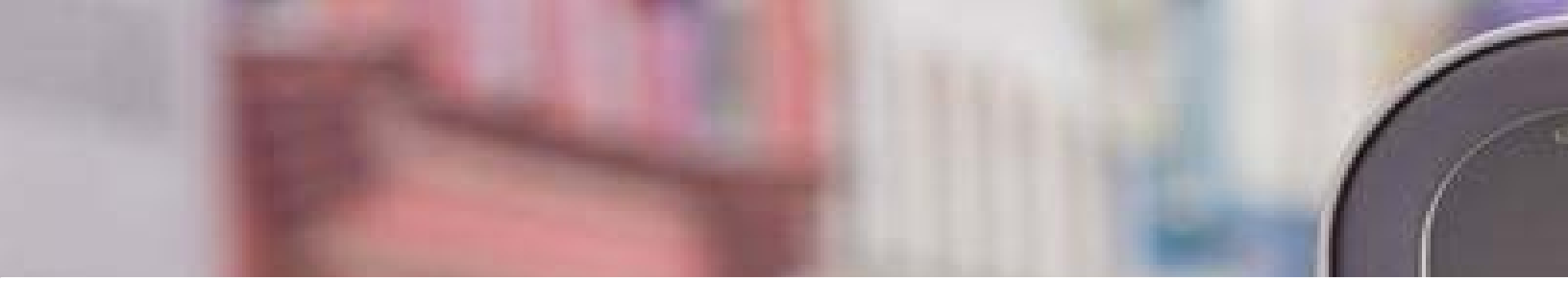

Protecting Our Communities from Air Pollution

Health Risks of Proposed Rollbacks to the Federal Clean Car Standards and the Benefits of Adopting Advanced Clean Car Standards

May 2018

BOULDER COUNTY PUBLIC HEALTH
Opportunity for a healthy life

DENVER PUBLIC HEALTH

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JEFFERSON COUNTY COLORADO Public Health

EXECUTIVE SUMMARY

Ozone pollution has long been a problem in the Denver metro area, and that problem has spread to the entire North Front Range of Colorado. Now, 90% of the state's population is exposed to unhealthy air from high ozone pollution, and Denver was ranked the 11th most polluted city in the nation for ozone levels in 2017.[1] Vehicle emissions are one of the largest contributors to ozone formation.

The federal government's planned rollbacks of federal auto emissions standards will result in significant public health impacts in Colorado. The associated increase in emissions of ozone-forming pollution and other regulated pollutants would result in:

- An increase in illness and premature death.
- More lost work days due to illness.
- An increase in health costs of nearly $6 to $15 million per year by 2040.[2]

In July 2017, Governor Hickenlooper signed an Executive Order to reduce greenhouse gas (GHG) emissions by 26% from 2005 levels by 2025. The analysis in the updated Colorado Climate Plan relies on the current, more stringent federal clean car standards to meet this goal. If these federal standards are rolled back, Colorado will find it difficult to meet the 26% reduction goal. With the planned rollbacks, carbon dioxide equivalent (CO_2e) emissions would be allowed to increase by nearly 2.6 million tons per year by 2030 and over 4.5 million tons per year by 2040.[3]

Under the Clean Air Act (CAA), Colorado has the option of adopting California's vehicle standards (Advanced Clean Car Standards), which are currently the same as EPA's, except for the addition of California's Zero Emission Vehicle (ZEV) program. In the absence of strong federal leadership on clean cars, Colorado should swiftly adopt Advanced Clean Car Standards, in order to avoid negative outcomes to the health of Coloradans and adverse climate impacts. If Colorado adopts Advanced Clean Car standards, we can maintain the climate benefits we are striving for by reducing vehicle emissions of CO_2e by 2.4 million tons per year by 2030 and 4.3 million tons per year by 2040[4] while also achieving reductions in ozone-forming pollutants (such as VOCs and NO_X) and reductions in fine particulates ($PM_{2.5}$) and sulfur oxides (SO_X).

> *"More fuel-efficient vehicles are a win for Colorado, reducing precursors of ozone, a pollutant that harms the health of Coloradans, and helping to curb greenhouse gas emissions."*
>
> Jonathan Samet, Dean and Professor,
> Colorado School of Public Health

[1] American Lung Association, State of the Air 2017, http://www.lung.org/our-initiatives/healthy-air/sota/.
[2] Rykowski, Richard, "The Benefits of Protective Advanced Clean Car Standards in Colorado: An Examination of Cost Savings, Greenhouse Gas Emission Reductions, and Health Outcomes," commissioned by Environmental Defense Fund, May 2018, at 35, https://www.edf.org/sites/default/files/content/The_Benefits_of_Protective_Clean_Car_Standards_CO.pdf
[3] Rykowski at 28.
[4] Rykowski at 29.

Introduction

Under the Clean Air Act (CAA), the U.S. Environmental Protection Agency (EPA) has the authority to establish emission standards for any emissions from new motor vehicles that "cause, or contribute to, air pollution which may reasonably be anticipated to endanger public health or welfare."[5] Since 2012, EPA's light-duty vehicle greenhouse gas (GHG) standards have been in line with the National Highway Traffic Safety Administration's (NHTSA) Corporate Average Fuel Economy (or CAFE) standards, as well as California's Advanced Clean Car Standards. Currently, there is essentially one national clean car program.

Unfortunately, on April 2, 2018**,** the EPA Administrator signed the Mid-term Evaluation Final Determination for the clean car standards, finding that, "…the model year 2022-2025 greenhouse gas standards are not appropriate in light of the record before EPA and, therefore, should be revised."[6] This impending revision to the federal clean car standards will likely significantly roll back current emission standards for new vehicles. Any revision to the clean car standards by the federal government will surely weaken the important protections for public health and the environment that were put in place in 2012 by the EPA and NHTSA after extensive analysis.

The rollback process was a result of the current Administration's reconsideration of the former Administration's midterm evaluation process that concluded on January 12, 2017, with the announcement that EPA would maintain the current GHG emissions standards for model year (MY) 2022-2025 vehicles. That final determination found that, "…automakers are well-positioned to meet the standards at lower costs than previously estimated."[7] Highlights from the final determination were that:

- "Automakers have a wide range of technology pathways available to meet the MY2022-2025 standards, at slightly lower per-vehicle costs than previously predicted. The standards are achievable with very low penetration of strong hybrids, electric vehicles and plug-in hybrid electric vehicles, consistent with the findings of a comprehensive 2015 National Academy of Sciences study."
- "The standards will save consumers money, significantly reduce GHG emissions and fuel consumption, and provide benefits to the health and welfare of Americans."
- "Automakers have outperformed the standards for the first four years of the program (MY2012-2015) and manufacturers are adopting fuel efficient technologies at unprecedented rates, all while vehicle sales have increased for 7 consecutive years."[8]

Contrary to the claims of the most recent determination, the January 12, 2017 determination was made after eight years of research, hundreds of reports and many stakeholder meetings.

A new poll released by the American Lung Association on March 27, 2018, shows that seven in ten voters want the EPA to leave the existing clean car standards in place. The regulations are popular across party lines, with a majority of Democrats and Independents and a plurality of Republicans voting in support of the standards.[9]

[5] CAA, Section 7521. "Emission standards for new motor vehicles or new motor vehicle engines."
[6] https://www.epa.gov/regulations-emissions-vehicles-and-engines/midterm-evaluation-light-duty-vehicle-greenhouse-gas#final
[7] Ibid.
[8] Ibid.
[9] ALA, http://www.lung.org/about-us/media/press-releases/new-poll-voters-support-fuel-efficiency.html

The Impact of the Proposed Rollback

The proposed action to roll back these standards will leave Colorado behind California and the other states that have adopted Advanced Clean Car Standards. Under the Clean Air Act Section 177, states can choose to adopt Advanced Clean Car Standards. There are currently 12 states (Connecticut, Delaware, Maine, Maryland, Massachusetts, New Jersey, New York, Oregon, Pennsylvania, Rhode Island, Vermont and Washington), and Washington D.C., that have adopted the Low-Emission Vehicle program (LEV III), and nine states (Connecticut, Maine, Maryland, Massachusetts, New Jersey, New York, Oregon, Rhode Island and Vermont) that have adopted the Zero Emission Vehicle program (ZEV). LEV III is the program that reduces criteria air pollutants[10] and GHG emissions for light- and medium-duty vehicles while the ZEV program requires manufacturers to produce an increasing number of zero emitting (battery electric and fuel cell electric) vehicles, while also allowing for the production of plug-in hybrid electric vehicles (PHEV) through model year 2025.

If the federal standards are decreased for new vehicles and if Colorado does not adopt Advanced Clean Car Standards, this will mean worsening air quality and an increase in climate impacts for the state. To date, the EPA has not announced precisely how far they plan to roll back the existing standards; for purposes of this report, we assume that the EPA "flat-lines" the standards after 2020, halting any further requirements for emissions reductions or fuel economy gains for the period from 2021-2025. The actual proposal may vary from this, so precise numbers may change, but the qualitative conclusions will still apply. The increases in carbon dioxide equivalent (CO_2e) would be nearly 2.6 million tons per year by 2030 and over 4.5 million tons per year by 2040.[11] To provide a sense of the scale of these impacts, the biggest current action to reduce emissions in Colorado is Xcel Energy's plan to shut down more coal-fired power plants and replace them with wind and solar. Xcel's plan will increase its share of renewable generation from 29% to 55% of its total energy mix by 2026, a shift that would reduce emissions by 4.1 million tons per year.[12] Rolling back the clean car standards would wipe out these gains. And there would be increases in ozone-forming pollutants, such as volatile organic compounds (VOCs) and nitrogen oxides (NO_X), as well as increases in fine particulates ($PM_{2.5}$) and sulfur oxides (SO_X). This rollback will lead to public health impacts as a result of poor air quality, such as increased illness and premature death due to cardiovascular and respiratory disease.

[10] Criteria air pollutants are the six common air pollutants regulated under the federal Clean Air Act; those pollutants are: ground-level ozone, particulate matter, carbon monoxide, lead, sulfur dioxide and nitrogren dioxide. Vehicle emission standards reduce levels of all the criteria pollutants with the exception of lead.
[11] Rykowski at 28.
[12] Xcel Energy, http://jeffcoedc.org/wp-content/uploads/2017/11/11-Colorado-Energy-Plan-Fact-Sheet.pdf

The Impact of Vehicle Pollution on Public Health in Colorado

High ozone levels in the Denver Metro/North-Front Range (DMNFR) ozone nonattainment area have been a problem for too many years, and a refusal to address this issue with modern clean car standards would further exacerbate the problem. In the DMNFR:

- 31% of NO_X and 16% of VOC pollution is due to on-road vehicle pollution.[13]
- Vehicle emissions are one of the two largest contributors to ozone formation (as shown by air quality modeling).

In 2017, 10 Colorado counties (Adams, Arapahoe, Boulder, Clear Creek, Douglas, El Paso, Jefferson, Larimer, Rio Blanco, and Weld) received an "F" grade and two counties (Denver and La Plata) received "D" grades for high ozone days under the American Lung Association's (ALA) State of the Air report. The population in those 12 counties was nearly 4.4 million, meaning that 90% of the state's population was exposed to unhealthy air from high ozone pollution. This includes over 86,000 children suffering from pediatric asthma and 196,000 people suffering from cardiovascular disease in these counties. And the ALA rated Denver the 11th most polluted city in the nation for ozone levels in 2017.[14]

[13]Moderate Area Ozone State Implementation Plan for the Denver Metro and North Front Range Nonattainment Area, at ES-3, https://raqc.egnyte.com/dl/q5zyuX9QC1/FinalModerateOzoneSIP_2016-11-29.pdf .

[14] American Lung Association, State of the Air 2017, http://www.lung.org/assets/documents/healthy-air/state-of-the-air/state-of-the-air-2017.pdf.

The adverse effects of vehicle pollution on everyone who breathes – especially on the old, the young, and those disadvantaged by health or socioeconomic conditions – is well documented. And the weakening of federal clean car standards will result in significant impacts to the health of people in Colorado. Near-roadway air pollution disproportionately impacts low-income communities and communities of color, children, older adults and people with preexisting cardiopulmonary disease, and children whose schools are located near highways. The EPA states that, "People who live, work or attend school near major roads appear to have an increased incidence and severity of health problems associated with air pollution exposures related to roadway traffic."[15]

In addition to near-roadway air pollution, there are also impacts from the fuel production process or so-called "upstream" emissions. This emission category includes the extraction, refining, and transport of fossil fuels for traditional vehicles. The upstream vehicle-related emissions category also contributes to air quality impacts on public health in Colorado.

Research by the Health Effects Institute concluded that there is sufficient evidence pointing to the relationship between exposure to traffic-related air pollution and the exacerbation of asthma. This research also found, "…suggestive evidence of a causal relationship with onset of childhood asthma, nonasthma respiratory symptoms, impaired lung function, total and cardiovascular mortality, and cardiovascular morbidity…."[16]

[15] EPA, https://www.epa.gov/mobile-source-pollution/how-mobile-source-pollution-affects-your-health
[16] Health Effects Institute, Special Report 17, *Traffic-Related Air Pollution: A Critical Review of the Literature on Emissions, Exposure, and Health Effects*, January 2010, Executive Summary at 10.

The Health Impacts of Climate Change on Colorado Residents

There is increasing scientific evidence that carbon dioxide and other greenhouse gases released into the atmosphere are exerting a profound effect on the earth's climate: increasing extreme weather events, changing rainfall and crop productivity patterns, and fueling the migration of infectious diseases.[17] Since 1983, average temperatures in Colorado have risen 2° F and continue to rise.[18] Climate change will impact the health of those who live, work, and play in Colorado.

Many Colorado communities are already experiencing the impacts of a warming climate in the form of reduced snowpack, earlier snowmelt, increased risk of high-intensity wildfires and their associated air pollution, extreme weather events, and an increased number of "high heat" days. The ways in which Coloradans are being impacted by the health effects of climate change include:

- Poor air quality that aggravates cardiovascular, respiratory, and allergy-related illness and leads to:
  - More doctor or hospital visits for asthma caused by more frequent wildfires.[19]
  - Increased length and severity of allergy seasons.[20]
  - Higher temperatures, leading to more high ozone days when air quality is poor.[21]
- Death, physical injury, and exposure, which can result from:
  - Increased frequency and intensity of flooding and precipitation events.[22]
  - More intense wildfires that can destroy more homes.
  - Increased frequency and duration of droughts:[23]
    - Rising temperatures and recent droughts in the region have killed many trees by drying out soils and enabling outbreaks of forest insects.[24]
    - Dry forest conditions have increased the risk of forest fires.[25]
    - In the coming decades, the changing climate is likely to decrease water availability and agricultural yields in Colorado, impacting residents and farmers.[26]
- Dehydration, heat stroke and aggravated cardiovascular and respiratory illness:
  - Children, the elderly, people with weakened immune systems, and Colorado residents living in poverty are more vulnerable to heat-related illness.[27]
  - In the Denver area, the annual frequency of 100 degree days has increased by more than 250% on average since 1967-1999. With continued high greenhouse gas emissions, Denver could experience extreme heat similar to temperatures in Tucson.[28]

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[17] IPCC, 2014 "Climate Change 2014: Synthesis Report," Contribution of Working Group I, II, and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change, http://www.ipcc.ch/pdf/assessment-report/ar5/syr/AR5_SYR_FINAL_SPM.pdf

[18] Western Water Assessment, Cooperative Institute for Research in Environmental Sciences (CIRES), University of Colorado Boulder, Climate Change in Colorado: A Synthesis to Support Water Resource Management and Adaptation, 2014, http://wwa.colorado.edu/climate/co2014report/Climate_Change_CO_Report_2014_FINAL.pdf

[19] https://www3.epa.gov/airnow/wildfire_may2016.pdf

[20] http://www.aafa.org/media/Extreme-Allergies-Global-Warming-Report-2010.pdf

[21] U.S. Global Change Research Program, The Impacts of Climate Change, chapter 3, https://health2016.globalchange.gov/

[22] https://nca2014.globalchange.gov/highlights/report-findings/extreme-weather/graphics/observed-us-trends-heavy-precipitation

[23] https://www.c2es.org/content/drought-and-climate-change/

[24] https://www.ucsusa.org/sites/default/files/attach/2014/09/Rocky-Mountain-Forests-at-Risk-Full-Report.pdf

[25] https://www.ucsusa.org/sites/default/files/attach/2014/09/Rocky-Mountain-Forests-at-Risk-Full-Report.pdf

[26] What Climate Change Means for Colorado, EPA, August 2016.

[27] https://health2016.globalchange.gov/climate-change-and-human-health

[28] http://www.rockymountainclimate.org/images/DenverHeatExtremes.pdf

- Increased transmission and severity of waterborne and vector-borne diseases, including West Nile virus, Hantavirus, and tick-related diseases.[29]

It is useful to illustrate the severity of the impact on Colorado communities by reviewing what is known about the likely increased severity of heat waves in specific communities in Colorado. In 2017, the Colorado Department of Local Affairs and Denver Public Health and Environment funded analyses of the likely future temperature extremes in Larimer County, Boulder County and Denver. [30] The Denver metro area study found that if emissions continue to rise, by mid-century, the Denver area will go from the historical average of 1-2 days a year over 100 degrees to 7 days a year, and that by the end of the century a typical summer would have 34 days a year over 100 degrees, while unusually hot summers could have over 70 days per year of these temperature extremes.[31]

Benefits of Adopting Advanced Clean Car Standards in Colorado

By adopting the full suite of clean car standards, Colorado can reduce rates of premature mortality and lost work days due to criteria air pollutant emissions. An analysis conducted by Richard Rykowski (and commissioned by the Environmental Defense Fund (EDF)) modeled the impact of adopting these standards on criteria air pollutants. This analysis found that there would be significant reductions in criteria pollutants from cars. The table below shows the potential reductions in criteria pollutants compared to the scenario where the federal standards have been rolled back. By 2040, Colorado could see VOC emissions reduced by 1,960 tons, NO_X emissions reduced by 1,590 tons, $PM_{2.5}$ reduced by 153 tons and SO_X emissions reduced by 159 tons per year.[32] These reductions in VOC and NO_X emissions are critical to Colorado's efforts to reduce ozone pollution. Note that California is currently developing a new "Tier 4" emissions standard, and this future standard is used for the emissions forecasting in the scenarios presented below.

Table 1. Criteria Emissions Reductions in Colorado with Benefit of Advanced Clean CarGHG Standards (U.S. tons per year)[33]

	VOC	NO_X	$PM_{2.5}$	SO_X
Total in 2030	687	308	45	89
Total in 2040	1960	1590	153	159

Using the EPA's CO-Benefits Risk Assessment (COBRA) model,[34] which estimates the health impacts of changes to air pollution levels, one can use these emissions estimates to quantify health impacts under varying scenarios. The following table identifies the health benefits of adopting the Advanced Clean Cars Standards compared to the assumed federal rollback scenario. Because the model primarily analyzes health impacts due to changes in ambient fine particulates or $PM_{2.5}$ (which includes the PM precursors, NO_X and SO_X), this estimate does not include impacts from ozone or greenhouse gases, and therefore underestimates the potential impacts. The monetized value of the health benefits due to reduced

[29] https://www.niehs.nih.gov/health/materials/a_human_health_perspective_on_climate_change_full_report_508.pdf

[30] http://www.rockymountainclimate.org/extremes/extremes_1.htm

[31] The Rocky Mountain Climate Organization, "Future Extreme Heat in the Denver Metro Area: A report to Denver Environmental Health," June 2017, http://www.rockymountainclimate.org/images/DenverHeatExtremes.pdf.

[32] Rykowski at 32.

[33] Rykowski at 32.

[34] https://www.epa.gov/statelocalenergy/co-benefits-risk-assessment-cobra-health-impacts-screening-and-mapping-tool

ambient $PM_{2.5}$ in Colorado would be $6 to $13 million per year in 2030 and $16 to $37 million per year by 2040.

Table 2. Changes in Health Due to Changes in Emissions in Colorado from COBRA Using Base 2025 Emission Inventories[35]		
	Relaxation of the 2022-2025 EPA GHG Standards (shown as additional health costs to Colorado	**Advanced Colorado Clean Car Program** (shown as health savings to Colorado)
Value of Health Benefits in 2030	-$3 to -$7 million	$6 to $13 million
Value of Health Benefits in 2040	-$6 to -$15 million	$16 to $37 million

Adopting the Advanced Clean Car Standards will help to meet the goals in the Governor's July 2017 Executive Order to reduce greenhouse gas emissions 26% by 2025 (as compared to 2005 levels). The analysis in the recently updated Colorado Climate Plan relies on the current, more stringent federal clean car standards to meet this goal. Without Advanced Clean Car Standards, Colorado would find it difficult to meet the 26% reduction goal. Based on Colorado's 2014 greenhouse gas inventory, CO_2e emissions in 2025 is projected to be approximately 138.25 million tons,[36] meaning that total emissions could be closer to 141 million tons per year under the clean car standards rollback. Colorado is also part of the Climate Alliance, which is committed to upholding the goals of the 2015 Paris Agreement. Continuing a clean car program that includes the most stringent reductions possible is critical to achieving the goals in the Paris Agreement.

Table 3 shows that with Colorado's adoption of the Advanced Clean Car Standards, the state could see reductions in CO_2e of about 2.4 million tons per year by 2030 and about 4.3 million tons per year by 2040. This estimate includes not only direct vehicle emission reductions, but also emission reductions at refineries (at which one-third of the gasoline used in Colorado is produced).[37]

[35] Rykowski at 34.
[36] Based on projections in CDPHE's "Colorado Greenhouse Gas Inventory - 2014 Update," October 2, 2014, Exhibit 2-2, p. 37. Projections years given are 2020 and 2030, so the projection used for 2025 is the halfway point between these data points. This analysis also cautions that the projections do not take into account reduction measures implemented after 2010, such as oil and gas regulations, so these figures may be higher than actual emissions.
[37] Rykowski at 28.

Table 3. GHG Emission Impacts In Colorado for a Colorado Advanced Clean Car Program (Metric Tons per Year)[38]				
	CO_2	N_2O	Methane	CO_2e
Total in 2030	2,362,616	6	2,392	2,424,219
Total in 2040	4,226,651	10	4,279	4,336,666

The potential impacts of reduced greenhouse gas emissions can be estimated using the social cost of carbon, as established by an interagency working group convened by the U.S. EPA, we can estimate the monetized benefits of the decreased emissions of greenhouse gases.[39] Using the median values of $50 per ton in 2030 and $60 per ton in 2040, the cost savings from reduced carbon emissions would be $121 million per year in 2030 and $260 million per year in 2040, in current dollars.

Table 4. Cost savings from Reduced Carbon Emissions			
	Median Carbon Values	**Total CO_2e Reductions**	**Cost Savings from Advanced Clean Car Standards**
2030	$50 per ton	2,424,219	$121 million per year
2040	$60 per ton	4,336,666	$260 million per year

The Rykowski analysis found that if Colorado adopts the Advanced Clean Car Standards, the additional average vehicle cost in 2025 would be $382 to $647 with both Colorado and Federal ZEV tax credits, but Coloradans will save $3,584 to $3,892 over the life of the vehicle on gasoline.[40] Thus, the benefits that would be achieved by adoption of the Advanced Clean Car Standards do not come at a cost; rather, this is a case where we can "have our cake and eat it too," where we can achieve significant consumer savings while improving health outcomes.

It is important to note that clean car standards have demonstrated for years that it is both feasible and cost-effective for manufacturers to produce high-performing vehicles; more and more efficient and advanced models that meet emissions standards and consumer needs are being brought to market. The 2016 midterm review for the 2022-2025 standards by EPA, NHTSA and California Air Resources Board concluded that, "A wider range of technologies exist for manufacturers to use to meet the MY2022-2025 standards, and at costs that are similar or lower, than those projected in the 2012 rule."[41]

[38] Rykowski at 29.
[39] https://19january2017snapshot.epa.gov/climatechange/social-cost-carbon_.html
[40] Rykowski at 4.
[41] Draft Technical Assistance Report: Midterm Evaluation of Light-Duty Vehicle Greenhouse Gas Emission Standards and Corporate Average Fuel Economy Standards for Model Years 2022-2025 (July 27, 2016).

Conclusion: Colorado Can Lead the Way to Protect Residents

In the absence of strong and consistent federal leadership on clean cars, Colorado should join a growing number of states in adopting Advanced Clean Car Standards as soon as possible, in order to avoid negative outcomes to the health of Coloradans and adverse climate impacts. The people of Colorado value the wonderful opportunities to enjoy the outdoors in our beautiful state. Adoption of the Advanced Clean Car Standards by Colorado is important in order to continue the protection of our public health and the continuation of our high quality of life.