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The Environmental Law Clinic at the University of California, Berkeley School of Law submits the following comments in response to the request for comment on the “Safer Affordable Fuel-Efficient (SAFE) Vehicles Rule for Model Years 2021-2026 Passenger Cars and Light Trucks.” The Clinic is a teaching law office that provides pro-bono legal services in environmental matters and is staffed by Berkeley Law students working under the supervision of licensed attorneys.

The Clinic supports retaining the existing GHG emissions standards for model years 2021 through 2025. EPA’s proposal, in the SAFE Vehicles Rule, to freeze the standards through year 2026 at the levels set for 2020, turns a blind eye to the thousand-plus pages of technical analysis from the Midterm Evaluation process,1 to public opinion,2 and the welfare of American consumers—especially low-income Americans. This letter offers an in-depth analysis of the ways in which the existing federal GHG emissions standards will affect low-income vehicle consumers and explains why these standards are particularly critical for them.

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Introduction

Consumers are a central focus of EPA’s proposed “Safer Affordable Fuel-Efficient (SAFE) Vehicles Rule,” which would relax the current federal vehicle GHG emissions standards for vehicle model years 2021 through 2025. One major consumer interest that the proposed rule purports to advance is vehicle affordability. While affordability is unquestionably an important objective, relaxing vehicle GHG emissions standards is the wrong tool for the job, and in fact, lax standards can undermine this goal. This comment letter examines the SAFE Vehicles Rule’s affordability claim by investigating the ways in which the existing GHG standards, if retained, would affect low-income consumers. A holistic analysis reveals that the current standards ultimately help, rather than harm, low-income Americans.

As a threshold matter, the suggested harm from the current GHG emissions standards—an estimated $1000 – $2000 increase in new-vehicle prices—is unlikely to affect vehicle affordability for low-income consumers. More significant determinants of vehicle price, such as macroeconomic conditions, will subsume any modest vehicle price increase from these standards. More importantly, the GHG emissions standards apply only to new cars, and low-income consumers overwhelmingly purchase used vehicles. In the unlikely event that the emissions standards do cause an observable, albeit modest, uptick in new-vehicle prices, it is unclear to what extent this increase will carry over to the used-car market. Furthermore, relaxing GHG emissions standards to avoid a modest sticker-price increase would do nothing to address low-income households’ lack of access to capital and affordable financing to facilitate vehicle purchases. Thus, weaker vehicle GHG standards that avoid the anticipated price increase would do little, if anything, to make vehicles more affordable for low-income consumers.

Strong GHG emissions standards, on the other hand, actually advance vehicle affordability because the standards promise to reduce operating costs. The current federal GHG emissions standards would yield a future fleet of increasingly fuel-efficient and electrified used vehicles, which offer savings on gas and maintenance costs. These savings are especially significant for low-income households, who are generally on fixed budgets; an unanticipated gas-price spike or vehicle repair can mean these households are unable to drive the cars they already own.

Evaluating the effects of GHG emission standards on both vehicle prices and operating costs reveals that lowering the standards to avoid a $1,000 – $2,000 price-increase will not improve vehicle affordability for low-income Americans. The small price reduction offered by relaxing GHG emissions standards does not meaningfully help low-income consumers, who are limited by access to capital and affordable financing, make vehicle purchases. In contrast, strong GHG emissions standards,

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3 The other major consumer interest that the SAFE Vehicles Rule purports to advance is vehicle safety. Again, this is an important goal that is not served by relaxing vehicle GHG emissions standards. Other comment letters submitted in this proceeding comprehensively and thoughtfully explain this point, but it is outside the scope of this letter.

standards significantly reduce operating costs, helping to ensure that once a low-income household has access to a car, driving that car is economically feasible.

This comment letter offers a detailed and comprehensive look at how the current vehicle GHG emissions standards for model years 2021 through 2025 will affect low-income Americans. Section I analyzes how the GHG emissions standards affect vehicle operating and maintenance costs. Section II discusses the standards’ limited effect on the purchase price of vehicles and then examines a few incentive programs and policy mechanisms that can help lower the purchase-price barrier to vehicle access. Section III examines the SAFE Vehicles Rule’s claims about shifts in consumers’ vehicle preferences and explains why retaining the current standards can help ensure that automakers make cars that address low-income consumers’ needs. Finally, Section IV sets forth the additional, more indirect ways in which the 2021 – 2025 GHG emissions standards benefit low-income households: improvements in air quality and climate change mitigation. This analysis reveals that the existing vehicle GHG emissions standards are essential for advancing vehicle affordability for low-income Americans, and relaxing the standards would seriously frustrate progress towards that goal.

I. EPA Should Maintain the Adopted GHG Emissions Standards for Model Years 2021 – 2025 Because They Promise Low-Income Households Significant Savings on Vehicle Operating Costs.

EPA should retain the existing vehicle GHG emissions standards for model years 2021 through 2025 because they offer substantial savings on vehicle operating costs, and these savings are significant for low-income Americans. Furthermore, for low-income households, the benefits offered by the GHG emissions standards are more than simple pocketbook savings and include broader economic gains like increased job security.

This Section explains, in detail, the benefits of the current GHG standards for low-income Americans and thereby reveals the standards’ value in reducing the operating-cost barrier to vehicle access. Part A explains the importance of considering vehicle operating costs, which include fuel and maintenance expenditures, in analyzing the economic impacts of the GHG emissions standards on low-income households. Part B analyzes how the standards will affect households’ annual fuel costs, and Part C examines the effects on vehicle maintenance costs. Part D explains how the GHG emissions standards offer additional economic benefits, beyond operating-cost savings, to low-income consumers. In sum, this discussion demonstrates that the substantial economic benefits that the current GHG emissions standards offer make them an essential component of a set of policies that will ultimately advance, not obstruct, vehicle affordability for low-income households.

A. Analysis of the Economic Effects of GHG Emissions Standards Must Include Operating Costs Because These Are the Largest Proportion of Low-Income Vehicle Owners’ Transportation Expenditures.

Narrowly analyzing the extent to which the current GHG emissions standards will affect vehicle prices, in isolation, is inadequate for assessing the standards’ effects on low-income consumers. Such an approach oversimplifies and mischaracterizes the complex economic picture of vehicle ownership. Accurately measuring the impact of the vehicle GHG emissions standards on vehicle affordability demands a holistic examination of vehicle ownership costs, i.e., the “total-cost-
of-ownership.” This metric accounts for the costs of a vehicle over its operable lifetime rather than simply focusing on the expense at the time of purchase. Using the total-cost-of-ownership to understand the economics of personal vehicle ownership is important because the bulk of vehicle-related expenses are not concentrated in the purchase price; rather, vehicle ownership usually involves significant ongoing maintenance and operating costs. By contrast, for some goods, such as a laptop computer, total-cost-of-ownership is not necessary to capture the economic effect of the good because the purchase price accounts for the overwhelming majority of laptop-related expenses.

The total cost of car ownership of a vehicle includes (1) the initial purchase price (including taxes and financing costs); (2) operating costs (including fuel expenditures and maintenance); (3) recurrent registration and licensing fees; (4) insurance costs; and (5) depreciation of the vehicle’s value. For Americans, on average, purchase price accounts for approximately one third of annual vehicle-related costs, operating costs account for roughly another third, and the remaining costs, such as registration and insurance expenses, account for the rest. For low-income households, who buy primarily on the used-car market and therefore pay less in purchase price, operating costs are the most significant fraction of vehicle-related expenditures.

Accordingly, any meaningful analysis of GHG emissions standards’ economic effects on car consumers cannot focus exclusively on purchase-price, which represents only one-third of vehicle-related expenditures for average consumers, and less than one-third for low income consumers. Instead, this analysis should focus first on changes that the GHG emissions standards may bring to operating costs, because this is a major point of cost divergence between cars produced under vehicle GHG emissions standards and those produced without these standards, and for low income consumers represents the greatest fraction of the total cost of car ownership.

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5 Jens Hagman et al., Total Cost of Ownership and Its Potential Implications for Battery Electric Vehicle Diffusion, 18 RES. IN TRANSP. BUS. & MGMT. 11, 11 (2016). One variable that most studies do not include are any offsets by incentive programs. But see Jerome Dumortier et al., Effects of Providing Total Cost of Ownership Information on Consumers’ Intent to Purchase a Hybrid or Plug-in Electric Vehicle, 72 TRANSP. RES. 71, 76 (2015). Although most studies do not address why they do not include incentives, one possible explanation is that currently clean car incentives are not uniform across states or countries. However, incentives would affect the TCO for any car given that it lowers the cost of these vehicles and saves the consumer money.


8 See Greene & Welch, supra note 7, at 5, fig. E-1.
In sum, any analysis of the economic effects on consumers of the vehicle GHG emissions standards is incomplete if it does not account for operating costs as well as differences in purchase price.


Under the existing vehicle GHG emissions standards for model years 2021 – 2025, vehicle owners across all income groups will save money on fuel expenses, but low-income households will save the most, as a percentage of income. Fuel economy improvements brought about through regulatory standards have already demonstrated how effective these improvements can be in saving consumers money. Since 1980, consumers across all income levels have saved on fuel costs as fuel economy increased. In 2014, for example, households in the lowest income quintile spent, on average, $500 less on annual fuel expenditures than they would have if fuel economy had remained flat since 1980; households in the highest income quintile, meanwhile, spent $1,500 less on average.

In terms of a percentage of household income, however, Americans in the lowest-income quintile saved the most in 2014—a little more than four percent of average annual household income. Higher-income households saved around 0.9 percent of household income. Saving roughly four percent of annual income is especially significant because low-income households spend a sizeable proportion of household income on transportation expenditures. In 2014, for example, low-income households spent approximately sixteen percent of their average annual income on transportation, while middle-income households spent only nine percent. Furthermore,

9 Id. at 6. Some studies have attempted to calculate the total-cost-of-ownership of fuel-efficient and electric vehicles as compared to conventional cars, and break down this cost as a monthly cost to the consumer. The studies find that more fuel-efficient vehicles are less expensive than conventional vehicles but the degree of the savings vary. It is difficult to interpret the results and make generalizations based on these studies because they vary based on assumptions of fuel cost and time period of ownership. See, e.g., Dumortier et al., supra note 5, at 76–77; Hagman et al., supra note 5, at 14.

10 Greene & Welch, supra note 7, at 35.

11 Id. Households with high income garnered more total fuel savings than lower-income households because high-income households drive more than low-income households, and therefore have higher potential savings. CALIFORNIA HOUSING PARTNERSHIP COOPERATION & TRANSFORM, WHY CREATING AND PRESERVING AFFORDABLE HOMES NEAR TRANSIT IS A HIGHLY EFFECTIVE CLIMATE PROTECTION STRATEGY 7 (2014).

12 See Greene & Welch, supra note 7, at 35.

13 Id.

fuel-expenditures account for the greatest proportion of low-income households’ vehicle-related transportation expenses. Therefore, modest savings on fuel expenditure can go a long way for budget-constrained low-income households.

If EPA retains the existing GHG emissions standards for model years 2021 – 2025, as it should, low-income Americans will continue to see these substantial fuel-cost savings, because cars that comply with these standards will eventually migrate to the used car market. The GHG emissions standards will drive automakers increasingly towards electrified vehicles, and these cars promise very significant fuel expenditure savings. Fuel costs for hybrids can be anywhere from a third to over half the cost of fuel for combustion-engine sedans, while electric cars offer up to eighty percent savings in fuel expenditures. As these vehicles slowly penetrate the used car market, they promise even more substantial transportation cost savings for low-income families.

Thus, retaining the current GHG emissions standards can help ensure that future used-car fleets are increasingly more fuel efficient, alleviating some of the burden that fuel expenditures place on low-income Americans’ tight household budgets.


Maintenance expenses are also a key component of vehicle operating costs, and the vehicle GHG emissions standards for model years 2021 – 2025 offer the potential for savings on these expenses. The standards will likely push a shift away from manufacturing conventional, combustion-engine cars and towards electric vehicles. This electrification of the vehicle fleet could eventually reduce vehicle maintenance and repair costs.

Electric cars may be less expensive to maintain due to the electrification of the engine. Electrification eliminates some components of combustion-engine vehicles, such as transmissions

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15 See note 7, supra.
16 Greene & Welch, supra note 7, at 86–88.
17 Since the used car market relies on the new car market for its supply, any fuel economy standards will have a delayed effect on the used car market.
19 See AAA, supra note 18.
20 Propfe, supra note 18.
21 One study found that, although repair and maintenance costs for internal combustion-engine vehicles and hybrids average roughly the same (approximately $1000 a year), the cost of maintenance for plug-in hybrids is about a sixth lower than combustion-engine vehicles, and the
and catalytic converters, that are costly maintain.\textsuperscript{22} Furthermore, electric cars have fewer moving parts, and therefore require less frequent maintenance.\textsuperscript{23} Additionally, electric-vehicle engines do not require oil or filter changes.\textsuperscript{24}

The extent of potential maintenance cost savings, however, varies by electric vehicle type. Hybrids, for example, still have internal-combustion engines and require some of the maintenance associated with conventional cars, but because they run on electricity part-time, they do not need this maintenance as frequently.\textsuperscript{25} Battery electric vehicles, meanwhile, may require regular maintenance for complicated and costly electronics,\textsuperscript{26} and this could undercut some of the potential maintenance-cost savings.

Although electric cars offer promising maintenance-cost savings, there is one major expense of electric cars that currently exceeds that of conventional, combustion-engine cars: battery replacement. Electric-car batteries are expensive to fix and replace.\textsuperscript{27} But battery costs are fast declining.\textsuperscript{28} Battery costs are projected to drop by over 66 percent in the next 10 years.\textsuperscript{29} This reduction will translate to cheaper maintenance and repair costs for electric vehicles.\textsuperscript{30}

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\textsuperscript{23} Rachel M. Krause, et al., \textit{Perception and Reality: Public Knowledge of Plug-In Electric Vehicles in 21 Cities}, 63 ENERGY POLICY 433, 436 (2013); Hagman et al., \textit{supra} note 5, at 15; Gorzelany, \textit{supra} note 22.

\textsuperscript{24} Krause et al., \textit{supra} note 23, at 436; Hagman et al., \textit{supra} note 5, at 15.

\textsuperscript{25} Krause et al., \textit{supra} note 23, at 436

\textsuperscript{26} See Amin Andwari, et al., \textit{A Review of Battery Electric Vehicle Technology and Readiness Levels}, 78 RENEWABLE & SUSTAINABLE ENERGY REVIEWS 414, 417 (2017)

\textsuperscript{27} It is worth noting that battery costs vary depending on the battery’s technology and the size of the battery that can range from 30 kwh to over 100 kwh. Andwari, \textit{supra} note 26, at 415. However, general cost savings trends can be aggregated across all battery types.


\textsuperscript{29} \textit{Electric Cars to Reach Price Parity by 2025}, BLOOMBERG NEW ENERGY FINANCE (June 23, 2017), https://about.bnef.com/blog/electric-cars-reach-price-parity-2025/.

Thus, although maintenance costs of electric cars are presently only slightly less than that of conventional cars, this difference will become more pronounced over the next ten years. This means that low-income families in future may be able to buy cars that not only offer fuel-expenditure savings but are also cheaper to maintain. Further, although low-income consumers’ uptake of electric vehicles has been slow due to the higher purchase price of electric vehicles and the lack of these vehicles on the used-car market, this underscores the importance of vehicle GHG emissions standards, which can push automakers towards electrifying the national vehicle fleet and improving electric vehicle battery technology. Eventually, this will increase the supply of electric vehicles on the used-car market and thereby reduce prices of these cars. Ultimately, strong vehicle GHG emissions standards can help bring to low-income households the option of driving fuel-efficient, electric vehicles.


The current vehicle GHG emissions standards for model years 2021 – 2025 promise economic benefits to low-income households beyond simple pocketbook savings. Cars produced in compliance with these standards facilitate more reliable and time-efficient vehicle transportation for low-income Americans. Together, these benefits can help workers make it to work on time, increasing job security, and perhaps even allow pursuit of better-paying jobs a little farther away from home. Additionally, strong vehicle GHG emissions standards promise to shift spending away from the fossil-fuel industry and into the more job-intensive consumer goods and service sectors, ultimately leading to job growth. This Part examines each of these effects.


There are two ways in which the current vehicle GHG emissions standards may increase job security and expand employment opportunities for low-income Americans: (1) lowering fuel consumption and (2) offering time-savings benefits through driving incentives like free access to toll roads.

First, low-income households generally have tight monthly transportation budgets, and gas-price fluctuations may render them unable to afford to drive their cars; GHG emissions standards can help reduce that vulnerability by lowering vehicle fuel consumption. Gas-price increases, which

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31 It is true that any savings from reduced battery costs will have a delayed effect for low-income households, because clean-car adoption is not high among low-income households, and any present improvements in new vehicles will not reach the used car market for another 5 to 10 years. To receive these benefits down the line, however, the GHG emission standards must remain in place, and continue to ramp up.

disproportionately affect low-income drivers, can indeed be dramatic.\textsuperscript{33} Between 1999 and 2008, for example, gas prices skyrocketed from approximately $1 dollar per gallon in 1999 to approximately $4 dollars per gallon in 2008.\textsuperscript{34} An increase in gas prices that would exceed a monthly transportation budget may leave a car-owning household to resort to other forms of transportation that may be inconvenient or impracticable.\textsuperscript{35} At worst, increases in gas prices may force a household to limit other expenditures or forgo travel altogether,\textsuperscript{36} resulting in forcibly abandoned job shifts, missed school days, or cancelled healthcare appointments.

Vehicle ownership alone is thus insufficient to improve a low-income household’s economic outlook. These households need policies that support their maintaining reliable use of their vehicles.\textsuperscript{37} GHG emissions standards can help insulate low-income drivers from gas-price fluctuations, thereby increasing the likelihood that they can continue to use their cars to get to work (and other necessary destinations), regardless of gas-price hikes.

Second, low-income consumers may also realize some time-savings benefits from adoption of electrified vehicles that qualify for state driving and parking incentives. Several states incentivize hybrid or electric vehicle purchases by providing free access to parking spaces, toll roads, and high-occupancy vehicle (HOV) or carpool lanes without meeting occupancy requirements.\textsuperscript{38} Though increasing the availability of electrified vehicles that qualify for HOV lane exemptions might increase congestion in HOV lanes,\textsuperscript{39} federal law commands that states manage these lanes to maintain an


\textsuperscript{35} Agrawal, \textit{supra} note 33, at 35.

\textsuperscript{36} Id.


\textsuperscript{39} See Antonio Bento et. al, \textit{The Effects of Regulation in the Presence of Multiple Unpriced Externalities: Evidence from the Transportation Sector}, 6 \textit{Am. Econ. J.: Econ. Pol’y} 1, 10, 14 (2014).
optimum flow. Thus, HOV lanes can still offer a time saving benefit as compared to general-purpose lanes.

Access to toll roads, HOV lanes, or preferred parking has the potential to shave time off of commutes and can thereby stabilize employment. Faster and more predictable commute times may enable workers to arrive to work earlier or within a more reliable time frame. Additionally, shorter commute times may mean more punctual drop-offs and pick-ups from childcare or school, more time available to cook or grocery shop, or more leisure time with family, and these result in additional gains in financial and personal well-being.

Currently, however, there is an inequitable distribution of the time-savings benefits associated with electric cars; strong GHG emissions standards, such as the current 2021 – 2025 standards, can help counteract this. Today, electric-vehicle drivers that qualify for single-vehicle HOV lane access and preferred parking are generally wealthier than conventional-car drivers. By promising to electrify the future used-car fleet, the GHG standards increase the availability of these cars for lower income buyers who might be interested in the time-savings benefits conferred by HOV lane access or preferred parking. Even if these cars are modestly more expensive than conventional cars, low-income drivers may be interested in purchasing them to access the time-savings benefits. In the context of public transit, for instance, low-income individuals are willing to pay a little more money for transportation that is more reliable.

In sum, strong vehicle GHG standards can bring a variety of economic benefits to low-income households. These standards increase job security by increasing the reliability of vehicle use; greater fuel-economy limits the instances in which gas-price spikes might foreclose vehicle use. Moreover, individuals can also gain time-savings benefits from electric-vehicle adoption incentives like preferred parking and HOV-lane exemptions. This can help ensure workers have predictable and shorter commute times. Furthermore, the combined benefits of more reliable and time-efficient vehicle transportation may even enable low-income households to increase their commuting radius to pursue better-paying jobs.

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41 Some states that offer alternative fuel vehicles access to HOV lanes do have HOV lanes that are congested. However, it is not clear that this congestion is attributable to an increase in HOV lane exemptions for alternative-fuel vehicles. In fact, HOV congestion increased in California after the state terminated HOV lane exemptions for hybrids in 2011. See Katherine F. Turnbull, U.S. Dep’t of Transp., Fed. Highway Admin., Impact of Exempt Vehicles on Managed Lanes 13 (2014).

42 See Langbroek et al, supra note 32.

ii. Savings for Low-Income Households Create More Disposable Income, Resulting in Macroeconomic Benefits.

Strong vehicle GHG emissions standards may also yield additional macroeconomic benefits for low-income households by stimulating economic growth. The vehicle operating-cost savings brought to American households by the GHG emissions standards can help spur the economy by redirecting expenditures to the retail and commercial industry. Lower operating expenses of more fuel-efficient vehicles creates disposable income, and Americans funnel that newfound disposable income into other economic activities like spending on consumer goods and services. In other words, the GHG emissions standard will bring about a shift in consumer expenditures from fuel to other consumer goods and services.

This shift of expenditures from fossil fuels to consumer goods may, in turn, yield employment growth for low-income Americans, because the retail, service, and consumer goods industries create more jobs. The fossil fuel industry is one of the least job-intensive industries in the economy. On the other hand, consumer goods and services industries such as retail are among the most job intensive industries. Each dollar spent on retail and commercial goods is sixteen times as job intensive as each dollar spent on the fossil fuel industry. Lower income households stand to benefit most, because job growth tends to occur in the sectors of the economy, such as construction and retail, that employ low-income individuals.

A shift towards more fuel-efficient vehicles will have “sizeable and lasting macroeconomic impacts” as consumers shift their spending from fossil fuels to consumer goods and services. Thus, not only do the existing vehicle GHG emissions standards for 2021 – 2025 promise to directly improve job security and employment prospects by reducing vehicle operating-costs for individual households, but these also offer more indirect economic benefits of national job and income growth by shifting expenditure away from fossil fuels.

45 Id.
46 Id.
47 Id. at 16.
48 Id.
49 Id. at 17.
50 Roland-Holst, supra note 44, at 17.
51 Id.
II. The Effect of the Current GHG Emissions Standards on the Purchase-Price Barrier to Vehicle Access Is Not Likely to Be Significant, and Public and Private Incentive Programs Help Lower This Barrier.

In addition to consideration of changing operating costs and related indirect benefits of the current 2021 – 2025 vehicle GHG emissions standards, fully understanding their effects on low-income consumers also requires an assessment of changes to new- and used-vehicle prices. The GHG standards only apply to new vehicles, and low-income consumers primarily occupy the used-car market. New-car market dynamics do eventually affect low-income consumers, however, because the new-car market supplies the used-car market. If consumers buy fewer new cars or more consumers opt to purchase cars on the used-car market, a decrease in the used-car supply or an increase in demand for used cars could drive up prices, hurting low-income car consumers.

Although the vehicle GHG standards may affect vehicle prices for both new and used cars, these changes are more complicated than a simple uptick in price. Part A first discusses how the new-car market will respond to the new GHG emissions standards. Next, Part B analyzes the resulting effect on the used-car market, in which low-income consumers preferentially participate. Because the used-car market depends on the new-car market, the used-car market experiences a delayed effect of the standards. Part C discusses ways to combat any price increases to ensure that these standards do not exacerbate the purchase-price barrier to automobile access for low-income Americans.

A. New Car Purchase Price Increases May Be Less Dramatic Than Initially Projected.

In its 2016 Technical Assessment Report, EPA estimated that the GHG emissions standards will increase the cost of an average new car by between $900-$1,000 in model year 2025.52 EPA now claims to have “updated” its analytical methods and changed the predicted vehicle-price increase to $1,800.53 But the uptick in new vehicle prices will likely be less than even $900, in part because EPA overestimated the cost and underestimated the effectiveness of some GHG emissions reduction strategies.54 In fact, EPA’s 2016 estimate for the price increase of $900-$1,000 was already a fifty-percent drop from the agency’s initial estimate when these standards were first rolled out in 2012.55 Automakers continue to develop new technologies, further reducing EPA’s price-increase

52 TECHNICAL ASSESSMENT REPORT, supra note 1, at 12-41.
53 SAFE VEHICLES RULE, supra note 4, at 42994.
Although the cost of technology to meet the standards could increase over time because manufacturers will implement the most cost-effective strategies first, the more likely scenario is that costs will drop as production volumes increase and manufacturers accumulate experience. Indeed, it is well documented that “the price of a novel technology declines with cumulative production.” The example of airbag technology in cars is illustrative. Automakers claimed that the cost of installing airbags was onerously high and managed to delay the adoption of regulations requiring them. But the cost of airbags plummeted from $1,233 per airbag in 1988 to $190 per airbag in 2000. Between 1988 and 2000, production volumes had increased roughly ten-fold. Thus, the cost of complying with airbag requirements dropped with time, due to both innovation and higher production volumes. Likewise, the cost of complying with the existing vehicle GHG emissions standards for model years 2021 through 2025 may drop as automakers include technologies in more automobile models and correspondingly increase the scale of producing that technology.

Even if the current vehicle GHG emissions standards cause a modest increase of $1,800 in the cost of producing vehicles in 2025, there will not likely be an observable change in the prices consumers pay for these cars. Historically, even when regulatory compliance costs were substantial, these did not dramatically change vehicle prices, because there are far more powerful determinants of vehicle price. Macroeconomic conditions, for example, strongly dictate vehicle prices.

56 See NATIONAL ACADEMY OF SCIENCES, NATIONAL RESEARCH COUNCIL TO THE NATIONAL ACADEMIES, COST, EFFECTIVENESS AND DEPLOYMENT OF FUEL ECONOMY TECHNOLOGIES FOR LIGHT-DUTY VEHICLES 250, 264 (2015).

57 Greene & Welch, supra note 7, at 61.

58 See NATIONAL ACADEMY OF SCIENCES, supra note 56, at 245.

59 See id. at 250.


61 Id.


63 See id.

64 Id. at 11–12.

65 TECHNICAL ASSESSMENT REPORT, supra note 1, at 6-17.
especially on the used-car market. Additionally, automakers deal with cost increases due to regulation compliance by using marketing strategies and financial incentives like favorable lending rates and cash rebates. Thus, even when regulation has historically required costly changes on a short timeframe, “the impact on vehicle prices was barely discernible.”

In sum, automakers will likely be able to comply with the vehicle GHG emissions standards for model years 2021 through 2025 at lower cost than EPA has estimated. More importantly, any influence that the vehicle GHG emissions standards have on vehicle production costs will not cause any drastic price shock for consumers, because more significant forces that shape vehicle prices, like macroeconomic conditions and automakers’ marketing and financing strategies, are the primary determinants of price.

B. Low-Income Consumers May Receive Fuel Economy Improvements for Bargain Prices on the Used Car Market.

Low-income purchasers represent less than four percent of new-car consumers. Most low-income consumers purchase used cars and will primarily encounter the effects of the GHG standards on the used car market. Under the GHG emissions standards, low-income consumers may realize the benefits of fuel economy improvements for a bargain price because the price of a used car depreciates more rapidly than its fuel economy. Additionally, low-income consumers are more likely to own older cars, which means the cost of such vehicles will be considerably lower compared to new vehicles. As a result, low-income consumers get clean cars at bargain prices.

Although it is difficult to determine precisely how fuel-economy improvements depreciate because many factors influence used car resale value—macroeconomic trends on supply and demand, gas prices, and the rate at which vehicles are scrapped—the fuel economy declines only about

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68 Silva-Risso, supra note 67, at 25.


70 See Greene & Welch, supra note 7, at 29.

71 See id. at 32


73 See Greene & Welch, supra note 7, at 39–40.
0.1 miles per year, meaning a one-mile reduction in fuel efficiency every ten years. Thus, it is reasonable to conclude that cars maintain most of their fuel efficiency as they age. Meanwhile, vehicle values depreciate, on average, by approximately fifty percent in the first two years after purchase. Because fuel economy essentially endures as a car ages, under the GHG emissions standards, used car consumers will benefit from increasing fuel-efficiency available at a bargain price.


Although the current GHG emissions standards are important for low-income drivers because they make cars cheaper to operate, the proportion of marginal cost of fuel efficiency improvements and future fuel expenditure savings that are passed on to the used car market may affect low-income consumers’ ability to purchase vehicles. But contrary to EPA’s contentions, setting GHG emissions standards to minimize vehicle prices will not solve this problem. Relaxing emissions standards would do nothing to address the issues that create the purchase-price barrier for low-income consumers. Because low-income consumers have less liquidity, they must finance their purchases, often at high interest rates, or wait to purchase vehicles until they receive a lump sum of cash, such as a tax refund. To better highlight why weak GHG emissions standards are a poor strategy for tackling the purchase-price barrier, this Part offers examples of several programs and policies that do directly and effectively address the finance and liquidity issues for low-income vehicle consumers.

Several public and private institutions have begun to experiment with programs to lower the barrier to car ownership and access. Unlike GHG emissions standards, purchase-price incentives are suited for helping consumers overcome the purchase-price barrier to vehicle ownership because they are designed to lower the upfront cost of buying a car. Public sector purchase price incentives have been implemented at both the federal and state levels and include mechanisms such as

74 Id. at 90.
75 NATIONAL ACADEMY OF SCIENCES, supra note 56, at 331.
76 Greene & Welch, supra note 7, at 53.
79 See GreenTRIP Certification, TRANSform, http://www.transformca.org/landing-page/greentrip-certification-program (last visited Nov. 8, 2017). Programs such as the GreenTRIP certification offer an alternative to increasing low-income households’ access to transportation without focusing on the purchase price barrier. See id. However, other policy mechanisms attempt to tackle the purchase price barrier as well. See Alternative Fuels Data Center: All Laws and Incentives Sorted by Type, supra note 38.
subsidies and tax waivers. In the private sector, financial institutions and utility companies offer subsidies, loan discounts and other incentives to encourage consumers to purchase clean vehicles. Although these programs largely target new car consumers, they show promise if extended to used-car transactions, which are more relevant for low-income consumers.

Public programs promoting the adoption of electric cars have proliferated in recent years, largely through state and local-government programs. Presently, there is only one federal incentive focused on consumer access to clean cars: a purchase-price reduction in the form of a federal income tax credit. Under the federal incentive, an electric or plug-in hybrid vehicle owner who purchased a vehicle new in or after 2010 is eligible for a federal income tax credit of up to $7500. However, the government will phase out the tax credit to half of the full-credit amount “once a manufacturer has reached 200,000 [plug-in hybrid electric vehicles and battery electric vehicles] sold.”

Previous federal tax incentives have been successful in encouraging clean vehicle purchases. For example, a 2012 study analyzing the impact of federal incentives on hybrid vehicle adoption found that the federal tax incentive promulgated in the Energy Policy Act of 2005 had a positive and statistically significant impact on hybrid vehicle sales in the US—with $1000 as the threshold amount for positively affecting hybrid adoption. For example, the data revealed that “at the full incentive amount of $3150, the Toyota Prius experienced a 15 percent increase in sales over the vehicles that would have been sold in absence of such incentive.” Thus, given that an incentive’s magnitude is so closely tied to its effectiveness, low-income households may need an even greater monetary incentive to overcome the purchase price barrier.

Many states offer financial incentives in addition to the federal income tax and have seen similar success. California’s programs stand out in particular because they are especially extensive. For example, the California Air and Resources Board provides increased rebates for low and moderate-income consumers who purchase or lease a new zero-emission vehicle through the

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80 See Alternative Fuels Data Center: All Laws and Incentives Sorted by Type, supra note 38.
82 See Alternative Fuels Data Center: All Laws and Incentives Sorted by Type, supra note 38.
85 See 26 U.S.C. § 30D; see also Plug-In Electric Drive Vehicle Credit at a Glance, supra note 84.
87 See id. at 940.
California clean vehicle rebate programs have been very successful at facilitating clean car adoption. To date, California has issued 81,913 rebates for plug-in hybrid electric vehicles, 123,743 rebates for battery electric vehicles, 2,074 rebates for fuel cell electric vehicles, and 809 rebates for vehicles falling into the “other” category. Moreover, California has issued 4,969 rebates totaling $19.6 million to low-to-moderate income consumers since March 2016, when the state began offering more substantial rebates to people with greater financial need. This indicates that a majority of all plug-in hybrid electric vehicle and battery electric vehicle consumers in California took advantage of the program, indicating that it effectively incentivized car buyers to increase the number of clean vehicles on the road.

In addition to rebates and credits that lower the initial purchase price of vehicles, green financing opportunities may be another mechanism that helps consumers stay in the new car market in the face of more expensive cars that comply with GHG standards. Green financing refers to private financial institutions and government entities financing investments that achieve environmental benefits by, for example, offering more favorable loan rates. While green lending in the car market specifically seems to be a relatively recent phenomenon, a 2011 study found that the most popular “green loan” among surveyed credit unions was for fuel-efficient vehicles. Moreover,

90 See id.
92 See id. In March 2016, higher-income consumers became ineligible to participate in the Clean Vehicle Rebate Project (CVRP). Id.
95 See W. ROBERT HALL, FILENE RES. INST., FINDING SUSTAINABLE PROFITS: GREEN LENDING IN CREDIT UNIONS 13–14 (2011), https://filene.org/assets/pdf-
a November 2016 memorandum, commissioned by EPA, identified over 60 financial institutions nationally that offer auto loan rate reductions to consumers who purchase more fuel-efficient vehicles. Such institutions included major national banks like City National Bank and U.S. Bank. Therefore, by offering more affordable rates, “green loans” are promising mechanisms for addressing the purchase-price barrier for low-income car consumers.

However, not all purchase price incentives are created equally, and an incentive’s magnitude and distribution scheme can predict its effectiveness in increasing clean vehicle adoption. First, the effectiveness of the incentive scales with the magnitude of incentive; the greater the monetary value of the incentive, the more effective it is. The timing of consumer realization of the financial incentive, relative to the point of vehicle purchase, also affects the rate of clean vehicle adoption. For instance, tax waivers, the benefits of which are realized instantly, may be more successful at increasing clean vehicle adoption than tax credits. Because tax waivers decrease the amount of money consumers have to pay upfront, such incentives might be especially helpful for lowering the purchase-price barrier for low-income consumers who may have difficulty accumulating sufficient capital to purchase a car.


97 See id.

98 Though these incentives effectively increase clean vehicle adoption, and lower the purchase price barrier, there is still room for improvement. One concern about the effectiveness of these incentives is the possibility that dealerships can capture some of the economic value of the incentive by simply increasing the vehicle’s purchase price. See J.R. DeShazo et al., Designing Policy Incentives for Cleaner Technologies: Lessons from California’s Plug-In Electric Vehicle Rebate Program, 84 J. ENVTL. ECON. & MGMT. 18, 20 (2017). For example, imagine that a dealership sets a car’s price at $10,000 but the consumer qualifies for $2500 tax waiver on the vehicle. With the tax waiver, the car’s total price would be $8,500. However, a dealership could account for the tax waiver by instead setting the car’s price at $12,500. Now with the waiver, the consumer would be back to paying $10,000. Nonetheless, consumers still capture a portion of the financial incentive. See Salle, James M., The Surprising Incidence of Tax Credits for the Toyota Prius, 3 American Economic Journal: Economic Policy 189-219, 189 (2011); see also Meghan Busse et al., $1000 Cash Back: The Pass-Through of Auto Manufacturer Promotions, 96 AM. ECON. REV. 1253–70 (2006).

99 See Kelly Sims Gallagher & Erich Muehlegger, Giving Green to Get Green? Incentives and Consumer Adoption of Hybrid Vehicle Technology, 61 J. ECON. & MGMT. 1, 7 (2011); see also Jenn et al., supra note 86. Research seems to indicate that “only sufficiently large incentive amounts yield an effect on sales.” Id.

100 See Gallagher & Muchlegger, supra note 99, at 9.
This discussion provides a few examples of policy mechanisms that can effectively lower the purchase-price barrier to car ownership for low-income households without compromising realization of environmental goals. Reductions in operating costs due to improved fuel economy under the existing GHG emissions standards, when combined with tailored incentive programs for clean-vehicle purchase, can comprehensively address the challenges that low-income households face in securing vehicle access.

III. EPA’s Claim That Relaxing the GHG Emissions Standards Is Necessary Due to Shifts in Consumers Preferences Is an Unfounded Assertion and Overlooks Low-Income Consumers’ Needs.

The current vehicle GHG standards for 2021 through 2025 are valuable to low-income consumers in part because they would eventually expand the supply of highly fuel-efficient—and therefore more affordable—cars on the used-vehicle market. In the proposed SAFE Vehicles Rule, however, EPA contends that the current GHG emissions standards actually undercut this possibility. According to EPA, the GHG standards will generate cars that consumers do not want, and therefore Americans will forgo new-car purchases, retaining their old cars for longer. Extending this reasoning, the current GHG emissions standards would then limit the supply of cars on the used-car market, driving prices up and leaving older, dirtier cars on that market. Thus, according to EPA, ensuring consumers continue to buy new cars requires setting GHG emissions standards that accommodate consumer preferences. There are several serious issues with this approach and the underlying reasoning.

First, tailoring health and welfare regulations to “consumer preferences” is problematic because this approach does not distinguish between consumers’ vehicle needs and vehicle tastes. A consumer may prefer a large vehicle because she has a large family. This is a need because without a larger vehicle, transporting a large family becomes complicated or impossible. Another consumer may prefer a high-performing engine because she likes to feel more dominant on the roads; this is a consumer taste rather than a need. While public policy and regulations like vehicle emissions standards should be responsive to consumer needs, consumer tastes should not receive the same weight.

EPA should not compromise stringency of vehicle GHG emission standards—which alleviate low-income households’ disproportionate exposure to the substantial cost of operating vehicles, fuel price fluctuations, and the environmental impacts of vehicle emissions—to accommodate consumer tastes. EPA’s mandate under the Clean Air Act is to set vehicle emissions standards to protect public health and welfare, not cater to consumer choice. In the SAFE Vehicles Rule, EPA repeatedly highlights vehicle features that consumers purportedly prefer over

101 See SAFE VEHICLES RULE, supra note 4, at 42993, 42995.
102 Id. at 21.
103 See Section I, supra.
104 See Section IV, infra.
fuel economy; these include “zero-to-sixty” acceleration, towing, hauling, \footnote{SAFE VEHICLES RULE, supra note 4, at 42991.} “better infotainment package[s],” and more powerful powertrains. \footnote{Id. at 19 – 20} Not only does EPA fail to offer any primary data on consumer preferences to support these claims, it does not assess whether these features should be treated as needs or tastes.

Even if the SAFE Vehicles Rule cited data demonstrating shifts in new-car consumer preferences—and EPA provides no such data—then retaining the existing vehicle GHG standards might be even more essential to protect low-income consumers. Consumer preferences on the new car market, which supplies the used car market, may not reflect consumer preferences on the used car market, where most low-income households purchase their cars. Indeed, higher income vehicle consumers are “more opposed” to electrified (and therefore more fuel efficient) cars than lower income vehicle consumers. \footnote{John P. Helveston et al, Will Subsidies Drive Electric Vehicle Adoption? Measure Consumer Preferences in the U.S. and China, 73 TRANSP. RES. PART A: POL’Y & PRAC. 96, 105–06 (2015).} This means that “[t]hose who can afford an electrified vehicle are more opposed to them, and those who prefer them have lower incomes and may not be able to afford them.” \footnote{Id. at 106.} Accordingly, retaining the current federal GHG emissions standards is necessary to ensure that the used-vehicle fleet is responsive to low-income consumer needs.

Among the “consumer preferences” that the SAFE Vehicles Rule asserts should be prioritized over fuel economy, one feature does likely warrant careful consideration in setting emissions standards: vehicle safety. But as the SAFE Vehicles Rule’s “Consideration of Safety” analysis reveals, increasing safety and improving fuel economy through GHG emission standards are not truly in tension. \footnote{SAFE VEHICLES RULE, supra note 4, at 43231.} EPA’s determination that increasing fuel economy will compromise safety is just an outgrowth of its conclusion that GHG emissions standards will yield cars that consumers do not want and will not buy, resulting in “delayed turnover of the vehicle fleet to newer, safer vehicles.” \footnote{Id. at 517.}

Again, the fundamental problem with EPA’s assessment that consumers will reject the fuel-efficient cars produced under the existing GHG emissions standards is that it is not based on any primary data on consumer preferences. Instead, the SAFE Vehicles Rule’s analysis of “shift in consumer preferences” cites gas-price data. \footnote{E.g., SAFE VEHICLES RULE, supra note 4, at 42993 & nn.29-30.} EPA’s assumption, apparently, is that gas price is a proxy for consumers’ vehicle preferences, which in turn predict vehicle demand. But calculating and predicting demand is much more complex than tracing gas-price projections, and demand modeling
must account for other major influences on consumer behavior, such as macroeconomic conditions.\footnote{U.S. EPA & NHTSA, U.S. DEP’T OF TRANSP., EPA-HQ-OAR-2018-0283, PRELIMINARY REGULATORY IMPACT ANALYSIS: THE SAFER AFFORDABLE FUEL-EFFICIENT (SAFE) VEHICLES RULE FOR MODEL YEAR 2021 – 2026 PASSENGER CARS AND LIGHT TRUCKS, at 951 (July 2018).}

Gas prices alone do not approximate vehicle demand, and there is reason to approach any such correlation with caution, because automakers take aggressive steps to counter any influence gas prices might have on vehicle demand. A 2013 study examining General Motors, Ford, Chrysler, and Toyota’s manufacturer incentive programs from 2003 to 2006 revealed that manufacturers offered cash incentives on less fuel-efficient cars when gas prices were high.\footnote{Ashley Langer & Nathan H. Miller, Automaker’s Short-Run Responses to Changing Gasoline Prices. 95 REVIEW OF ECON. & STAT. 1198 (2013).} The purpose of these cash incentives was “to mitigate substitution toward fuel-efficient vehicles,”\footnote{Id.} and therefore manufacturer cash incentives may have dampened the demand for fuel economy.

Outside of gas prices, the only other support EPA offers for its contention that consumer preferences have shifted away from fuel economy is a technical report on the vehicle market that EPA issued in January 2018.\footnote{SAFE VEHICLES RULE, supra note 4, at 43230 – 43231.} That report actually identifies a strong trend of steadily increasing hybrid sales between 2000 and 2017.\footnote{Id.}

More importantly, there are indications that consumer preferences are shifting towards, rather than away from, fuel economy. Consumer interest in more environmentally conscious vehicle purchases is growing.\footnote{Deloitte, supra note 2, at 13 (finding that in 2014, 65% of millennials and roughly half of other generations reported willingness to pay more for an electric car).} Furthermore, dramatic cultural shifts in travel behavior and available services, such as the rise of car-sharing and ride-hailing services, is influencing consumer automobile preferences in favor of fuel-economy.\footnote{See Deloitte, supra note 2, at 9.} For example, increased dependency on ride-hailing services like Uber and Lyft might increase preferences for fuel economy, because lower fuel costs might mean lower fares for riders and lower expenditures for drivers, who cover their own fuel costs.
Thus, the current set of GHG emissions standards for model years 2021 through 2025 is an essential policy tool that helps correct for the discrepancy between consumer preferences in the new- and used-car markets and can expand low-income consumers’ access to more fuel-efficient vehicles on the used-car market.

IV. Strong GHG Emissions Standards Confer Additional Benefits on Low-Income Households, Including Health Benefits from Air Quality Improvements and Slowing the Onset of Threats from Rising Seas and Extreme Weather.

In addition to fuel and maintenance savings, the implementation of stronger GHG emissions standards may also indirectly benefit low-income Americans in dramatic ways. The standards will encourage an increase in the number of fuel-efficient and electric vehicles in the national car fleet, thereby reducing emissions of both conventional air pollutants and GHGs. This in turn will decrease health care costs related to air pollution and climate change, which preferentially harm low income Americans.

The current vehicle GHG emissions standards promise significant improvements in respiratory health for many low-income households. The standards will increase vehicle electrification and lower rates of gasoline combustion, reducing the present high concentrations of hazardous pollutants emitted by combustion engine vehicles near major roadways. Because many low-income individuals tend to live closer to freeways and busy thoroughfares, they suffer greater rates of asthma and respiratory illness caused by these pollutants. The GHG standards thus offer meaningful health benefits to low-income Americans in particular.

Additionally, the GHG reductions brought by stronger GHG emissions standards will help mitigate the effects of climate change on low-income households. This is critical because low-income Americans are most vulnerable to the effects of climate change, which include increased temperatures, extreme weather events, and sea level rise. By reducing GHG emissions, the existing emissions standards directly combat climate change. With low-income communities experiencing the disproportionate impacts of Hurricane Harvey in Houston and Hurricane Irma in Puerto Rico in 2017, the need to reduce GHG emissions is even more apparent, especially to protect those communities that will be hit the hardest.


121 Id.

122 Id.

123 Ian W. H. Parry et al., Automobile Externalities and Policies, 45 J. Econ. Lit. 373, 375 (2007).

124 CAROL ZABIN ET AL., ADVANCING EQUITY IN CALIFORNIA CLIMATE POLICY: A NEW SOCIAL CONTRACT FOR LOW-CARBON TRANSITION 7 (2016).

125 See Andrew Buncombe, Hurricane Harvey was a natural disaster, but a man-made catastrophe that will hurt the poor the most, Independent (September 3, 2017),
The preceding discussion reveals the powerful ways in which the current vehicle GHG emissions standards provide benefits to low-income individuals even beyond financial savings or opportunities for economic advancement. These standards promise improvements in air quality that will confer substantial health benefits through reductions in local air pollution and the likelihood of the extreme weather events and sea-level rise that threaten entire communities.

**Conclusion**

This comprehensive review of the vehicle GHG emissions standards’ effects on vehicle consumers reveals that the vehicle GHG emissions standards for model years 2021 through 2025 are extremely valuable to low-income households and actually advance vehicle affordability. These standards promise a future used-car fleet with substantially lower fuel and maintenance costs. Stronger GHG emissions standards help ensure that low-income households can more easily afford to operate and maintain the cars they own, thereby realizing the time-efficiency and transportation-reliability benefits of vehicle access. Finally and critically, more stringent GHG standards help protect low-income Americans from local air pollution and climate change effects to which they are particularly vulnerable. Thus, if EPA truly cares about affordable vehicles for all, it should protect and not weaken existing vehicle GHG emissions standards for model years 2021 through 2025.

Sincerely,

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September 3, 2018  
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