

Fueling the Clean Energy Economy: Solving Global Warming Pollution in the Transportation Sector

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For nearly 100 years, the United States has operated its transportation system with primarily one fuel: oil. As a result, the transportation sector is now the second largest source of U.S. global warming pollution, contributing 28 percent of all emissions (see Figure 1). The total amount of transportation emissions is the product of three major factors: the carbon intensity of the fuels used, the fuel efficiency of the vehicle fleet, and the number of vehicle miles traveled (VMT).¹ To solve global warming cost-effectively, we need a trio of policies to drive solutions in each of these areas: 1) an upstream cap on fuel emissions; 2) performance standards for clean, efficient vehicles, clean fuels, and low-carbon transportation planning that we strengthen periodically; and 3) incentives to overcome market barriers to widespread adoption of low-carbon technologies, practices, and designs.

NRDC's Policy Roadmap for Reducing Transportation Sector Emissions

1. ESTABLISH UPSTREAM CAP ON ALL TRANSPORTATION FUELS

Transportation fuels, including gasoline, diesel, natural gas, and aviation fuels, should be included in the same declining emissions cap that covers all sectors of the economy. The point of regulation should be refineries and importers, who must hold allowances for each ton of fossil carbon emitted when the fuel is used, which they may trade with other sources covered under the cap.



Transportation fuels must be included in the cap to ensure that we meet an economy-wide emissions target. Performance standards are a more effective tool for forcing the deployment of low-carbon technologies and measures, but they are intensity-based, controlling only emissions per vehicle or unit of fuel. If overall vehicle mileage or fuel use increases, then total transportation emissions will increase. A cap on transportation fuels is essential to ensure that emissions from this sector (in combination with those of other capped sectors) meet specified targets.

2. ADOPT HIGH-EFFICIENCY AND LOW-CARBON PERFORMANCE STANDARDS

Performance standards, such as minimum fuel efficiency requirements for vehicles or a low carbon standard for fuel, are a critical complement to the cap because they drive low-carbon innovation beyond what might occur with a price signal alone. Aggressive and increasing standards for vehicles, fuels, and transportation planning are needed today and in future decades to overcome the market barriers to cost-effective emissions reduction opportunities. Lack of information about low-carbon vehicle and fuel technologies and alternatives to driving, along with consumer focus on short-term interests instead of long-term impacts, stall deployment of clean vehicles, clean fuels and transit. If the sole tool employed to address global warming in the transportation sector was a cap-and-trade program at the fuel refiner level, these emission reduction opportunities will not be captured because the resulting fuel price increase will be too small to have much effect on consumer purchase or business investment decisions.

Performance standards are an effective, and cost-effective, complement to the cap. Studies show, for example, that when lifetime fuel savings are taken into account, high efficiency vehicles are much cheaper to own and operate than their gas-guzzling counterparts even if the vehicle itself is more expensive. Based on a recent EPA study of vehicle powertrain technologies, NRDC estimates that when fuel savings are included, controlling carbon from vehicles results in present value savings equivalent to \$43-94/metric ton of CO₂ for midsize cars, and \$86-126/metric ton of CO₂ for large SUVs.²

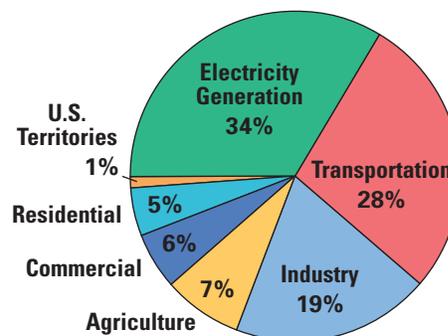
Specific recommendations for realizing the potential from performance standards are outlined below:

Enact More Stringent Vehicle Performance Standards

Congress should require the fleet of new light-, medium-, and heavy-duty vehicles sold each year to meet increasingly stringent performance standards (either fuel economy or emissions) to ensure a reduction in emissions from vehicles on the road as the fleet turns over.³ For passenger cars and light trucks, currently available conventional vehicle technologies can achieve at least 40 miles per gallon (mpg) without downgrading the size or performance of the fleet.⁴ By 2030, the new sales fleet could reach 55 mpg with a sales make-up of 75 percent hybrids and 25 percent plug-in hybrids. By 2050, a new vehicle fleet of lightweight, flex-fuel plug-in hybrids could achieve 80 mpg.

For medium- and heavy-duty vehicles (trucks heavier than 10,000 pounds), technologies exist to improve fleetwide fuel economy by 40 percent by 2015.⁵ Emerging technologies can deliver greater improvements before 2020. Medium-duty trucks are generally better suited for hybrid drivetrains, while long-haul tractor trailers gain from better diesel engine efficiency and tractor and trailer modifications to reduce rolling resistance and aerodynamic drag.

Figure 1: U.S. Global Warming Pollution by Economic Sector



Source: EPA, *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2006*, USEPA Report #430-R-08-005, April 2008. Under this accounting scheme, upstream fuel emissions from fuel production and non-road mobile source emissions, such as from construction, farm, and lawn and garden equipment, are included in the industry sector contribution. Adding these emissions to the transportation sector would increase the transportation sector to approximately 36 percent of U.S. total emissions.

Enact Fuel Performance Standards

Congress should adopt a low carbon fuel standard (LCFS) to ensure that investments in low-carbon fuel production, infrastructure, and vehicles are made in a timely manner. The LCFS is a full-fuel-cycle emission intensity standard (e.g., grams of CO₂-eq/Mbtu of fuels) on the entire mix of transportation fuels sold. Gradually decreasing the intensity standard forces a shift in the fuel pool toward cleaner fuels such as electricity and sustainable biofuels. The standard also discourages large, long-lived investments in high-carbon dirty fuels such as tar sands, liquid coal, and oil shale. Moreover, the LCFS prevents emissions leakage by evaluating the entire lifecycle of fuels. Without the LCFS, a cap-and-trade program will not reduce the upstream emissions of imported fuels that are the product of U.S. demand. To protect sensitive ecosystems and avoid competition with food supplies, the LCFS must also include safeguards that account for non-CO₂ impacts of fuel production.

Improve Transportation Planning Performance Standards

Standards for cleaner cars and cleaner fuels are critical, but in the past technological gains in these areas have been offset by increases in VMT. As Figure 2 shows, the number of miles Americans drive each year grew steadily for decades, particularly between 1980 and 2000. Not surprisingly this corresponds with a period during which the rate of land development per capita rose steeply.

Regional growth plans are a critical leverage point for reducing VMT. A new law in California, Senate Bill 375 (Steinberg, 2008), provides a policy framework requiring that plans include greenhouse gas reduction targets and that transportation investment decisions be consistent with the targets and aligned with housing development plans as well; Congress should adopt a similar structure at the federal level and require regions—through their Metropolitan Planning Organizations (MPOs)—to develop plans to reduce VMT, the metric most directly linked with CO₂ emissions, as a condition of receiving federal assistance.⁶ These plans should be based on reaching specific reduced-GHG targets, to be set at the federal level to align with national targets and help deliver the emission reductions set forth in the overarching climate legislation. Congress should provide MPOs with flexibility to choose from a number of strategies, including transit, pedestrian and bicycle infrastructure, congestion pricing, pay-as-you-drive insurance and reformed land use plans and strongly encourage them to consider combinations of strategies—congestion pricing combined with expanded transit service, for instance, or boosting the planned density and mix of uses around new transit stops—since studies have shown that this has the greatest impact. Congress should develop a strategy-neutral, performance based incentive program as an integral component of both transportation and climate legislation in order to provide MPOs with the assistance they need to boost planning capacity and to fund eligible pollution-reducing projects.

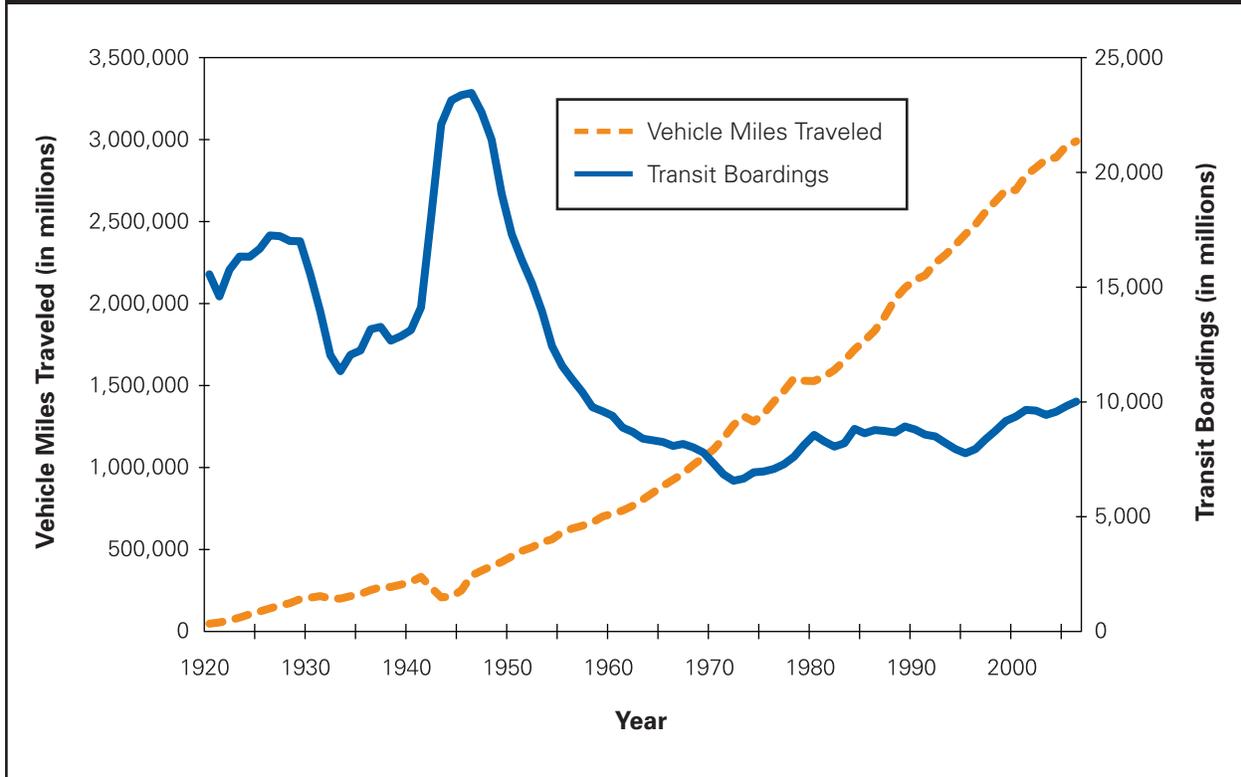
3. PROVIDE INCENTIVES TO OVERCOME MARKET BARRIERS AND STIMULATE THE ECONOMY

Incentives can encourage a more rapid adoption of energy-efficient technologies than standards alone, expediting the transformation of our entrenched transportation infrastructure and creating new jobs. Nearly 100 years of driving on cheap oil has created an overwhelmingly car-focused infrastructure and acceptance of low fuel economy. Incentives to vehicle manufacturers, fuel producers and consumers can help overcome market barriers and drive development of next generation, low-carbon technologies, bringing down their cost and making them more accessible and attractive to consumers. Congress can kick-start rapid and steady investment in these solutions using the value of allowances under a cap on global warming pollution. Allowances can fund investments as soon as Congress passes climate legislation, because Congress can borrow against the value of allowances it will auction in the future or auction allowances in advance of the effective date of the cap.

Early Carbon Market Prices Are Insufficient to Promote Advanced Vehicles

If allowances are trading at \$45/metric ton CO₂, for example, the resulting gasoline prices would increase by about 40 cents per gallon. Because it is difficult for consumers to translate an increase price at the pump into the higher costs of owning and operating a vehicle, the price increase is insufficient to encourage consumers to buy advanced vehicle technologies that may cost more up front. For comparison, gasoline prices have risen about \$1.00 since 2005, and while there has been a shift toward more-efficient conventional vehicle technologies, the increased prices have not guaranteed the widespread commercialization of vehicle technologies, such as lithium batteries, that are needed to transform the fleet to ultra-low emissions.

Figure 2: For Half a Century, Driving Increases While Transit Use Stagnates



Stepping up Investment in Low-Emission Vehicles

- Retool U.S. vehicle factories and retrofit long-haul trucks.** Rapid retooling of U.S. vehicle and component manufacturing can make the United States a leading producer of cars and trucks with efficient drivetrains, such as hybrids and advanced, clean diesels. Investments should also include advanced battery production to help drive cost reductions and to enable widespread adoption of emerging plug-in vehicles. Low-cost financing should be available to truck operators to retrofit the existing fleet of long-haul trucks with EPA SmartWay technologies, which reduce aerodynamic drag, rolling resistance, and idling and can cut fuel consumption and yield significant emissions benefits. The heaviest trucks (above 33,000 pounds) are the workhorses for long-haul road freight and therefore account for three-quarters of the fuel consumption of all commercial trucks. Improving the efficiency of these trucks has the triple benefit of cutting emissions, oil consumption, and operating costs—which in turn can help keep the price of goods down for consumers.
- Encourage vehicle manufacturers to exceed standards and encourage consumers to purchase top performers.** Congress should provide incentives to vehicle manufacturers that exceed average fleet fuel economy standards, to ensure that early innovators and first-movers who develop advanced vehicle technologies benefit from commercializing their technologies. Even with manufacturer incentives, advanced technology vehicles can carry large up-front costs that deter consumers, even if the cost is more than offset by greater fuel savings. Congress should target consumer incentives on the lowest emission vehicles produced by manufacturers that demonstrate a sustained improvement (at or above standards) for their fleetwide fuel economy or emissions performance.

Promoting Clean Fuels

- **Offer production incentives for low-carbon fuels.** Congress should provide incentives to spur continued development and deployment of ultra-low-carbon fuels and foster competition and technological innovation using a technology-neutral and a performance-based framework. A variety of fuel technologies should compete for production incentives based on lifecycle greenhouse gas emissions and other environmental criteria, including sustainability measures and land-use safeguards.
- **Invest in R&D for the next generation of low-carbon fuels.** To ensure that these fuels emerge, Congress should aggressively invest in research and development (R&D) for low-carbon fuels, including biofuels as well as non-liquid options such as batteries that can enable greater use of electricity. Research and development activities should deepen our understanding of the utility of existing feedstocks and fuel technologies as well as develop new opportunities for commercialization. These efforts will strengthen our basis for objective comparison between fuel choices and allow us to accurately administer performance-based incentives.

Reducing Vehicle Miles Traveled

- **Dedicate funding for priority transit projects.** Less than 20 percent of federal assistance for transportation goes to transit projects—with the remainder largely channeled toward highways and bridges—a modest investment that saves hundreds of thousands of barrels of oil daily.⁷

However, due to rising gas prices and other demographic factors, demand for transit is higher than it has been in decades. The opportunity to shift transportation habits to dramatically less carbon-intensive modes has never been bigger, but because many potential new riders either have no access to transit, or find the nearest system woefully under-maintained and under-serviced, this opportunity could slip away without rapid investment.

Currently 78 regions in 37 states have proposed 400 fixed-guideway transit projects, such as rail and dedicated bus lanes, worth \$248 billion—indicating unprecedented interest in expanding transit networks. These projects are approved, ready to go, and can create almost 7 million high quality service and construction jobs.⁸ But at the status quo rate of federal investment, building these projects would take 77 years. Congress should adopt a transit incentive program that fast tracks projects that can demonstrate the most cost-effective VMT reductions and that provide higher levels of service and increase speed and capacity on existing systems. Such investments have huge collateral economic benefits since reducing driving increases the financial security and spending power of American consumers: the average household in an area with good access to transit spends only 9 percent of its income on transportation, compared to the 25 percent (and rising with gas prices) spent by the average household in auto dependent exurbs.⁹

- **Improve incentives to reform and integrate land use and transportation planning and reinvest in intercity rail.** As MPOs establish plans and begin tracking reductions in VMT, Congress should provide additional incentives for the most aggressive strategies, based on demonstrated progress implementing plans and actual measured performance improvements.

Investments in intercity rail, including high-speed passenger rail and a greater freight capacity, are also essential to lowering the carbon intensity of the U.S. transportation sector. A legacy of rights-of-way, stations and loading docks, and other necessary infrastructure are already in place because of rail's previous status as the preeminent American transportation system. But extensive upgrades and increased capacity are needed to bring the system into the 21st century, especially after decades of neglect. Current intercity rail capacity should be doubled by 2050, which at 22,000 miles is less than half that of the interstate highway system. The National Association of Railroad Passengers has adopted this as a long-term goal; the National Transportation Policy and Revenue Study Commission adopted a similar objective of providing service to all of the lower 48 states by 2050.

Endnotes

1. Transportation emissions can also be divided into subsectors by vehicle type: passenger cars and light trucks, including minivans, SUVs and pickups account for 54 percent of all transportation emission; medium- and heavy-duty trucks for 18 percent, followed by aviation at 11 percent, non-road sources such as construction and farm equipment at 8 percent, marine vessels at 5 percent, rail at 3 percent, and pipelines emissions at 1 percent. EPA Advance Notice of Proposed Rulemaking: Regulating Greenhouse Gas Emissions Under the Clean Air Act, *Federal Register* Vol. 73, p. 44435.
2. EPA, *New Powertrain Technologies and Their Projected Costs: Interim Report*, www.epa.gov/otaq/technology, October 2005. The California Air Resources Board reached the same conclusion regarding the consumer savings from its greenhouse gas emission standards.
3. Vehicle performance metric should include adjustments for upstream emissions and fuel energy content so that emissions reductions expected from the vehicle fleet are achieved. Without adjustments, diesel vehicles used to meet a fuel economy standard would be responsible for more GHG emissions than gasoline vehicles that meet the same fuel economy standard.
4. Kliesch, Jim, Union of Concerned Scientists, *Setting the Standard: How Cost-Effective Technology Can Increase Vehicle Fuel Economy*, April 2008.
5. EPA, Memorandum: "Summary of Greenhouse Gas Emission Control Technologies for Heavy-Duty Trucks," Docket EPA-HQ-OAR-2008-0318, June 12, 2008.
6. MPOs vary greatly and many will require additional resources to build capacity to measure baseline data, create VMT reduction plans, and track improvement. Funding to build capacity should be allocated when necessary, but be specifically directed to relevant activities. A complementary way to ensure adequate capacity would be to apply this new requirement to just large metropolitan areas (above 200,000 in population).
7. Bailey, Linda, Patricia Mokhtarian, Ph.D. and Andrew Little, *The Broader Connection between Public Transportation, Energy Conservation and Greenhouse Gas Reduction*, February 2008.
8. Reconnecting America's Center for Transit-Oriented Development, "Realizing the Potential: Expanding Housing Opportunities Near Transit," Federal Transit Administration and the U.S. Department of Housing and Urban Development, Report CA-26-6004, 2007.
9. Reconnecting America's "Jumpstarting the Transit Space Race: How the New Administration Could Make America Energy-Independent, Create Jobs and Keep the Economy Strong," October 2008.