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TO: PETE BUTTIGIEG, U.S. SECRETARY OF TRANSPORTATION
FROM: JACOB ALDER, TAX ANALYST
DATE: MAY THE FOURTH, 2022
RE: REPLACE THE FEDERAL FUEL TAX WITH ROAD MILEAGE USER FEES

I. OVERVIEW

Policymakers and academics collectively agree that the gasoline excise tax is dying (Duncan et al., 2020). The tax accounts for approximately half of all road financing, but Congress has not raised the tax since 1993.[i] Three decades of inflation coupled with increased fuel efficiency, make the gasoline tax an insufficient revenue source. To add further complication, most automakers have committed to dramatically expand electric vehicle product lines, if not to completely overhaul hybrid and gas-only vehicles. Electric vehicle drivers pay no fuel taxes because they use *no fuel*.

These three trends—inflation, fuel efficiency, and market transition—have effectively written an end to the future of the gas tax. Consequently, this memorandum reviews an alternative. In its most basic form, road mileage user fees (MUFs) charge users for each vehicle mile traveled (Duncan et al., 2014). While MUFs offer a viable, benefits-based solution to road financing, they remain unpopular among drivers. Representative surveys show minor increases in support over the past decade (Agrawal and Nixon, 2010, 2020; Duncan et al., 2020).[ii] Still, MUFs have gained momentum in the literature and in several states; properly designed they could resolve financing issues.

II. POLICY DESCRIPTION

The proceeding analysis presents a hypothetical policy scenario: replace the federal fuel tax with a $0.05 per mile MUF, effective January 1st, 2023. I include annual revenue estimates for the five-year period from 2023 to 2027 for both a static and a micro-dynamic model. Herein lies the key empirical question: will the increased salience of the MUF drive significant behavioral response? The static model assumes driver behavior does not change during the time frame. The micro-dynamic model includes an elasticity measure to account for behavioral response to the new policy.

III. DISCUSSION OF FINDINGS

The following table, which highlights the two models, underscores the importance of the empirical question. It lists the Congressional Budget Office's (CBO) 2021 projections of the National Highway Trust Fund, then my base case scenario and revenue estimates, with both models scored against the base case.

Revenue Projection	2023	2024	2025	2026	2027
CBO 2021	42.70	42.70	42.74	42.75	42.74
Base: Fuel Tax	76.35	76.48	76.72	76.65	76.79
MUF: Static Model	170.09	172.71	175.11	177.18	178.76
MUF: Dynamic Model	103.95	120.33	132.66	141.75	149.20
Static Score	93.74	96.23	98.39	100.53	101.98
Dynamic Score	27.59	43.85	55.94	65.11	72.41

Note: All projections are presented in nominal billions of dollars. The static and dynamic scores are the absolute value of the Base: Fuel Tax – MUF: Static (or Dynamic).

The subsequent table provides the CBO's projected outlays for the National Highway Trust Fund (NHTF) and end of year balances (accrued). I corroborated the CBO's projections with the Congressional Research Service report (Kirk and Mallett, 2020). I calculated the difference between my three estimated scenarios and CBO's projected outlays. My revenue estimates source proved "sufficient" to meet the CBO's forecasted outlays in each case. While this likely indicates some level of bias, due to omitted factors, my two models provide, at a minimum, a consistent idea of the factor differences between the revenue *levels*.

Outlays Projection	2023	2024	2025	2026	2027
CBO 2021 Outlays	56.71	58.91	61.30	63.46	65.16
CBO 2021 End of Year Balance	(9.64)	(20.53)	(33.35)	(48.09)	(64.29)
Base - CBO Outlays	19.64	17.57	15.41	13.18	11.63
Static - CBO Outlays	113.38	113.80	113.81	113.71	113.61
Dynamic - CBO Outlays	47.23	61.43	71.35	78.29	84.04

Note: All projections are presented in nominal billions of dollars. Rows 3-5 show the absolute difference between the CBO 2021 Outlay estimate and Projected revenue, displayed in the prior table.

In the static model, unchanged driving behavior generates over $170 billion in revenue in each year over five years, compared to $70 billion for the fuel tax (CBO: $42 billion). In the behavioral response model, I accounted for a sudden initial response (a shock to driver behavior as a result of the increased salience) which gradually declines over the forecast period. For this reason, the dynamic model estimates increase as opposed to the static model estimates which remain relatively constant over time. Yet, even with the shock, the dynamic model provides over $100 billion each year.

I outline the full set of assumptions and methodological approach in the Methodological Appendix, but also include several key assumptions for context here. First, I included a modest amount of inflation year-over-year in my forecasted gasoline prices to account for commodity variability. These correspond with the Energy Information Administration's (EIA) Annual Energy Outlook, as well as the American Petroleum Institute's (API) predictions (Lem, 2021). Second, I scored the CBO 2021 estimates with current prices as a validity check, prior to including them in my model. The CBO estimates underestimated the amount of current inflation. Finally, I modeled price elasticity for miles traveled by averaging the estimates from several models. I concluded with a measure of -0.081 (Davis and Sallee, 2020; Forkenbrock, 2005; Hymel, n.d.; Mann, 2016; Schroeckenthaler and Fitzroy, 2019; Sjoquist et al., 2011; Wenzel and Fujita, 2018; Zhang et al., 2009).

IV. Conclusion

These assumptions reflect standard approaches in the literature. Even with a simple, and broadly-applied MUF of $0.05 per mile, the funding level is substantially larger than the current program. Policymakers should strongly consider a MUF design that minimizes privacy concerns and increase simplicity, to increase popular favor among voters. By doing so, they can literally pave the future of roadway infrastructure in the United States.

[i] The Tax Reform Act of 1993 passed by the 103rd Congress raised the gasoline tax by 4.3 cents per gallon. The Act raised the total to 18.4 cents per gallon, all of which goes into the Federal Highway Trust Fund for maintenance, repair, reconstruction, and new construction of US roads. Last year Republican Senator Mitt Romney proposed indexing the tax to meet inflation, but the proposal stalled under pressure from the Biden Administration's attempt to install more comprehensive tax reform and infrastructure financing. The gasoline tax remains unchanged.

[ii] Agrawal and Nixon have conducted a yearly survey of Americans' opinion of federal tax options to support transportation. Now in its eleventh year, the survey shows an increase from 30% support for a MUF to now 45%.

V. REFERENCES

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VI. Methodological Appendix

a. Data

Assumptions

Tax Exclusive Gas/Diesel Prices:	Forecasted five years using 20 years of historic FRED data
Vehicle Miles Traveled:	Used 5 years of EIA projections. Estimated HDV/LDV separately
Miles Per Gallon	Used 5 years of EIA projections. Estimated HDV/LDV separately
Federal Tax on Fuel:	$0.184/gallon
State Tax on Fuel:	$0.3869/gallon
State Tax on Diesel:	$0.4024/gallon
Federal MUF:	$0.05/mile
Inflation:	0.2%/year
Elasticity:	-0.081

b. Method

I used two different models.

Static:

Gallons Consumed = VMT * 1/MPG

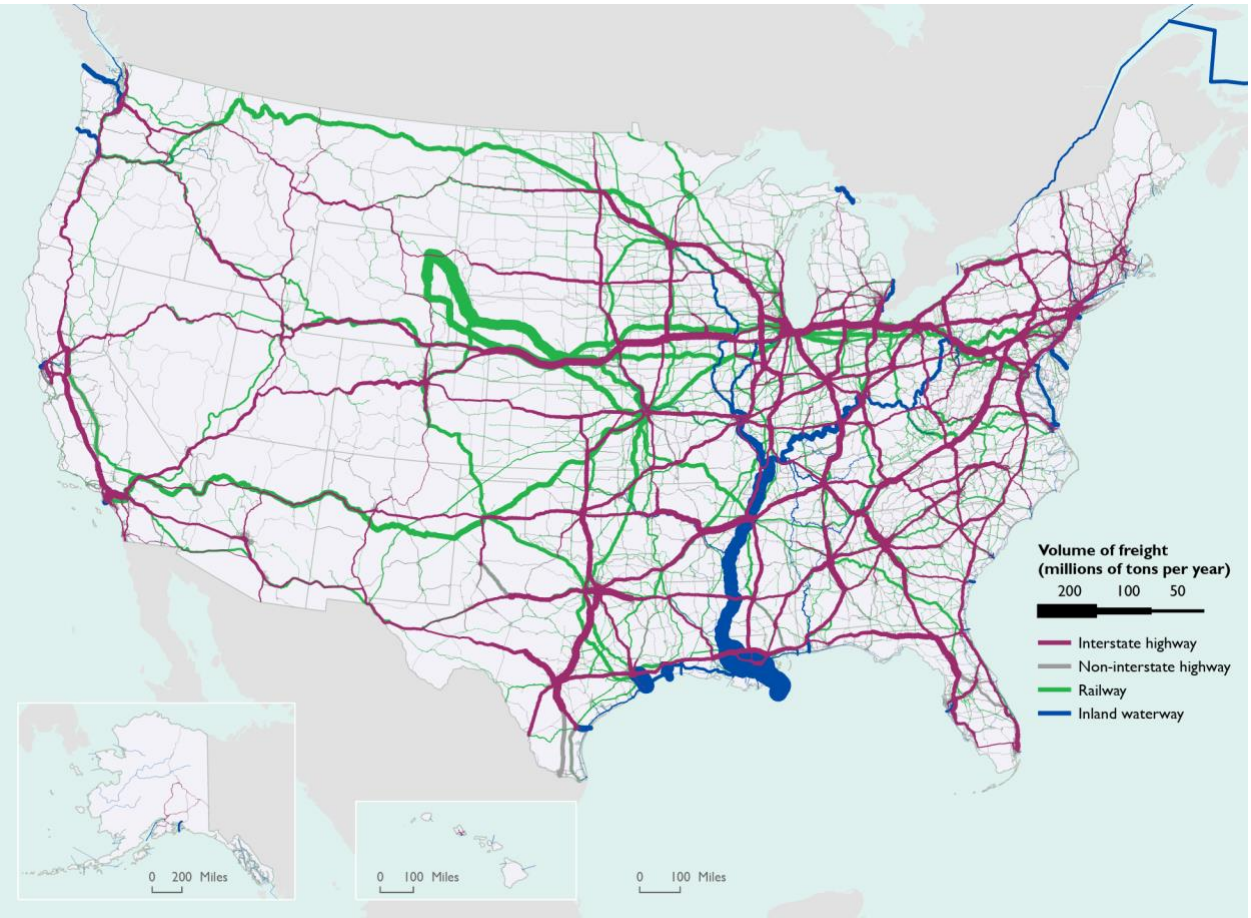
Revenue = Combined Gasoline Tax * Gallons Consumed

Dynamic:

Cost per Mile = (1/MPG)* Fuel Price + Combined Fuel Tax) + Federal MUF

Revenue = Federal MUF * Vehicle Miles Traveled

VII. FIGURES AND CHARTS



Notes: Highway flows depicted in the map are based on the Freight Analysis Framework data for 2015.

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