

Adoption of California Greenhouse Gas Vehicle Emissions Standards in New Mexico Saves Drivers Money and Reduces Air Pollution¹

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Key Findings

When we compare forecasted New Mexico vehicle fleets with and without Clean Car standards from 2010 through 2030, we find that adoption of the Clean Car standards in New Mexico will result in both economic and environmental benefits:

- Drivers will save significant money and fuel with implementation of the Clean Cars standard. We estimate that in the year 2030, Clean Car standards will avoid consumption of 135 million gallons of gasoline, thereby saving drivers \$335 million at a \$2.47 per gallon gas price.
- Clean Car standards will contribute significantly to fighting global warming, avoiding over 18 million metric tons of greenhouse gas emissions from 2010 through 2030.
- Low income drivers will particularly benefit. The 40% of New Mexican working families classified as low-income will save about \$200 per year in fuel costs.
- Delaying implementation of the Clean Cars standard will be costly for both drivers and the environment; a two year delay will cost drivers an extra \$49 million at the pumps, and result in over 6 million tons of additional greenhouse gas emissions

Summary

Although any modeling forecast is uncertain, these findings provide a quantitative estimate of greenhouse gas emissions reductions and fuel cost savings for drivers. Our results indicate that adopting Clean Cars standards will enable all drivers in all income brackets to drive farther while reducing their emissions and fuel costs. Nevertheless, low-income families in particular will benefit.

This study estimates the economic and environmental benefits, through 2030, that would be accrued in New Mexico from adopting Clean Car² standards similar to California's greenhouse gas emissions performance standards. We modeled fuel consumption and greenhouse gas emissions by passenger cars and light duty trucks in New Mexico using the Argonne National Laboratory's VISION model in three scenarios:

1. Business-as-usual vehicle performance improvements under current Federal CAFE standards.
2. Adoption of Clean Car standards with implementation starting in 2011.
3. Adoption of Clean Car standards with implementation starting in 2013; a 2-year delay.

The study concludes that in New Mexico, adoption of Clean Car standards will avoid over 18 million tons of greenhouse gas emissions, and will save \$335 million dollars on fuel bills and 370,000 gallons of fuel each day by 2030³. We also studied the implications of delaying Clean Car standards until 2013 rather than starting in 2011, and found that delaying implementation of the Clean Car standards by two years will cost drivers an extra \$49 million at the pumps, and result in over 6 million metric tons of additional greenhouse gas emissions.

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²These standards are promulgated by the California Air Resources Board in accordance with California's 2005 Assembly Bill 1493; though often called "Pavley auto standards", we refer to them as "Clean Car standards". AB1493 establishes declining emissions performance standards through model year 2016 for passenger autos, light duty and medium duty trucks. By Executive Order, California has achieved a 45% greenhouse gas emissions rate reduction by 2020 using a 2002 baseline.

³Based on the price elasticity function of fuel, drivers will travel more miles at lower fuel costs.

The economic and environmental benefits from adopting Clean Car standards in New Mexico are summarized in Table 1. By 2030, vehicle efficiency improvements can save drivers \$335 million annually and avoid about 135 million gallons of fuel use annually while drivers cover 500 million more miles. Cars and light-and medium-duty trucks in 2030 will emit 18.5 million fewer metric tons of greenhouse gas emissions (see Figure 1). Annual fuel cost savings in 2030 for the average new car and truck driver will be \$400 and \$300, respectively, at \$2.47 per gallon.

Table 1: Summary of Benefits for 2030 if Clean Car Standards are Implemented Beginning 2011

	Cars	Light Trucks	Cars + Light Trucks
Avoided Fuel Use (Gallons/Year)	75,000,000	60,000,000	135,000,000
Avoided Fuel Use (Gallons/Day)	210,000	170,000	380,000
Avoided Fuel Costs (\$2005)	\$187,000,000	\$148,000,000	\$335,000,000
Avoided Fuel Costs (\$2005 Per Vehicle) ⁴	\$400	\$300	-
Additional VMTs (Miles Per Vehicle)	500	450	-
Avoided GHG Emissions (Cars & Light Trucks, MMTC Eq, 2010-2030)	2.5	2.6	5.1
Avoided GHG Emissions (Cars & Light Trucks, MMTCO ₂ Eq, 2010-2030)	9.1	9.4	18.5

Figure 1

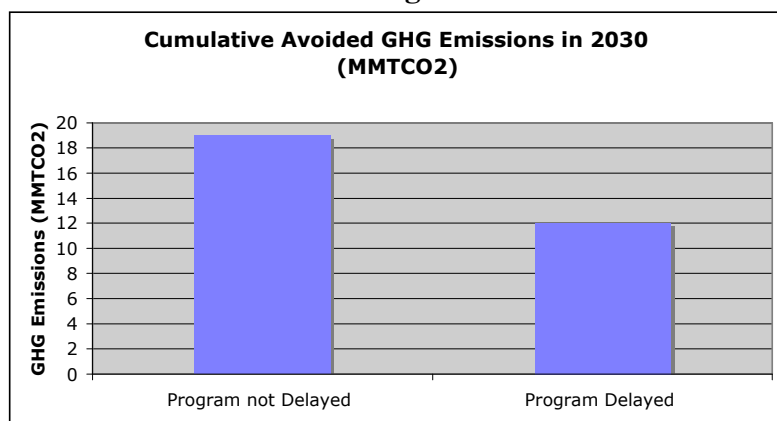
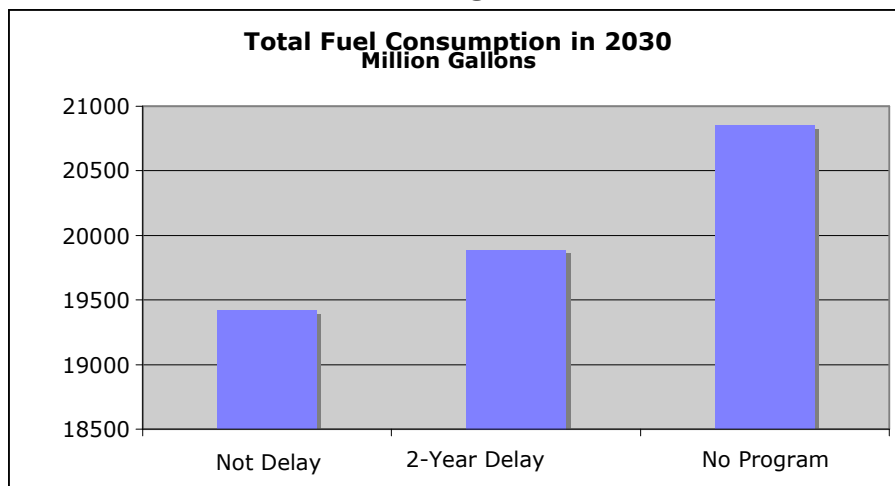


Figure 2⁵



⁴ Costs associated with onboard technologies needed to meet the Clean Car standards are not included. CARB estimates that vehicles meeting Clean Cars standards will cost an additional \$50 per car per year (see California Air Resources Board, Global Warming Solutions Scoping Plan, December 2008).

⁵ The total fuel consumption is based on cumulative fuel consumption between 2010 and 2030.

Costs of Delaying Clean Car Standards

If implementation of the Clean Car standards is delayed two years, there will still be significant program benefits, but compared with a 2011 start, New Mexico drivers will pay stiff penalties in the form of higher expenditures on fuel, more emissions, and more overall fuel use. Table 2 displays the economic and environmental benefits of implementing Clean Car standards in New Mexico starting in 2013. Table 3 shows the difference between a 2011 and 2013 program start.

Table 2: Program Delay: Results for 2030 if Clean Car Standards Implemented in 2013

	Cars	Light Trucks	Cars + Light Trucks
Avoided Fuel Use (Gallons/Year)	65,000,000	50,000,000	115,000,000
Avoided Fuel Use (Gallons/Day)	180,000	140,000	320,000
Avoided Fuel Costs (\$2005)	\$161,000,000	\$123,000,000	\$284,000,000
Additional VMTs (Cars & Light Trucks)	200,000,000	190,000,000	390,000,000
Avoided Fuel Costs (\$2005 Per Vehicle) ⁶	\$335	\$240	-
Additional VMTs (Miles Per Vehicle)	400	350	-
Avoided GHG Emissions (All Cars & Light Trucks, MMTC Eq, 2010-2030)	1.5	1.6	3.1
Avoided GHG Emissions (All Cars & Light Trucks, MMTCO ₂ Eq, 2010-2030)	6.1	6.2	12.3

As summarized in Table 3, considerable benefits will be lost if the Clean Car program is delayed. Cumulatively from 2010 through 2030, drivers in New Mexico will emit over 6 million metric tons of additional GHG emissions if the program start is delayed from 2011 until 2013. The cost of delay lingers throughout the study period since the increased integration of better air conditioning units and other onboard technologies will also be delayed. For example, in 2030, the 2-year delay scenario will be consuming 50,000 more gallons of fuel per day than the No Delay. The resultant additional fuel consumption of 20 million gallons of fuel will cost drivers \$49 million in 2030.

Table 3: Costs of Delay: The Economic and Environmental Costs for Delaying Clean Car Standards 2 years

If Program Begins 2013...	Cars	Light Trucks	Cars + Light Trucks
Extra Fuel Costs (Cars & Light Trucks, \$2005)	\$24,000,000	\$25,000,000	\$49,000,000
Emissions from delaying CC (Cars & Light Trucks, MMTC Eq, 2010-2030)	0.8	0.9	1.7
Emissions from delaying CC (Cars & Light Trucks, MMTCO ₂ Eq, 2010-2030)	3	3.2	6.2

⁶ Costs associated with onboard technologies needed to meet the Clean Car standards are not included. CARB estimates that vehicles meeting Clean Car standards will cost an additional \$50 per car per year (see California Air Resources Board, Global Warming Solutions Scoping Plan, December 2008).

Effects on Low-Income New Mexicans

Low-income families are affected more significantly by transportation costs because they spend twice as much of their household budget than the average person⁷. The average American spends as much as \$0.20 of every dollar they earn to put gas in their vehicle⁸. Fuel expenditures place an even greater burden on the 40% of working families in New Mexico classified as low-income⁹. The relatively high cost of fuel means low-income families drive less. For example, 60% of low-income households and 66% of low-income single-parent vehicle trips are 3 miles or shorter¹⁰. With twenty percent (twice the national average) of New Mexico's population hovering below the poverty line, every cent matters¹¹. Data from the Bureau of Business and Economic Research (BBER) shows almost 70% of New Mexico residents earned below \$35,000 per year, and spent 5 to 10% of that annual income on commuting¹². Moreover, half of the low-income households in New Mexico are single mother families¹³. So whether it is a mother taking her child to school or the head of the family trying to get to work, Cleaner Car standards have the potential to reduce fuel consumption for low income drivers. While clean cars and lower fuel costs may induce slightly more vehicle trips, overall the program yields significant decreases in vehicle emissions. Table 4 shows the benefits of avoided fuel bills and additional mobility by income bracket in New Mexico¹⁴.

Table 4: Low Income Benefits in 2030 from Adopting Clean Car Standards in New Mexico

Household Income	Total Families with Vehicle	Percent of New Mexico Population with Vehicle	\$ Benefits by Income Bracket	Additional VMT from Clean Cars	Savings Per Family ¹⁵
\$10,000	66,000	6%	\$41,000,000	30,000,000	\$195
\$15,000	44,000	4%	\$28,000,000	20,000,000	\$180
\$20,000	83,000	8%	\$52,000,000	40,000,000	\$190
\$25,000	76,000	7%	\$48,000,000	36,029,341	\$195
\$35,000	212,000	10%	\$56,000,000	50,000,000	\$95

⁷ Source: U.S. Census Bureau Data from the Survey of Income and Program Participation. Median percentage spent on commuting by income level. In 1999, person making annual income below \$8,000 spent 9.5% on commuting compared to all persons that spent 3.9% on commuting.

⁸ BTS. Bureau of Transportation Statistics. "Commuting Expenses: Disparity for the Working Poor." March 2003.

⁹ New Findings on the Challenges Confronting America's Working Families. Working Poor Families Project. 2008. A family is defined as a married couple or single parent with at least one child under 18. Report available at <http://www.workingpoorfamilies.org/pdfs/NatReport08.pdf>.

¹⁰ Elaine Murakami and Young, J. Daily Travel by Persons with Low Income. 1997.

¹¹ BBER. Bureau of Business and Economic Research at the University of New Mexico. Socioeconomic profile data, households by income level and population estimates. US poverty rate comes from the census bureau quick facts.

¹² BBER. Bureau of Business and Economic Research at the University of New Mexico. Socioeconomic profile data, households by income level and population estimates. More info at http://bber.unm.edu/bber_data.html. 5%-10% derived from Source: U.S. Census Bureau Data from the Survey of Income and Program Participation. Median percentage spent on commuting by income level in 1999.

¹³ New Findings on the Challenges Confronting America's Working Families. Working Poor Families Project. 2008. A family is defined as a married couple or single parent with at least one child under 18. Report available at <http://www.workingpoorfamilies.org/pdfs/NatReport08.pdf>.

¹⁴ See methods section for more detail on how these calculations.

¹⁵ Costs associated with onboard technologies needed to meet the Clean Cars standards are not included. CARB estimates that vehicles meeting Clean Cars standards will cost an additional \$50 per car per year (see California Air Resources Board, Global Warming Solutions Scoping Plan, December 2008).

Methods

We utilized the *VISION AEO 2008 Expanded Model* to quantify emissions and economic impacts. VISION is built around a national fleet dataset that we adapted to reflect the vehicle fleet in New Mexico. We developed a reference case using representation of Federal CAFE standards. We then updated the fleet fuel efficiency forecast to include the consequence of Clean Car standards implemented in 2011. Last, we developed a "delayed Clean Car case" to simulate the program starting in 2013.

We adjusted some of the default parameters in VISION to more accurately represent the New Mexico fleets, such as the proportion of forecasted light-duty truck and passenger car sales, and fleet age. The VISION model builds its forecast by observing trends from 1970, including retiring vehicles at a rate based on past trends, so we disaggregated all vehicles into age classes based on detailed fleet data for Texas¹⁶. We used default values for the market penetration of new technologies, such as electric vehicles and plug-in electric vehicles, though it remains possible that compliance with Clean Car standards might inspire greater rates of their integration.

We used Federal Highway Administration (FHWA) data for New Mexico in 2007 and applied factors to estimate the actual sales in previous years based on the retirement rates determined in the VISION model. We assigned a number of personal cars (PC) and light trucks (LT) that were sold in New Mexico in each year through 1980. The remainder of the fleet was calculated based on the percentages of increased sales in PC and LT between 1970 and 1980. LT ranged between 55% and 60% of the fleet in New Mexico during the study period. For this reason we also adjusted the stock correction factors to achieve LT totals that corresponded to 2001, 2004, and 2007 data from the FHWA. The VISION model calculates the future fleet population based on past fleet data.

In calculating economic effects, we do not consider the costs of capital equipment associated with higher fuel efficiency or flexible fueling, but the California Air Resources Board (CARB) estimates these costs at \$50/year. We study a range of values for fuel costs. However, our midrange value for a gallon of gasoline in 2030 is \$2.47 based on forecasts by the Federal Energy Information Administration. We consider these to be very conservative midline assumptions as gas reached as much as \$4.00 or more per gallon in 2008.

The low income data in Table 4 were generated based on socioeconomic profiles from the Bureau of Business and Economic Research (BBER) at the University of New Mexico, including data for households by income level for the year 2000. The percentage of people by income bracket assumes 2.63 persons per household based on U.S. Census data at the national level. The growth in population rate was derived from BBER population estimates for 2030. With the population forecast, we calculated the number of households by income level using the percentage of people in each income bracket in 2030. The number of families with a vehicle was calculated using the assumption that 26% fewer low-income families have vehicles than non low-income families¹⁷. To account for rural families we assumed 85% of low-income families have vehicles based on the BBER data that 27% of the population was rural in 2000 and NHTS data indicating rural families drive more¹⁸. Finally, the percentage of families with vehicles by income bracket was applied to 2030 VISION results for fuel consumption and vehicle miles of travel.

¹⁶ From a prior study, we have detailed fleet data for Texas that we deem more representative of New Mexico vehicle fleet age characteristics than the national fleet within VISION.

¹⁷ Elaine Murakami and Young, J. Daily Travel by Persons with Low Income. 1997. \$25,000 or less annual income was assumed to be low income.

¹⁸ Even when families with income over \$25,000 are assigned 2 vehicles per family in the model 2030 total vehicles is still smaller than the modeled total vehicle results. For this reason, our results for low income families may be low. This factor was corroborated by the total vehicle fleet provided by VISION.