Greenhouse Gas Reductions and Implementation Possibilities for Pay-to-save Transportation Price-shifting Strategies

By

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*Disclaimer

- Although the first author is employed by the Federal Highway Administration (FHWA), the views expressed are not those of the FHWA or the U.S. Department of Transportation, and instead are solely those of that author.
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Questions for Technical Analysis

- Could substantial GHG emissions reductions from personal transportation result from a bundle of price-shifting policy measures, spurred by EPA regulatory action, that doesn't actually increase total user costs?
- Would the emissions reductions from such a bundle be on the same order of magnitude as those achieved by EPA's Clean Power Plan rule?
- How would the emissions reductions compare to those of a \$50 per ton CO_2e emissions surcharge on transportation fuels from a tax or permit-purchase requirement?

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- If instead of EPA applying a regulatory strategy, conservatives in Congress concerned about climate change led the enactment of a “light-touch” law to bring about some transportation price-shifting, what impact would there be?
- If no Federal action were taken to compel or encourage transportation price-shifting, what emissions reductions would result if states inclined toward climate action enacted the transportation price-shifting bundle on their own?

Questions for Legal/Policy Analysis

- Could Federal administrative actions compel state emissions targets reflective of a transportation price-shifting policy without requiring Congress to pass any new laws?
- Could such actions also compel states and metropolitan governments to select transportation infrastructure projects that contribute to CO_2e emissions reductions?
- How would a model State Implementation Plan (SIP) be constructed to facilitate state compliance?
- What would be allowable in a Federal Implementation Plan (FIP) that would be triggered in uncooperative states?

EPA's Final Clean Power Plan Rule

- Individual state-level 2030 targets are expressed as both rate-based goals (CO_2e lbs. per megawatt hour of power generated) and mass-based sector-wide emissions goals
- EPA in accompanying documentation compares the "do nothing" 2030 Base Case total emissions against results from the final rule
- Three pillars of emissions reductions ("heat rate" improve-ments, fuel switching, and no/low carbon power source expansion) are used in developing the final rule
- One pillar from the proposed rule, entailing setting targets for and counting demand-side energy efficiency measures, was dropped from the final rule, although credits for pursuing this are allowed in the final rule

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- State-level standards can be met in ways different from how they were developed using the three pillars
- Environmentalists call EPA’s Clean Power Plan the most important regulatory action the U.S. government has ever undertaken to address climate change

Scope an Analogous "Existing Transportation Sources" Carbon Reduction Rule

- Transportation efficiency targets based on simultaneously deploying three transportation demand management strategies
  - (1) pay-as-you-drive-and-you-save (PAYDAYS) car insurance
  - (2) parking cash-out
  - (3) the conversion of state and local sales taxes applying to newly purchased vehicles to mileage taxes designed to raise equivalent revenue
- Prices and coverage for each strategy are determined by best research and applying reasonability tests

Describe the Modeling Behind and Modeled Benefits of the EPA Final Rule

- Tables from EPA's Integrated Planning Model (IPM) Base Case 5.15 are compared against EPA's Mass-Based Case tables to determine differences in 2030 emissions
- Specifically, the table showing emissions for CO_2 is used (according to EPA, CO_2e emissions for power plants are virtually equivalent to CO_2 emissions)

Describe Modeling Behind Analogous "Existing Transportation Sources" Carbon Rule

- ***PAYDAYS car insurance*** – converted today's average premium to a rate that is 30% fixed, 70% variable based on today's average vehicle-miles traveled (VMT); applied same variable rate per mile for 2030
  - The 70% variable premium is a "best practice" which matches the minimum variability required for a State of Oregon PAYDAYS insurance tax credit
  - Today's marketplace high has variability ranging from 50-60%
  - Milemeter, Inc., previously offered a fully variable rate

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- ***Parking cash-out*** – about 95% of private-sector employers provide their employees free workplace parking, versus only 6% offering other commute benefits
- Real-world, before-after tests of parking cash-out in Los Angeles, Minneapolis, and Seattle have shown a minimum 10% reduction in drive-alone commutes

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- ***Parking cash-out (continued)*** – levels would ideally be set at a minimum of cost-recovery values, as other real estate amenities are priced; this value is $242 per month in King County for a suburban, above-ground, two-story parking structure (derived for its RightSizeParking.org tool), but an average $121 per month, or half this value, is used here
- Sufficient time is provided to repurpose parking that will no longer be demanded because of cash-out; thus employers only need to offer cash-out after costs for unused parking can be recouped

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- ***Convert fixed-percentage sales taxes to mileage-based taxes*** – population-weighted combined state/local sales taxes charged on newly purchased vehicles are converted to mileage-based taxes, charged out over three years and designed to raise the same amount of revenue
- Spurs new vehicle sales (generally with lower carbon emissions than vehicles that are replaced) as it would reduce, by the amount of the sales tax, the money that a buyer would need to have or borrow to make a purchase; the literature converges upon a price elasticity of about -1.0 for new vehicle sales

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- New mileage and/or parking prices are applied to appropriate driving trips (PAYDAYS insurance premiums to all trips; parking cash-out to driving commutes; mileage-based taxes to trips taken with newly purchased vehicles)
- The arc elasticity approach is used, with a “featured” -0.30 price elasticity (with much justification in the literature), but also reported results of two lower-bound (-0.15 and -0.22) and one upper-bound (-0.45) elasticities

Model Application Summary (Comparison to EPA Final Rule)

Scenario	Assumed Price Elasticity	Total Nationwide Million Metric Tons (MMT) of CO_2e Reduction	Percentage of Nationwide Power Rule MMT of CO_2e Reduction	Number of States (including D.C.) Where Transportation Reductions Exceed Power Plant Reductions
1	-0.15	138.3	36.9%	23
2	-0.22	196.0	52.3%	25
3	-0.30	257.2	68.6%	25
4	-0.45	359.7	95.9%	29

Summary of Analysis by State for Selected Scenario

- Selected Scenario 3 (price elasticity of -0.30)
- In the summary tables that follow
  - Green color indicates states where reductions from transportation strategies exceed Clean Power Rule reductions
  - Power reductions are based on EPA Integrated Planning Model (IPM) Base Case 5.15 versus Mass-Based Case (no reductions required for VT and DC; negative reductions estimated by IPM for several states)

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State	CO_2E Reduction in Million Metric Tons (MMT)	
	Estimated EPA Final Power Rule	Estimated Transportation Policy Strategy
Alabama	1.1	4.5
Alaska	N/A	0.5
Arizona	11.9	6.7
Arkansas	6.8	2.4
California	5.9	33.8
Colorado	9.1	4.1
Connecticut	0.2	2.6
Delaware	-0.2	0.8
D.C.	0.0	0.2
Florida	14.5	22.0
Georgia	19.0	10.2
Hawaii	N/A	0.9
Idaho	-0.1	1.3

State	CO_2E Reduction in Million Metric Tons (MMT)	
	Estimated EPA Final Power Rule	Estimated Transportation Policy Strategy
Illinois	9.1	8.5
Indiana	25.5	5.1
Iowa	3.9	2.2
Kansas	17.4	2.1
Kentucky	0.1	3.4
Louisiana	-4.3	4.1
Maine	1.4	0.9
Maryland	-3.0	4.9
Massachusetts	1.1	4.9
Michigan	3.8	9.8
Minnesota	6.5	4.8
Mississippi	-0.3	2.2
Missouri	25.4	4.7

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State	CO_2E Reduction in Million Metric Tons (MMT)	
	Estimated EPA Final Power Rule	Estimated Transportation Policy Strategy
Montana	8.4	1.0
Nebraska	13.9	1.4
Nevada	-0.5	2.8
New Hampshire	0.1	1.1
New Jersey	2.7	5.8
New Mexico	5.7	1.8
New York	3.6	9.1
North Carolina	-3.7	7.4
North Dakota	10.3	0.5
Ohio	25.0	9.0
Oklahoma	3.6	2.7
Oregon	-1.1	3.0
Pennsylvania	10.8	7.8

State	CO_2E Reduction in Million Metric Tons (MMT)	
	Estimated EPA Final Power Rule	Estimated Transportation Policy Strategy
Rhode Island	0.4	0.8
South Carolina	10.4	4.3
South Dakota	1.0	0.7
Tennessee	15.7	5.8
Texas	53.1	22.3
Utah	11.9	2.3
Vermont	0.0	0.5
Virginia	-3.6	6.6
Washington	-0.1	5.4
West Virginia	28.7	1.2
Wisconsin	17.7	5.4
Wyoming	6.2	0.5
TOTAL	375.1	257.2
As Percent of EPA Power Rule		68.6%

Results Summary

- The transportation pricing policy bundle would yield nationwide GHG emissions reductions of 257 MMT CO_2e or 68.6% of those of the final Clean Power Plan rule on top of the reductions from that rule
- The transportation policies would bring about reductions greater than those calculated for the Clean Power Plan rule in 24 states plus the District of Columbia

Additional Transportation Reductions are Available to States in lieu of Those Modeled

- Require more of one strategy in lieu of another strategy (e.g., higher PAYDAYS premium variability, raise the minimum cash-out value or mandate daily cash-out, also convert vehicle registration fees and general tax revenues supporting transportation to VMT taxes, etc.)
- Apply new strategies (mandatory or optional eco-driving training, incentives for vehicle efficiency retrofits, etc.)
- Apply behavioral economics enhancements to modeled strategies

Apply Behavioral Economics to Maximize Driving Reductions (PAYDAYS Insurance Example)

- Direct and transparent per-mile or per-minute-of-driving pricing – avoid rebates
- In-vehicle graphic displays of “insurance pricing meter” with email and web summaries
- Frequent billing without automatic bill payment
- Transit pass discounts for UBI customers or bundling transit passes with a few free miles of insurance
- Individualized assistance to identify alternatives
- Peer comparisons and “regret lotteries” to encourage continuous mileage reductions

Comparative Emissions Reductions of Taxing Carbon from Personal Transport Fuel Use

- Numerous editorial writers lament the lack of political will in the U.S. for a carbon tax, asserting its necessity to achieve emissions reductions sufficient to limit the average warming on earth to 2 degrees Celsius
- Modeled $50 per ton social cost of carbon (SCC) for 2030, as estimated by the Interagency Working Group on the SCC and published by the Office of Management and Budget
- Resulted in a nationwide reduction of 84.6 MMT CO_2e, or only 22.6% of the final Clean Power Plan rule reductions; by comparison, the price-shifting bundle would yield over three times the GHG emissions reductions
- Only with a $183 per ton price would comparable carbon reductions result

Comparative Emissions Reductions from a "Conservative" Climate Action Law

- Postulated a Congressionally enacted parking cash-out requirement, coupled with tax credits to companies offering PAYDAYS car insurance and to states converting fixed vehicle purchasing taxes to mileage fees
- The law would require cash out nationwide (endorsed by the Reason Foundation as a substitute for the ECO mandate in the Clean Air Act Amendments) and to use resulting tax revenues to encourage the other strategies
- The tax credits are assumed to lead to 20% of insurance policies in each state to become PAYDAYS priced

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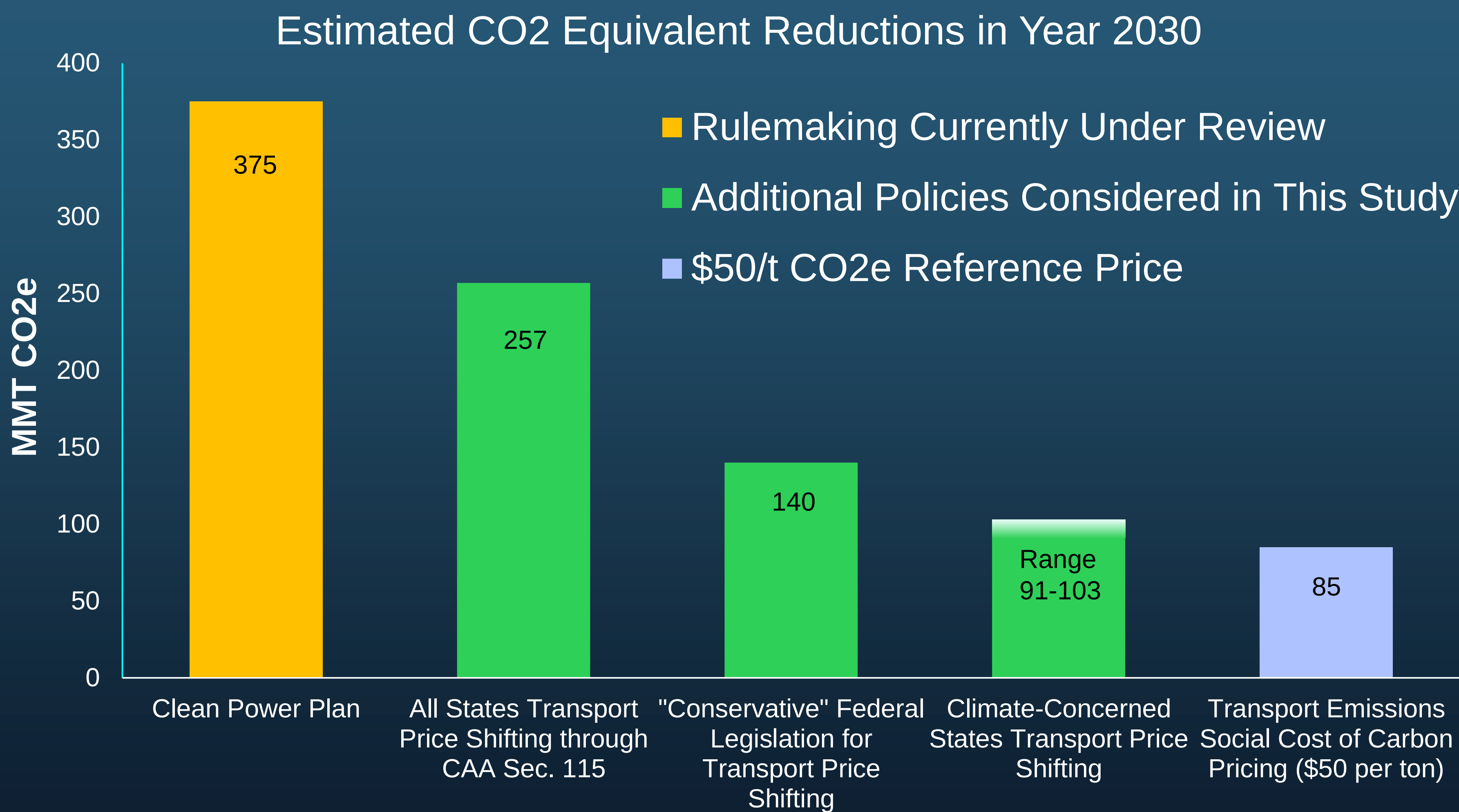
- States already taking significant carbon reduction actions (CA and RGGI states) or signing a legal brief in support of the Clean Power Plan, plus the three states with over 100,000 auto manufacturing jobs, are assumed to tax shift
- This yielded a 140 MMT CO_2e reduction, or 1.7 times the reductions of the $50 per ton carbon charge, or the same reductions as would result from a nationwide $89 per ton carbon charge on gasoline
- It also resulted in 54.5% of the 257 MMT CO_2e reduction if the transportation price-shifting bundle were applied universally, and a greater reduction than from the Clean Power Plan in 23 states plus the District of Columbia

Comparative Emissions Reductions from State-only Measures

- Made two slightly different sets of assumptions as to which states may act on their own
- The first assumption was that all 19 states plus the District of Columbia that voted for Hillary Clinton in the 2016 election would take action
- The second assumption was that states already implementing significant carbon reduction policies (CA and RGGI states) or signing a legal brief in support of the Clean Power Plan would act on their own
- The assumptions resulted in a 103 or 91 MMT CO_2e reduction, respectively, or 1.2/1.1 times the reductions of the $50 per ton CO_2e charge, or 40%/35% of the reduction if the transportation price-shifting bundle were applied universally

Comparative Emissions Reductions Summary by Strategy



Top Level Legal and Policy Summary

- Specific sections of the Clean Air Act (CAA) and Federal surface transportation law are examined to find “avenues of authority” to establish state-level carbon emissions reduction targets through Federal administrative action absent any additional Congressional authority
- Also researched is whether legislative authority exists to further bolster carbon reduction targets by limiting project selection authority to bring about investments that encourage VMT reductions
- The legal authority to price transportation fuels, such as through a cap-and-trade, at the rate of the social cost of carbon is also explored as a second-best alternative

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- CAA Sec. 115 was found to provide the broadest legal authority, including allowing EPA to set and enforce carbon targets through State Implementation Plans (SIPs) based on enacting a transportation pricing policy bundle
- Sec. 115 may possibly also allow basing such targets on making infrastructure investments that encourage VMT reductions but only in CAA nonattainment areas
- In all areas, the burden of having to meet emissions targets tied to a transportation pricing policy bundle could be mitigated by allowing offset credits for funding of transportation infrastructure projects that reduce carbon emissions below an established baseline

Legal and Policy Background

- The legal path to requiring states to implement transportation demand management actions to reduce GHG emissions appears less clear cut than to regulating power sector GHG emissions
- CAA Sec. 111 provides EPA the same authority to regulate emissions from existing stationary sources (Sec. 111(d)) as from new sources (Sec. 111(b)), and requires regulations for both after making a so-called “endangerment finding” under Sec. 111(b) that a source “causes, or contributes significantly, to air pollution which may reasonably be anticipated to endanger public health or welfare”

Emission Standards for New Motor Vehicles (CAA Section 202)

- Regulates fuel economy, but only of new vehicles
- "Off cycle" credits for measures to influence driver behavior and decisions, including efficient routing assistance, are strongly implied to be legal within the preamble of a final rulemaking
- Core standards are set based on vehicle technology with off cycle credits serving only to loosen the core standards instead of to secure additional carbon emissions reductions
- The more novel off cycle credit strategies to influence driver behavior have yet to be allowed, and thus their legality has also not been tested in court

Regulation of Fuels (Section 211)

- With an "endangerment finding" for this source due to its GHG emissions, which EPA has already issued for other GHG-emitting sources, EPA could establish a national carbon regulation for motor vehicle fuel emissions
- States may not deviate from the national standard unless necessary to meet standards for ozone, particulate matter (PM), or carbon monoxide (CO), and approved by EPA, thus severely curtailing state-level policy innovation
- This would only enable the enactment of a single national strategy, such as a cap-and-trade system for fuel sales
- There may be some legal vulnerability if costs of a regulation exceed its benefits; permit prices in excess of the social cost of carbon could trigger a legal challenge

International Air Pollution (Section 115)

- This section is triggered because U.S. carbon emissions are endangering public health or welfare in another country, and the affected country gives the U.S. reciprocal rights to weigh in about foreign sources of pollution
- Sec. 115 coverage "shall be deemed to be a finding" under Sec. 110 "which requires a…[State Implementation Plan or SIP] revision…to prevent or eliminate the endangerment"
- There is no limitation within this section on the sectors to be regulated and strategies to be deployed
- EPA has broad authority to pursue a state-level regulatory approach to control carbon emissions, including setting SIP targets based on the expected statewide emissions reductions from a transportation pricing policy bundle

Limitations on CAA Authority Due to Transportation Law

- The broad legal authority otherwise enabled by CAA Sec. 115 does not trump 23 USC 145, which says that the Federal government "shall in no way infringe on the sovereign rights of the States to determine which [transportation] projects shall be federally financed"
- But 23 USC 135(g)(4)(D)(iii) —which requires project conformance in SIPs in nonattainment areas for ozone, PM and CO—necessitates Federal "infringement" on project selection to ensure conformity
- In *Utility Air Regulatory Group versus EPA*, the U.S. Supreme Court ruled that EPA could layer on GHG emissions restrictions for facilities already subjected to CAA Title V regulations due to their emissions of one or more other covered pollutants
- Applying the logic of that ruling to areas already subjected to conformity requirements, a court *could* carve out an exception to the 23 USC 145 limitation on Federal infringement on project selection, allowing GHG targets to be layered onto other pollutant targets and project conformity requirements to apply to ensure meeting all such targets

“Model SIP” Design and Compliance

- Specify parameters identical to those modeled in this research
- States that fully implement the transportation price-shifting policy as specified would be presumed to be in compliance
- States that implement only one or two of the three price-shifting policy provisions would have the EPA modeling results apply to such provision(s) and then would need to make up the difference in a manner satisfactory to EPA

Federal Implementation Plan Design

- The goal is to use the model SIP provisions to the extent allowed by law and the U.S. Constitution
- The Federal government is prohibited from requiring states to act as its agent; anything the Federal government wants done it needs to do or enforce itself
- Different implications for the three different price-shifting strategies; without any new Federal laws:
  - It is reasonably likely, but not certain, that the Federal government could bring about PAYDAYS car insurance on its own
  - The Federal government likely could <u>not</u> enforce parking cash
  - The Federal government almost certainly could impose a mileage fee for newly purchased vehicles
- Where Federal enforcement authority is constrained, the FIP could include a backstop measure, limiting the sale of fuel permits, with a price set using a cap-and-trade mechanism

Legal/Policy Conclusions

- CAA Section 115 provides EPA the authority to set and enforce carbon targets through SIPs (and a FIP) based on the presumption of states enacting a transportation pricing policy bundle
- Conflicting provisions of law make it uncertain if EPA could—in areas in nonattainment for ozone, PM and CO—compel even further reductions in GHG emissions based on the presumption that transportation infrastructure projects that reduce carbon emissions below some pre-established baseline level will be prioritized, and then constrain state or metropolitan project selection authority accordingly
- In all areas, offset credits to help meet emissions targets reflective of the modeled transportation pricing policy bundle could legally be provided for funding of transportation infrastructure projects that are anticipated to reduce carbon emissions below some pre-established baseline

Final Thoughts about Moving Forward

- Communicate to climate-concerned state leaders about the substantial benefits of implementing transportation price shifting
- Contemplate the possibility that some climate related emissions tax policy/incentives could be implemented as part of a broader tax reform package, and how that could be structured to maximize transport reductions in the most politically acceptable way

Thank You!

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