs, federal spending should include provisions for prevailing wage standards, project-labor agreements, and labor peace neutrality along any supply chain. Funds would be allocated to federal government agencies, states, local governments, and special authorities that provide public services, and distributed by formula based on population and existing service use. This program would be allocated over ten years, and include bonuses for governmental agencies contributing their own funds for electrification, in order to electrify the entirety of the public fleet by 2030. The recently proposed BUILD GREEN Infrastructure and Jobs Act⁶¹ would begin the critical investments needed to electrify the public transit and rail fleet, and ensure frontline, rural, and vulnerable communities have clean and climate-safe mobility while also creating good-paying jobs through community reinvestment.

2.2 Electrify the private fleet

RECOMMENDATIONS:

- **Reduce the use of fossil fuels in privately owned vehicles.**
- **Provide universally available funds for bike purchases, with added incentives for e-bikes and companies replacing local freight delivery with cargo e-bikes.**
- **Create a Clean Mobility for Clunkers program that enables consumers, along a sliding income scale, to trade in older gasoline vehicles toward a new or used electric vehicle, an electric bicycle, annual passes for transit or other mobility options, or a combination of these.**

57. According to Alon Levy, there are 7,902 miles of commuter rail in total, subtracting about 1,300 miles of electrified service, and 21,407 miles of Amtrak, subtracting about 600 miles of electrified service, Construction Costs: Electrification, *Pedestrian Observations*, May 22, 2018, <https://pedestrianobservations.com/2018/05/22/construction-costs-electrification/>; US Department of Transportation, System Mileage Within the United States, Bureau of Transportation Statistics, 2020, <https://www.bts.gov/content/system-mileage-within-united-states>

58. US Department of Transportation, "Highway Statistics 2018—Policy: Federal Highway Administration, Table MV-7," December 2019, <https://www.fhwa.dot.gov/policyinformation/statistics/2018/mv7.cfm>

59. American Council for an Energy-Efficient Economy, "Fleets," accessed March 20, 2021, <https://database.aceee.org/state/fleets>

60. State of California, SB-498 Vehicle fleets: Zero-emission vehicles, 2017, https://leginfo.ca.gov/faces/billTextClient.xhtml?bill_id=201720180SB498.

61. Warren, Elizabeth, "Warren, Andy Levin, Markey, and Ocasio-Cortez Unveil the BUILD GREEN Infrastructure and Jobs Act to Jumpstart the Transition to Electric Transportation and Modernize Infrastructure," March 18, 2021, <https://www.warren.senate.gov/newsroom/press-releases/warren-andy-levin-markey-and-ocasio-cortez-unveil-the-build-green-infrastructure-and-jobs-act-to-jumpstart-the-transition-to-electric-transportation-and-modernize-infrastructure>

- **Assist freight providers with a transition to electricity. Require 50 percent of new cars sold in the United States to be plug-in electric by 2025, and 100 percent by 2030; impose similar requirements on taxi and ride-hailing providers.**
- **Require 50 percent of deliveries of materiel purchased by the US government to be delivered by a zero-emissions vehicle by 2025 and 100 percent by 2030.**

Far larger than the publicly owned vehicle fleet is the privately owned fleet, including personal cars and trucks, intercity buses, and freight services. There are more than 250 million private cars and light trucks in use in the United States, more than 2.75 million private heavy-duty trucks, and more than 575,000 private buses.⁶² Transitioning this fleet to electric propulsion will require a major effort comprising new funding support and regulatory intervention, combined with an effort to reduce the total number of vehicles. Though this initiative would mean engagement with the nation's transportation network at an unprecedented scale, this change is possible, as the Norwegian example demonstrates. It would also radically and rapidly reduce urban air pollution, support domestic manufacturing of new vehicles, and massively reduce the carbon footprint of the transportation sector.

The United States is by far the world's largest emitter of transport emissions; most of those emissions come from road transportation.⁶³ And the majority of road transportation is individuals driving privately owned cars, all but a tiny share of which operate on fossil fuels. The same can be said for the roughly 30,000 rail locomotives that transport freight around the country.⁶⁴ To address the emissions from these vehicles, the federal government should provide transportation options that allow Americans to own fewer cars and convert the remaining fleet to electric vehicles.

62. US Department of Transportation, "Number of U.S. Aircraft, Vehicles, Vessels, and Other Conveyances," Bureau of Transportation Statistics, accessed March 20, 2021, <https://www.bts.gov/content/number-us-aircraft-vehicles-vessels-and-other-conveyances>; US Department of Transportation, "Highway Statistics 2018—Policy: Federal Highway Administration," accessed March 20, 2021, <https://www.fhwa.dot.gov/policyinformation/statistics/2018/>

63. Shiyang Wang and Mengpin Ge, Everything You Need to Know About the Fastest-Growing Source of Global Emissions: Transport, World Resources Institute (blog), October 16, 2019, <https://www.wri.org/blog/2019/10/everything-you-need-know-about-fastest-growing-source-global-emissions-transport>

At the urban level, one way to rapidly reduce the pollution produced by the transportation system is to encourage a mode shift away from cars and into public transportation and active modes such as bicycling and walking, key to encouraging a healthy lifestyle for more Americans. This will require new infrastructure and land-use incentives, as we describe in the next section, but it also will mean offering allowances to encourage more people to buy bikes and altering land uses to encourage shorter trips (as we detail in a later section). We propose providing a universal \$300 credit—available through bicycle retailers—for any individual to purchase a new bike. For children under 18, we propose that this credit be renewed every four years. The recently introduced E-BIKE Act proposes up to a \$1,500 tax credit for consumers to offset a portion of the cost of an electric bike.⁶⁵ Ensuring that any enacted tax credit for e-bikes remains fully refundable will enable more low- and middle-income households to take full advantage of this important opportunity. To expand access, e-bike policy proposals should also explore opportunities for the tax credits to be available immediately at the point-of-sale, as well as apply to e-tricycles and other e-bikes that increase mobility. Furthermore, additional integrated policies such as providing low-cost and no-cost e-bike sharing programs, e-bike lending libraries, protected bike lanes, secure bike storage, and community bike workshops can advance the broader adoption of bikes and e-bikes.

Similarly, we propose that the federal government offer \$2,000 tax credits to small businesses for the purchase of cargo e-bikes to be used for local delivery. This program would support the effort to reduce local congestion and air pollution, especially in low-income communities and those in which people of color reside, while responding to the rise in deliveries ordered on the internet. Both this and the previous program would be targeted at reducing the necessity of owning a private vehicle—whether for a household or a business. To facilitate a rapid scale-up in travel by bike and e-bike, we propose deploying 10,000 miles of protected bike lanes coupled with green infrastructure.

64. US Department of Transportation, National Highway Traffic Safety Administration, National Statistics, 2018, <https://www-fars.nhtsa.dot.gov/Main/index.aspx>; HDS Truck Driving Institute, Semi Trucks: By the Numbers, April 5, 2014, <https://hdstruckdrivinginstitute.com/semi-trucks-numbers/>; California Environmental Protection Agency, Air Resources Board, *Technology Assessment: Freight Locomotives*, November 2016, https://ww2.arb.ca.gov/sites/default/files/classic/msprog/tech/techreport/final_rail_tech_assessment_11282016.pdf

65. US Congress, House, *Electric Bicycle Incentive Kickstart for the Environment Act (E-BIKE Act)*, HR 1019, 117th Congress, introduced February 11, 2021, <https://www.congress.gov/bill/117th-congress/house-bill/1019/>

In order to address the massive number of private automobiles in the existing fleet, we propose a \$300 billion Clean Mobility for Clunkers program, with a focus on equity and greenhouse gas emissions savings. Unlike the previous Cash for Clunkers program, this revamped initiative would focus on transitioning older gasoline vehicles out of the fleet and replacing them with electric vehicles, electric bicycles, transit, and other mobility options like bike and scooter share. Consumers who have owned a gasoline vehicle for at least two years could retire that vehicle at a participating dealership in exchange for up to a \$5,000 credit, based on vehicle age and fuel economy. Eligible low-income consumers, such as those qualified for the Earned Income Tax Credit, would get a trade-in credit of up to \$10,000. The Clean Mobility for Clunkers credit would enable the trade-in vehicle's owner to apply this credit toward the purchase of a new or used electric car, an electric bicycle, annual passes for transit or micromobility, or a combination of these options, until the credit is exhausted.

We also propose a program to assist freight transporters in their transition to electrification, in order to decarbonize both last-mile and long-distance goods movement and to do so in a way that ensures that good-paying, existing freight and port jobs are maintained. The cargo bike incentive program we laid out above would address a portion of the first issue, but it is essential to identify a mechanism to speed the transformation of motorized freight. One such mechanism is to encourage the electrification of the national freight railroad network. We propose a program to electrify the freight rail lines—supplementing those that carry Amtrak trains, as discussed above. There are roughly 70,000 miles of Class I railroads beyond the Amtrak system; these could cost \$70 to \$350 billion to fully electrify. We recommend beginning the process of identifying the most-used freight lines, mandating electrification in areas suffering from high levels of point-source pollution, and providing federal grants to partially fund the electrification of those routes.

The national freight rail network works in tandem with the maritime transportation system, which moved 41.9 percent of the value and 70.7 percent of the weight of US international trade in 2018.⁶⁶ Maritime transportation is the most efficient form of freight movement, reducing travel delays caused by congestion, cutting greenhouse gas emissions compared to other modes (lowest tons of greenhouse gases per million ton-miles), conserving energy (highest ton-miles/gallon), and reducing landside

infrastructure costs.⁶⁷ “Coastwise” or “short sea” shipping between two US ports can be incentivized through federal programs like the America’s Marine Highway Program and, per the Jones Act, must use boats built and registered in the United States and serviced by American mariners, who support some of the most resilient unions in the country. While ferries and smaller passenger vehicles are slowly being electrified through state-led initiatives, existing vessels often run on heavy fuel oil, marine diesel, and liquefied natural gas, each of which bears immense consequences for local air quality and global greenhouse gas emissions. The full or hybrid electrification of these vessels can reduce emissions, facilitate more efficient operations, and in addition to removing fossil fueled—trucks from the road, reduce the impacts of pollutants on communities living next to freight hubs, such as by integrating alternative maritime power programs that allow cargo ships to plug into the grid rather than idling and releasing pollutants.

Finally, we propose an assistance program to encourage the electrification of semi trucks. We propose offering a significant tax credit to freight owners to replace their diesel trucks with new electrified vehicles in association with a mandate for corporate-owned fleets, with the goal of a fully electrified national freight system by 2040 achieved without putting the cost burden of these changes on the drivers themselves. For electrified heavy truck purchases, the federal government can provide additional tax credits or purchases or leases, or can guarantee heavy truck electric vehicle loans. Pilot programs for the electrification of refrigerated vehicles (like those proposed in H.R. 2) are the first step in a swift fleet transition.

Additional demand for electric trucking can be created by giving federal contracting priority to firms delivering federal-purchased goods with zero-emissions freight vehicles. For medium duty trucks delivering goods over the last mile, the US government could require 50 percent of deliveries of goods it purchases to be provided by a zero-emissions vehicle by 2025 and 100 percent by 2030. These incentives and regulations must come hand in hand with labor protections for truckers, including payments for non-driving activities, recognition of state meal and rest break laws, addressing the continued misclassification of drivers as independent contractors, and thoughtful, labor-first implementation of new automation technologies. As with school buses, the Department of Transportation can provide retraining to ensure the mechanic and operator workforce is fully prepared for the electric transition

66. Vessel and air data: US Department of Commerce, US Census Bureau, USA Trade Online, available at <https://usatrade.census.gov/> as of December 2019.

67. 2015 Urban Mobility Scorecard, Texas A&M Transportation Institute and INRIX, 2015 Urban Mobility Scorecard, 2015.

through workforce retraining assistance, guaranteeing that good jobs follow these changes in the US mobility system. At the same time, the Department should partner with existing training programs, such as state-approved apprenticeship programs or community-college training programs, both in association with unions promoting good-paying jobs.

Beyond these programs, new regulatory initiatives must be undertaken to ensure that the automobile fleet sold in the United States is electrified as quickly as possible. The Obama Administration required that corporate average fuel economy standards for US automobile manufacturers increase by about five percent each year by 2025; in March 2020, the Trump Administration rolled back these rules to just 1.5 percent annually, though the Biden Administration raised the standards again in December 2021.⁶⁸

Not one of these standards, however, comes close to meeting the need. We propose incrementally replacing the fuel efficiency standards with a plug-in electric vehicle mandate for all new vehicles.⁶⁹ To jumpstart the broad development and sale of electric vehicles, we propose a vehicle carbon portfolio standard for new vehicle sales. The percentage of all new sales from vehicle manufacturers required to be electric or zero emissions would increase each year starting in 2022. Following the rollout time in Norway, we propose that 50 percent of new cars sold in the United States be plug-in electric by 2025.

The vehicle carbon portfolio standard would culminate with all new vehicle sales to be electric or zero-emissions by 2030. Refundable tax credits of up to \$7,500 that are available to the buyer at the point of sale would be supported through 2030 (similar tax credits were previously available to car buyers in the US). For low-income buyers, and for the 45 percent of Americans residing in an area not currently served by a transit agency,⁷⁰ the refundable tax credit would be up to \$10,000. Concurrent robust investments in public transit would enable reduction of total EV tax credit expenses.

68. David Shepardson, “Trump Finalizes Rollback of Obama-era Vehicle Fuel Efficiency Standards,” Reuters, March 31, 2020, <https://www.reuters.com/article/us-usa-autos-emissions/trump-finalizes-roll-back-of-obama-era-vehicle-fuel-efficiency-standards-idUSKBN21I25S>

69. General Motors proposed a nationwide zero-emissions vehicles program in 2018, recommending that manufacturers have 50 percent of their fleet be electrified by 2030. See General Motors, “General Motors Calls for National Zero Emissions Vehicle (NZEV) Program,” October 26, 2018, <https://media.gm.com/media/us/en/gm/news.detail.html/content/Pages/news/us/en/2018/oct/1026-emissions.html>

Similarly, ferries and short-distance marine transportation should reach 90 percent electrification by the same target date; Washington State Ferries, the largest ferry system in the United States, announced a gradual electrification of its fleet toward zero emissions in 2019.⁷¹ Though this is an ambitious regulatory move, it would be encouraged through the consumer benefits described above, as well as new energy infrastructure described in the following section.

Finally, we propose that ride-hailing and traditional taxi providers with 100 or more vehicles in their service fleet—meaning any vehicles linked to their apps or with a taxi medallion—achieve similar plug-in electric requirements of 50 percent by 2025 and 100 percent by 2030. This would apply not just to new cars introduced into their respective fleets, but to their operating fleets as a whole. Given the potential for ride-hailing and taxi services to share charging bases, this more ambitious requirement is feasible.

2.3 Update the electric grid and deploy charging infrastructure

RECOMMENDATIONS:

- **Enable decarbonization of the transportation sector and beyond with a 100 percent clean electric grid by 2030.**
- **Require 100 percent clean electricity for federal purchases by 2025.**
- **Provide grants to assist state and local governments and transit agencies in deploying electric vehicle charging infrastructure.**

70. American Public Transportation Association, “Public Transportation Facts,” 2020, <https://www.apta.com/news-publications/public-transportation-facts/>

71. Washington State Department of Transportation, “Ferry System Electrification,” 2020, <https://wsdot.wa.gov/projects/system-electrification/home>

72. Abdullah F. Alarfaj, W. Michael Griffin, and Constantine Samaras, “Decarbonizing US Passenger Vehicle Transport under Electrification and Automation Uncertainty Has a Travel Budget,” *Environmental Research Letters* 15, no. 9 (2020): 0940c2.

The massive electrification of the transportation sector that we described in the previous section necessitates an equally ambitious investment in the national electricity grid. Without a clean electricity grid, transportation electrification will not enable decarbonization at a rate fast enough to meet our climate goals.⁷² A clean electricity sector sets the stage for the decarbonization of all other sectors, which is why the US needs a 100 percent clean electricity standard by 2030. This document is focused on transportation, and therefore we do not extensively outline programs and policies that could lead to the achievement of that objective, but one place to start would be in Washington, DC: The federal government is the single largest user of electricity in the country, and it could lead by example by purchasing 100 percent clean electricity for its facilities by 2025 and massively investing in energy efficiency for its buildings.

But the current power generation, transmission, and distribution systems would need to be upgraded to handle the large increase in demand that would be spurred on by the replacement of fossil fuel-powered vehicles with electric ones. The National Renewable Electricity Laboratory found that, under a high level of transportation electrification, America would need to increase electricity production by 30 to 45 percent.⁷³ Concurrent with deep building retrofits and other energy efficiency investments to reduce overall electricity demand, meeting this new demand would require new power sources, upgraded transmission lines in congested areas, upgraded local distribution lines, and new infrastructure to handle vehicle charging.

In 2020, the House passed H.R. 2: a surface transportation reauthorization bill aimed at the just, rapid decarbonization of the transportation sector. It included significant new investments in electric vehicle charging infrastructure alongside new requirements to prioritize accessibility and equity in the distribution of formula funds—the largest pool of funding administered by the US Department of Transportation. H.R. 2 took an essential first step to remake the transportation sector through creative pilot programs that aimed to incentivize community-scale air quality improvements and electric vehicle market share, among other programs. The 2021 Bipartisan Infrastructure Framework absorbed several of

H.R. 2's discretionary programs, including RAISE (formerly BUILD and TIGER) and the provisions to incentivize the repair and maintenance in some formula funding that is devolved to state and local Departments of Transportation. While it was an admirable first step in the long march toward a just, decarbonized transportation sector, it is not enough in and of itself. To enact a Green New Deal for transportation, Congressional leaders must build on—and go well beyond—the programs put forward in H.R. 2 and the President's Infrastructure Investment and Jobs Act.

Substantial charging station infrastructure grants to state and local governments, transit agencies, school districts, and others can enable the beginning of a rapid transition to electrified transportation. Enhanced grants and tax credits should be considered where solar PV and/or distributed energy storage is integrated with local charging stations, and where trained electrical workers are used, so that this infrastructure also contributes to decarbonizing the grid and building a sustaining workforce.

Port infrastructure represents a large opportunity for integrated intermodal electrification, where investment in public-private infrastructure can enable larger systems electrification. Representative Nanette Barragán's Climate Smart Ports Grant program (H.R. 7024, included in H.R. 2) is one example of a comprehensive policy to incentivize an intermodal shift toward electrification, prioritizing investment where it has the greatest impact on frontline communities. This \$500 million per year program supports the replacement of cargo handling equipment, port harbor craft, drayage trucks, and more with zero-emissions equipment and technology, scoring grants in part based on how they will reduce public health disparities in communities and reduce toxic air pollution. Investing *simultaneously* in all forms of freight and public transportation within a port, based on the degree of relief to impacted communities provided by that investment, is a model for the national transportation system writ large.

73. Trieu Mai, Paige Jadun, Jeffrey Logan, Colin McMillan, Matteo Muratori, Daniel Steinberg, Laura Vimmerstedt, Ryan Jones, Benjamin Haley, and Brent Nelson, *Electrification Futures Study: Scenarios of Electric Technology Adoption and Power Consumption for the United States* (Golden, CO: National Renewable Energy Laboratory, 2018), NREL/TP-6A20-71500, <https://www.nrel.gov/docs/fy18osti/71500.pdf>

Bringing the GND into Port: Intermodal Resilience

WHAT IS INTERMODAL TRANSPORTATION?

Intermodal freight transport, where freight is shipped from origin to destination by a sequence of at least two transportation modes, offers the possibility of shifting freight (either partially or in full) from one mode to another in the hope of reducing the greenhouse emissions by appropriately scheduling the services and routing the freight. Traditional planning methods for scheduling services in an intermodal transportation network usually focus on minimizing travel or time-related costs of transport. The cargo often has intermediate or finished goods, is less than 25 tons, and is containerized. Freight traveling more than 300 miles, or longer than one day by truck, is typically moved by multiple modes.

As this report lays out, electrifying mobile sources of emissions will drastically reduce net greenhouse gas and air pollutant emissions. But low-income and minority populations are exposed to disproportionate rates of harmful particulate pollution from another source: stationary freight facilities like ports and other intermodal nodes, whose daily air pollutant emissions from petroleum product combustion accumulate in frontline communities.

Senate Majority Leader Chuck Schumer's recent push for electric vehicle charging infrastructure must simultaneously build a framework for transit and freight electrification and improved grid infrastructure,⁷⁴ while reducing the noise and the emission of pollutants that put freight-adjacent communities on the front line of environmental injustice. In addition to direct subsidies to local governments for electric vehicle infrastructure, the federal government should require the electrification of the freight system and transportation into and out of freight hubs, ensuring community-first investment in charging infrastructure at intermodal sites as modeled in Rep. Nanette Barragan's Climate Smart Ports Act (H.R. 501).

Infrastructure investments must center community needs in planning and implementation. Additional funding to the DOT's **Congestion Mitigation and Air Quality**

Program (CMAQ) program would support transportation projects designed to reduce traffic congestion and improve air quality, particularly in national air quality nonattainment areas. Congress should expand funding eligibility from diesel engine replacement to support electrified construction equipment, port-related landside non-road or on-road equipment, alternative fuel infrastructure, and mapping and retrofitting diesel bus depots to service electric buses. Paired with additional appropriations to the EPA's Ports Initiative, Environmental Justice Collaborative Problem-Solving Cooperative Agreement Program, and the Healthy Communities Grant Program, existing programs can provide a framework for investment in clean intermodal port infrastructure and a reliable grid.

THE NEXT GENERATION OF MARINERS

Port authorities have begun to electrify their in-port assets, generating concern from unions that want to ensure electrification doesn't mean automation and elimination of union jobs but rather supports new opportunities for good-paying jobs. As part of this initiative, Congress should appropriate additional funds for the Merchant Marine Academies to train mariners for electrified intermodal infrastructure, like cold-ironing vessels or sustainable port design, or subsidize voluntary retraining for mariners and longshore workers to manage electrified infrastructure, like the Coast Guard's Commercial Fishing Safety Training Grant Program, to begin the in-port transition to clean operations.

Portside communities have borne the brunt of freight transportation impacts, living across the street from idling ships, trucks, and the movement of goods in port—all of which are prime candidates to shift from using petroleum products to electricity. Congress should reauthorize the **Fostering Advancements in Shipping and Transportation for the Long-term Achievement of National Efficiencies** grant program to prioritize zero-emissions proposals and include improvements to the grid. A new grant program to increase freight efficiency through enhanced organization, coordination, and route planning could

74. Chuck Schumer, "Chuck Schumer: A Bold Plan for Clean Cars," *The New York Times*, October 24, 2019, <https://www.nytimes.com/2019/10/24/opinion/chuck-schumer-electric-car.html>

Bringing the GND into Port: Intermodal Resilience

reduce emissions per ton-mile and engage a new generation of mariners and managers in clean transportation.⁷⁵

Congress should also (1) create additional criteria to fund electrification of rail and truck transport, advance freight transport efficiency, and improve resiliency through the **Port Infrastructure Development Program (PIDP) and Fund and Transportation Infrastructure Finance and Innovation Act (TIFIA)** and (2) use TIFIA's direct loans, loan guarantees, and standby lines of credit to finance substantial electrification projects including improvements to local and regional grids supporting intermodal facility operations or landings for transmission cables.

RESEARCH POTENTIAL

Federal support for studies of regional grid capacity to handle an electrified ferry system would help states, cities, and tribes plan for how to accommodate the unique energy demands of entirely carbon-free fleets.

75. This might include intermodal hubs that can serve as dry ports located near strategic urban and rural locations, staging raw materials and dry goods to reduce travel distance and the number of freight trips for just-in-time delivery. Reducing the number of deliveries going directly to the construction sites would thereby reduce traffic congestion and vehicle emissions by up to 75%. See also: A. C. McKinnon, M. Browne, A. E. Whiteing, and M. Piecyk (eds.), *Green Logistics: Improving the Environmental Sustainability of Logistics*, London and Philadelphia: Kogan Page Ltd., 2015; Marie Sawadogo, Didier Anciaux, and Daniel Roy, "Reducing Intermodal Transportation Impacts on Society and Environment by Path Selection: A Multiobjective Shortest Path Approach," *IFAC Proceedings* 45, no. 6 (2012, May 25): 505-513, <https://doi.org/10.3182/20120523-3-RO-2023.00063>; J. Bauer, T. Bektaş, and T. G. Crainic, "Minimizing Greenhouse Gas Emissions in Intermodal Freight Transport: An Application to Rail Service Design," *Journal of the Operational Research Society* 61, no. 3 (2017, 21 December): 530-542,

Intermodal nodes aren't just the site of transition between modes of freight transport, but also critical staging grounds for emergency response that can become hubs for community and energy resilience. Ports provide rare undeveloped areas from which emergency response agencies can stage their efforts.⁷⁶ Already home to critical energy infrastructure like pipelines and food storage, ports can become Restoration Centers with services tailored to nearby community needs; this recommendation was first outlined in the NYC *Hurricane Sandy After Action Report* (2013), but can apply nationally.⁷⁷ To reinforce this effort, Congress should revise **FEMA's Port Security Grant Program (PSGP) and the PIDP** to not only improve port-wide maritime security risk management and maritime security mitigation protocols that support port recovery and resiliency capabilities, but ensure ports can act as community emergency response hubs. Enhanced energy efficiency and adaptive design, key factors for infrastructure resiliency, should be included as eligible criteria for intermodal nodes in FEMA PSGP grants.

IATSS Research 35, no. 1 (2011, July): 16-23, <https://doi.org/10.1016/j.iatssr.2011.06.001>; Transport for London in partnership with Bovis Lend Lease, Constructing Excellence, Stanhope and Wilson James. London Construction Consolidation Centre Final Report, 2007, https://www.ndslogistik.se/files/documents/1425975813_9.pdf

76. Thomas Wakeman III et al., "Final Report: Lessons from Hurricane Sandy for Port Resilience," University Transportation Research Center, UTRC-RF Project No: 49997-56-24, December 2013 http://www.utrc2.org/sites/default/files/pubs/Final-Hurricane-Sandy-Resilience_0.pdf; American Association of Port Authorities, "Emergency Preparedness & Continuity of Operations Planning Manual for Best Practices," accessed March 20, 2021, <https://www.aapa-ports.org/empowering/content.aspx?ItemNumber=21501>

77. Linda I. Gibbs and Caswell F. Holloway, *Hurricane Sandy After Action, New York City*, May 2013, https://www1.nyc.gov/assets/housingrecovery/downloads/pdf/2017/sandy_aar_5-2-13.pdf

PART 3:

**PROPOSAL: REDUCE
THE RESOURCE
INTENSITY OF THE
TRANSPORTATION
SECTOR FOR
INTERNATIONAL AND
DOMESTIC BENEFIT**

3. PROPOSAL: REDUCE THE RESOURCE INTENSITY OF THE TRANSPORTATION SECTOR FOR INTERNATIONAL AND DOMESTIC BENEFIT

3.1 A Global Green New Deal: Cut the volume of extraction for battery materials and pursue fair green trade

PROPOSED POLICY:

- **Reduce the total volume of extraction for battery materials in sensitive ecosystems and disadvantaged communities; subject imported materials and components to the highest standards for labor rights, human rights, and Indigenous rights, as well as for environmental sustainability and emissions.**

Electric vehicles are more mineral-intensive than fuel-powered, internal combustion engine vehicles. The current supply chains that extract, refine, and ship the minerals required for lithium ion battery cathodes result in a range of concerning environmental impacts, as well as violations of human rights, labor rights, and the rights of Indigenous peoples, as codified in ILO Convention 169 and the UN Declaration on the Rights of Indigenous Peoples.⁷⁸ These supply chains are globally dispersed, with key nodes for resource extraction currently sited in Australia, Chile, China, the Democratic Republic of the Congo, Indonesia, and Russia.

While the United States has deposits of some of the minerals needed to manufacture the batteries used for EVs and grid storage applications, projects to extract and process them are in early, environmental permitting stages, and would likely not supply sufficient battery feedstock for the level of projected EV and grid storage demand, given prevailing cathode chemistries. As a result, over the next five to ten years—i.e., the timeline for rapid decarbonization—US-based battery and EV manufacturers will need to continue importing raw materials as well as components from abroad, and/or work in partnership with non-US-based firms with access to their own global supply chains. In addition, as governments around the world increasingly adopt policies to promote EV use, global lithium demand may exceed available market supply after 2030.⁷⁹ At the same time, infrastructure for recycling and recovery of critical minerals remains inadequate, and contemporary battery designs require recycling processes that are costly, toxic, and logistically complex.⁸⁰ Meanwhile, US policymakers face the challenge of applying and enforcing

regulations along these far-flung, nascent, and oftentimes relatively opaque networks of extraction and distribution.

In light of this situation—a looming supply crunch, inadequate recycling capacity, and an insufficient regulatory framework to mitigate the socio-environmental impacts of lithium battery supply chains—we aim to, first, reduce the total volume of extraction for battery materials in sensitive ecosystems and disadvantaged communities, and, second, subject imported materials and components to the highest standards for labor rights, human rights, and Indigenous rights, as well as for environmental sustainability and emissions. By reducing the total quantity of extracted materials, and applying rigorous standards to the materials we do extract and/or import, we can ensure that the governance of lithium battery supply chains aligns with social and environmental justice, and promotes climate safety, at every node from extraction to end-use.

In addition, our proposition is that the more transportation users can rely on walking, cycling, and electrified mass transit, the fewer total electric vehicles need to be manufactured in the first place and the fewer total vehicles will need to be on the road—which carries important co-benefits for pedestrian and cyclist safety, as well as opening up streetscapes for other socially beneficial uses. The scale of EV tax credits could be weighted toward encouraging e-bicycles and smaller electric vehicles⁸¹ to get the most potential electrified travel with the smallest quantity of batteries. We also propose public investments in research and development to create and deploy environmentally sustainable extraction methods for all battery minerals and in infrastructure for battery recycling and material recovery to reduce the need for new extraction, paired with incentives for reuse of end-of-life EV batteries for grid and home energy storage. Such measures would reduce the total resource footprint of lithium battery manufacturing and encourage practices of reuse and repair, while improving the socio-environmental sustainability of new extraction.

To buttress this last goal, we also propose environmental standards, combined with Indigenous rights, human rights, and labor rights provisions for materials and components acquired via government procurement. As discussed elsewhere in this report, government procurement is a powerful policy tool, as local, state, and federal fleets are sizable enough to contribute to setting industry-wide standards, especially in the context of a relatively nascent industry such as battery and EV manufacturing.

3.2 Reform infrastructure funding

PROPOSED POLICY:

- **Disallow the use of federal infrastructure funding for new highway infrastructure, except for focused opportunities that improve equity; provide immediate funds for a quick-start infrastructure program for walking and cycling; vastly expand support for transit and metropolitan network planning.**

The federal surface transportation program has, as we noted above, prioritized spending on roadway infrastructure. It continues to encourage more and more lane-miles: Arterial and Interstate Highway mileage in the United States has increased by 12 percent since 2000 alone. Given the extensive evidence that more roadway mileage induces demand for more driving, these new roadways have not relieved congestion, nor have they provided an effective alternative to it.⁸² The federal government must cease funding such roadway expansions to meet the goal of reducing national automobile reliance and encouraging a sustainable mobility system.

Although, the Bipartisan Infrastructure Framework is allocating \$1 billion towards reconnecting communities separated by highway projects, this sum is quite small compared to the total put towards roadway infrastructure and will likely only be sufficient in barely covering the cost of one urban highway removal project. This amount

is also only one-twentieth of what Biden promised during his campaign. In addition, such an approach is likely to continue a practice that other highway removal projects began—handing that new urban real estate over to luxury developers to produce high-end housing and mixed-use developments rather than public or affordable housing, or some form of co-operative local ownership (one of many tools in the reparations toolbox going unused here). We propose that no federal transportation road funds be allocated to lane-mile expansions, and that these funds be reserved to reconstruction of the existing system alone, with priority placed on approaches that ensure increased transportation equity, such as raising bridge clearances, adding exits, or building new access roads in communities (such as rural towns) that are currently underserved.

We recommend, instead, a radical change in federal transportation priorities. We propose the creation of a quick-start investment in walking and cycling infrastructure nationwide, with the goal of achieving 100 percent sidewalk coverage in all Census-defined urban areas by 2030, at least 50 percent cycle path coverage by the same date, and the achievement of “Vision Zero”: zero bike and pedestrian fatalities on our streets. The grant would distribute \$50 billion to local governments, distributed by population, to fund networks of safe and protected bike infrastructure, complete streets, and transportation-oriented bikeways. Cities receiving funds would be encouraged to invest in new projects that specifically reduce vehicular lanes and on-street parking spaces, and

78. Zeke Hausfather, “Factcheck: How Electric Vehicles Help to Tackle Climate Change,” Carbon Brief, May 13, 2019, <https://www.carbonbrief.org/factcheck-how-electric-vehicles-help-to-tackle-climate-change>; Thea Riofrancos, “What Green Costs,” *Logic* 9 (2019); Daniel Aldana Cohen, Thea Riofrancos, Billy Fleming, and Jason Ganz, “Memo: Green Industrial Policy for Domestic and Global Climate Justice Is Popular,” *Data for Progress* (2020); Benjamin Sovacool, Saleem Ali, Morgan Bazilian, Ben Radley, Benoit Nemery, Julia Okataz, and Dustin Mulvaney, “Sustainable Minerals and Metals for a Low-Carbon Future,” *Science* 357, no. 6467 (2020): 30–33; Elsa Dominish, Sven Teske, and Nick Florin, *Responsible Mineral Sourcing for Renewal Energy*, Earthworks (2019).

79. Peter Greim, A. A. Solomon, and Christian Breyer, “Assessment of Lithium Criticality in the Global Energy Transition and Addressing Policy Gaps in Transportation,” *Nature Communications* 11, no. 1 (2020): 1–11.

80. Dustin Mulvaney, Ryan M. Richards, Morgan D. Bazilian, Erin Hensley, Greg Clough, and Seetharaman Sridhar, “Progress Towards a Circular Economy in Materials to Decarbonize Electricity and Mobility,” *Renewable and Sustainable Energy Reviews* 137 (2020); Dana L. Thompson, Jennifer M. Hartley, Simon M. Lambert, Muez Shiref, Gavin DJ Harper, Emma Kendrick, Paul Anderson, Karl S. Ryder, Linda Gaines, and Andrew P. Abbott. “The Importance of Design in Lithium Ion Battery Recycling—a Critical Review,” *Green Chemistry* 22, no. 22 (2020): 7585–7603.

81. Michalek, Jeremy J., Mikhail Chester, and Constantine Samaras. “Getting the most out of electric vehicle subsidies,” *Issues in science and technology* 28, no. 4 (2012): 25.

82. US Department of Transportation, *Estimated U.S. Roadway Lane-Miles by Functional System*, Bureau of Transportation Statistics, 2020, <https://www.bts.gov/content/estimated-us-roadway-lane-miles-functional-system>; Kent Hymel, “If You Build It, They Will Drive: Measuring Induced Demand for Vehicle Travel in Urban Areas,” *Transport Policy* 76 (2019): 57–66; Jihye Byun, Sungjin Park, and Kitae Jang, “Rebound Effect or Induced Demand? Analyzing the Compound Dual Effects on VMT in the U.S.,” *Sustainability* 9, no. 2 (2017): 219.

that can be promptly completed. This aid would provide a boost to the local construction sector, and support cities reeling from the negative effects of the COVID-19 crisis.

In the longer term, we propose a large expansion of the federal transit investment program (Small Starts/New Starts), increasing the program's budget to \$10 billion annually. This program is designed to fund new rail and bus projects, and can be a centerpiece of a future, less automobile-centric American mobility system. Yet the current roughly \$2.5 billion spent on such transit expansions annually has failed to create the extensive, useful network needed for people to be able to travel around their communities without driving. This should form one component of a larger, \$40 billion annual commitment to funding transit and intercity rail capital projects. These funds should support the development of frequent and reliable regional rail services throughout metropolitan areas, stations that are accessible to people with all abilities, and maintenance of existing bus and train networks. Together, this infusion of federal support would create the infrastructure for a nation less dependent on cars.

To support this large increase in transit projects, metropolitan areas need to develop network plans that aim for the creation of regional rapid transit systems. Just as the 1956 Interstate Highway Act set off the creation of a national network of grade-separated highways, we propose that the federal government devote \$1 billion annually to aid communities in planning for regional transit investment. One goal to motivate investment would be for all residents in each metropolitan area of 500,000 or more residents to be able to reach the downtown by transit in 45 minutes.

3.3 Provide new funding for federal transit operations

RECOMMENDATION:

- **Pass a \$25 billion annual federal funding bill to support transit operations funding throughout the United States.**
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83. Dave Colon, MTA: 40% Service Cuts Will Happen Without Federal Aid, *Streetsblog NYC*, August 26, 2020, <https://nyc.streetsblog.org/2020/08/26/mta-40-service-cuts-will-happen-without-federal-aid/>

84. US Department of Transportation, Federal Transit Administration, 2018 Annual Database Operating Expenses, 2020, <https://www.transit.dot.gov/ntd/data-product/2018-annual-database-operating-expenses>

The COVID-19 crisis has made clear the degree to which the national public transportation system is sensitive to changes in local and state tax revenue. Emergency funding from the federal government in 2020 and 2021 provided more than \$60 billion to transit agencies to make up the gap, but those funds will be inadequate to ensure that bus and rail lines throughout the country—which often carry many of our communities' essential workers—continue to run. Without additional aid, for example, New York's Metropolitan Transportation Authority, which provides up to eight million rides a day, would have to cut service by 40 percent.⁸³

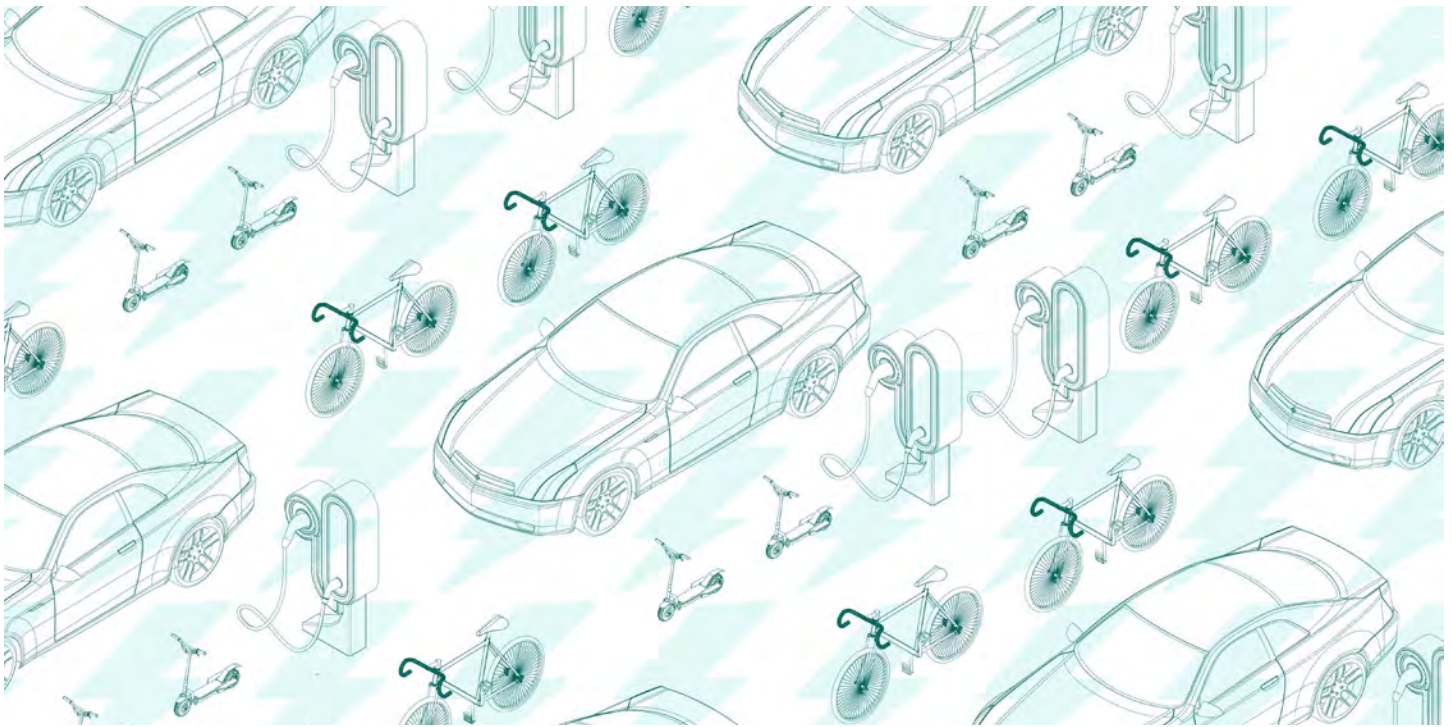
An essential federal principle must be ensuring that transit services expand to guarantee effective service for people living throughout the country. Currently, transit operators spend a total of roughly \$50 billion running trains and buses each year, supported primarily by passenger fare revenues and local taxes (federal support for operations in large cities, where most transit trips occur, is minimal).⁸⁴ While \$50 billion is a large amount of money, it pales in comparison to the roughly \$870 billion Americans spent on keeping their cars running with motor vehicles, parts, and gasoline in 2019.⁸⁵

A federal transit operations program of \$25 billion annually, distributed by formula by service area population, and with a guarantee that existing revenue sources would not be diverted to other programs, would allow a roughly 50 percent increase in transit services nationwide. This program should be implemented on top of whatever additional aid is needed to maintain transit services during the COVID-induced recession, when both fare and tax revenues have declined precipitously.⁸⁶

In addition, the federal government should set a national goal of ensuring that all residents of urban areas have access to transit, while also expanding access in rural areas. One goal, for example, would be for all residents to have access to a bus or train with a short wait within at most a 15-minute walk at all times of the day. The additional aid for transit operations will go a long

85. US Bureau of Economic Analysis, Table 2.3.5, Personal Consumption Expenditures by Major Type of Product, 2020.

86. Yonah Freemark, "What Would Providing Every City with High-Quality, Zero-Emissions Public Transportation Look Like?" *Urban Institute*, November 23, 2020, <https://www.urban.org/urban-wire/what-would-providing-every-city-high-quality-zero-emissions-public-transportation-look>.



way in meeting this initiative. It would also significantly remediate existing inequalities in transportation access, ensuring more transportation options for more people.

3.4 Adopt a new regulatory approach

RECOMMENDATION:

- **Require metropolitan planning organization voting systems to be proportional to resident population; mandate adjustments to local zoning policy to enable more dense, affordable housing near transit in exchange for federal aid; and implement regional commuter benefits throughout the nation.**

In the United States, the federal government distributes transportation funds for regional needs, but only after they have been included in the short- and long-term transportation plans developed by federally designated metropolitan planning organizations (MPOs). Unfortunately, MPO voting structures are undemocratic and often prioritize the voice of rural and exurban locales, rather than urbanites and communities that are most likely to demand and design mobility systems that depart

from automobile dependence. This structure also has the tendency to under-represent minority communities, giving largely white cities and counties more funds. For example, the Chicago MPO's policy committee—which ultimately chooses how to allocate federal funds—gives equal voting power to the representative of Cook County (population: 5.2 million, 42 percent non-Latinx white) and to that of Kendall County (population: 128,000, 70 percent non-Latinx white).⁸⁷ In addition, MPOs are often dominated by state departments of transportation, typically more focused on highway infrastructure than on building more sustainable and equitable mobility.

We propose that federal guidelines related to MPOs be adjusted in two fundamental ways. First, the voting structure on MPO policy committees must be proportional to the population of member counties and local governments. This adjustment would increase the ability of populous areas to have their say in metropolitan transportation policy. Second, MPOs should directly receive a large share of allocations from federal infrastructure grants, rather than having them routed through state departments of transportation, as is currently the case. This change would increase the meaningfulness of these regional bodies by giving them federal funds over which they are directly responsible.

The federal government must also increase its oversight of local land-use policy in order to ensure that local communities are being protected, designed, and built to both encourage a mix of people and population densities that are high enough to allow for easy walking, biking, and transit use and ensure that low-income households and communities

⁸⁷ Paul G. Lewis, "Regionalism and Representation: Measuring and Assessing Representation in Metropolitan Planning Organizations," *Urban Affairs Review* 33, no. 6 (1998): 839–853; CMAP (Chicago Metropolitan Agency for Planning), MPO Policy Committee, 2020, <https://www.cmap.illinois.gov/committees/policy/mpo>

of color are protected from displacement. We propose that the federal government set several minimum requirements in exchange for the receipt of transportation funds.

First, state governments must ban the use of single-family zoning by any community, enact tenant protections—such as rent stabilization and just cause protections—to protect existing residents, allow accessory dwelling units, and conduct a feasibility study of housing markets state to state to determine the highest possible percentage of inclusion at 60 percent of area mean income and below. Second, state governments must eliminate parking requirements from municipal codes, and disassociate ownership and use of any parking facility with adjacent buildings. Third, states must develop a plan to achieve no net land consumption by 2030, and demonstrate progress on meeting that goal. Fourth, states must plan and demonstrate progress toward reducing vehicle miles traveled by 25 percent by 2030.

Existing transit-oriented development policies that prioritize creating housing for the demographics most likely to be dependent on, and use, transit (particularly extremely and very low-income people) should be assessed, both within the United States and abroad. The City of Los Angeles Transit-Oriented Communities Affordable Housing Incentive Program has created 30,721 housing units within a half mile of transit—6,497 of which are covenanted affordable units—since its inception in September 2017. The program, which could be a model for cities across the country, requires that the developments include a mix of affordable units that are available to extremely low-income, very low-income, and low-income renters. Federal resources should be deployed into technical assistance programs that would support implementation and replication of these programs nationally around transit lines.

TIFIA (Transportation Investment and Financing Innovation Act) is the Department of Transportation's credit program for eligible transportation projects, including transit-oriented development (TOD), TOD-related infrastructure, facilities that incorporate daycare or healthcare services, and pedestrian and bicycle infrastructure. Although this financing source hasn't yet been used for TOD housing projects, efforts should be made to encourage TIFIA funding to be utilized to leverage local TOD financing sources; support the preservation of older transit-adjacent housing through a naturally occurring affordable housing acquisition/rehab program; and permanently counter speculation on transit-adjacent properties by placing land under community stewardship through local/regional Community Land Trusts.

Furthermore, local transit agencies often have substantial land holdings near high-use transit areas that could be used for affordable housing development, such as social housing. However, there may be certain challenges to pursuing this use on land in which the Federal Transit Administration retains an interest. This inconsistency could likely be addressed with fixes at the federal level that would allow transportation agencies to pursue community-serving and/or affordable housing development on valuable land holdings near transit. Additionally, a federal directive should be pursued that requires disposition of land in which the FTA retains an interest for affordable housing.

Finally, the federal government has an opportunity to implement transportation demand management policies by working with its newly empowered MPOs. MPOs should be tasked with working with employers to ensure all employees have access to federal commuting benefits, and should aid with relocation plans such that new jobs are located in communities with excellent walking, bicycling, and transit infrastructure.

PART 4:

**PROPOSAL: USE
TRANSPORTATION
POLICY AND
PROGRAMS AS
MECHANISMS TO
DEVELOP A MORE
EQUITABLE SOCIETY**

4. PROPOSAL: USE TRANSPORTATION POLICY AND PROGRAMS AS MECHANISMS TO DEVELOP A MORE EQUITABLE SOCIETY

4.1 Create an equitable transportation network

PROPOSED POLICY

- **Identify all possible paths to work toward a transportation system that is accessible to all, including those with physical disabilities and those who cannot afford to pay.**

The American mobility network is remarkably inconvenient for a large share of the population. Because of our automobile dependence, young people, elderly people, people with disabilities, and low-income individuals are often reliant on others to get around. The policies we have laid out above would take important strides in improving their access, by making streets more safe for active transportation and improving the quality of the transit system. But more must be done.

Consider the environment faced by people with limited physical mobility. The Americans with Disabilities Act was passed in 1990—three decades ago—and yet most of the New York City Subway system, for example, remains unusable for people in wheelchairs. Sidewalks throughout the country are discontinuous, inappropriately sized, and in poor condition. These circumstances, especially when worsened by poorly marked crosswalks, endanger pedestrians with limited vision and make it difficult for many to roll around. The federal government should create a dedicated fund to ensure that our entire transportation system is accessible to all—no matter their physical capacities—by 2030.

The mobility system is also simply unaffordable for many low-income households. The first quintile of American households spends upwards of 30 percent of their incomes on transportation, a huge amount for people of modest means, and far more than low-income people in Europe, for example.⁸⁸ Part of this problem can be addressed by making it easier to walk, bike, and

take transit—all far less expensive than driving. But even transit can be expensive; an annual pass on the Long Island Rail Road from Hempstead (95 percent minority, with 28 percent of children growing up in poverty) to Penn Station is \$3,240. That's simply off limits for many.

Some cities in the United States, such as Kansas City and Olympia, Washington, have eliminated fares altogether. Los Angeles is currently studying this possibility as well. At the very least, municipalities should offer either low- or no-fare transit passes to students, seniors, and low-income residents, while creating incentives for localities to make fare enforcement an activity that does not involve the police, and that is decriminalized. Fare-free transit, when implemented at the same time as improved service, increases ridership.

In association with the operating support for transit that we laid out above, we propose a national fair fares system that ensures that people with low incomes have access to low or no fares for transit throughout the country. In order to ease the implementation of this system, we propose that the federal government develop a nationwide network that allows people to use the same fare card on every system receiving federal funds.

All of these initiatives must also take into account the historic inequities of the American transportation system. When appropriate (and not a burden) these proposals should firstly target disadvantaged communities: those displaced, underserved, or polluted by transportation. We also recommend the development of equity standards or review processes that consider the socio-environmental impacts of all transportation projects.

Together with the decarbonization programs and infrastructure efforts described in the previous two sections, our proposals would produce a transportation system that serves more people and results in more equitable access. To meet climate and equitable mobility objectives, the federal government should organize all of these initiatives under a national goal of increasing clean and accessible public transit ridership five-fold by 2030. Rather than rely on a transportation network whose net effect is increased pollution and increasing inequalities between people of different racial and economic backgrounds, it is possible to build a green, socially responsible mobility network.

⁸⁸. Institute for Transportation & Development Policy, The High Cost of Transportation in the United States, May 23, 2019, <https://www.itdp.org/2019/05/23/high-cost-transportation-united-states/>

