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The Climate Crisis and the American Road

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Research Article

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Abstract

This manuscript revisits the history of American highway policy from the perspective of the powerful institution at its core: a confederation of state highway departments able to cut through partisan and sectional divides in Congress with two powerful claims: they represent both the advice of experts and the will of the states. After documenting their role in the development of the American highway system, the manuscript applies this perspective to current policy developments with an emphasis on the potential reauthorization of the Bipartisan Infrastructure Act of 2021, scheduled to expire at the end of fiscal year 2026. The manuscript concludes that the intersection of a looming fiscal crisis with the climate crisis creates the opportunity for this still powerful institution to launch a sustained transition away from fossil fuels, with impacts significantly beyond this policy realm.

1. The climate crisis and the American road

At the center of the massive Infrastructure Investment and Jobs Act of November 2021 (IIJA) was the reauthorization of programs established 30 years before in the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA).[1] Widely regarded as an island of bi-partisan accord in a roiling partisan sea, these programs, which encompass the nation's highways and transit systems, also survived the faltering of their longstanding revenue base in the federal excise tax on gasoline. Though shortfalls first emerged in the early 2000s, Congress has continued to fill the gap with general funds. The IIJA actually pre-paid the deficit, estimated at some twenty percent of total outlays.[2] There are clear signs, however, that bipartisan accord on the issue is wearing thin. Progressives held the 2021 bill hostage for months in an effort to pass a companion bill, deliberately appropriating the label "infrastructure" for programs that had suffered decades of spending cuts, including childcare, affordable housing, and public health. They relented only after a weak showing by Democrats in the off-year elections of November 2021. Republicans, who secured a narrow majority in the elections 2022 and 2024, are already gearing up for a re-debate when current authorizations run out in 2026, with many expected to reprise a dominant theme of the 1970s: that spending on anything other than highways constitutes a "raid" on the Highway Trust Fund.[3]

As this paper will argue, the primary reason for the unusual success of this policy realm over the past 30 years is the collective authority of the agencies that built the American highway system: a vast network of almost four million miles of roads, all retrofitted for motor vehicles. These agencies, the state-level departments of transportation, have distinguished themselves for the past 100 years by their capacity to resolve their own often significant conflicts first; a capacity that has enabled them to advance their collective policy recommendations in Congress as both the advice of experts and the will of the states.[4] This extra-constitutional capacity helps explain not just remarkable achievements of American highway policy—two continent spanning highway systems—but their equally remarkable social and economic costs, including the razing of large swaths of America's cities and rising dependence on foreign oil. As the paper will also explain, the intersection of the looming fiscal crisis with the climate crisis creates an opportunity for these agencies to collectively reshape American transportation policy once again, with impacts well beyond this policy realm.

[1]Infrastructure Investment and Jobs Act (IIJA) (P.L 117-58), November 2021. Highways and transit constituted just over half of the $1.2 trillion authorization, which also included funding for water supply, energy transmission, port facilities, and broad band.

[2]IIJA 2020, sec. 80,103 (prepaid Highway Trust Fund deficit). For an overview of the Highway Trust Fund, see Center for a Responsible Federal Budget (CRPB) https://www.crfb.org/blogs/infrastructure-bills-impact-highway-trust-fund (accessed 8-22-22).

[3]See especially the regular postings of the Heritage Foundation and the Cato Institute on transportation policy.

[4]See, especially, Stephen Skowronek, *Building a New American State* (Cambridge University Press, 1982), who coined the term "extra-constitutional" to describe the authority of American political parties. The confederal authority of state highway departments emphasized in this article is more similar to the "executive federalisms" common to Canada and other parliamentary federations, which are charactered by more clearly defined distinctions between central and sub-national authority. See, especially, Ronald Watts, *Executive Federalism: A Comparative Analysis*, Institute of Intergovernmental Relations (1989).

In order to make this case, however, I must first confirm that this extra-constitutional capacity exists. Though state highway departments are often cited in historical accounts of American transportation policy, their role is generally missed in favor of other factors, including the technological and cultural force of the automobile, the lobbying power of the industry that produces them, the vote-getting strategies of politicians, and the many outsized personalities drawn to the issue over the past century.[5] It has also been missed by scholars of American political development due to its resemblance to two other types of institutions that draw authority from the capacity to organize across a divided political order: inter-governmental associations and policy subsystems, or the powerful "iron triangles" of federal agencies, congressional committees, and industry lobbyists that have emerged in other policy realms such as agriculture and national defense.[6] Highlighting this other layer of policy formation is doubly important, as I also explain, because most prognoses for federal transportation policy based on these other theories are fairly bleak.[7]

The article begins, accordingly, with a brief review of American highway history from this perspective, showing where and how the extra-constitutional authority of state highway departments emerged, expanded, faltered, and recovered over the past century. The first two sections focus on their remarkable achievements and costs during the first half of the twentieth century.[8] The next two sections focus on the policy upheavals that followed the Oil Embargo of October 1973, including the rise of a powerful transit lobby and the logroll of 1982, which spared the program from the Reagan axe. This is followed by a closer look at the landmark reauthorization of 1991 that institutionalized that truce in a new national purpose of connecting that massive highway system to other transportation modes.

2. An extra-constitutional institution

The most common explanation for the massive extent of the American highway system is the remarkable utility of motorized vehicles. Able to cover as much as five times the distance of draft animals in a day, the automobile fueled the popular demand that fueled the rise of a massive industry that set off a massive building boom on the urban fringe, all of which amplified political pressure on politicians at all levels of the federal system to build more roads.[9] Largely missing from this account, however, is the role of the agencies that built the roads: the state highway departments. First established across the Northeast in the 1890s, these agencies not only preceded the automobile but created the highway systems that determined where they could go.

In 1914, a handful of state highway officials gathered in Washington, D.C. to intervene in a protracted debate between advocates of interstate roads, championed by the new motor vehicle industry, and advocates of rural "post roads," championed by congressmen from the South and Midwest. The state highway departments resolved the debate in favor of the latter with an ingenious formula for allocating federal aid among the states: though heavily weighted toward rural and land grant states, it retained the traditional apportionment factor of population, effectively providing an apportionment cushion for state highway departments in more urbanized states based on a population they did not have to serve (the other condition was a provision that limited federal aid to rural roads).The final bill, approved in June 1916, also conditioned the new federal grants on the creation of a state agency with the requisite technical expertise to take on the job, effectively putting themselves in charge.[10] Three additional conditions, however, shifted that project into high gear. The first was a new federal mandate approved in 1921 to hook up their emerging state highways systems at the state line. That purpose persuaded Congress not just to expand federal aid but bypass their own budget rules: highway authorizations were designated as a formal "contract" with the states in 1922, bypassing the appropriations process. The response was the nation's first highway system: a massive 200,000-mile map, formally approved in 1923, connecting all 3,000+ county capitals.[11] The second condition was the advent of state excise taxes on gasoline. First introduced by Western states in order to match the step-up in federal aid, the gas tax was a revenue source that effectively grew with each new mile built.[12] It is no surprise in this regard that the state highway departments were able to grade and gravel all 200,000 miles of the new system by 1929, just before the stock market crash shifted the larger economic forces they had harnessed into reverse. The third condition was the economic collapse. It is no surprise that both Presidents Hoover and Roosevelt chose that massive unfinished project as their front-line defense

[5]On the technological and cultural force of the automobile, see James Flink, *The Automobile Age* (MIT Press, 1988); Tom Lewis, *Divided Highways: Building the Interstate Highways, Transforming American Life* (Viking, 1997); and, Cotton Seiler, *Republic of Drivers: A Cultural History of Automobility in America* (Chicago University Press, 2008). On the political power of the motor vehicle industry, see David St. Clair, *The Motorization of American Cities* (Praeger, 1986); and Stan Luger, *Corporate Power, American Democracy, and the Automobile Industry* (Cambridge University Press, 2000). On the vote-getting strategies of politicians, see Diana Evans, "Policy and Pork: The Use of Pork Barrel Projects to Build Policy Coalitions in the House of Representatives," *American Journal of Political Science* 38, no. 4 (1994). On the role of key individuals, see Bruce Seely, *Building the American Highway System: Engineers as Policy Makers* (Temple University Press, 1987), and Mark Rose, *Interstate: Express Highway Politics:1941–1956* (The Regents Press, 1979).

[6]On inter-governmental associations, see David Arnold and Jeremy Plant, *Public Official Associations and State and Local Government* (George Mason University Press, 1994). On highways as an "iron triangle," see Timothy Conlan, *From New Federalism to Devolution: Twenty-Five Years of Intergovernmental Reform* (Brookings Institution, 1998).

[7]See, especially, Richardson Dilworth, "Infrastructure Politics: Implications for a Cohesive National Transportation Policy in the 21st Century," in *US Infrastructure: Challenges and Directions for the 21st Century*, ed. A. Khan and K. Becker. (Routledge, 2019). Dilworth argues that the advent of programming flexibility in 1991 reinforced a cultural divide between libertarians and social justice advocates. See also Clayton Nall, *The Road to Inequality: How the Federal Highway Program Polarized America and Undermined Cities* (Cambridge University Press, 2018). Nall musters statistical and geographical data to argue that the reforms of 1991 contributed to the rising partisan divide in Congress over the past thirty years.

[8]Katherine Johnson, *The American Road: Highways and American Political Development, 1891–1956* (University of Kansas Press, 2021). The method I use to develop this argument draws on the philosophy of social science known as critical realism, which rejects the implicit positivism in the explanations noted above in favor of a layered ontology, epistemology, and methodology. See Andrew Sayer, *Method in Social Science: A Realist Approach*, 2nd ed. (Routledge, 1992), 52–60, 85–117.

[9]On the technological and cultural force of the automobile, see Flink, *The Automobile Age*; Lewis, *Divided Highways*; and, Seiler, *Republic of Drivers*. On the political power of the motor vehicle industry, see St. Clair, *The Motorization of American Cities*, and Luger, *Corporate Power*.

[10]Federal Road Act of 1916 (P.L 64-156), July 1916. The other context was the 16th Amendment which eliminated the requirement of enumeration for the federal income tax. Northeast states fought that precedent from the collection all the way up to the Supreme Court, which ruled in June 1923 that there was no violation of the 10th Amendment so long as participation by the states remained voluntary. Massachusetts v Mellon, 262 U.S. 447 (1923).

[11]Federal Aid Highway Act of 1921 (P.L 67-87), November 1921, sec. 6 (the new highway system). Post Office Appropriations Act (P.L 67-244), June 1922 sec. 4 ("contract authority").

[12]On the origin of the gas tax, see John Burnham, "The Gasoline Tax and the Automobile Revolution," *The Mississippi Valley Historical Review* 48, no. 3 (1961).

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against the Great Depression. In April 1930, Hoover not only doubled authorizations for the highway program but extended a loan to the states to cover their matching share. Highways were also the only earmark in Roosevelt's massive National Industrial Recovery Act of June 1933, which launched the New Deal.[13]

The central argument of this article is that the agencies that built the nation's first highway system also created a powerful institution in the American political system able to advance their collective policy aims as both the advice of experts and the will of the states. In contrast to other associations that emerged in response to the advent of a new administrative state, members of the new American Association of State Highway Officials (AASHO) were representatives of co-equal sovereigns in a policy realm historically dominated by the states.[14] Delegated authority from two levels of the federal system situated them, in turn, at the center of an expanding constellation of private industries, from building contractors, to equipment suppliers, to firms producing sand, gravel, asphalt, and cement—each with its own national lobby able to bring additional influence to bear on the policy process. In the 1926 reauthorization debate, the motor vehicle industry (by now, the largest in the land) dropped their opposition to the rural-focused highway program and joined the entourage.[15]

That same extra-constitutional authority, however, was also the source of distinctive excesses. The fact that they were not elected officials or legislators, but bureaucrats meant that their policy recommendations were the product of bureaucrats negotiating with bureaucrats. Highway officials notably defined themselves in opposition to the excesses of politicians in this regard, that is, as engineers committed to applying scientific reasoning to solve policy problems that politicians could not. The cost, however, was a tendency to rationalize their own political compromises in scientific terms.[16] The capacity to invoke the will of the states also required a high threshold of consensus for any substantive policy change, ensuring that most of their policy recommendations were rigid one-size-fits-all prescriptions that were unusually hard to change.

The best indicator of these extra-constitutional constraints was the failure to address a major functional problem with their new highway system: rising traffic congestion where the new roads left off. Construction protocols as noted above emphasized geographical reach over capacity; traffic counts emphasized farm goods on the way to market, not people on their way to work.[17] When the cities demanded a share of the state gas tax to address the problem, highway departments invoked their federal mandate to complete the national system; when the new urban majority in Congress lifted the urban exclusion in 1933, most state highway departments met that obligation by extending their roads through small towns, still technically defined as "urban" at the time. Their primary achievement during the New Deal, indeed, was a formal "secondary" highway program for rural roads only approved by Congress in 1936.[18] The rising traffic congestion in the cities, however, was also the inspiration for a new kind of road.

In February 1938, President Roosevelt proposed a national system of superhighways funded by tolls, drawing on the simple insight that motorists would pay to bypass the traffic jams. That plan, which became the centerpiece of his 1939 bill for a Federal Loan Authority designed to provide low-interest loans for "self-liquidating projects," was challenged by a report authored by the federal Bureau of Public Roads (BPR), the small agency in the U.S. Department of Agriculture charged with overseeing the federal highway program.[19] The primary argument of the BPR report—that tolls would increase traffic congestion by encouraging motorists to divert to adjacent free roads—played a major role in the narrow defeat of Roosevelt's Loan Authority bill; Southern Democrats, in particular, used it as evidence of the general hazards of debt.[20] It is best known, however, for proposing a freeway system twice as large, the first blueprint of the Interstate highway system that was later built.

That report, aptly named *Toll Roads and Free Roads*, is widely attributed to longstanding BPR Chief, Thomas MacDonald, whose achievements spanning a 40-year career fit the description of a classic "bureaucratic entrepreneur," or an agent endowed with both the technical expertise and political savvy to navigate a fragmented political system. As a state highway official from Iowa, however, MacDonald was also a founding member of AASHO selected by his fellow state highway engineers in 1918 to be their chief advocate in Washington, D.C., a role he self-consciously assumed in all of his public appearances and reports.[21] The freeway plan is a striking example of that *situated* agency: extending the big roads directly into the cities would not just cure the functional problems created by a generation of overbuilding rural roads but attract new traffic, potentially transforming the entire highway system into a self-funding public utility, with costs defrayed through the existing

[13] Authorization and Amendment (P.L. 71-90), April 4, 1930 (Hoover's public works initiative); National Industrial Recovery Act (P.L. 73-67), June 1933, Title II, sec. 204, 205. The highway earmark of $400 million was about 12% of the total $3.3 billion authorization.

[14] Johnson, *The American Road*, 24–25. These conditions also distinguished AASHO from other associations that emerged in response to the advent of federal matching grants, none of which had a similar history of state-level funding or initiative. The only comparable institution in American political history was the National Guard Association formed by state militia officials in the 1870s to secure federal aid for the construction of new armories in the cities. See William Riker, *Soldiers of the States: The Role of the National Guard in American Democracy* (Washington, DC: Public Affairs Press, 1957).

[15] AASHO held their annual convention in Detroit in 1926 specifically to enlist the motor vehicle industry against efforts by President Coolidge to limit the program to interstate roads. The motor vehicle industry organized its own national association only in 1932, specifically to lobby against Hoover's new federal gas tax. See, Johnson, *The American Road*, 31–36.

[16] See, especially, Seely, *Building the American Highway System*, whose study of American highway policy emphasizes this new professional identity. See also Johnson, *The American Road*, 24-26, on the confederal aspects of this extra-constitutional institution.

[17] On the urban traffic crisis, see Seiler, *Republic of Drivers*.

[18] Hayden-Cartwright Act of 1936 (P.L 74-686), June 16, 1936, sec. 1(c), 7, 8. (creating a new rural program). "Urban" was defined in the 1921 Act as any municipality with a population of 2,500 or more with houses averaging under two hundred feet apart (sec. 2). By the late 1930s, the federal-aid highway system had expanded by almost 75% to 327,000 miles, with another 188,000 potentially eligible under the new secondary program. Federal Highway Administration (FHWA), *Highway Statistics to 1955*, Table M-200 (road mileage).

[19] On the Works Financing bill of 1939, see Richard Chapman, *Contours of Public Policy, 1939-1945* (Garland Publishing, 1981). The timing of the loans would be calibrated to keep the economic recovery on track without resort to deficit spending.

[20] Bureau of Public Roads,"Toll Roads and Free Roads," April 1939, House Document no. 272, 76th Congress, 1st sess. On the role of the freeway plan in its defeat of the Works Financing bill, see Johnson, *The American Road*, 79-84.

[21] On situated agency of MacDonald, see Johnson, *The American Road*, 68-85. For accounts that emphasize his entrepreneurial agency, see especially Seely, *Building the American Highway System*. Lewis, *Divided Highways*. MacDonald's high profile is a striking contrast with state highway officials, whose opportunities for leadership were constrained by AASHO bylaws designed to foster consensus, the key to their authority in Congress, No committee, for example, could have more than two representatives from each state; the primary role of the association's president, who rotated annually, was to present the consensus resolutions passed by the membership to Congress. Exceptions, of course, emerged during periods of crisis: See, American Association of State Highway Officials (AASHO), "The First Fifty Years, 1914-1964: a Story of the Beginning, Purposes, Growth, Activities and Achievements of AASHO" (1965).

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state excise taxes on gasoline.[22] The big obstacle, however, was its enormous upfront cost.

Subsequent efforts to get Congress to fund those costs failed. His proposal to attach it to the defense build-up as a new "strategic network" so incensed Roosevelt that he cancelled the entire highway program for the duration of the war. His plan to prioritize it in a new program of public works for *after* the war collapsed in a fierce new debate among state highway officials, who were unable to agree on any change to the original parameters of 1916.[23] That conflict, which played out in the full public glare in a series of hearings during the 1943–44 legislative session, spilled back into Congress, which debated for another eight months before passing its own truncated highway bill.[24] Though the final bill, signed by Roosevelt in January 1945, approved the freeway plan in principle, it not only failed to fund the system but divided the regular highway program into three separate programs, each with its own conditions and formulas, effectively reclaiming the authority that Congress had delegated to the state highway departments 30 years before.[25]

3. The interstates

It is a great irony that the largest category of public works during the New Deal declined after the war, even as the traffic congestion it helped to produce surged to new heights. Persistent discord among state highway departments persuaded Congress to cancel an entire year of the already truncated highway authorization in 1948. President Truman not only failed to lift the embargo on construction materials for a full year after the end of the war but reinstated it in 1950 as the conflict in Korea took hold—effectively agreeing with his predecessor that highways were not necessary for the national defense. That same post-war traffic surge, however, also inspired a wave of toll road construction, as states beginning in the Northeast and spreading West chose to pick up where Roosevelt left off. Bond issues for toll roads exceeded federal highway aid in 1953. More importantly, the "toll road epidemic" persuaded President Eisenhower that he could build the entire Interstate system by pledging the federal gas tax to the job.[26] That plan, developed by a special advisory committee headed by Lucius Clay, Eisenhower's supply general during the war, also invoked a new national threat to overcome opposition to the costly urban portions at the heart of the dispute among the states: the big roads could double as evacuation routes in the event of a nuclear war. That purpose also justified a federal share of ninety percent, sparing the states from the need to increase their own matching funds.[27]

The final bill, signed by Eisenhower in June 1956, is rightly celebrated as a great national achievement: it committed the federal government to the expedited construction of 41,000 miles of high speed, limited access superhighways connecting all the major cities and stretching across all forty-eight states. It also resurrected the powerful confederation of state highway departments that built the first highway system noted above. Though Congress would pay most of the cost, there was no question that the states would build *and own* the roads. It also shifted all of the existing highway programs to the federal gas tax as well.[28] The prospect of a huge increase in their authority and resources persuaded these agencies, in turn, not just to set aside their differences but map out the final 2000 miles in urban areas, an initiative that also significantly increased the cost. New estimates submitted to Congress in January 1958 were forty percent greater than the original cost estimates of 1955, precipitating the system's first fiscal crisis.[29] It also set them on a collision course with the cities.

Even before the 1956 Act was signed, city planners called for a moratorium on the urban portions of the Interstate system until more coordinated procedures could be worked out, noting that some seventy percent required new rights-of-way. Emphasizing the accelerated construction schedule, however, highway official managed to persuade Congress not just to exclude city planners from a formal role in the location and design of the big roads but include recourse to federal eminent domain in case they got in the way.[30] In the run up to the 1960 election, big city mayors reassembled their own powerful national lobby to demand relief for people and businesses in the way, securing the first federal aid for transit and relocation assistance in 1961. That same legislation, however, also made a temporary surcharge on the gas tax permanent, enabling highway authorizations to surpass $2 billion that year ($23 billion in today's dollars).[31] The most poignant indicator of the resurrected authority of state highway departments, however, was the new planning requirement approved by Congress in 1962. This, notably, was not a formal plan but a continuous planning process involving all local governments in a

[22]The fiscal argument was elaborated in a follow-up report completed in 1941, "Interregional Highways: A Report of the National Interregional Highway Committee." 78th Congress. 2nd Sess., 1944, pp. 53-78; 89, 114-133. For an extended discussion of the fiscal logic of urban freeways, see Jeffrey Brown, Eric Morris, and Brian Taylor, *The Drive for Dollars: How Fiscal Politics Shaped Urban Freeways and Transformed American Cities* (Oxford University Press, 2023).

[23]*Congressional Record*, August 7, 1941, p. 6886 (Roosevelt's veto message). Roosevelt's war strategy focused on expanding the nation's railroad depots and ports.

[24]Hearings, House Committee on Roads, February 29-April 27, 1944. On the development of the post war plan, see Johnson, *The American Road*, 84-89.

[25]Federal Highway Act of 1944 (P.L.78-521), December 20, 1944, sec. 7 (the Interstates). The highway debate also allowed other postwar initiatives to catch up, including the Servicemen's Readjustment Act of 1944 (the GI Bill, PL 78-348 June 22, 1944) and the War Mobilization and Reconversion Act (58 Stat. 788), October 3, 1944), a large non-highway public works bill.

[26]Johnson, *The American Road*, 92-100. FHWA, *Highway Statistics to 1955*, Table SB 201-A (toll road mileage/bond issues).

[27]"National Highway Program," 84th Congress 1st sess., H. Doc 93, February 1955 (the Clay Report), pp. iv, 5 (the nuclear rationale). The urban portions were also advanced as an alternative to the costly underground shelters that Soviets were building. For a review of the Cold War justification, see David St. Clair, "National Defense and the U.S. Interstate Highway Act of 1956," *International Journal of Business, Humanities and Technology* 4, no. 4 (2014).

[28]Federal Aid Highway Act of 1956, P.L 84-627), sec 108 (the Interstates); sec 108 (e) (90% federal share); 108(d) (cost to complete); Title II (funding provisions). The primary reason the federal gas tax was not dedicated to highways before this is that it was disproportionately collected in the more urbanized states, Johnson, *The American Road*.

[29]On the scramble to map the urban mileage, see Gary Schwartz, "Urban Freeways and the Interstate System," *Southern California Law Journal* 49, no. 3 (1976), 406-513. On the first fiscal crisis, see Jeff Davis, "The First Time the Highway Trust Fund Went Broke," *Eno Transportation Weekly*, August 21, 2019. In another indicator of their new unity, state highway departments agreed to defer a promised reimbursement to the states that had already built portions of the system with tolls in 1958, when projected revenues came up short, effectively taking another two thousand costly miles off the table. See Johnson, *The American Road*, 107-09.

[30]1956 Act, sec. 109 (federal eminent domain). City planners were another proud Progressive era profession that had just secured their own federal aid pipeline in the Housing Act of 1954 for "urban renewal," a program of federal aid enabling cities to write down the cost of "blighted" areas for commercial redevelopment. On the conflict with city planners, see Raymond Mohl, "Ike and the Interstates: Creeping toward Comprehensive Planning," *Journal of Planning History* 2, no. 3 (2003). See also Louis Kemp, "Aesthetes and Engineers: the Occupational Ideology of Highway Design," *Technology and Culture* 27, no. 4 (1986); and Jeffrey Brown, "Tale of Two Visions: Harland Bartholomew, Robert Moses, and the Development of the American Freeway," *Journal of Planning History* 4, no. 1 (2005).

[31]Federal Highway Act of 1961 (P.L. 87-61), June 1961, Title II (increase in the federal gas tax); Federal Housing Act of 1961 (P.L. 87-70), June 1961, sec. 303 (transit demonstration grants; $25 million). On the mayors' role in the 1960 general election, see Mel Scott, *American City Planning Since 1890* (University of California Press, 1969).

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metropolitan area, effectively giving equal voice to areas outside the cities where the impact of Interstate construction was much less acute. Administered by a new inter-governmental entity, the Metropolitan Planning Organizations (MPOs), it also gave the state highway departments control of the funds, a large share of which were allocated to the calibration and feeding of traffic flow models running on large new mainframe computers, effectively reducing their conflict with city planners to a technical dispute.[32]

Lack of formal recourse, of course, did not prevent opponents from pouring into the streets. Interstate construction was especially egregious in the South where the new corridors deliberately cut through African American neighborhoods; the rising monoliths were also a visible symbol of an unaccountable government prosecuting an undeclared war in Vietnam.[33] It was the decision by one of those big cities to heed the protesters rather than the highway engineers, however, that finally pulled Congress back in. In a cliffhanger vote on March 21, 1966, the San Francisco Board of Supervisors rejected both of the city's Interstate routes, along with $200 million in federal aid, the equivalent of over $1 billion in today's dollars.[34] That event persuaded congressmen from around the country, fearing that their districts could be next, to back significant revisions to federal highway policy that year. The reauthorization of September 1966 gave federal agencies a veto over any plan that did not consider "all feasible and prudent alternatives" to the disruption of parkland and historic sites;" the bill creating a new consolidated Department of Transportation the following month required an environmental review for all highway projects funded by federal aid. It also put a new layer of federal administrators over their heads, who began to hold up approvals for Interstate routes already approved by the states.[35] The highway departments, however, also regrouped.

At a special hearing called by the House Public Works Committee in June 1967, state highway departments used the rising delays in urban areas to call for a 15-year extension of the Highway Trust Fund (HTF), the mechanism created by the 1956 Act to secure the federal gas tax for the highway program. Though initially off to a shaky start, by the late 1960s dedicated revenues in the HTF were over twice the original projections of 1955. Revenues were so great, indeed, that the Johnson Administration impounded several billion dollars as an anti-inflation measure in 1968, setting off a multi-year legal fight by the state highway departments to defend their claim.[36] The bigger concern, however, was the impending sunset of the HTF scheduled for 1972, the original date for completion of the Interstates. Though giving the rising delays it was reasonable to assume that the fund would be extended, the prospect also raised fears of renewed political disputes over formulas and matching shares as Interstate construction wound down. The rising cost and delays in urban areas provided a perfect excuse in both respects not just to extend the Highway Trust Fund, invoking Congress' commitment to complete the system, but to advance a new post-Interstate plan designed to address the problems that had emerged.[37]

In another indicator of their resurrected clout, Congress not only gave the highway departments an enthusiastic go-ahead to develop the new post-Interstate plan but extended the time to complete it as new threats emerged.[38] Those threats included not just a further escalation of the freeway revolts but the prospect of extensive environmental reviews under the new National Environmental Policy Act (NEPA), passed by Congress in December 1969. The March 1970 petition by the bankrupt Penn Central Corporation to abandon all of its passenger rail lines was widely blamed on the huge federal investment in roads; the Clean Air Act, approved on December 31, 1970 authorized the new Environmental Protection Agency (EPA) to regulate emissions from motor vehicles, potentially undercutting that revenue source.[39] The biggest threat, however, was a plan announced by President Nixon in his State of the Union Address of January 1971 to consolidate all federal transportation aid in urban areas—highways included—into a single block grant, directly administered by local governments, not the states. That proposal set off a fierce debate in Congress that lasted the better part of the next two years, distilled in the popular press as a contest between a powerful "road gang" of motor vehicle manufacturers, truckers, and road contractors against a growing array of freeway opponents, civil rights activists, and environmentalists.[40]

Prospects initially favored the Nixon plan. Although Congress delayed its own debate until the highway departments had completed their post Interstate plan, administration officials did not hesitate to conform the data pouring in from the states to the Nixon bill, introduced as the "Federal Highways and Mass Transportation Act" in May 1972. That data, however, was also a formidable display

[32]Federal Highway Act of 1962 (P.L 87-866), October 1962, sec.134 (planning requirement). On the weakness of the new planning requirements, see Todd Goldman and Elizabeth Deakin, "Regionalism Through Partnerships?" *Berkeley Planning Journal* 14 (2000). The 1962 Act also required the creation of a Metropolitan Planning Organization (MPOs), which I discuss below.

[33]For a good summary of the freeway revolts, see Raymond Mohl, *The Interstates and the Cities: Highways, Housing, and the Freeway Revolt*, Poverty and Race Research Action Council (2002).

[34]On the San Francisco freeway revolt, see Katherine Johnson, "Captain Blake versus the Highwaymen: Or, How San Francisco Won the Freeway Revolt," *Journal of Planning History* 8, no. 1 (2009). The 1956 Act also included a provision that Interstate funds would lapse after two years if no formal agreement was reached, which had discouraged other cities from demanding changes. 1956 Act, sec. 108 (f) (g) (funds lapsing).

[35]Federal Aid Highway Act of 1966, (PL 89-574), sec. 138 (disruptions); Department of Transportation Act of 1966 (PL 89-670), sec. 4(f) (in-house environmental review). On role of the new federal administrators in the freeway revolt, see especially Raymond Mohl, "The Interstates and the Cities: the U.S. Department of Transportation and the Freeway Revolt, 1966–1973," *The Journal of Policy History* 20, no. 2 (2008).

[36]House Committee on Public Works, June 7, 1967, "Preliminary Report of AASHO on Federal Aid Highway Needs after 1972." On the origins of the Highway Trust Fund, see Brian Taylor, "When Finance Leads to Planning: Urban Planning, Highway Planning, and Metropolitan Freeways in California," *Journal of Planning Education and Research* 20, no. 2 (2003). FHWA, Table FE-221 (Highway Trust Fund revenues); Table FA-200 (authorizations). The original schedule in 1956 projected authorizations of $1.5 billion for 1968; the actual authorization was $3.4 billion. The impoundment dispute was resolved in April 1973 when the Eighth Circuit Court of Appeal ruled in favor of the highway departments. *State Highway Commission of Missouri v. Volpe*, 479 F.2d 1099. On the role of highways in the debates leading up to the Impoundment Control Act of 1974 (P.L 93-344), see Eric Pataschnik, *Putting Trust in the US Budget: Federal Trust Funds and the Politics of Commitment* (Cambridge University Press, 2000), 125-26. I pick up on the Highway Trust Fund below.

[37]1956 Act, Title III (trust fund sunset); sec 108 (d) ("cost to complete" provision that supereced formula allocation). Planning for a post-Interstate program had begun two years before in 1965 as the new metropolitan planning requirements kicked in.

[38]Federal Aid Highway Act of 1968 (P.L. 90-495), August 23, 1968, sec. 17 (functional reclassification study). Federal Aid Highway Act of 1970 (P.L 91-605), December 31, 1970. sec. 121 (b) (extended time to complete the plan). The 1970 Act also raised the federal matching share for non-Interstate projects from 50 to 70 per cent (sec. 108) and reduced funding for the Interstates, significantly expanding funds for the post-Interstate plan (sec. 105 (a) 14 (b) (reduced funding for the Interstates).

[39]National Environmental Policy Act (P.L. 91-190) (NEPA), January 1970; Clean Air Act of 1970 (P.L. 88–206). December 31, 1970. On the Penn Central bankruptcy, see Robert Sobel, *The Fallen Colossus* (Weybright and Talley: 1977).

[40]See, especially Ben Kelley, *The Pavers and the Paved* (Donald W. Brown, Inc.: 1971) and Richard Hebert, *Highways to Nowhere: The Politics of City Transportation* (Bobbs-Merrill: 1972).

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of the technical capacity of the state highway departments, honed over 50 years: it not only re-classified all 3.5 million-plus miles of the nation's roads into new functional categories but included a broad array of measures designed to promote highway solutions to the problems that had emerged, including enhanced traffic signaling, high occupancy vehicle lanes, expanded access roads, and the designation of "economic growth center highways" for areas outside the cities where the primary solution to traffic congestion was de-concentration. Equally impressive, it projected 20-year funding needs of almost $600 billion ($4.4 trillion in 2023 dollars)—over twice the original estimate of 1955 in real terms—sending a strong message to Congress that there was no room in the Highway Trust Fund for anything but highways.[41]

Though final debates were also fierce, the final highway bill passed by Congress in August 1973 not only dropped the Nixon plan entirely but incorporated all of the aims that the state highway departments had set out to achieve five years before, all of which would be funded by a sharp reduction in authorizations for the Interstates, which the legislation confirmed were in the "final stage of completion."[42] The one exception—a provision allowing cities to substitute their Interstate routes for an equal amount of funds for other transportation projects—also proved the rule: all of the new "trade ins" would be funded by general revenues, not the Highway Trust Fund.[43] Most remarkable, however, was the timing Two months after Nixon signed the Federal Highway Act of 1973 the Organization of Arab Petroleum Exporting Countries quadrupled the price of crude oil.

4. The energy crisis

As the Oil Embargo of October 1973 forcefully revealed, 60 years of retrofitting the nation's public roads for motor vehicles had exposed the entire economy to the political volatility of the Middle East, home of the largest share of the world's crude oil reserves. The new grip of the highway departments on the gas tax ratified by Congress two months before, however, effectively eliminated a powerful tool for addressing the crisis. Nixon quickly backed off the hefty surcharge on the gas tax he proposed in November 1973 to conserve use, famously opting for onerous regulations instead, including a 55 mile-per-hour speed limit on roads designed for 70 miles-per-hour. President Ford also opted for regulations, imposing the first fuel efficiency standards for new motor vehicles in 1975.[44] In the reauthorization debates of 1976, state highway departments persuaded Congress to extend the deadline for completion of the Interstates by another 15 years by emphasizing the additional costs and delays imposed by the new environmental reviews.[45] It was another response to the Energy Crisis, however, that finally began to challenge their grip: the rise of a powerful transit lobby.

The first major casualty of the 1956 Act were the commuter rail lines operated by the nation's freight railroads. Anticipating a major drop-off in passengers from the huge new corridors being cleared for cars, they petitioned the Interstate Commerce Commission (ICC) for permission to abandon these lines, which was granted by Congress as part of a general relief package for the railroads in 1958. This, not surprisingly, galvanized the nation's big city mayors, who reassembled their own formidable lobby in the general election of 1960 to demand relief, emphasizing the threat to their downtown business districts. President Kennedy, who owed his own narrow victory to the urban vote, responded with the first federal transit aid in 1961, which was expanded into a formal program by the Johnson Administration in 1964.[46] These initiatives, combined with the popular reaction to the Interstates noted above—freeway revolts, civil rights protests, environmental activism—produced not just a major increase in federal aid in 1970, from $125 million to over $800 million per year, but the consolidation of large public transit authorities with resources approaching the state highway departments in metropolitan areas. The other result, not surprisingly, was the rise of a formidable lobby in Washington, D.C. bent on securing those funds.[47]

As noted above, the new national transit lobby had a major influence on President Nixon, whose central proposal in the 1971–73 debates was to transform the gas tax into a general transportation tax in urban areas, cross-subsidizing other modes.[48] The energy crisis also significantly expanded the purpose of federal aid from the rehabilitation of transit to energy conservation. The reauthorization of 1974 not only doubled the already sizeable increase in capital grants for transit approved in 1970 but provided the first operating assistance expressly designed to make transit more competitive with the automobile.[49] That same legislation, however, also enabled the state highway departments to advance their own solution to the urban problem ratified by Congress the year before: "highway-oriented mass transportation." The new operating assistance, in particular, enabled scores of smaller cities to establish new bus systems, all of which would be operated on the new urban highway systems authorized by the 1973 Act. (Highway officials celebrated that achievement by

[41]"National Highway Needs Report," H. Doc. No. 92-266, 92nd Congress, 2d sess. On the new cost estimates, see Edward Weiner, *Urban Transportation Planning in the United States: An Historical Overview* (Praeger, 1999), 39.

[42]For a detailed account of the congressional debates, see Richard Weingroff, "The Battle of its Life," *Public Roads* 69, no. 6 (May/Jun 2006). Weingroff has also posted a compendium of excerpts, *Busting the Trust: Unraveling the Highway Trust Fund, 1968-1978*, Federal Highway Administration (2013). https://rosap.ntl.bts.gov/view/dot/68521.

[43]Federal Aid Highway Act of 1973 (P.L. 93-87), August 1973, sec. 134; sec. 137 (b) (4) (Trade-in funds from the general fund). There were similar restrictions for projects involving rail transit under section 121 (c). Trade-ins freed about $1.5 billion of HTF revenues for the highway program over the next three years. USDOT 1982. Table III-1. FHWA Table FA-205.

[44]Nixon's "Project Independence" address, November 7, 1973 (gas tax surcharge); Emergency Highway Energy Conservation Act (P.L 93-239), January 1974 (55 mph speed limit). Energy Policy and Conservation Act of 1975 (P.L 94-163), December 1975 (Corporate Average Fuel Economy, or "CAFÉ" standards). Ford's decision was taken after a failed attempt to limit the Highway Trust Fund to the Interstates only.

[45]Federal Aid Highway Act of 1976 (P.L 94-280), May 1976, sec. 103 (new completion date for the Interstates). On the rising delays associated with the new environmental reviews, see, Richard Weingroff, *Addressing the Quiet Crisis: Origins of the National Environmental Policy Act of 1969*, Federal Highway Administration (2017). By the mid-1970s highway projects represented more than half of the cases brought under the new action forcing provisions. By doubling the time to complete the Interstates, however, the extension also freed up funds for the new post-Interstate plan.

[46]Urban Mass Transportation Act of 1964 (P.L. 88-365), July 1964, On the commuter rail crisis, see Michael Danielson, Alan Hershey, and John Bayne, *Federal-Metropolitan Politics and the Commuter Crisis* (Columbia University Press, 1965), 55-56.

[47]Urban Mass Transportation Act of 1970 (P.L 91-453), October 15, 1970, increased authorizations for transit capital grants to 15% of highway outlays that year. On the creation of metro-wide transit authorities see Jones, Mass Motorization and Mass Transit, and David Jones, *Mass Motorization and Mass Transit: An American History and Policy Analysis* (University of Indiana Press, 2010), 137-72. On the rise of the transit lobby, see Alan Altshuler, James Womack, and John Pucher, The Urban Transportation System: Politics and Policy Innovation (The MIT Press, 1979).

[48]On the rising calls to open the Highway Trust Fund to non-highway projects, see Jeff Davis, "The Transportation Trust Fund Idea, 40 Years On," *Eno Transportation Weekly*, April 29, 2011.

[49]National Mass Transportation Assistance Act (P.L 93-503), November 1974, sec. 101 ($10 billion authorization); sec 103 (formula grants and operating assistance).

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rechristening their national association, the American Association of State Highway *and Transportation* Officials (AASH*T*O) the same year). The following year, they extended their claim to the new transit aid by calling for a formal merger between the federal highway and transit programs, a proposal widely viewed by the transit lobby not as a merger but a reverse raid.[50]

The rivalry between highways and transit emerged full blown in the debate over President Carter's proposal for a modest 5-cent increase in the gas tax. That proposal, introduced in April 1977 as part of his comprehensive energy plan, was quickly challenged by state highway officials, who descended on Capitol Hill the following month to assert their prior claim. This prompted transit supporters to negotiate a separate deal with the Carter Administration for a 50–50 split of the increase, arguing that transit *unlike highways* would advance the President's conservation goals.[51] Though highway officials managed to hold the line again—the gas tax increase was defeated by large majorities in early August—the cost was a significant erosion of political support for the highway program. Congress not only rejected a second merger plan but ignored their calls for fiscal relief over the next four years, even as inflation cut the purchasing power of the Highway Trust Fund in half.[52]

The larger context of the sharp new rivalry between transit and highways was a debate over federal controls on the price of domestic oil. First imposed by President Nixon in 1971 as an anti-inflation measure, controls kept the price of domestically produced oil some forty percent below the international price as the energy crisis ensued. Though a significant cushion for consumers, it also precipitated a fierce reaction from domestic oil producers, who argued that controls prevented them from developing new domestic sources. This, according to historian Meg Jacobs, was the source of an anti-tax, anti-regulation, libertarian critique of government in general that culminated with the election of Ronald Reagan in 1980.[53] The more immediate problem for Carter, however, was that it split the Democrats. Demands for deregulation by congressmen from the South and West were met by equally fierce charges of price gouging by congressmen from the urbanized Northeast. Failure to agree on even a small increase in the gas tax for conservation in this context set the tone for the rest of Carter's ambitious energy agenda. Debates persisted well into the following year with only meager results—leaving the country almost as unprepared for the next oil crisis as it was for the first.[54]

That second oil crisis, which began with a strike by Iranian oil workers in November 1978, ushered in a calamitous year not just for Carter's presidency but the country as a whole. The new surge in oil prices precipitated an even greater surge of inflation, which was followed by declining economic growth, the Iranian Hostage Crisis, and a Soviet invasion of Afghanistan. These calamities notwithstanding, Carter did manage to resolve the price control debate. He approved a phased deregulation of domestic oil prices in April 1979 and a "windfall" tax on the resulting increase in oil industry profits the following year, which was followed by a major supplemental for transit funded by that windfall tax approved by large majorities in both houses of Congress.[55] These achievements, however, were not sufficient to save his reelection bid. The transit supplemental succumbed to a filibuster during the lame duck session of December 1980 orchestrated by supporters of the President elect.

5. Truce

In sharp contrast with his predecessors, Ronald Reagan was motivated by the simple conviction that "government is the problem."[56] He managed extraordinary legislative gains during his first year in office under that banner, including a huge tax cut, across-the-board budget cuts, and the consolidation of scores of federal programs into new block grants. In his State of the Union Address of January 1982, he went after the rest of the federal budget, proposing to devolve all grant-in-aid programs—highways included—back to the states.[57] What saved the highway program from that fate was a big log roll orchestrated by Democratic leaders in the House, recovering their voice after a bruising year. Two things, more specifically, combined to set that compromise in motion. The first was the exception Reagan had made for the Interstates. Like Ford's similar proposal of seven years before, this was a non-starter for the simple reason that it would send the lion's share of the remaining highway funds to the Northeast, home of the longest Interstate delays. When Senate Republicans tried to advance a regular highway bill instead, however, they were blocked by House Democrats who insisted on another joint reauthorization bill, effectively conditioning any rescue of highways on a rescue of transit.[58] The second condition was the resurrection of Carter's plan for a five-cent increase in the gas tax. Initially advanced by Reagan officials as a means of honoring his pledge to complete the Interstates, it emerged from negotiations with Congress as an increase for the highway program as a whole with a penny for transit, a proposal that galvanized stakeholders on both sides of the aisle. The result was an all-out campaign to highlight the nation's crumbling infrastructure, road and rail alike.[59] Two other conditions, however, combined to push the bill over the

[50]"A Proposal for Transportation Funding," adopted by AASHTO Policy Committee on November 16, 1975. Reprinted in hearings before House Subcommittee on Surface Transportation, May-June 1977, pp. 137-161. Transit advocates in Congress defeated the merger proposal in the 1976 reauthorization debate.

[51]Carter's National Energy Plan, April 20, 1977 (fact sheet: https://www.presidency.ucsb.edu/documents/fact-sheet-the-presidents-national-energy-program). On AASHTO's response, see House Subcommittee on Surface Transportation, "Highway and Transit Proposals," May 1977, pp. 103-254. The issue was closely followed in the national press. See, especially, the report by Stephen Rattner for the New York Times, July 30, 1977, "House Democratic Leaders Agree on a 5c-a-Gallon Gasoline Tax Rise."

[52]Though the two programs were combined in a single reauthorization in 1978, transit supporters made sure they were advanced as separate titles with little overlap. Surface Transportation Assistance Act of 1978 (P.L 95-599), November 1978, Title I (highway programs); Title III (Federal Public Transportation Act). Already rising in the late 1960s, inflation took a sharp jump after the oil embargo, rising another 50% by 1978. Construction price index, St. Louis Fed https://fred.stlouisfed.org/series/WPUSI012011.

[53]See especially, Meg Jacobs, *Panic at the Pump: The Energy Crisis and the Transformation of American Politics in the 1970s* (Hill and Wang, 2016). Jacobs' otherwise excellent account misses the debate over the allocation of the gas tax, the only federal tax on fossil fuels.

[54]For a good summary of the 1978 debates, see Robert Ryan, "President Carter and the National Energy Policy," Environment International 2 (1979).

[55]Windfall Profits Tax (P.L 96-223), April 2, 1980. The Senate passed a transit supplemental on June 25, 1980, by a vote of 79-15 (s.2720). The House passed a similar bill on December 4, 1980, also by a wide margin (346-33).

[56]Inaugural Address, January 20, 1981; https://www.reaganlibrary.gov/archives/speech/inaugural-address-1981.

[57]Omnibus Reconciliation Act of 1981 (P.L 97-35). August 1981. Title XI included a 12 percent cut in authorizations for the Interstates (sec. 1106) along with across-the-board cuts for transit (sec. 1111). Reagan's devolution agenda was outlined in his State of the Union Address of January 26, 1982, The American Presidency Project, https://www.presidency.ucsb.edu/node/245636.

[58]The deadlock forced Reagan to sign a one-year reauthorization bill so as not to let authorizations lapse, effectively realigning the highway program with the expiring transit program. Federal Aid Highway Act of 1981 (P.L 97-133), December 29, 1981.

[59]For a detailed account of these events, see the compilation of administration documents assembled by Jeff Davis, *Reagan Devolution: The Real Story of the 1982 Gas Tax Increase*, ENO Center for Transportation, September 9, 2015, https://enotrans.org/

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top: a sharp recession, which began in the second quarter of 1981; and big gains for the Democrats in the midterm elections of 1982 (though Republicans held onto the Senate, they lost twenty-seven seats in the House, increasing the Democratic majority to sixty-two percent). In a rare display of ideological backsliding, Reagan personally faced down a new filibuster in the final debates. In his signing statement of January 6, 1983, he assumed the mantle of his historical rival, Franklin Roosevelt, boasting that the large new investment in public works would get the economy moving again.[60]

The timing this time was almost as remarkable as the 1973 reauthorization above. The Surface Transportation Assistance Act of 1982 not only rescued highways and transit from the fate of other federal programs during the Reagan years but positioned them for a new economic boom, which took off just after the bill was signed.[61] The return of oil prices to their pre-crisis lows in real terms produced not just a strong increase in motor vehicle traffic but a surge of pork barrel politics, as members of Congress realized that the new revenues pouring into the Highway Trust Fund were exempt from the new budget procedures inaugurated by Reagan's other signature achievement: the Gramm Rudman Hollings Balanced Budget Act of 1985. In the 1986–87 reauthorization debate Congress inserted scores of demonstration projects (also known as "earmarks") into the bill and then overrode a presidential veto to secure them. In 1990 Congress voted to increase the federal gas tax again rather than subject the rest of the federal budget to new sequestration cuts.[62] Not surprisingly, that new revenue surge also inspired state highway departments to launch a second post-Interstate plan.

Formally introduced in October 1989, the new AASHTO plan called for a new collaborative mapping exercise designed to identify which of the original pre-Interstate highways should be upgraded to Interstate status. When complete, the new "national highway system" (NHS) would add another 120,000 miles of high speed, limited access highways to the 42,500-mile Interstate system already in place. Incorporated into the Bush Administration's bill of February 1991 the AASHTO plan also called for consolidating urban and rural programs into block grants with a lower federal matching share.[63] Before the debate could begin, however, transit advocates also regrouped. Their plan, outlined in a May 1991 report, "Acting in the National Interest," effectively resurrected Nixon's block grant proposal of 20 years before: it called for delegating all authority to program federal aid in urban areas to the Metropolitan Planning Organizations (MPOs), the agencies created in 1962 to implement the first federal planning mandate noted above.[64] Though initially little more than a rubber stamp for the highway departments, the MPOs' authority expanded through the 1970s, bolstered by new federal mandates to improve intergovernmental coordination.[65] Most importantly, they were grandfathered in the 1982 logroll, thus escaping the fate of other urban programs during the Reagan years, making them a good vehicle for urban activists seeking to recover lost ground. Their cause was taken up, finally, by Senator Daniel P. Moynihan, a veteran of the Nixon Administration and longtime critic of the highway program, who incorporated it into the Senate's reauthorization bill of 1991.[66] Though the two bills were initially far apart, negotiators managed to find common ground in a new national purpose of connecting the nation's massive highway systems to other transportation modes. The ISTEA was signed by President Bush on December 18, 1991.[67]

6. Reform

To briefly recap, this article has revisited the history of American highway policy from the perspective of the powerful institution at its core: a confederation of state highway departments whose capacity to resolve their own often significant differences was the primary condition behind both the remarkable achievements of American highway policy – two continent spanning highway systems – and their equally remarkable social and economic costs. It provides an especially good example in this regard of an institutional layer of social process and form in the American political system. As argued above, the rules and resources collectively secured by state highway departments in the early twentieth century were the primary source of self-reinforcing policy feedback and crisis tendencies that produced two distinctive cycles of institutional expansion and decline. As also explained, the second cycle, set off by Congress' approval of a plan in 1956 designed to cure the problems created by the first highway system, precipitated the rise of a powerful opposition. Though lacking similar institutional capacity and reach, transit advocates successfully challenged the extra-constitutional authority of state highway departments in the 1970s, creating the conditions for both the logroll of 1982 and the institutionalization of that truce in the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA).

The basic provisions of that landmark law have been reauthorized five times over the past 30 years, a record approaching the landmark Federal Highway Acts of 1921 and 1956.[68] The primary

eno-resources/reagan-devolution-the-real-story-of-the-1982-gas-tax-increase-2/. See also Richard Weingroff's compilation of the congressional debates, *Palace Coup: President Ronald Reagan and the Surface Transportation Assistance Act of 1982*, Federal Highway Administration (2017).

[60]Surface Transportation Assistance Act of 1982 (P.L 97-424), January 1983; Reagan's signing statement, January 6, 1983, Ronald Reagan Presidential Library and Museum, https://www.reaganlibrary.gov/archives/speech/remarks-signing-surface-transportation-assistance-act-1982.

[61]According to Timothy Conlan, *From New Federalism to Devolution*, 144. the broad category of programs known as "inter-governmental transfers" saw a 33 per cent decline during the Reagan years in real terms. Federal outlays for highways, by contrast, grew by 30 per cent over the same period. On the growth of traffic and revenues through the 1980s, see FHWA, Tables VM-2 (vehicle miles traveled) and FE-201 (Highway Trust Fund revenues).

[62]Surface Transportation and Uniform Relocation Assistance Act (P.L 100-17), April 1987; Omnibus Reconciliation Act of 1990 (P.L101-508), November 1990, sec. 11211 (gas tax increase). Evans, "Policy and Pork" counted 150 earmarks totaling $1.5 billion in the 1987 bill—a 10-fold increase over the 1982 authorization.

[63]AASHTO's October 1989 report was titled "Keeping America Moving." Provisions incorporated in the Surface Transportation Assistance Act of 1991 (H.R 1351, S. 610) (Bush administration bill) included a five-year, $105 billion reauthorization that included a 40% increase in funding for highways ($88.5 billion) and a marginal increase for mass transit ($16.5 billion).

[64]The new Surface Transportation Policy Project (STPP) that introduced this report was organized in November 1990. Founding members included the American Planning Association, the American Institute of Architects, the National Trust for Historical Preservation, the National Wildlife Federation, and a host of smaller environmental and urban advocacy groups.

[65]On the expanding capacities of MPOs through the 1970s, see Bruce McDowell, "Role of Metropolitan Planning Organizations in the 1980s," Transportation Research Record, no. 1045 (1984).

[66]The Surface Transportation Efficiency Act (S. 965 (Senate Report 102-71) introduced in April 1991. Moynihan was Assistant to the President for Domestic Policy in the Nixon Administration and executive secretary of the Council of Urban Affairs (later the Urban Affairs Council) in the late 1960s.

[67]Intermodal Surface Transportation Efficiency Act (ISTEA) (P.L. 102-240), December 1991. Hallmarks included beefed-up criteria for the new National Highway System (NHS) emphasizing connections to depots and docks (sec. 1006) along with significantly expanded planning and programming authority at the metropolitan level (sec. 134 (g) (2).

[68]Transportation Equity Act (P.L 105-178), June 1998 ($203 billion over five years, up from $155 billion in 1991); Safe, Accountable, Flexible, Efficient Transportation Equity Act

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explanation for that achievement is simply that new national purpose. In contrast with all federal transportation legislation back to the nineteenth century, the central purpose of ISTEA was to integrate separate transportation modes.[69] The effect was not just the absence of the type of systemic excesses that plagued the highway systems of 1921 and 1956 but a greatly expanded stakeholder base. Reauthorization debates now draw not just the traditional "road gang" or transit lobby but city planners, bikers, pedestrian, and environmental activists whose funding is also at stake. In the first reauthorization of ISTEA in 1997, that expanded stakeholder base persuaded Congress to reassign all increases in the federal gas tax initially designated for deficit relief to the Highway Trust Fund, the equivalent of a sixty percent increase in federal aid.[70] Equally important, the agencies emphasized in this account were also reformed in 1991. Though problems of representation and accountability persist, the simple fact that the old state highway departments were compelled to negotiate with local governments on basic funding and programming effectively transformed them into multi-modal departments of transportation for the first time, with a vested professional, political, and financial interest in all transportation modes within their states. This transformation has been especially important as I discuss below given the faltering of their century-old fiscal base in the excise tax on fossil fuels.[71]

The Highway Trust Fund (HTF) registered its first shortfall in 2004 in the wake of a new surge in oil prices. Though quick action managed to defang provisions designed to insulate the General Fund from such shortfalls, it was clear by that time that the problem was deeper than renewed volatility in the oil markets. Two trends in particular had emerged by the early 2000s. The first was the rising efficiency of motorized vehicles. By the early 2000s average fuel economy had finally overcome the exception to the fuel economy standards secured by Reagan for "light trucks," a category that encompassed the fast-rising market for sport utility vehicles and passenger vans.[72] The second was a slowdown in traffic growth. By the early 2000s, the most closely watched indicator, vehicle-miles-traveled (VMT), was growing at half the rate of the volatile 1970s, indicating a slowdown in the larger economic forces associated with highway development in the past.[73] Shortfalls resumed, not surprisingly, during the Financial Crisis of 2008–09 and have continued ever since.

A large share of the blame for the current fiscal crisis has been the failure of Congress to increase the federal gas tax rate. Though faltering, revenues are still a formidable $40 billion per year, suggesting that even a modest increase could have filled the gap as shortfalls emerged.[74] The most common explanation—fear of motorists' wrath—misses not just the relative invisibility of the gas tax (currently about five percent of the retail price paid directly at the pump) but the sharp conflicts over allocation of that revenue source emphasized above.[75] Two residual claims to the gas tax, more specifically, still have the capacity to roil the political debates. The first is the claim that it is a "user fee" whose proceeds are only properly dedicated to roads. That claim, which dates to the advent of state gas taxes in the 1920s and is still professed by many conservatives, is not just technically incorrect—the gas tax is an excise tax requiring additional statutory mechanisms to secure it for a specific use—but a flawed application of public finance theory: though the "user pays principle" still applies, the corresponding conception of "user benefit" has shifted sharply through the years in response to the widespread externalities associated with an exclusive focus on roads.[76] The second residual is the claim by the more automobile-dependent states for a one-to-one return of all federal gas tax revenues collected in their states. That claim, which can be traced to the rising costs and delays on the urban interstates in the 1970s, is essentially no different from the claim by Northeast states in the 1910s for a one-to-one return of the new federal income tax collected in their states. Though the latter lost their case in 1926 when it was overturned by the Supreme Court, highway advocates managed to institutionalize their claim to the federal gas tax in the form of a minimum return in the 1982 Act along with formal "equity adjustments" if actual programming amounts fell short.[77]

It is a testament to the steady stream of expert testimony from state transportation officials, urging lawmakers to keep all of the post-Interstate programs intact and detailing the dire consequences if they do not, that Congress has consistently filled the rising gap in the Highway Trust Fund with General Funds. The two reauthorizations during the Obama years are especially notable in this regard given the sharp rightward turn of Congress after the midterm elections of 2010. Republican majorities in the House made an exception in both cases to their crusade against the federal deficit and agreed to large infusions from the General Fund. (Both parties had already agreed before then to a moratorium on earmarks, long regarded as the political glue holding

(P.L 109-59), August 2005 ($244 billion over five years); Moving Ahead for Progress (P.L 112-141) July 2012 ($105 billion over two-years); Fixing America's Surface Transportation Act (P.L 114-94), December 2015 ($305 billion over five-years); Infrastructure Investment and Jobs Act of 2021 (P.L 117-58), November 2021. Divisions A-C (surface transportation authorizations), doubled to $667 billion over five years). Transportation projects were also prominently featured in the 2009 stimulus bill, the American Recovery and Reinvestment Act of 2009 (P.L. 111-5) ($47 billion).

[69]On the historical emphasis of federal transportation policy on single modes, see especially Mark Rose, Bruce Seely, and Paul Barrett. *The Best Transportation System in the World: Railroads, Trucks, Airlines, and American Public Policy in the Twentieth Century*, (University of Pennsylvania Press: 2010, 213).

[70]On the new 'intergovernmental lobby in transportation policy, see Paul Lewis and Eric McGhee, "The Local Roots of Federal Policy Change: Transportation in the 1990s," *Polity* 34, no. 2 (2001); and Joseph Marbach and Wesley Leckrone, "Intergovernmental Lobbying for the Passage of TEA-21," *Publius* 32, no. 1 (2002).

[71]For a good portrait of the expanded capacity and commitments of state transportation departments today, see AASHTO's 2022 compendium "Transportation Governance and Finance: a 50-State Review."

[72]Energy Information Agency, 2011 Annual Report, Table 2.8, p. 59 "Motor Vehicle Mileage, Fuel Consumption, 1949-2010." FHWA, Table VM-1, "Annual Vehicle Distance Traveled in Miles."

[73]FHWA, Tables VM-201 (Annual Vehicle Distance Traveled in Miles) and VM 202 (by functional system). For a review of theories behind declining traffic growth, see Leard, Benjamin, Joshua Linn, and Clayton Munnings. "Explaining the Evolution of Passenger Vehicle Miles Traveled in the United States." *The Energy Journal* 40, no. 1 (2008): 25-54. See also Phineas Baxandall, "Moving Off the Road: A State-by-State Analysis of the National Decline in Driving." U.S. PIRG Education Fund, 2013.

[74]The last increase in the federal gas tax rate was in 1993, which was initially designated for deficit relief (18.3 cents for gasoline and 24.4 cents for diesel). According to AASHTO, each cent generates around $1.4 billion. Hearing Before the Subcommittee on Highways and Transit, October 18, 2023, p. 16 (reprint of AASHTO's matrix of revenue options).

[75]On the motorist wrath thesis, see Christopher Knittel, *The Political Economy of Gasoline Taxes: Lessons from the Oil Embargo.* National Bureau of Economic Research (2014). His analysis relies on Gallup polls from the 1970s focusing on the large increases proposed for conservation not the smaller increases required for the highway program. Knittel also fails to explain the sharp increase approved by Congress in 1982 when gas prices and inflation were at historic highs.

[76]Paul Samuelson "The Pure Theory of Public Expenditure," *The Review of Economics and Statistics* 36, no. 4 (Nov. 1954), 387-389.

[77]For a good history of the so-called "equity" claim see, Congressional Research Service (CRS), The Donor-Donee State Issue: Funding Equity in Surface Transportation Reauthorization, March 19, 2009, Report #R40451.

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the program together).[78] As noted above, President Biden drew on that longstanding bi-partisan accord for his signature legislative achievement: the *Bipartisan* Infrastructure Act of 2021.

It is also clear, however, that the next reauthorization will be a much heavier lift. According to the Congressional Budget Office, the combination of pandemic lockdowns, rising inflation, and an accelerated shift to remote work has increased the projected deficit in the Highway Trust Fund to fifty percent of outlays when current authorizations run out in 2026, up from twenty percent in 2021. This would require an additional $40 billion per year just to keep the program whole.[79] Equally significant, the federal deficit also took a pandemic leap, pushing the federal debt above Gross Domestic Product (GDP) for the first time since World War II. Given the fact that Republicans managed to retake the Senate and hold onto their narrow majority in the House in the general elections of November 2024, the opening salvo in the reauthorization debate in the 119th Congress will most likely be a push to off-load transit, still widely perceived by conservatives as an illegitimate use of the gas tax.[80] That, however, would still leave a sizeable deficit in the trust fund, leaving the even less palatable options of increasing the gas tax rate or devolving highway programs back to the states. Given the fact that Republican-controlled states are significantly more dependent on federal highway aid than their Democratic counterparts, the latter could threaten a revolt by Republican governors.[81] Without a broader remedy for the fiscal crisis, in short, the most likely scenario for the new Congress is a new round of hairsplitting debates over a declining revenue source.

In the final two sections, I return to the insight that launched this investigation of a potent intersection between the fiscal crisis and the climate crisis. I make the case, more specifically, that the transportation departments of the fifty states have both the incentive and the capacity to advance two proposals in the upcoming reauthorization debates: (1) to replace the excise tax on fossil fuels with a new system of mileage based fees using the same technology that has already revolutionized telecommunications; and (2) to develop a new capital plan designed to shore up all of the nation's aging transportation infrastructure against the coming storms, road and rail alike.

6.1. From user fee to carbon tax

The final report of a special commission authorized by Congress in 2005 to address the looming gap in the Highway Trust Fund made a compelling case for replacing the federal gas tax with a system of mileage-based user fees assessed by satellite-based global positioning systems (GPS). That technology, which had already revolutionized telecommunications, promised not just a general replacement for the gas tax but expanded capacities to monitor and manage the highway system, including real time traffic data and the ability to vary rates by location and time of day.[82] Those same advantages, however, also came with significant costs, including the need for an entirely new administrative apparatus along with a host of new privacy and enforcement concerns. These concerns, including real fears of a motorist backlash as payments shift from a largely invisible excise tax at the pump to a highly visible user fee, directly billed, have effectively relegated this option to small pilot projects in the states for the past 15 years.[83] The looming fiscal crisis, however, provides a good opportunity to remake the case.

Two arguments in particular have the potential to persuade bi-partisan majorities in Congress to support the shift to mileage-based fees. First and foremost, it would be a self-funded fix. Unlike the other issues that threaten to roil the debates, there is no question that the transition to a new revenue system would justify an increase in the gas tax rate: it would not only resecure the user pays principle of the past 100 years but spare this policy realm from the much bigger debate over the federal deficit. Second, and equally important, it would reaffirm Congress' longstanding "partnership" with the states. As the level of government with direct authority over the licensing and regulation of motor vehicles, the states are in the best position not just to implement but administer a national mileage-fee plan. Their pilot projects over the past 15 years have also made significant progress in addressing administrative complexities and privacy concerns, with some states getting ready to launch a formal shift to the new revenue source.[84] A combined federal-state system would also ensure that motorists receive a single bill.

Given their longstanding track record of developing national policy, the transportation departments of the fifty states are also in the best position to negotiate national standards and protocols for the on-board transponders and inter-state clearinghouses required for the new revenue system. This, by extension, would engage the capacities and incentives of powerful industries, including motor vehicle manufacturers, already heavily invested in the development of onboard diagnostics and other telematics, as well as the internet giants of Silicon Valley, whose efforts to develop self-driving and connected vehicles will require even more extensive public investments to enable this new type of user on the public roads.[85] Equally

[78]See American Association of State Highway and Transportation Officials, "Policy Resolutions 2013-2022" (2022), which summarizes positions advanced in Congressional hearings. House Republicans voted 3-1 in favor of the 2012 and 2015 reauthorizations. Earmarks reached 13.5% of authorizations before a ban was observed in 2011. Congressional Research Service, 2020, Report #R41554.

[79]Congressional Budget Office, *The Budget and Economic Outlook: 2024 to 2034*. February 2024, pp. 86-87, projects that the deficit in the HTF will rise to 50% of programming needs by 2026. Office of Management and Budget, June 2024, Table 1.1.

[80]See the Heritage's Foundation's "Project 2025: Mandate for Leadership," pp. 634-636.

[81]On the return to a highways-only account, see the testimony of Jeff Davis before the House Subcommittee on Highways and Transit, "Running on Empty." October 18, 2023, pp. 3-59. Davis estimates that this would still leave a gap of around $11 billion per year, the equivalent of a 10-cent increase in the gas tax rate. Data on the dependence of Republican-controlled states on federal aid was calculated from FHWA, Table SF-1 Revenues used by States for Highways, which also indicates that states with Republican-controlled legislatures receive an average of 40% of their highway budgets from Congress as compared Democratically controlled states of 25%. They also collect significantly less from motorists in gas tax and registration fees.

[82]"Paying our Way," Report of revenue study commission authorized in the 2005 Act (Sec. 11142). The report also outlined a ten-year plan to implement the shift to mileage-based fees funded by a ten-cent increase in the gas tax (2009, pp. 7, 9, 195, 205).

[83]On the "daunting obstacles," see Robert Kirk and Marc Levinson, *Mileage Based Road User Charges*, Congressional Research Service (2016).

[84]For a good review of the state mileage-based fee pilots, see Jame Aloisi, Athuri Bhuvan, Jinhua Zhao, Yunhan Zheng, and Joyce-Johnson Seamus, *Replacing the Gas Tax*, MIT Mobility Initiative and JTL Transit Lab (Cambridge, MA, July 2023). On the need for federal involvement, see Garrett Shrode, Jeff Davis, and Robert Puentes, *Driving Change: Advice for the National VMT-Fee Pilot*, ENO Center for Transportation July 24, 2023, https://enotrans.org/eno-resources/driving-change-advice-for-the-national-vmt-fee-pilot/. One of the last actions of outgoing Secretary of Transportation Pete Buttigieg was the creation of an advisory board to develop a national pilot program pursuant to sec 13,002 of the IIJA.

[85]On the problems and potential of the new on-board telematics, see Jon Truby, Rafael Dean Brown, and Imad Antoine Ibrahim, "Regulatory options for vehicle telematics devices: balancing driver safety, data privacy and data security," *International Review of Law, Computers & Technology*, 38, no. 1 (2024): 86–110. On the public investments required to enable automated and connected vehicles, see Oguz Tengilimoglu, Oliver Carsten, and Zia Wadud. "Infrastructure requirements for the safe operation of automated vehicles: Opinions from experts and stakeholders," *Transport Policy* 133 (2023) 209–222.

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important, a viable federal commitment could persuade the trucking industry to take the lead. Though currently opposed to the new revenue system out of reasonable fears that it would be confined to them (as is already the case in other countries), truckers are also the most vulnerable to current revenue trends. They currently account for some forty percent of total revenues in the Highway Trust Fund, up from thirty-five percent in 2000. As the heaviest users of the Interstates, they are also the most vulnerable to another widely promoted remedy, which I pick up on below: electronic tolls. In contrast to other highway users, however, truckers have few privacy concerns. Most truck cabs, indeed, are already festooned with GPS-based tracking systems, which puts them in a good position to offer a rapid shift of up to forty percent of current revenues to the new mile-based system – in exchange, of course, for guarantees to limit rate increases, secure their share with passenger vehicles, and/or impose a new federal ban on tolls.[86]

In addition to addressing the longstanding practical and political problems of the gas tax, a new joint federal-state system of mileage-based fees could hitch this policy realm to rising concerns with climate change. Additional increases in the gas tax to assume the cost of subsidies and tax credits for alternative-fueled vehicles, for example, could potentially pay for themselves by reducing the cost of rebates for fuel taxes paid, a necessary provision in any transition away from the gas tax. Recalibrating on-board transponders to record credits along with rebates at the pump could extend the subsidy to lower income drivers, correcting a major deficiency in previous subsidy regimes. In combination, these measures could also counter proposals in Congress for a "carbon tax," most of which are eying that same under-taxed revenue source. They would enable supporters to claim, in short, that the gas tax was already a carbon tax, with proceeds dedicated to reducing the largest source of greenhouse gas emissions in the United States.

What a revenue retrofit will *not* do in itself, of course, is address the cumulative deficit in the Highway Trust Fund, the product in large part by slowing traffic growth. That gap, projected to rise again to almost fifty percent of outlays in 2026 when current authorizations run out, would require a doubling of the current gas tax rate even before any rate increases required to implement a revenue shift. As a better long-term bet than fossil fuels, however, the revenue system would also create the opportunity for another long overdue reform of the current funding regime.

6.2. From pay-go to finance

Finance is the core institution of American capitalism, responsible for the basic calculations of risk and reward on which both public and private spending rely. It was also the initial proposal advanced by President Eisenhower for the Interstate system. His 1955 plan called for the creation of a special federal commission with the authority to issue bonds backed by the federal gas tax, which would be dedicated to roads for the first time. That plan was only narrowly defeated, notably by the same southern Democrats who defeated Roosevelt's Federal Loan Authority 15 years before.[87] Its replacement with a trust fund—another New Deal innovation—had a remarkable run precisely because the big new roads generated enough additional traffic to fund all federal highway programs as a current expense, a condition that no longer holds.

In sharp contrast with the 1950s, there is no ideological or partisan opposition to road financing today. On the contrary, Congress not only lifted its longstanding ban on tolls in the 1990s but began subsidizing them in a new program of "innovative finance."[88] That program, created in 1998 to fund stand-alone toll projects like bridge renovations and high-occupancy vehicle (HOV) lanes, was vigorously promoted by politicians of all stripes as shortfalls in the Highway Trust Fund emerged. The 2005 reauthorization, for example, created a pilot program for toll-financed HOV lanes and adjoining segments of the Interstate system; the 2012 reauthorization included a sharp step-up in capital grants for toll projects generally, along with an increased federal share of their cost. In 2018, tolls were advanced by President Trump as a general fix for the rising fiscal gap, which promised to leverage hundreds of billions of dollars in new private investment with no increase in taxes.[89]

The longstanding complaint against road tolls is that they are not a surcharge for added utility but a form of "double taxation" compelling motorists to pay twice for something they have already paid for through the gas tax. That complaint, which can be traced to the proliferation of toll bridges in the 1920s, is amplified today by the fact that federal aid is doubly subsidized: it includes both low-interest loans from the Highway Trust Fund and tax deductions for the interest income from state and local bonds. Because tolls only work on roads with sufficient traffic to pay for themselves, this option would pose a particular problem for states in the South and West, whose share of the Interstate system includes long stretches with low traffic counts.[90] The biggest problem with tolls, however, is the fact that the Interstate highway system has already been built as originally designed, that is, as a *freeway* system with closely spaced ramps and parallel roads. Though the physical barriers are gone, in short, there is no avoiding what the 1939 Report called a "traffic repelling" tendency where the tolls leave off.[91] It is no surprise in this regard that the states have been slow to accept Congress' offer of subsidized toll finance. Current toll mileage in the U.S. is up only slightly from the tally produced by the Clay Commission in 1955: about 5900 miles today as compared with 5242 miles in 1955.

[86]On the case for a truck-only system, see Robert Atkinson, *Why Congress Should Enact a Mileage-Based User Fee for Heavy Trucking*, Information Technology & Innovation Foundation (April 2024). FHWA, Table VM-201 (vehicle miles traveled by vehicle type); FE-1 (trucker contribution to the Federal Highway Trust Fund).

[87]On Carbon Tax proposals in Congress, see Jason Ye, *Carbon Pricing Proposals in the 117th Congress*, Center for Climate and Energy Solutions (2022).

[88]See footnote #19 above. Clay Report, pp. 20-25 (financing proposal). On the 1955 defeat, see Johnson, *The American Road*, 108-112. On the partisan divide over federal debt in the 1950s, see Teal Arcadi, "Partisanship and Permanence: How Congress Contested the Origins of the Interstate Highway System and the Future of American Infrastructure," *Modern American History* 5 (2022).

[89]On federal support for toll projects, see Robert Kirk, *Tolling U.S. Highways*, Congressional Research Service (2016). On the Trump infrastructure plan, see White House Fact Sheet, February 2018, https://trumpwhitehouse.archives.gov/briefings-statements/building-stronger-america-president-donald-j-trumps-american-infrastructure-initiative.

[90]On historical opposition to tolls, see Johnson, pp. 97-98. On the high cost of federal aid, see Congressional Budget Office, *Federal Support for Financing State and Local Transportation and Water Infrastructure*, October 2018, p. 4, The disadvantage of states in the South and West was calculated from FHWA, Tables HM-80 "State Highway Mileage by Functional System;" and Table VM-2 "Functional System Travel; Annual Vehicle Miles by state."

[91]1939 Report, p. 110. On the current problem of traffic diversion, see Peter Swan and Michael Belzer, "Empirical Evidence of Toll Road Traffic Diversion and Implications for Highway Infrastructure Privatization," *Public Works Management & Policy* 14, no. 4 (2010); and Ronald Davis, Yogesh Patel, Christopher Mwalwanda, and Edward Regan, "The Tradeoffs of Tolling Untolled Roads," *Transportation Research Record* 2672, no. 4 (2018). See also the report of a special committee authorized by Congress to address the rising investment needs of the Interstates, which also rejected a toll option. The National Academies Press. "Renewing the National Commitment to the Interstate Highway System." 2019, pp. 207-210.

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A large share of the stepped-up subsidies for tolls in the 2012 Act had to be clawed back in 2015. The Trump plan was denounced by Democrats and populists alike before being upstaged by a rival plan introduced by Republican lawmakers in July 2018, which focused on shoring up the Highway Trust Fund instead.[92]

As in the 1950s, there are no constitutional or legal obstacles to a centralized financing mechanism like the one proposed by Eisenhower in 1955. Mileage fees, indeed, are a much better bet than the gas tax in this regard because they are *not* an excise tax: they would not only free this policy realm from a volatile commodity—fossil fuels—but allow for rate increases without the need for approval by Congress or the state legislatures. A federal financing option for the American highway system as a whole, not just the parts, could also be advanced as a means of untangling the current accretion of programs in the Highway Trust Fund. Distinguishing capital from operating expenditures could enable Congress to preserve important on-going programs like vehicle to signage and signaling upgrades for automated vehicles, operating subsidies for urban and rural transit systems, current safety programs and basic research, while also preserving a routine political check.[93] The big challenge to resurrecting Eisenhower's federal financing proposal of 1955, indeed, is not the feasibility of a central financing mechanism but persuading Congress to let a big new revenue source out of its hands.

The final insight of this review of American highway history from the perspective of the powerful institution at its core is that the transportation departments of the fifty states have both the incentive and capacity to advance a second request to Congress as the reauthorization debates get underway: authorization to develop a new long range plan specifically designed to address the vulnerability of the nation's transportation infrastructure to climate change. This purpose would not only take another page out of Eisenhower's playbook—like the threat of nuclear war, no part of the country is immune climate change—but engage the longstanding collective capacity of these agencies to work out the details. All of the major achievements of American highway history chronicled above began with a formal authorization from Congress todevelop a multi-year plan, from the 1921 mandate to hook up their emerging highway systems at the state line, to the 1944 authorization to map out the Interstates, to the development of a post-Interstate plan in 1968, and a new National Highway System in 1991. All of these formal authorizations from Congress set off a multi-year process of identifying, classifying, reconciling, and projecting the widely diverging capacities and needs of the fifty states into a viable national plan. Judging by the increased use of the term "resilience," indeed, consensus is already emerging on the need to shore up all of the nation's aging transportation infrastructure against the coming storms, road and rail alike.[94]

Two additional arguments for this second request can be summarized briefly. First, the capacity of these state-level agencies to take on this new national task has significantly increased over the past thirty years. As noted above, the reforms of 1991 included both a beefed-up planning process and the delegation of significant funding and programming authority to the MPOs, the agencies originally created in 1962 to mollify critics of the Interstate plan. Though problems of representation and accountability persist at both levels, the simple fact that the old state highway departments were compelled to negotiate with local governments for the first time created a new layer of policy formation *within* the states where the problems of the old regime were most acute. There is a good chance, in short, that a new mandate from Congress emphasizing climate resilience and structural integrity—with the promise of long-term funding attached—will further focus and discipline the planning process, both within and between the states.[95] Second, like shift away from the gas tax, a viable plan to shore up the nation's aging infrastructure could encompass other federal initiatives consistent with this aim. According to the EPA, transportation is not just the second largest source of greenhouse gas emissions in construction, just behind residential construction, but the largest user of structural steel and cement, both of which have production-to-CO_2 emissions of over one-to-one. Though Build Green/Buy Green protocols could increase the cost, the sheer magnitude of a new capital resilience plan could spur the development of cleaner materials and construction techniques for other sectors, potentially elevate this policy realm into the nation's frontline defense against climate change.[96]

Even with all the details and protocols worked out, of course, there will be no avoiding a big debate. As with all the long term highway plans that preceded it, the sheer size and reach of a new capital resilience plan virtually guarantees that every congressman, state legislator, governor, mayor, and county clerk will want to weigh in, as will every manufacturer, building contractor, equipment dealer, and materials suppler whose financial prospects rely on the new public projects that ensue. Given the larger economic, social, and environmental uncertainties—for example, energy prices, inflation, the pace of fleet turnover, etc.—there is also a good possibility that the debate will extend beyond a single session of Congress or even a general election cycle, giving voters a chance to weigh in as well. If the achievements of their predecessors are any clue, however, the political debates will focus not on the substance of the plan but the means—come hell and high water—of getting it done.

Funding declaration. None.

Competing interest declaration. None.

[92]FHWA, Table HM-25 (toll road mileage). On the claw back provision, see Mallet, 2019, p. 7. On the Republican plan, see *Engineering News Record*, July 24, 2018, "Shuster Rolls Out Infrastructure Proposal, With Big Gas-Tax Hike." The Trump plan was quietly dropped in April 2019, a reported casualty of the congressional impeachment inquiry.

[93]On "program creep," see Robert Dilger, *Federalism Issues in Surface Transportation Policy: A Historical Perspective*, Congressional Research Service (November 6, 2015). A good model for rate setting is the Postal Rate Commission, established by Congress in 1970 to incorporate efficiency considerations into another public monopoly with costly public service obligations.

[94]The terms 'resilience, resilient, and resiliency' were repeated almost two hundred times in the IIJA 2021, up from less than 20 in the FAST Act of 2015.

[95]For a summary of the expanded responsibilities and capacities of State Departments of Transportation in this regard, see American Association of State Highway and Transportation Officials (AASHTO), "Transportation Governance and Finance: a 50-State Review" (October 2022). For a good account of the problems and potential of MPOs, see Janice Griffith, "Evolution of Metropolitan Planning Organizations (MPOs) into Multi-Functional Regional Roles," *Iowa Law Review* 106, no. 5 (2021).

[96]Environmental Protection Agency, *Inventory of U.S. Greenhouse Gas Emissions and Sinks, 1990-2019*. 2021, p. 7, https://www.epa.gov/ghgemissions/inventory-us-greenhouse-gas-emissions-and-sinks; and Peter Truitt, *Potential for Reducing Greenhouse Gas Emissions in the Construction Sector*, U.S. Environmental Protection Agency (2009), pp. 6-9. Note that both steel and cement have production-to-CO2 emissions ratios of over one-to-one. According to the Organization for Economic Cooperation and Development (OCED), the price of low-carbon steel and cement is currently around three times the price of conventional production methods.

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