Johan Yost

Professor Mia Banuelos

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(Graphics)

Earth is “warming faster than at any point in recorded history. Warmer temperatures over time are changing weather patterns and disrupting the usual balance of nature. This poses many risks to human beings and all other forms of life on Earth,” starkly warns the United Nations (Causes). We Coloradoans are not doing our part to help the Earth today or for future generations. Earth does not have a plan B, so we must act now. Astonishingly, Colorado’s greenhouse gas emissions are still rising, whereas 38 states decreased theirs between 2005 and 2021 (Friedrich). As these gases rise in the air, they collect to form a blanket over the Earth, trapping the sun’s heat and contributing to global warming and climate change. Fossil fuels, including coal, oil, gasoline, and diesel, are responsible for more than 75 percent of greenhouse gas emissions worldwide, and the transportation sector accounts for 24.2 percent of the total

(Friedrich). A significant contributor is older vehicles because as vehicles age, emissions increase exponentially: 10-year-old vehicles emit 200 percent compared to new, and 20-year-old vehicles emit more than 1000% more than new (Bernard 8-10). The average vehicle age in Colorado is 13.1 years and growing (Autos). Coupled with this, Colorado law exempts about 90% of its geographical area plus certain vehicle types from emission regulations and grants waivers to vehicles that cannot meet regulations (Weld; Colorado). Colorado's vehicle emission regulations should require all vehicles registered in Colorado powered by fossil fuels to pass emission regulations without waiver or exemption because this would allow all vehicle owners to contribute equitably to reduce Colorado's greenhouse gas emissions.

The first step toward an equitable solution to reduce Colorado's greenhouse gas emissions is that all vehicle owners should be subjected to the same emissions regulations to create balanced responsibility. This starts by eliminating exemptions based on geography and car type. The current geographic target is on the I-25 corridor from Fort Collins down to Colorado Springs only (Weld). While this fixates on a high population of vehicles, it is inequitable across the state. To further balance responsibility, the exemption must be removed for kit cars, motorcycles, autocycles, horseless carriages, farm vehicles, and vehicles registered as street rods and collector cars. Most of these exempt vehicles are older than average and thus high emitters of greenhouse gases (Nat'l 35, 43, 183, Average). Next, the current emission testing timeline and testing methods must be extended to all vehicles. Therefore, we should maintain the requirement to test emissions every other year for vehicles seven years old and older or annually if the vehicle has a model year of 1981 or older. The current cost of testing is fair but must apply to every vehicle: $25 per test or free if the vehicle passes RapidScreen roadside testing by recording "two clean readings within the last 14 months and at least 60 days prior to the vehicle's registration

renewal month" (Rapid). Lastly, waivers for vehicles unable to pass emissions testing must be eliminated. Any vehicle that does not pass must be repaired and/or retrofitted so that it will pass. In the case of financial hardship, where current regulations would issue an unfair waiver, Drive Clean Colorado, a non-profit organization specializing in government grants and incentive programs, can aid in locating funding assistance (Drive). These regulation changes combine to enhance Colorado's current vehicle emissions testing program to equitably distribute the financial responsibility of reducing Colorado's greenhouse gas emissions across all vehicle owners statewide.

The second step that must be undertaken for Colorado to implement a fairer means of reducing the state's greenhouse gas emissions is to require all vehicles that have failed emission testing to be retrofitted with modern technology to make them pass. Colorado law currently allows vehicle owners to obtain a waiver exempting them from emission testing if one of these two requirements are met: 1) for 1968 and newer vehicles, a failed emission test, followed by $715 in emissions-related repair costs, then a second failed emission test, or 2) for 1967 and older vehicles, a failed emission test, followed by $75 in emissions-related repair costs, then a second failed emission test (Emissions). Waivers should not be granted as effective retrofitting solutions are available to make these vehicles pass emissions testing. Electronic fuel injection has been implemented on all vehicle sales in the U.S. since the 1994 Isuzu pickup was the last vehicle sold with a carburetor (Fink). A carburetor is a mechanical device that delivers a mixture of fuel and oxygen to an internal combustion engine and operates using vacuum power and throttle cable control. (What). Adjusting a carburetor to pass Colorado's vehicle emission criteria is problematic. From personal experience, I can adjust the carburetor on my 1974 Corvette to pass emissions either at idle or when my car is moving. Since I can't adjust for both conditions,

my car will not pass Colorado's emission test. As opposed to obtaining an emission testing waiver, the appropriate solution is to change from a carburetor to electronic fuel injection (EFI). These systems utilize a computer to deliver the proper amount of fuel to the engine through injectors, and the amount of fuel is based on its operating condition (What). As the computer can continually adjust the fuel amount, the engine will consume an optimal amount of fuel and thus produce minimal emissions at all operating conditions. EFI reduces emissions by 30% (Petrea and Bujoreanu 8-9). In conjunction, catalytic converters should also be implemented during the retrofit. They have been required on all vehicles sold in the U.S. since 1975, so they are readily available (Used 74760). Today's technology, called three-way catalytic converters, utilizes platinum, palladium, and rhodium to create chemical reactions that reduce exhaust gas pollutants by 98% (Brownell). These two retrofitting options offer a very effective and fair solution to make all vehicles comply with emission regulations, allowing all vehicle owners a fair means to participate in reducing Colorado's greenhouse gas emissions.

As the Air Quality Control Commission seeks public input, as is their exemplary practice, to instigate these regulation changes across Colorado, there will be concerns to address (Air). The foreseen public pushback is: 1) the geographical area requiring emission testing already covers most of the vehicles in Colorado; 2) the cost to retrofit older vehicles will be too high; 3) requiring street rods and collector cars to comply with emissions regulations isn't fair because it will reduce their performance and value. These concerns have data-driven rebuttals and should be undertaken in the following manner, along with presenting the benefits of expanded emissions regulations.

Firstly, while the geographical area does account for the population-dense areas along Colorado's front range, vehicle emissions in urban areas represent a small fraction of overall

pollutants (Nat'l 44). Vehicle age is the reason for this small fraction, as it is lower in urban areas and significantly higher in rural areas, where 56% of rural vehicles are 13 or more years old (What's). Older vehicles are the highest polluters; it is at ten years of age that vehicle emissions double compared to when new and continue rising exponentially (Bernard 9). This evidence shows that the geographical exemption in Colorado must be abolished so the vehicle emissions regulations target the high-polluting vehicles contributing to Colorado's greenhouse gas emissions.

Secondly, the cost to retrofit a vehicle to pass emissions testing aligns with, and is even cheaper in some cases, than the current regulations requiring repair attempts. Today, the regulations state that a $715 investment in failed emissions-related repair costs must be made for 1968 and newer vehicles to receive a testing waiver. Instead, the regulation should state that a universal catalytic converter is to be installed as a first attempt to retrofit a failing vehicle, which might be all that is needed to pass emissions. Catalytic converters are available at all major auto supply stores, costing an average of just $140.91 at AutoZone (Catalytic). The installation time is about two hours, and at the national average labor rate of $179 per hour, the total cost to install a catalytic converter is $498.91 (Brown). If the vehicle still does not pass testing, an EFI system should be added. The U.S.'s most popular universal EFI system is the Holley Sniper 2, costing $1836.95; $1299.95 in parts plus $537 for three hours of labor (Holley). While these costs exceed the $715 required repair costs to earn a testing waiver, it is essential to note that a waiver is only good for one emission cycle, which is one or two years, depending upon the vehicle's year. Therefore, if a vehicle fails emission testing for three emission cycles, the minimum repair cost would be $2145, which is higher than the cost to retrofit the vehicle with EFI. The rebuttal

to the concern of too steep retrofitting costs is a simple comparison showing that it's cheaper to retrofit once than pay repair costs over multiple years.

Thirdly, requiring street rods and collector cars to comply with emissions regulations will improve performance and reliability and will not affect their value. The most common street rod and collector car engine in the U.S. is the small block Chevrolet with sizing from 4.3 to 6.6 liters (Chevrolet). MotorTrend magazine compared the Holley EFI to an aftermarket Holley carburetor, far more tunable than a factory carburetor, on the same 6.0 liter Chevrolet engine. Results showed a performance improvement with the EFI system in that it delivered more instantaneous torque as the throttle was engaged and 11 more horsepower at 6500 rpm (Holdener). Reliability was also improved because EFI cold and hot starting are enhanced by EFI's ability to be tuned over the entire operating range; conversely, carburetors are optimized at either idle or driving speeds, not both (Houlahan). Vehicle value is not diminished with the change from carburetor to EFI because this change is completely reversible. The carburetor and EFI use the same mounting holes, so the EFI can be removed and the carburetor reinstalled if the future vehicle owner wishes to have the vehicle reverted to stock. This data and evidence vanquish concerns that retrofitting will adversely affect the performance, reliability, and value of street rods and collector cars. It should be emphatically emphasized to these vehicle owners that the only reduction they will experience from retrofitting is lower greenhouse gas emissions.

Finally, using the presented evidence, the Air Quality Control Commission can dispel the aforementioned concerns anticipated by the public about subjecting all vehicles in Colorado to the same emissions regulations. Further, the commission should emphasize the benefit Coloradoans will experience from equitable participation to reduce the state's greenhouse gas emissions. The benefit is saving the Earth, as Earth does not have a plan B if climate change is

not addressed (Graphics). Plus, Coloradoans will join the current 38 states that are reducing their greenhouse gas emissions and will see fewer allergies and respiratory and cardiovascular diseases (Kumar 6315). A study in Basel, Switzerland, showed that particulate matter from the greenhouse gases in vehicle exhaust adheres to tree pollen in urban parks and rural forests near high-flow traffic (Wyler). This adherence caused a molecular change to allergenic proteins, further aggravating allergy sufferers. However, further study revealed that if exhaust emissions are reduced, the molecular structure of the tree pollen would return to normal levels and thus spur a reduction in allergies (Sedghy 221). Additionally, Coloradoans will appreciate the reduction in the approximate 53,000 premature deaths the U.S. attributed annually to vehicle pollutants (Caiazzo). These benefits combine to make a compelling point to the public. If all vehicle owners are subjected to identical vehicle emissions regulations, there will be an appreciable amount of benefits for everyone to share.

Reducing Colorado's greenhouse gas emissions must be a priority—the consequences of not addressing this range from personal health issues to global climate change. Colorado simply must do better, and a gigantic step forward is to require all vehicles powered by fossil fuels to pass emission regulations without waiver or exemption. As there are affordable, effective, and readily available retrofitting solutions for vehicles that fail emissions testing, the waiver option needs to be abolished. In the event of a financial hardship situation, Clean Air Colorado can provide a match to government assistance and incentive programs. It is equally justifiable to abolish exemptions for vehicle emissions testing based on vehicle type and geographical location. After all, 50-60% of vehicle emissions are produced by about 10% of the highest-polluting vehicles (National 33). These high polluters exist throughout all vehicle types and geographical locations. The only way to identify them is to require emissions testing for all.

Then, all Coloradoans will realize the benefits of equitable regulations. Everyone can appreciate the decrease in allergies, diseases, and premature deaths associated with decreased vehicle pollutants. And, as the United Nations stated, the endmost ramification of increased greenhouse gas emissions is the risk to all life forms on Earth (Causes). We Coloradoans need to do our part. Our mountains, trees, prairies, farmland, and people are too beautiful, majestic, and glorious to risk.

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