

ROLLING BACK THE ROLLBACK: STRONG NEAR-TERM STANDARDS TO SET UP A CLEANER FUTURE

President Biden’s executive order to re-examine the rollback of light-duty fuel economy and emissions standards under the previous administration signaled what we hope to be a commitment to dramatically reducing emissions from transportation. A return to the light-duty standards set under President Obama and then-Vice President Biden back in 2012, and affirmed in 2017, would be the best way to put us back on a path to strong greenhouse gas emission reductions in LDVs. Throughout the lengthy and numerous processes about these standards over the past five years, the science has been clear: these standards are more than achievable and offer both the best step forward *today* and can put us back on the trajectory we need to achieve our net-zero-emission *future*.

We understand that the auto industry has called for standards that “should achieve improvements in GHG emissions roughly midway between current standards and those of the former Obama Administration” while “support[ing] vehicle electrification in the market with a range of compliance incentives.”¹ This is similar to the California framework that five automakers (Ford, BMW, Honda, VW, and Honda) signed onto.² We have analyzed the California agreements and a national adoption of the California framework to show both what the emission reductions from this framework would be, as well as the pieces of the framework that could be strengthened to maintain stronger standards. If implemented federally, the California framework would net barely more than half the emissions reductions of the 2012 Obama-Biden standards and, despite numerous incentives, result in no greater penetration of electric vehicles (EVs).³

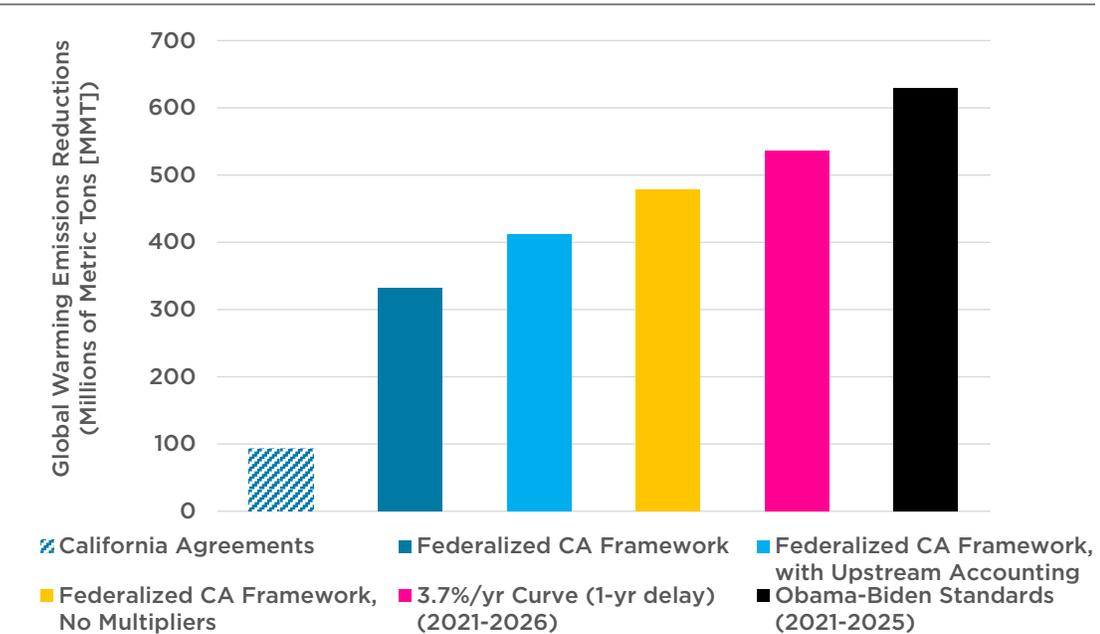
The standards that are enacted for 2021-2026 will serve as the baseline for the next round of standards, which we hope will dramatically increase deployment of EVs in the LDV fleet. The higher the baseline, the more likely it is that we can be on the

¹ <https://www.autosinnovate.org/posts/press-release/statement-on-greenhouse-gas-emissions>

² <https://ww2.arb.ca.gov/news/framework-agreements-clean-cars>

³ Throughout this memo we refer to analysis undertaken using a modified version of the Volpe model distributed with the final rulemaking for MY2021-2026 (85 FR 24174). We have incorporated a number of changes to the model submitted either during the public comment period or as part of the petition to NHTSA for reconsideration of the rule. These changes include: corrections to algorithm to better reflect and utilize credits, including enabling manufacturer-to-manufacturer trading; reducing economic factors to be more consistent with literature, including rebound (from 20 to 10 percent), sales elasticity (from -1.0 to -0.3), congestion costs, and the social costs of global warming emissions; reducing on-road shortfall for gas-powered vehicles from 80 percent to 77 percent to reflect EPA data; correcting the assumed share of reduced domestic refining to reflect EIA estimates; correcting off-cycle costs based on EPA, ICCT, and NRC data; enabling HCR2 engines; eliminating phase-in caps on electrification; and increasing Tesla model sales to reflect actual data. In our analysis, we consider all model years through 2026, accounting for differences in credit utilization and credit banks entering MY2027. Automakers party or not party to the California agreements are modeled separately, in order to preserve the integrity of the “Emission Benefit Balance” under the agreements, except for Tesla which is split by relative sales share between the two groups and is allowed to trade into the framework.

FIGURE 1 Emissions Reductions for Model Years 2017-2026 Under Different Regulatory Scenarios



The California agreements improve upon the current federal 2021-2026 program (dark blue hashed bar), but more is needed. Delaying full implementation of the 2012 Obama-Biden standards (black bar) by one year is equivalent to a 3.7 percent annual improvement through 2026 (magenta bar). While this reduces both the emissions reductions and net benefits compared to maintaining the current rules, this reduction is relatively small (less than 15 percent of total emissions reductions relative to the current standards). Incentives further reduce the stringency: both ignoring upstream emissions (yellow bar) and extending EV multipliers (light blue bar) lead to a significant reduction in benefits compared to just the one-year delay alone. However, it is the compounding effect of both these incentives through a federal implementation of the full California framework (dark blue bar) that reduces the benefits to just over half that of the Obama-Biden standards.

path to 100% ZEV sales by 2035. Unfortunately, our analysis shows that full federal adoption of the California framework would significantly lower the baseline, relative to the Obama-Biden standards.

The California Framework

The California framework, implemented in model years 2021-2026, is predicated on four main components: 1) a one-year delay in the 2025 target; 2) exclusion of upstream emissions from EVs; 3) a capped, five-year extension of EV multipliers; and 4) changes to the off-cycle credit program, including an increase in the cap on credits available for use from a pre-selected off-cycle technology menu, from 10 g/mi up to 15 g/mi. While the agreements signed with California by the five automakers provide some additional benefit beyond the current 2021-2026

standards (Figure 1), federalizing this framework would lead to significant reductions compared to those originally passed in 2012. Together, our analysis shows that federal adoption of the California framework would result in barely half of the emissions benefits of the Obama-Biden standards. Below, we walk through the impacts of each of these components. Figure 1 shows the relative disbenefit of each of these elements on their own, as well as in aggregate.

ONE YEAR DELAY

The California framework delays the 2012 standard by a year, roughly achieving the 2025 target in 2026, on paper. Ostensibly, this action should not have a dramatic impact on modeled compliance, since manufacturers use credits to smooth out year-to-year variations, both in practice and in the model. The delay does result in slightly increased emissions and reduced benefits, but at less than 15 percent it is a relatively small shift from the 2012 Obama-Biden standards (Figure 1).

NEGLECTING UPSTREAM EMISSIONS FROM ELECTRIC VEHICLES

While EVs have zero tailpipe emissions while operating on electricity, the emissions associated with the grid electricity needed to power the vehicles is not zero. Under the Obama-Biden standards, these upstream emissions were slated to be included in manufacturers' compliance calculations under the EPA's greenhouse gas program beginning in 2022.⁴ Under the current standards, upstream emissions are excluded from compliance, and the California framework matches this exclusion through at least the 2026 model year.

Excluding upstream emissions has a significant detrimental impact on emissions—every EV sold is credited with more emissions reductions than are actually achieved in the real world, allowing for reduced improvements from gasoline- and diesel-powered vehicles.⁵ While this can be compensated for with a more stringent curve, both the California framework and the current standards instead have reduced stringency, leading to a significant erosion in emissions reduction (Figure 1). This effect is even more pronounced under the California framework by the extension of alternative-fueled vehicle multipliers, discussed in the next section. Incorporating upstream emissions into the program greatly mitigates the harm caused by such compounding effects.

⁴ Rather than a set year, inclusion was based on a cap of 200,000 vehicles sold after 2021. For manufacturers who sold more than 300,000 vehicles from MY2019-2021, this cap was raised to 600,000 vehicles—only Tesla will achieve this early target. Assuming upstream emissions are counted in the model beginning in model year 2024 best balances the over- and under-credited sales volumes and acts as a stand-in for the cap in the Volpe model.

⁵ Alan Jenn, Inês M. L. Azevedo, and Jeremy J. Michalek. "Alternative Fuel Vehicle Adoption Increases Fleet Gasoline Consumption and Greenhouse Gas Emissions under United States Corporate Average Fuel Economy Policy and Greenhouse Gas Emissions Standards," *Environmental Science & Technology* 50 (5), 2165-2174 (2016). DOI: 10.1021/acs.est.5b02842.

EXTENDING ALTERNATIVE FUEL VEHICLE (AFV) MULTIPLIERS

AFV multipliers were implemented under the 2012 Obama-Biden standards in an effort to accelerate the market for EVs and compressed natural gas vehicles (CNGVs). The multipliers allow every sale of an AFV to count extra towards a manufacturer's compliance: for example, in 2017, every battery-electric vehicle sold is treated as *two* EV sales in a manufacturer's compliance calculation. These multipliers were phased out by 2022 under the 2012 standards. The current standards phased out EV multipliers by 2022 but extended the CNGV multipliers by five years. The California framework extends the EV multipliers by five years, but the overall use of those multipliers is capped in a given year.

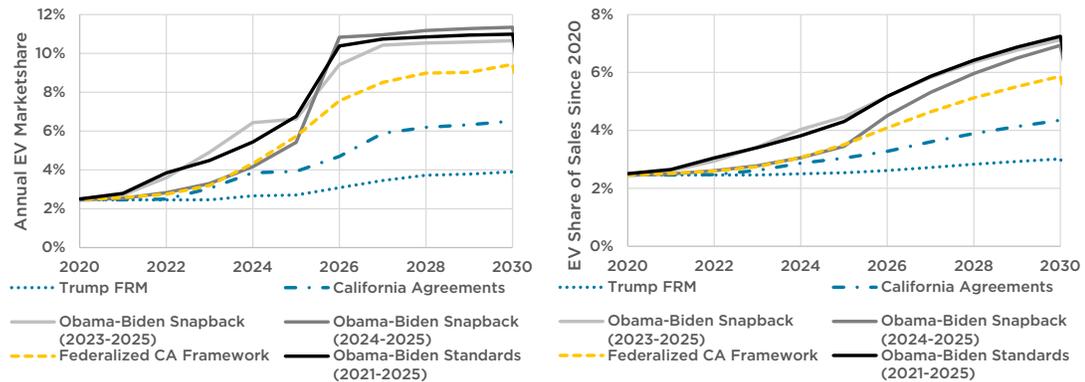
The California framework uses a "1 percent cap"—effectively, this means that the extra credits earned under the extended multipliers cannot exceed the difference between a 3.7 percent per year annual improvement and a 2.7 percent per year annual improvement.⁶ If manufacturers took full advantage of the multipliers under this cap, it would effectively be like complying with a 2.7 percent per year annual improvement. This is less than twice the improvement required under the current standards (1.5 percent annually) and only slightly more than half the improvement required under the 2012 standards (4.6 percent annually). And because of the lack of upstream accounting mentioned above, the emissions impacts amount to even worse than a rule set at 2.7 percent per year.

AFV multipliers by themselves have about twice the impact of the exclusion of upstream emissions (Figure 1). However, the complementary nature of the incentives (overcredited emissions improvements are multiplied) creates a greater incentive for manufacturers to take advantage of these credits in a feedback loop that severely weakens the program. While eliminating either is a significant improvement, eliminating *both* incentives would yield just a 15 percent shortfall from the 2012 standards.

Perhaps counterintuitively, strengthening the rule by eliminating EV incentives actually leads to *greater* EV adoption at the federal level (Figure 2). Incentives shift the relative attractiveness of applying electrification as a strategy to reduce emissions; on the other hand, stringency determines the level of overall technology adoption needed. By reducing the effective stringency of the regulation, on average, the EV incentives in a federal adoption of the California framework act to reduce the overall incentive to adopt *all* emissions-reducing technologies, leading to less

⁶ Due to limitations in the Volpe model, it is not possible to directly model a manufacturer-specific cap. Instead, we have considered two separate ways to illustrate the emissions impacts of the multiplier: 1) extend the multipliers without any cap and 2) assume manufacturers max out the cap, resulting in a 2.7 percent standard. Our best estimate of compliance (#1) achieves greater emissions reductions than the worst-case scenario (#2), affirming that we are not overestimating the shortfalls possible under the California framework. We have also confirmed that industry-wide credits do not exceed the 1 percent cap, which mean that even if the model may not accurately capture every individual manufacturer's strategy, it is generally consistent with the industry's average behavior overall.

FIGURE 2 National EV Adoption Under Different Regulatory Scenarios



Under any implementation of the 2012 Obama-era Standards, our modeling finds that EVs achieve 9 to 11 percent annual marketshare by 2026 and make up approximately 7 percent of all vehicles sold 2020-2030 (solid gray and black lines). The California framework lags this significantly, not reaching such EV marketshare until 2030 and leading to just a 6 percent share of all vehicles sold 2020-2030 (dashed yellow line). While post-2025 rules would accelerate adoption under any scenario, implementation of the 2012 standards as quickly as possible provides a better launch point for the EV transition and supports a greater share of early EV adoption.

EV adoption, even though the incentives act to reduce the effective cost of EVs as a compliance strategy for individual manufacturers.

OFF-CYCLE CREDITS

Federal adoption of the California framework could result in even fewer emissions reductions than presented in Figure 1 as a result of expanding the off-cycle credit provisions, if those credits are not adequately justified. Under current federal policy, auto manufacturers are limited to 10 g/mi of off-cycle credits from a predetermined menu. The California framework increases that to 15 g/mi, which could be problematic if the credits are given to technologies that don't have real emissions benefits.

In principle, off-cycle credits can capture real-world emissions reductions that are not adequately captured on the test cycle and reward the novel technologies resulting in those emissions reductions, many of which are being deployed by manufacturers because they are a potentially low-cost compliance option. However, if the program is not adequately backed by real-world data, the credit program simply acts as a giveaway to manufacturers and erodes the stringency of the overall emissions program. Because the agencies incorrectly assumed that no off-cycle credited technology was deployed in the 2008/2010 baseline fleet, a non-trivial share of the credits generated to-date are for status quo technologies, which only serves to erode the stringency of the program.

Moreover, because the values in the menu do not recognize prior efficiency improvement, the off-cycle menu overcredits successive technology application. And finally, while the agencies initially created the off-cycle menu with what they called “conservative” assumptions, more recent data on some of these technologies suggests that many of the off-cycle menu credits are not yielding the real-world reductions promised.⁷

In our estimate of the benefits of standards, we have assumed that the off-cycle credit program results in real-world reductions. Raising the cap to 15 g/mi under the California framework puts a tremendous share of the rule’s benefits at risk if there is not adequate assurance that such credits result in real world improvements—of the 332 MMTs of reductions of improvement from federal adoption of the California framework, 46 MMT of that is attributable to utilization of the off-cycle credit program beyond the current 10 g/mi cap, 13 percent of the total reductions.⁸

Snapping Back on Track

While ongoing litigation continues to push for the reinstatement of the 2012 Obama-Biden standards, in full, there remains uncertainty around how quickly the Biden administration could reinstate these standards. The longer the final rule promulgated under the Trump administration remains on the books, the more manufacturers can delay improving their vehicles and/or can accrue undue credits that can then be used to offset the requirements of strong standards. However, implementing the 2012 Obama-Biden standards as quickly as possible helps to capture a significant share of the benefits of the originally promulgated rule.

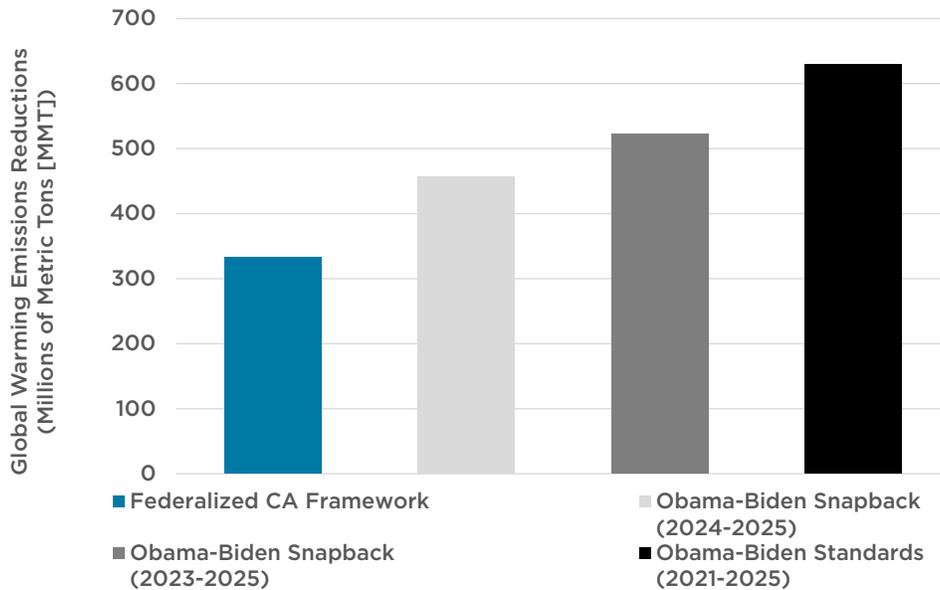
BENEFITS OF REINSTITUTING THE 2012 STANDARDS

Implementing the 2012 Obama-Biden standards for future years remains the strongest available option for minimizing the emissions damage from the current standards, despite the potential for delay (Figure 3). Delaying implementation of the Obama-Biden standards until the 2024 model year is expected to achieve nearly 40 percent more emissions reductions than even a fully implemented California framework (2021-2026)—if implementation of the Obama-Biden standards begins with the 2023 model year, that is increased to nearly 60 percent more emissions reductions than the California framework, recovering more than 80 percent of the full benefits of the 2012 standards.

⁷ Nic Lutsey and Aaron Isenstadt. 2018. How Will Off-Cycle Credits Impact U.S. 2025 Efficiency Standards? White paper from the International Council on Clean Transportation. <https://theicct.org/publications/US-2025-off-cycle>.

⁸ Given that some manufacturers are already hitting the 10 g/mi cap, and the FRM’s appropriate assumptions that manufacturers will maximize the menu cap, we assume in this analysis that by 2026 all manufacturers will hit the 15 g/mi off-cycle menu cap.

FIGURE 3 Emissions Reductions for Model Years 2017-2026 Under Different Regulatory Scenarios



Even delayed implementation of the 2012 standards results in 40-60 percent more emissions reductions than fully implementing the California framework.

Importantly, the benefits of reinstating the 2012 Obama-Biden standards are not limited to emissions savings. Our modeling indicates that reinstating the Obama-Biden standards, even after a delay, would result in twice as many additional automotive jobs in 2026-2030 than the California framework (31,000-40,000 per year, compared to 17,000-19,000).⁹

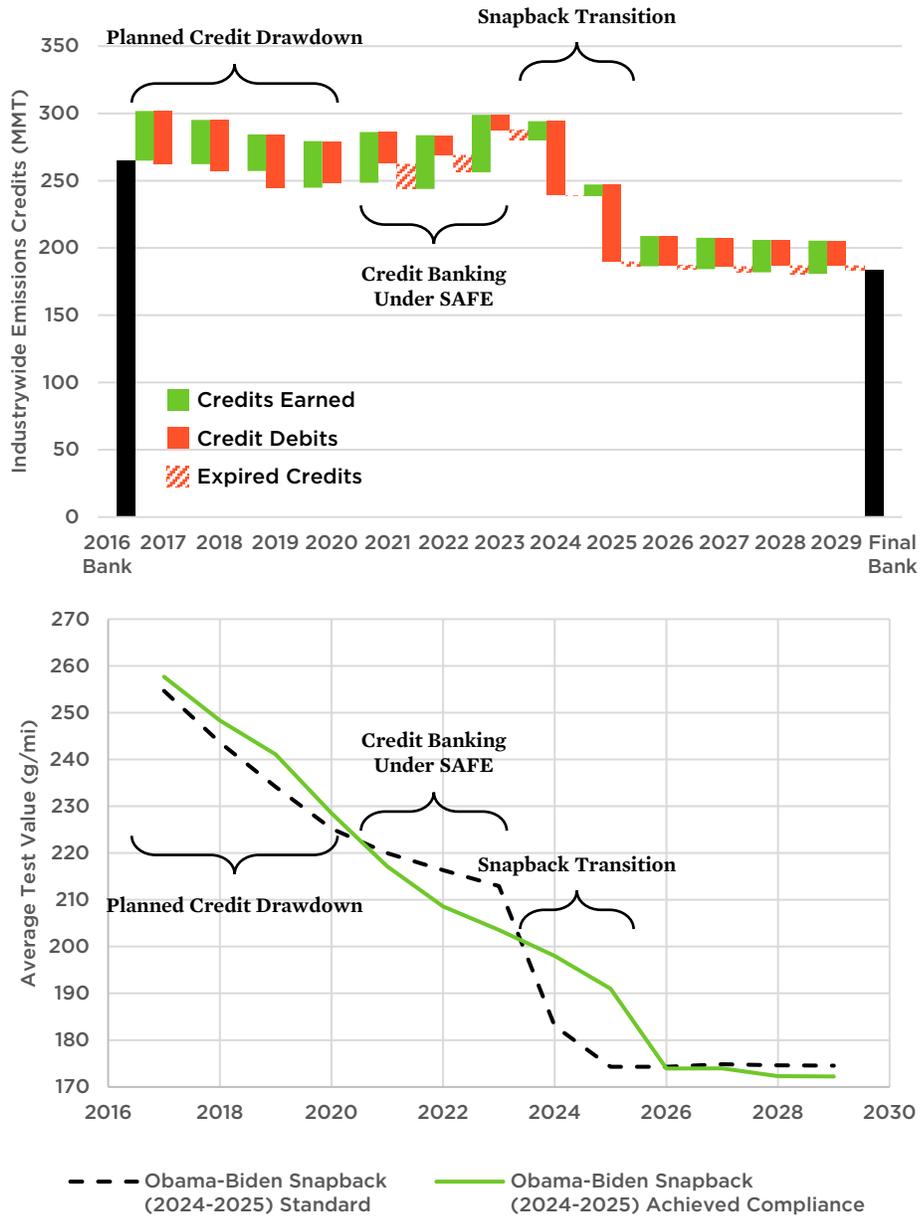
Similarly, despite the numerous incentives for EVs in the California framework, re-implementation of the Obama-Biden standards accelerates EV sales *faster*, owing to fewer loopholes (Figure 2). Not only do strong near-term standards make it more likely for us to hit near-term emissions targets such as those of the Paris Climate Agreement, but they also better enable the long-term trajectory to a more equitable and sustainable transportation future in line with President Biden’s commitments to a net-zero economy.

FEASIBILITY OF A SNAPBACK TO THE 2012 STANDARDS

While there are significant benefits to reinstating the 2012 Obama-Biden standards, and those standards remain a strong departure from the current regulatory trajectory, compliance with such standards does not require a dramatic

⁹ These numbers include jobs related to improvements from automakers that would have occurred under the California agreements regardless. If those are considered as part of the baseline, the difference is even more striking: 23,000-30,000 per year, compared to 9,000-14,000 per year).

FIGURE 4 Modeling of Industrywide Compliance in Response to Delaying Implementation of the 2012 Obama-Biden Standards to 2024



Credit banking and trading helps smooth out any abrupt shift in the regulatory standard for the industry (dashed black line, bottom). Vehicle emissions reduce gradually through the 2026 model year, as evidenced by the average emissions level, industrywide (solid green line, bottom). Manufacturers currently sit on a large credit bank, and have steadily continued to draw those credits down over time (top). Credits earned under the current standards (2021-2023) along with the existing large credit bank help compensate for shortfalls related to transitioning to substantially higher standards (2024-2025).

shift in technology deployment. By continuing to utilize the banking and trading provisions in the light-duty vehicle standards, manufacturers have a gradual path to compliance that helps smooth out any abrupt shifts in regulatory standards (Figure 4).

Manufacturers currently have a significant bank of credits—strategically, it is in their interest to take advantage of such banked credits, rather than deploy additional technologies, and this has been a significant compliance strategy to-date.¹⁰ Under the current standards, manufacturers are likely to accrue significant numbers of credits, while the standards are well below their technological capabilities (Figure 4). These credits can then be used to offset the snapback to the Obama-Biden standards in 2023 or 2024. Our modeled transition shows a temporary reliance on such credits (2024-2025), but the credit bank is more than sufficient for even an abrupt transition (Figure 4).¹¹

The diversity of available technologies allows for a smooth transition under numerous regulatory scenarios when factoring in the banking and trading flexibilities, thanks to the continued deployment of internal combustion engine technologies in the near-term along with a gradually growing share of EVs to meet the 2025 standards (Figure 2).

Conclusion

Strong near-term standards are needed to re-align the trajectory of the new car market with our long-term climate goals. While the California framework provides significant benefits compared to the regulations adopted in 2018 under the previous administration, adopting such a framework federally leads to increased emissions, reduced EV adoption, and reduced job growth compared to adopting the 2012 Obama-Biden standards as quickly as possible. Moreover, re-implementation of the strong 2012 standards will better accelerate the transition to electrification needed to reach 100% ZEV sales by 2035.

The framework's central flexibilities are two EV incentives that work in tandem to dramatically erode the stringency of the regulation, leading to significant increases in emissions. While eliminating either of these incentives can help reduce emissions losses, only eliminating both incentives entirely will yield comparable benefits to simply re-implementing the 2012 standards as quickly as possible.

¹⁰ See Table 5.18 in EPA. 2021. The 2020 EPA Automotive Trends Report: Greenhouse Gas Emissions, Fuel Economy, and Technology since 1975. EPA-420-R-21-003.

¹¹ Inefficiencies in the Volpe model preclude perfect credit utilization (e.g., credit expiration occurs, and manufacturers are precluded from using carryback as a compliance strategy), and therefore our credit usage represents a fairly conservative assessment of manufacturer behavior regarding future credit banks. However, even under the most credit-intensive scenarios, the model shows more than sufficient banks of credits available across the industry in the 2023-2025 timeframe to deal with any large increases in stringency.

While our analysis assumed all off-cycle menu credits resulted in real-world benefits, increasing the off-cycle menu cap from 10 g/mi to 15 g/mi puts an extremely large share of the benefits of stronger emissions standards at risk—this cap increase represents 13 percent of the potential emissions reductions from a federal adoption of the California framework. This flexibility could result in even further weakening of any future emissions standards if the credits are not supported by ample real-world data.