# Advanced Clean Cars Across Colorado:

## Investing in Public Infrastructure Means Cost Savings, Cleaner Air, and Better Health for All Coloradans

Colorado Fiscal Institute

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July 2023

# EXECUTIVE SUMMARY

In Colorado, transportation is responsible for most of the state's greenhouse gas emissions, and passenger vehicles account for over half of that portion. Other states have taken steps to address the contribution of vehicle emissions to total emissions, particularly through the promotion of electric vehicles (EVs). The Advanced Clean Cars II rule (ACCII) is a set of regulations adopted by California's Air Resources Board to regulate EV sales and further control vehicle emissions. This rule requires that by 2035, 100% of all new vehicle sales in the state be electric. ACCII can significantly boost EVs in both California and the US vehicle market, resulting in substantial economic, health, and emissions reduction benefits. Colorado could consider adopting a similar policy to reduce our greenhouse gas emissions.

In this report, we estimate the benefits of adopting an ACCII program in Colorado at the state and county level. On average, we estimate that under the ACCII program, we will have 104 million metric tons of reduction in cumulative CO2e emissions (CO2 and CH4) compared to the baseline scenario between 2035 and 2050 in Colorado. Counties are projected to experience up to $2 billion in cumulative savings if the ACCII is adopted. Adopting ACCII is projected to save Colorado about $4 billion by 2050 in health damages from exposure to NOx and PM2.5. Counties are projected to save up to $500 million in health costs.

While upfront costs of purchasing EVs are currently higher than standard Internal Combustion Engine (ICE) vehicles, consumers can save money by switching to EVs over the lifetime of their vehicles due to reductions in maintenance and fuel costs. However, for EVs to be truly appealing to all Coloradans, our public charging infrastructure, which is currently concentrated in high income, urban areas, needs to be expanded to cover rural areas and support families who do not have access to home charging.

The Inflation Reduction Act offers up to $7,500 in tax incentives to the buyers of electric vehicles, and Colorado's HB23-1272[1] provides additional state level tax credits which make EVs more affordable to Colorado families. The ACCII program, if adopted, can build on this policy momentum to expedite the transition to EVs across the state as well as the construction of required infrastructure to make this transition a reality.

1 https://leg.colorado.gov/bills/hb23-1272

# INTRODUCTION

According to the Colorado Greenhouse Gas Reduction Roadmap[2], transportation is the largest source of the state's total greenhouse gas emissions and passenger vehicles account for more than half of emissions in the sector. California's Advanced Clean Cars II (ACCII) is a set of proposed regulations that would help mitigate this major emissions source by establishing new vehicle emission standards and zero-emission vehicle (ZEV) requirements in California. The regulations are being developed by the California Air Resources Board (CARB), which is responsible for implementing air quality standards and reducing greenhouse gas emissions in the state.

ACCII would build on the existing Advanced Clean Cars (ACC) regulations, which the state adopted in 2012, and aimed to reduce smog-forming emissions and greenhouse gas emissions from new cars and light-duty trucks sold in California. California's Advanced Clean Cars II regulation requires the sale of 100% new light-duty vehicles to be zero-emission by 2035[3].

To date, 17 states[4] have adopted all or part of California's low-emission and zero-emission vehicle regulations, as allowed under Section 177 of the Clean Air Act. This additional support for the clean vehicle market means that nationally, more than 35% of new light-duty vehicle sales meet California automotive emissions standards.

Under ACCII, drivers will still be able to purchase new gas cars before the 2035 deadline, and drivers can continue to drive 2034 and earlier model year gas cars in perpetuity. The regulation only applies to new, on-road car sales and does not affect used car sales or off-road vehicles or equipment.

The American Lung Association has projected that between 2020 and 2050, switching to a zero emissions transportation sector could lead to significant national health benefits, including avoiding 110,000 premature deaths and preventing 2.78 million asthma attacks.[5]

Moreover, EV owners can save on lifetime ownership costs of between $6,000 and $10,000.[6] The Inflation Reduction Act offers up to $7,500 in tax credits through 2032 for the purchase of new EVs. Under House Bill 23-1272, Colorado increases the state tax credits from $2,500 to $5,000 for passenger vehicles under $80,000 MSRP starting on July 1, 2023, and decreases over time to $500 in 2028. The bill also creates an additional $2,500 credit for passenger vehicles under $35,000 MSRP.

In this paper, we focus on county-level benefits of adopting ACCII in Colorado. Using the history of EV adoption in each county, as well as data on population growth, income, jobs, and charging infrastructure, we model the future adoption of EVs in each county under the baseline scenario and under ACCII adoption scenario (assuming decarbonization of the power sector). Using these projections, we estimate the change in greenhouse gas emissions, air pollutants, health damages, and consumer savings.

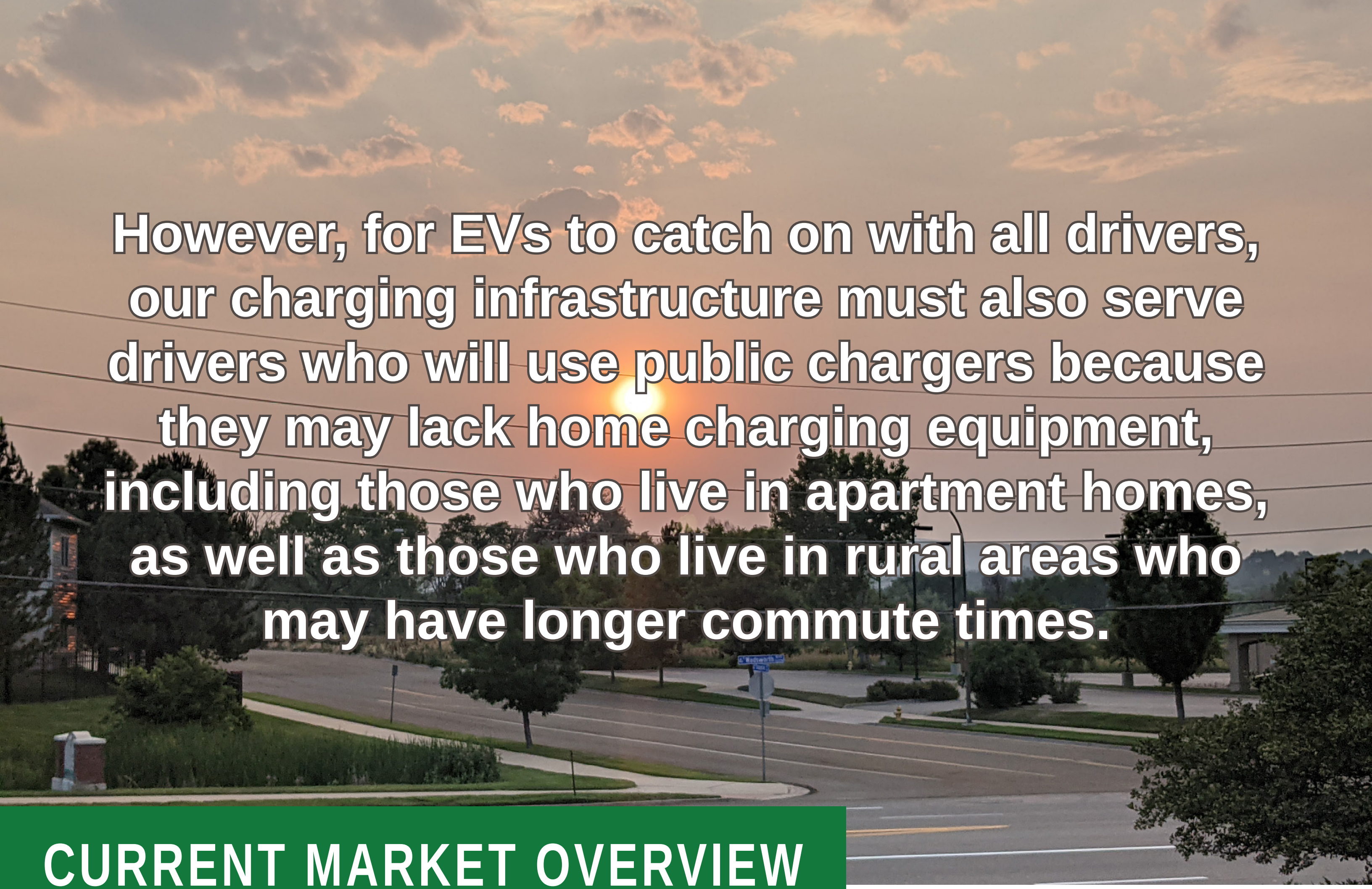
2 https://drive.google.com/file/d/1jzLvFcrDryhhs9ZkT_UXkQM_0LiYZfq/view

3 https://ww2.arb.ca.gov/our-work/programs/advanced-clean-cars-program/advanced-clean-cars-ii

4 https://ww2.arb.ca.gov/resources/documents/states-have-adopted-californias-vehicle-standards-under-section-177-federal

5 https://www.lung.org/getmedia/13248145-06f0-4e35-b79b-6dfacfd29a71/zeroing-in-on-healthy-air-report-2022

6 https://advocacy.consumerreports.org/wp-content/uploads/2020/10/EV-Ownership-Cost-Final-Report-1.pdf



However, for EVs to catch on with all drivers, our charging infrastructure must also serve drivers who will use public chargers because they may lack home charging equipment, including those who live in apartment homes, as well as those who live in rural areas who may have longer commute times.

# CURRENT MARKET OVERVIEW

## Where Are We Now?

Figure 1 shows the number of EVs registered in Colorado between 2016 and 2022. The line graph shows the share of EVs as a percentage of the total cars registered each year. In 2022, EVs (including both BEV and PHEV) comprised about 1.25% of the total vehicles in Colorado, and have made up an increasing share every year since 2016.

One of the most significant obstacles to the adoption of EVs is the lack of suitable charging infrastructure. In 2021, 71% of all occupied housing units in Colorado were single unit, detached, or attached structures[7], so these potential buyers can use private charging at home. **However, for EVs to catch on with all drivers, our charging infrastructure must also serve drivers who will use public chargers because they may lack home charging equipment, including those who live in apartment homes, as well as those who live in rural areas who may have longer commute times.**

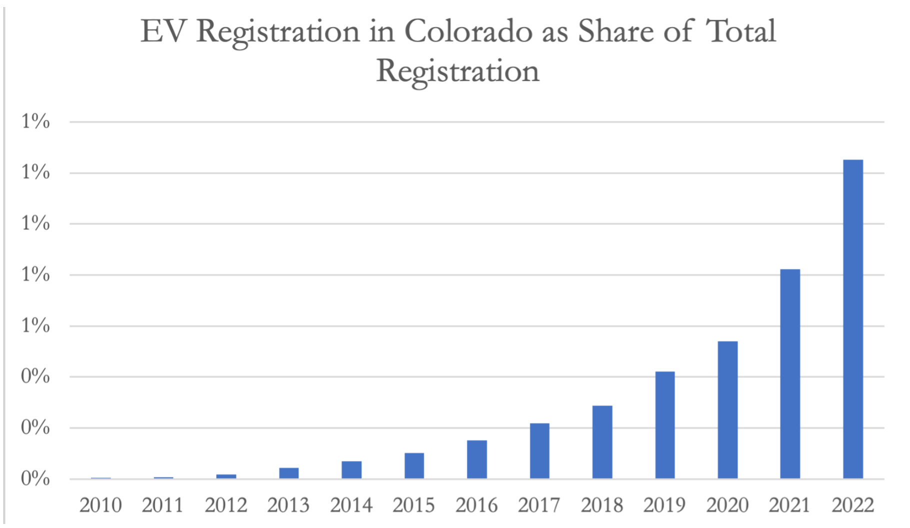



Figure 1: registered EVs in Colorado and EV share of total registration[8]

7 https://data.census.gov/table?q=occupied+housing+type&g=040XX00US08&tid=ACSST5Y2021.S2504&moe=false

8 https://www.atlasevhub.com/materials/state-ev-registration-data/

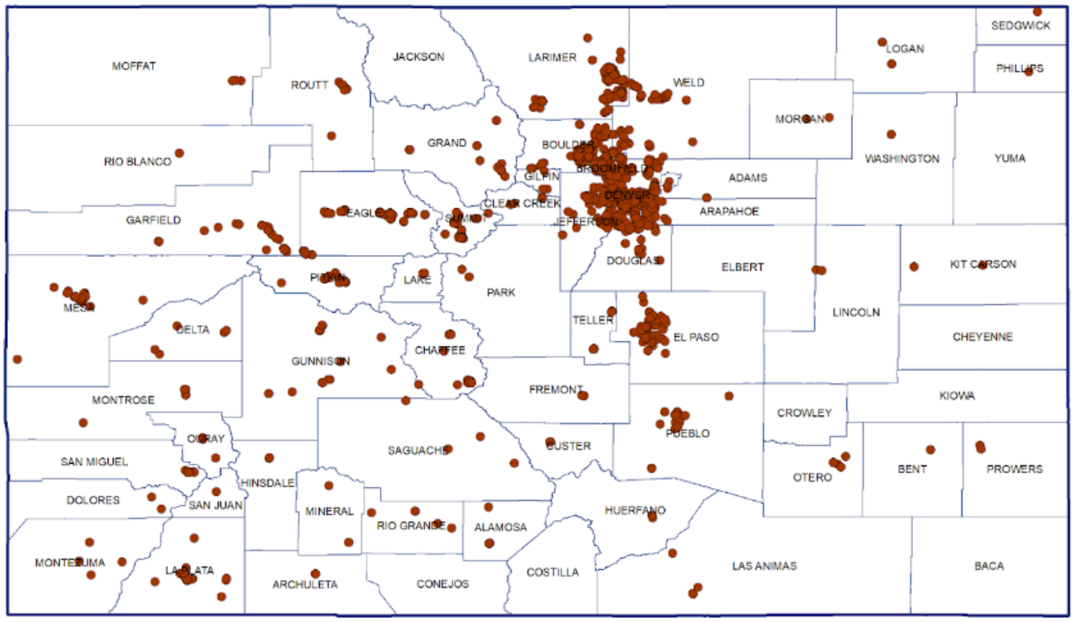
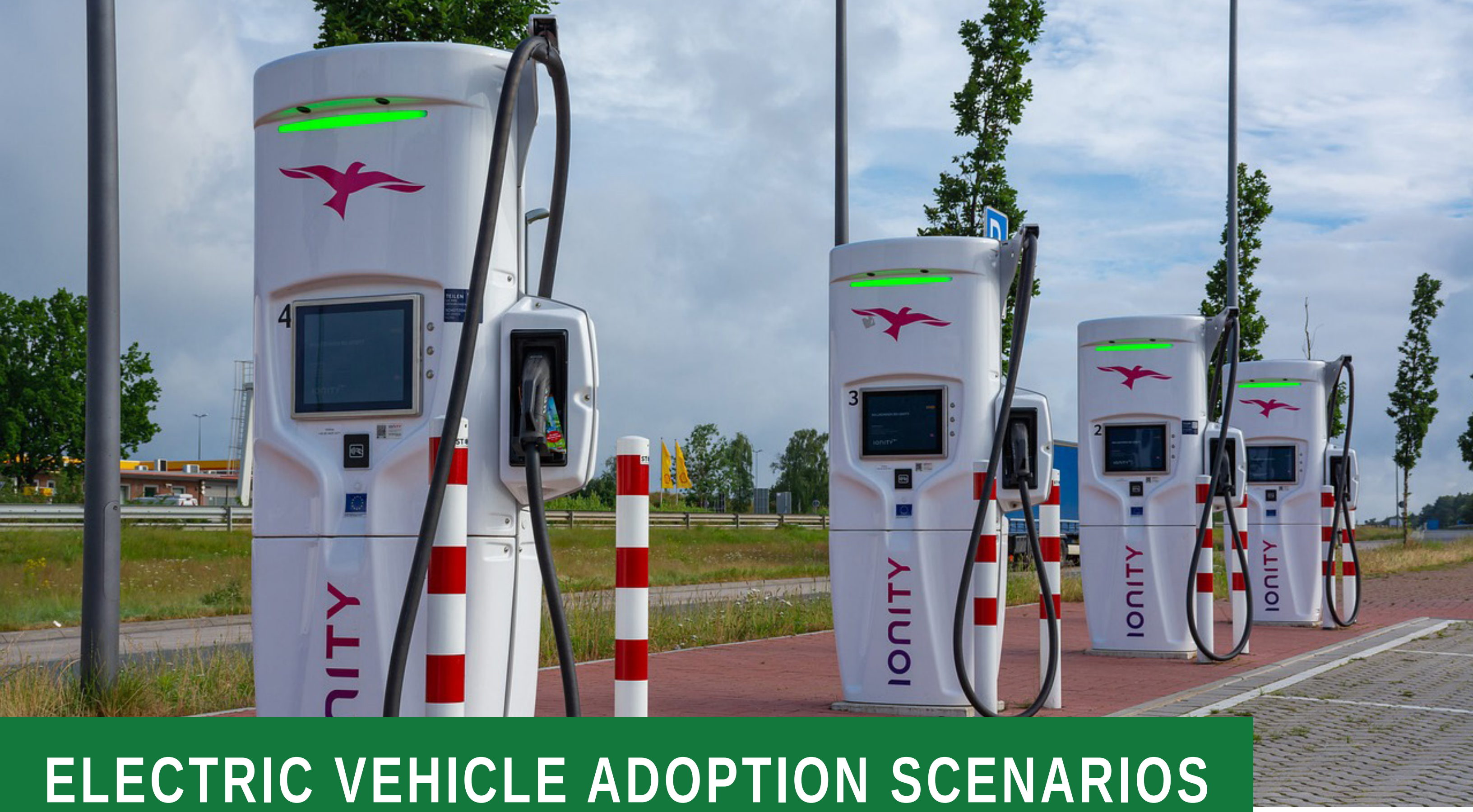



Figure 2: Public EV charging stations in Colorado, May 3, 2023 | Source: AFDC

As Figure 2 shows, public electric chargers are mostly concentrated in urban areas, and looking at the income breakdown of these areas, we also notice that they are mainly located in high income counties (Table 1). Future public chargers should be installed in areas that serve all income levels to make ownership of EVs as practical as ownership of ICE vehicles.

**Table 1:** Chargers per 100,000 households (May 2023)

| MHI | Average number of public chargers per 100,000 households |
|---|---|
| Under $45,000 | 81 |
| $45000-$80,000 | 328 |
| $80,000-$100,000 | 519 |
| Over $100,000 | 825 |




# ELECTRIC VEHICLE ADOPTION SCENARIOS

## Rural Counties See Huge Increase in EVs

Using past EV adoption trends in each county, as well as other data including income, population change, change in jobs, and charging infrastructure, we estimate the adoption rate of EVs in each county between 2021 and 2050 under the baseline scenario and the ACCII scenario.

The baseline scenario assumes the adoption of EVs will take place under natural market forces, without taking into account other rules that might accelerate EV adoption. The ACCII scenario assumes 100% zero emission new vehicles starting 2035. Even though the ACCII scenario suggests 35% new EV sales by 2026, we assume the two scenarios are identical before 2035, due to enforcement challenges. This assumption gives us more conservative estimates for benefits of the program in Colorado, so we can assume the true benefits are higher than our projections if the program requirements are successfully enforced before 2035. Detailed explanation of methodology can be found in Appendix 3. Figure 3 shows the total number of EVs on the road across Colorado under the two scenarios, and shows that ACCII will boost total EVs on the road by about 2 million.

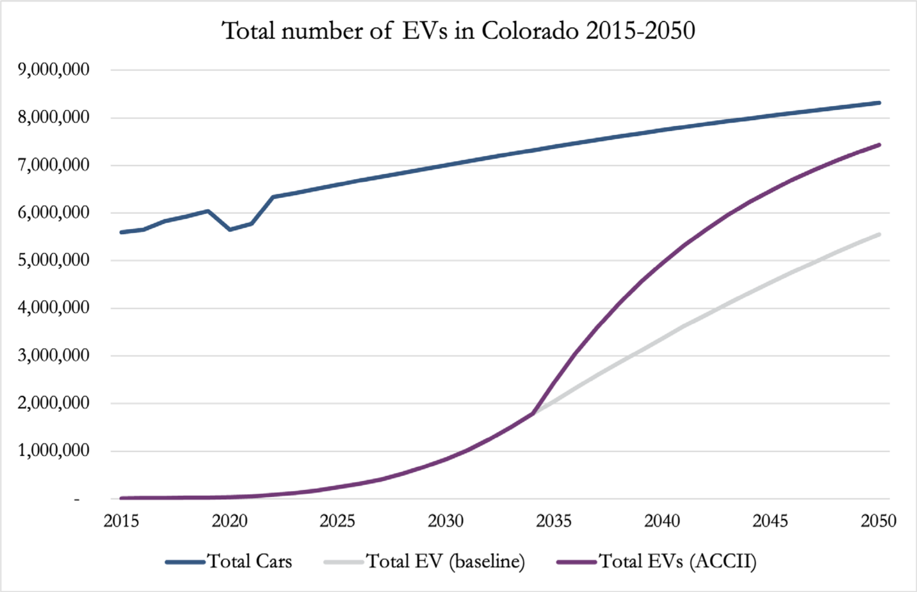
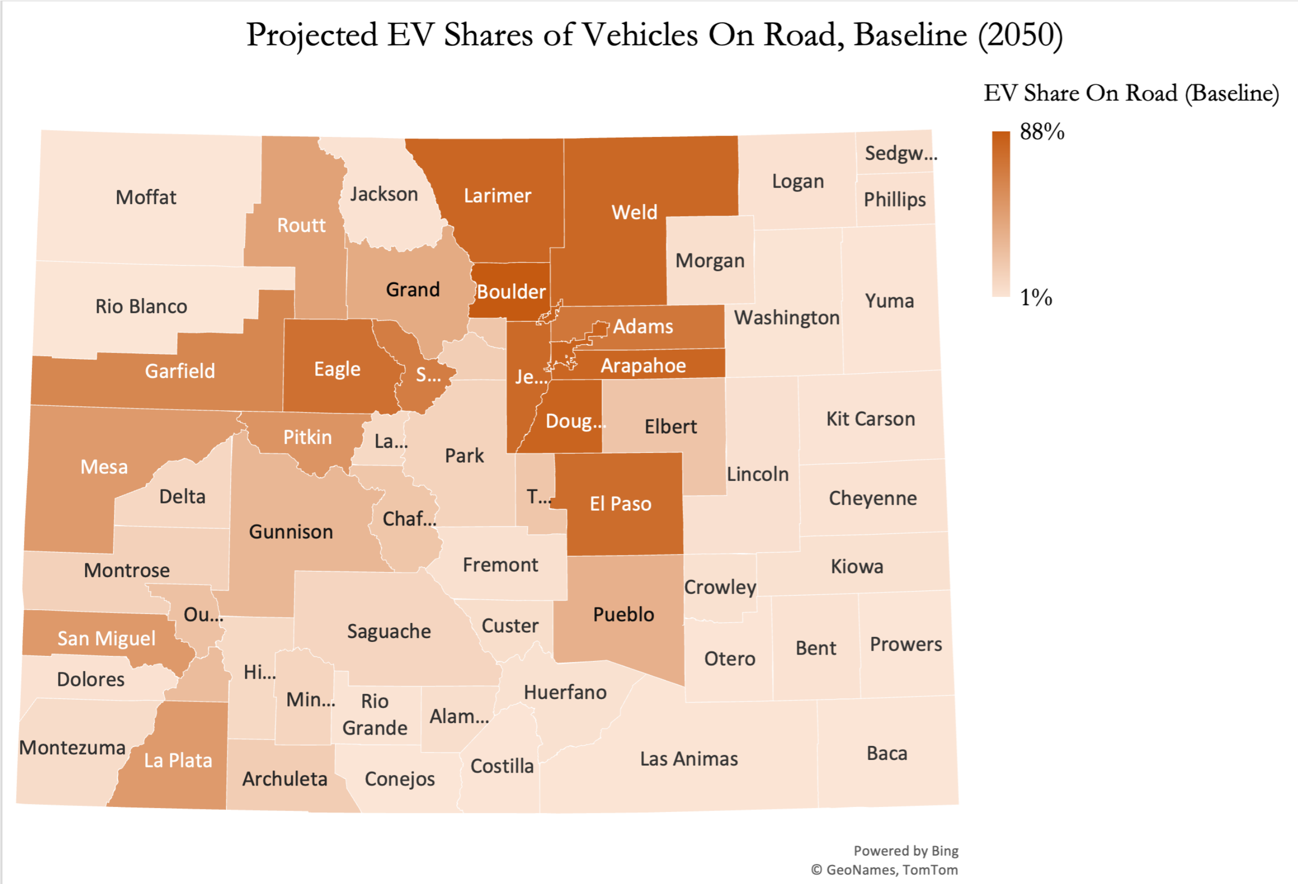



Figure 3: EV adoption trends under baseline and ACCII scenarios

Based on county-level data on historic EV sales as well as charging infrastructure and demographic information of each county, we project the share of EVs on the road by 2050 under the two scenarios at the county-level.

Figure 4 shows that under the baseline scenario, several counties are projected to lag behind in EV adoption, with less than 5% of their vehicles being electric. In this case, the highest level of adoption is estimated to occur in the Denver metro area. **However, in the ACCII scenario, all counties are projected to have more than 80% share of their vehicles on the road being electric.**



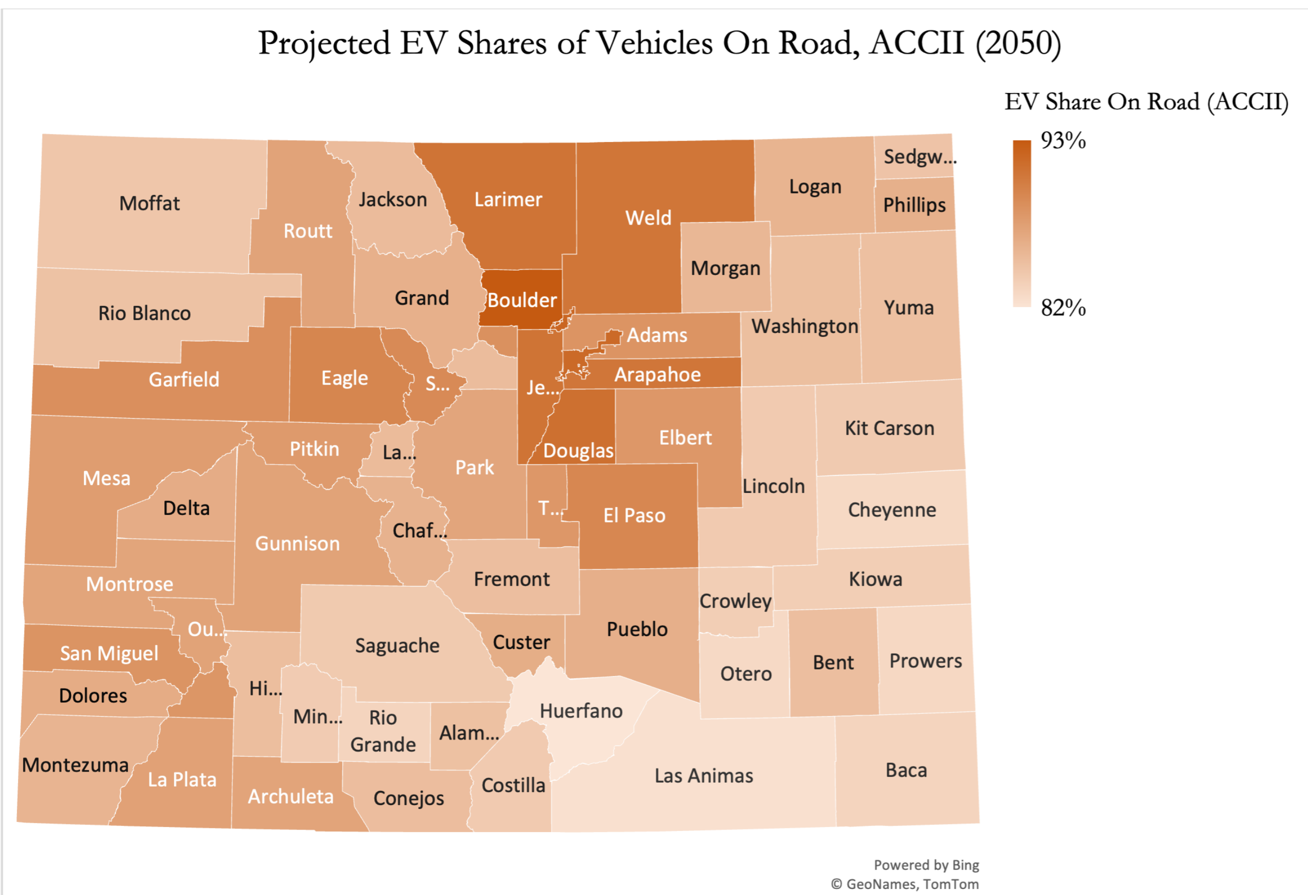
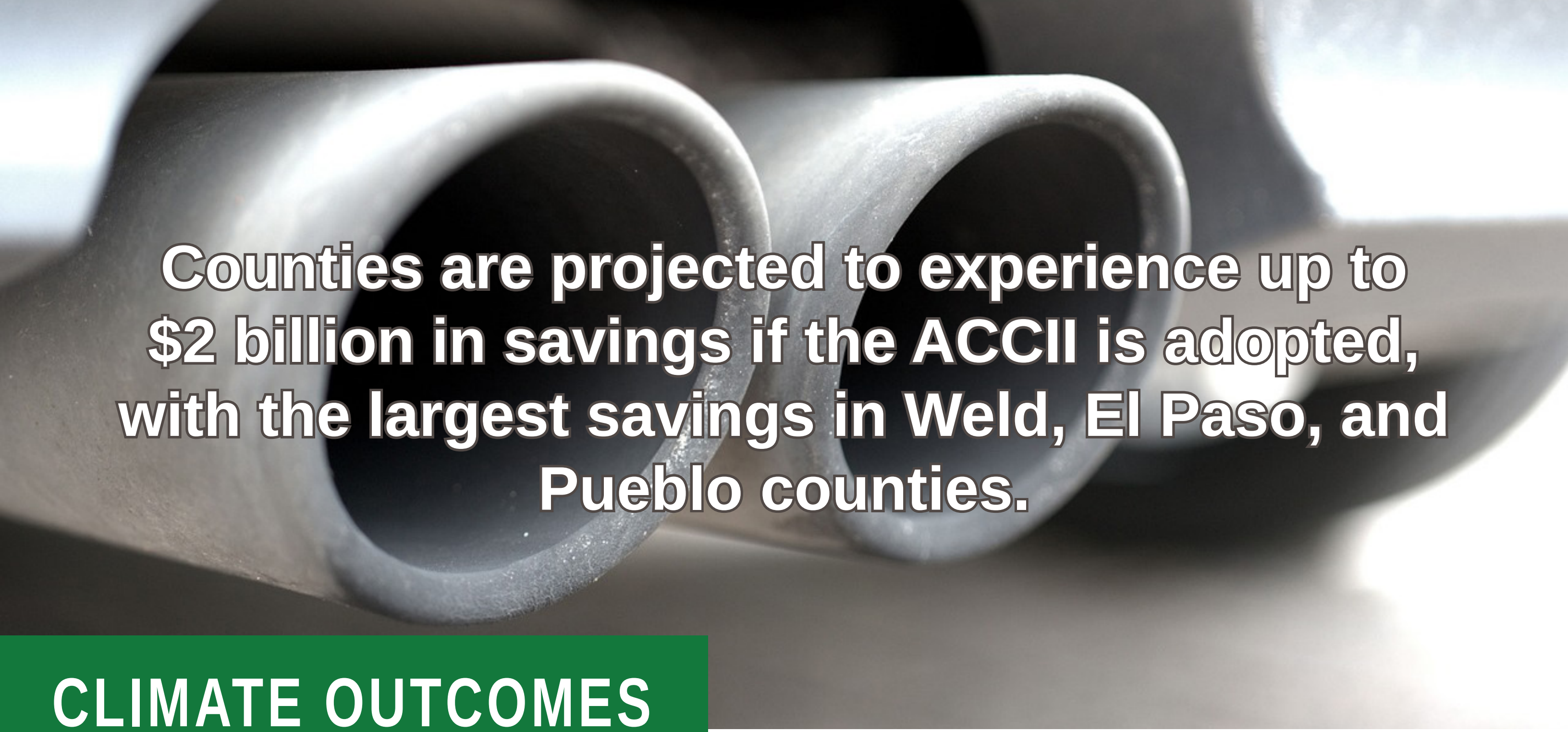




Figure 4: EV share of vehicles on the road under baseline and ACCII scenarios




# CLIMATE OUTCOMES

## Health and Financial Benefits

According to the EPA, a typical passenger vehicle emits about 4.6 metric tons of carbon dioxide per year. Every gallon of gasoline burned creates about 8,887 grams of CO2.[9] The EPA also estimates that ICE vehicles burning gasoline emit 0.375 grams of Methane (CH4) per gallon of gasoline.[10]

We calculate the CO2 and CH4 emission reductions from the adoption of ACCII by county based on the reduction in gallons of gasoline burned as a result of this rule. Figure 5 shows annual CO2e emissions under the two scenarios. On average, we estimate that under the ACCII program, between 2035 and 2050 in Colorado we will have 104 million metric tons of reduction in cumulative CO2e emissions (CO2 and CH4) compared to the baseline scenario.

Figure 6 shows the cumulative reduction in greenhouse gas emissions as a result of adopting ACCII in 2035. Weld, Adams, and El Paso counties are projected to experience the largest emissions reductions with more than 10 million metric tons of CO2e emissions reduced over the time period of the rule.

We use the social cost of carbon to quantify climate damages avoided by implementing ACCII. The social cost of carbon is the total damage that an additional ton of CO2 has on outcomes, converted into dollars. The most recent estimates of social cost of carbon[11] estimates it to be $185 per ton at a 2% discount rate and $80 at a 3% discount rate. This cost includes economic outcomes, such as changes in agricultural productivity and decline in human health and labor productivity.

Each ton of methane is equivalent to 25 tons of CO2 emissions, so we calculate the economic costs using CO2 equivalent under both estimates. As shown in Figure 7, we find that the economic costs between 2021 and 2050 for Colorado are between $8.4 billion and $19.4 billion, depending on which interest rate we use.

Counties can benefit from reductions in greenhouse gases resulting from reductions in transportation sector emissions. Figure 8 shows the estimated cumulative savings in each county. **Counties are projected to experience up to $2 billion in savings if the ACCII is adopted, with the largest savings in Weld, El Paso, and Pueblo counties.**

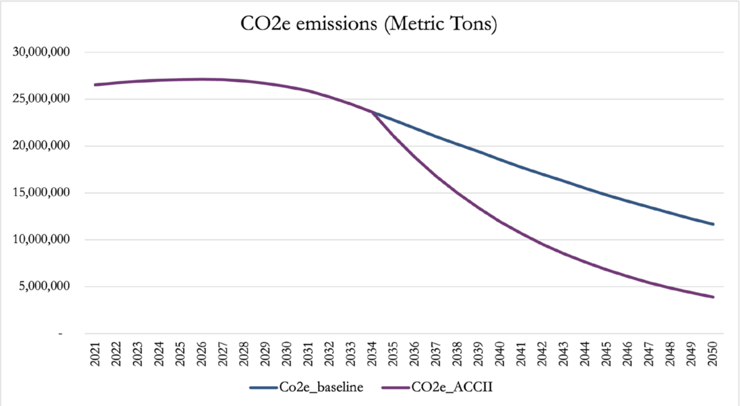



Figure 5: Annual greenhouse gas emissions (CO2 and CH4) under baseline and ACCII scenarios

9 https://www.epa.gov/greenvehicles/greenhouse-gas-emissions-typical-passenger-vehicle#:~:text=Every%20gallon%20of%20gasoline%20burned%20creates%20about%208%2C887%20grams%20of%20CO2.

10 https://www.epa.gov/sites/default/files/2015-07/documents/emission-factors_2014.pdf

11 https://www.nature.com/articles/s41586-022-05224-9

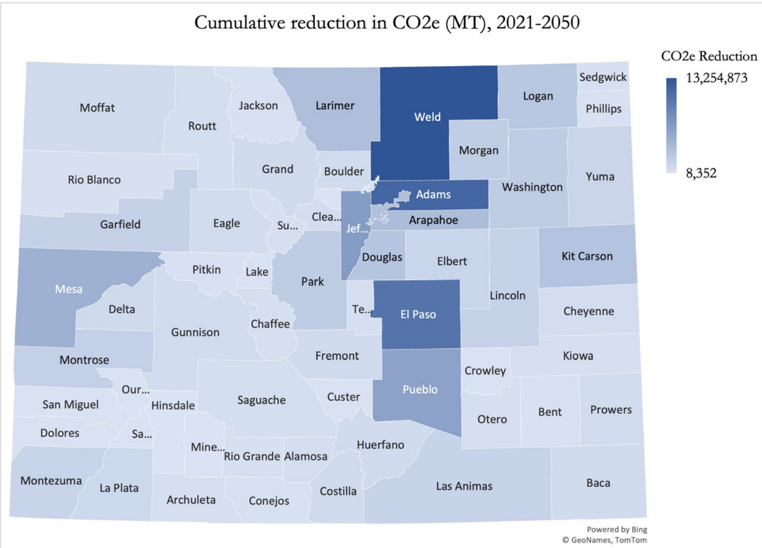



Figure 6: County-level cumulative reduction in greenhouse gas emissions, 2021-2050 (ACCII vs. Baseline)

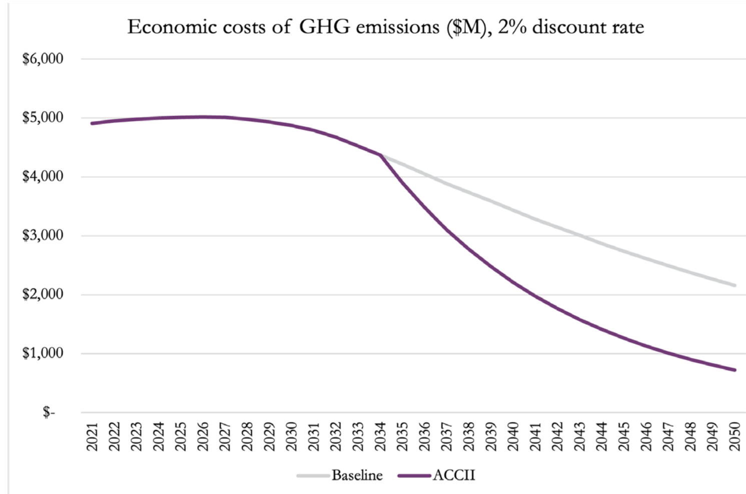



Figure 7: Economic costs of CO2 and CH4 emissions using Social Cost of Carbon at 2% discount rate

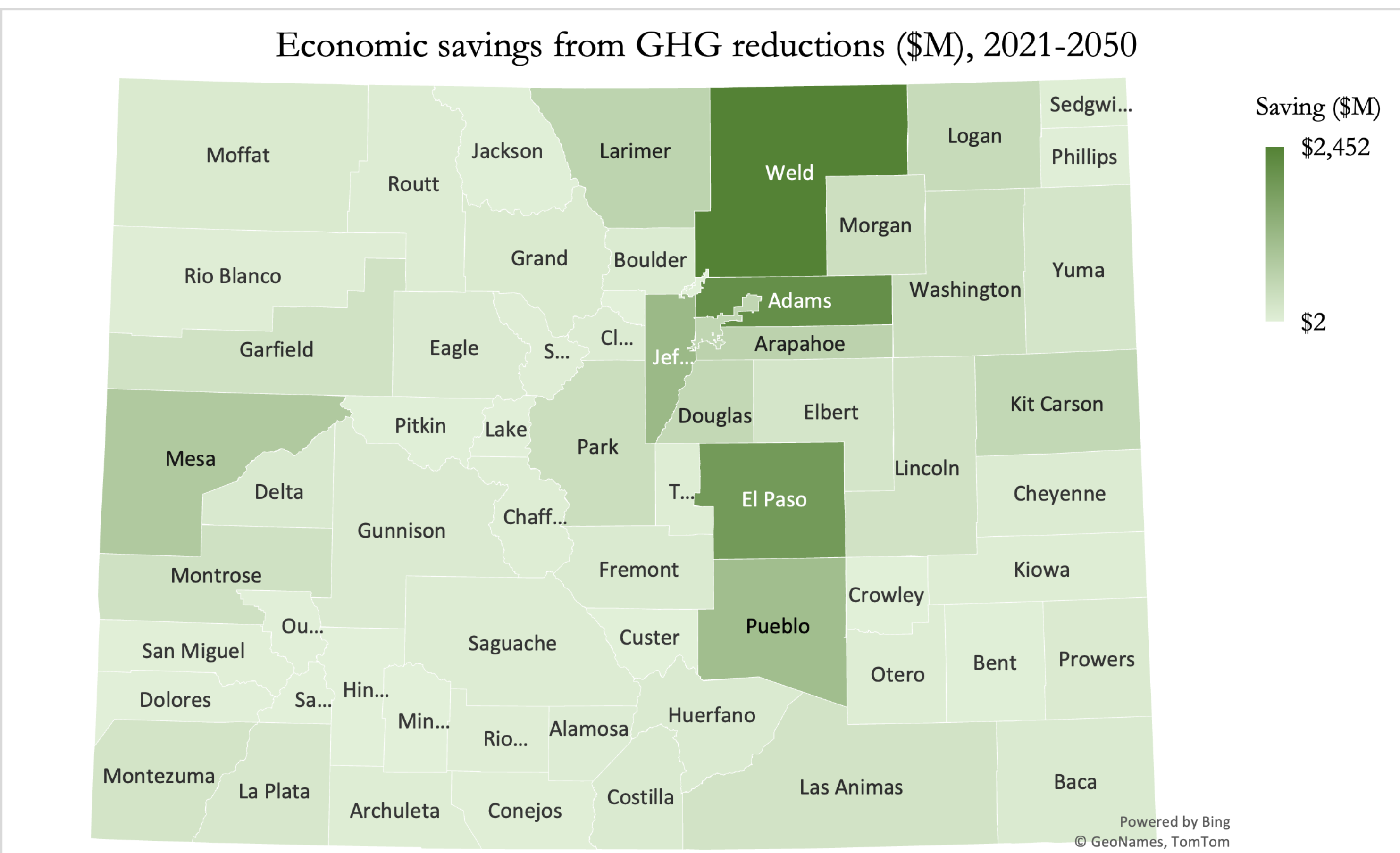



Figure 8: Cumulative economic savings ($M) from GHG emission reductions using Social Cost of Carbon at 2% discount rate

## ACCII Produces Significant Pollution Reductions

Vehicle emissions contribute to the formation of ground level ozone (smog), which can trigger health problems such as aggravated asthma, reduced lung capacity, and increased susceptibility to respiratory illnesses, including pneumonia and bronchitis. Pollutants forming ozone are Volatile Organic Compounds (VOCs) and Oxides of Nitrogen (NOx). Large areas of Colorado – from the northern Front Range to Denver – experience “ozone nonattainment,” which means that the level of ozone pollution contaminating the air we breathe exceeds federal safety standards. In the summer of 2021, Colorado recorded some of the worst air quality in the world. In September 2022, the EPA reclassified several counties of the Front Range from “serious” levels of dangerous ozone pollution to “severe.” Children, older people, and those who work outdoors are more likely to be negatively impacted by ozone pollution. Moreover, low-income people and communities of color are more likely to live in areas that are more exposed to ozone pollution (e.g. in cities and along highways).

Vehicles are also a source of particulate matter pollution. Many scientific studies have linked breathing particulate matter to significant health problems, including asthma, chronic bronchitis, and heart attacks. Levels of traffic-related air pollution are higher near major roadways that have high traffic volume.[12]

12 https://www.epa.gov/sites/default/files/2015-11/documents/420f14044_0.pdf

Figure 9 shows average levels of NOx and PM2.5 emissions from traveling one mile with a light duty vehicle that burns gasoline. Using projections of NOx and PM2.5 emissions (grams/mile) from BTS[13] as well as projections of vehicle miles traveled through 2050, we estimate the changes in pollution levels under the baseline and ACCII scenarios.

Figure 10 shows projected county-level changes in PM2.5 in 2050 versus 2021 under the two scenarios. Under the baseline scenario, many counties are projected to experience increases in PM2.5 levels, while under ACCII, all counties are expected to experience 80% to 90% reduction in PM2.5 pollution levels.

Similarly, we project the changes in NOx pollution levels in each county between 2021 and 2050 under each scenario. Figure 11 shows that ACCII is projected to provide significantly higher reductions in NOx levels compared to the baseline.

It should be noted that our projections of particulate matter and NOx assume that these pollutants do not cross county lines and the pollutants generated as a result of driving ICE vehicles in a county, stay within that county only. This is a simplifying assumption as it is extremely difficult to project true distribution of pollutants over future decades.

13 https://www.bts.gov/content/estimated-national-average-vehicle-emissions-rates-vehicle-vehicle-type-using-gasoline-and

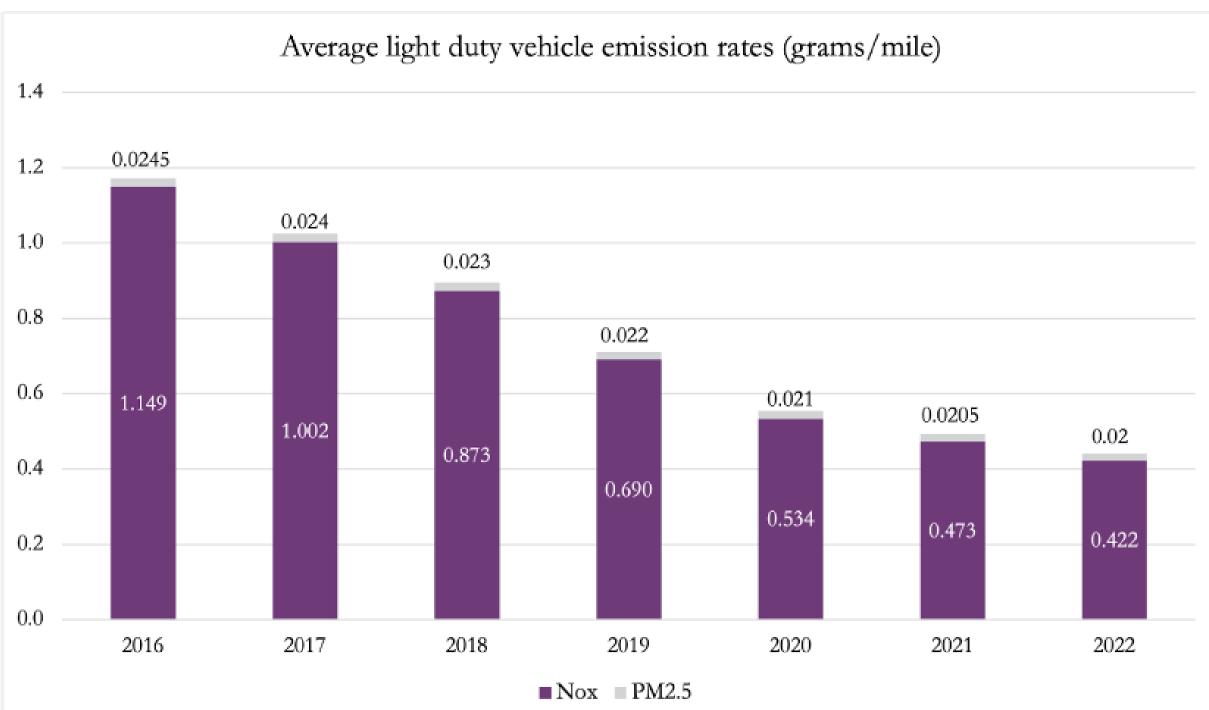
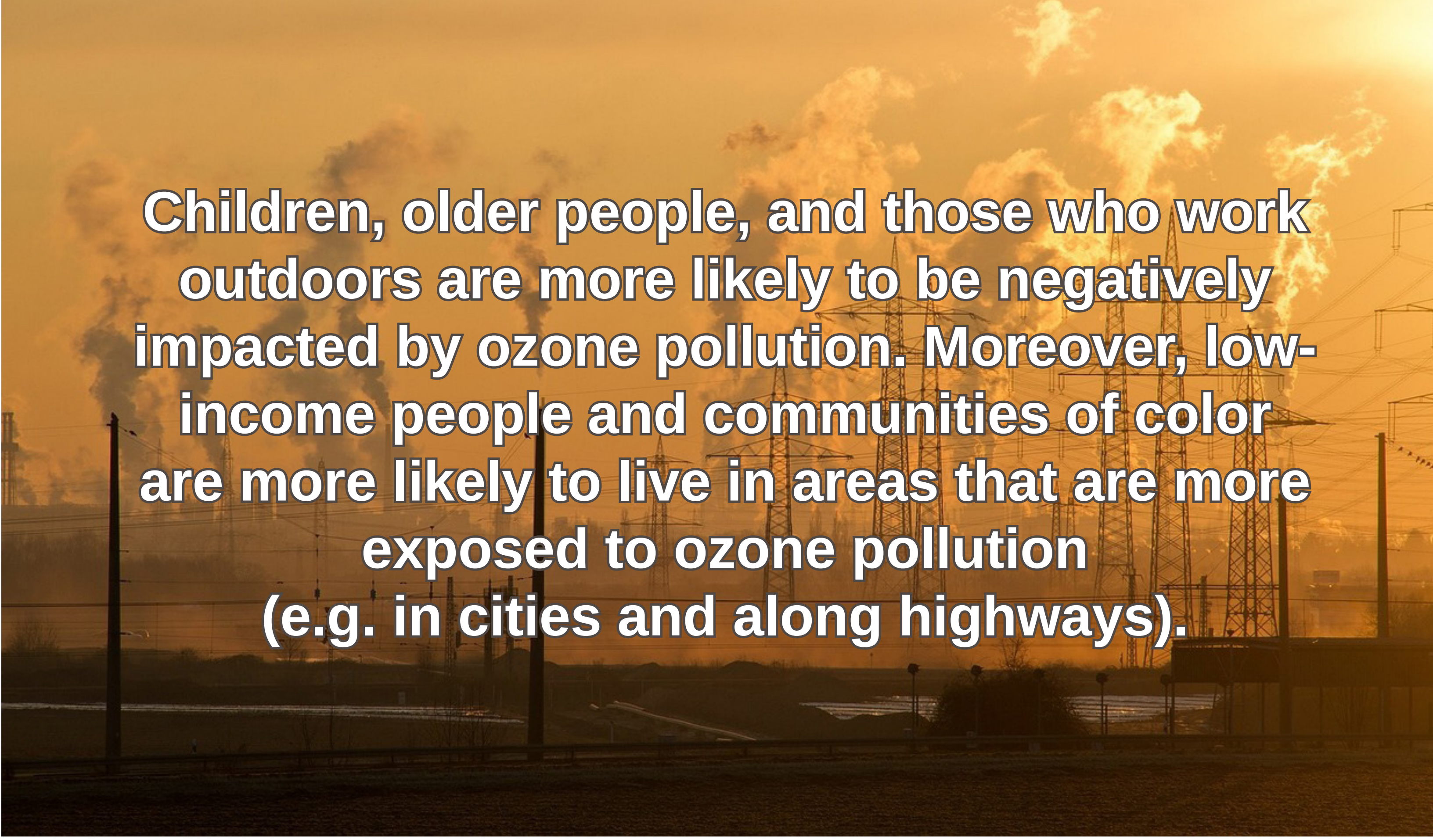



Figure 9: NOx and PM2.5 emission rates for average LDV | Source: Bureau of Transportation Statistics



**Children, older people, and those who work outdoors are more likely to be negatively impacted by ozone pollution. Moreover, low-income people and communities of color are more likely to live in areas that are more exposed to ozone pollution (e.g. in cities and along highways).**

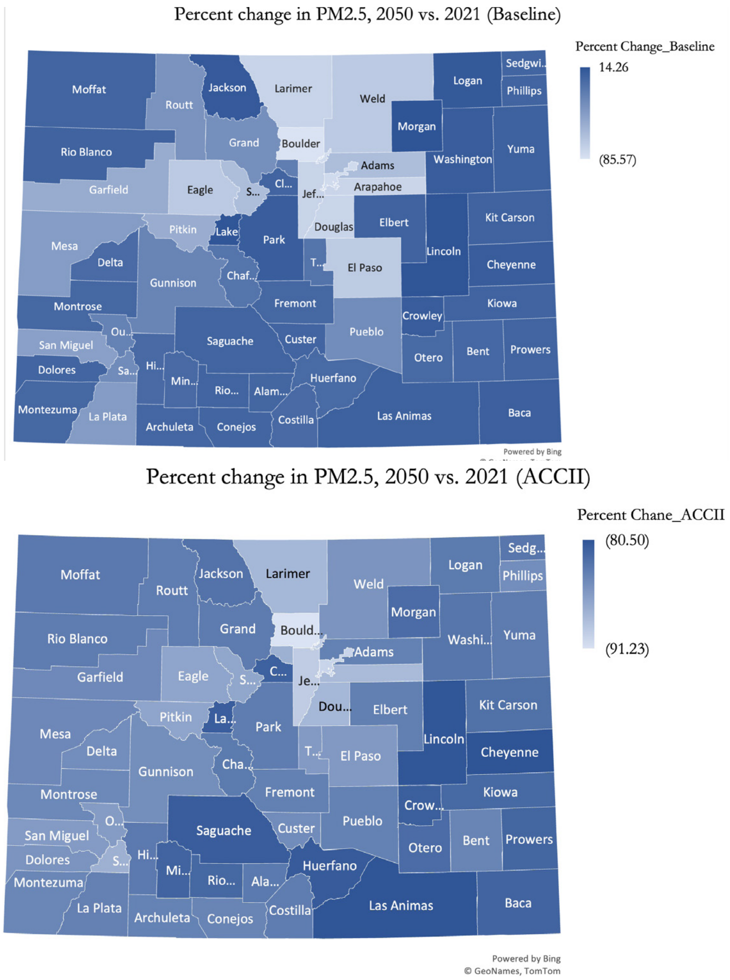



Figure 10: Change in PM2.5 emission levels 2021 vs. 2050 under base-line and ACCII scenarios

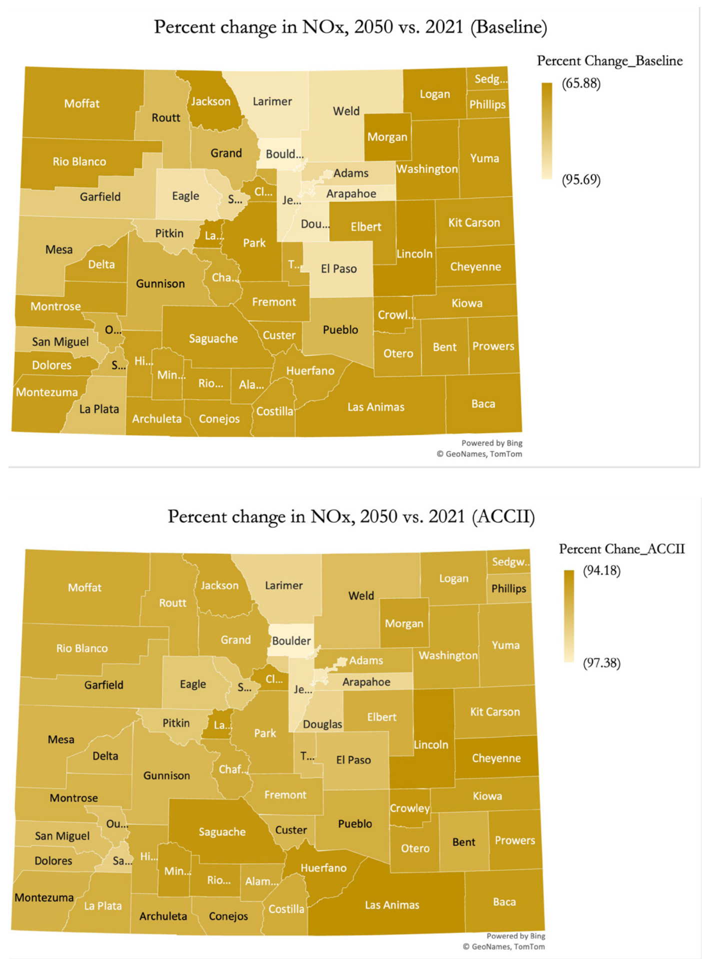



Figure 11: Change in NOx emission levels 2021 vs. 2050 under baseline and ACCII scenarios


# HEALTH BENEFITS

## ACCII Boosts Health Outcomes, Saves Money

Short-term exposure to nitrogen dioxide (NO2) and other nitrogen oxides can worsen respiratory diseases, particularly asthma, resulting in respiratory symptoms like coughing, wheezing, or breathing difficulties. It can also lead to hospitalizations and visits to emergency rooms. Prolonged exposure to high levels of NO2 may contribute to the development of asthma and potentially increase susceptibility to respiratory infections. Individuals with asthma, as well as children and the elderly, are generally more vulnerable to the health impacts of NO2.

As for PM2.5, brief exposures have been linked to premature death, increased hospital admissions due to heart or lung issues, acute and chronic bronchitis, asthma attacks, emergency room visits, respiratory symptoms, and reduced activity days. We use EPA estimates of the dollar value of mortality and nonfatal morbidity caused by each ton of PM2.5 and NOx (Table 2) to estimate the total costs of exposure to these pollutants to Colorado and at the county level. Figure 12 shows the annual costs at the state level. Figure 13 shows the aggregate county-level economic benefits of reduced mortality and morbidity as a result of adopting ACCII between 2021 and 2050. **Our estimates show that adopting ACCII is projected to save the state about $4 billion by 2050, with counties projected to save up to $500 million in health costs.**

**Table 2:** Total dollar value (mortality and morbidity) per ton of directly emitted PM 2.5 and PM 2.5 precursor reduced in 2025, 2040, and 2050 (2019$, 3% discount rate)

| Internal Combustion Engines | Directly Emitted PM2.5 | NOx* |
|---|---|---|
| 2025 | $162,000 | $68,700 |
| 2040 | $228,000 | $90,600 |
| 2050** | $238,000 | $133,100 |

* both ozone and PM2.5 related benefit
** Calculated based on 2040 data and 3% discount rate
Source: EPA

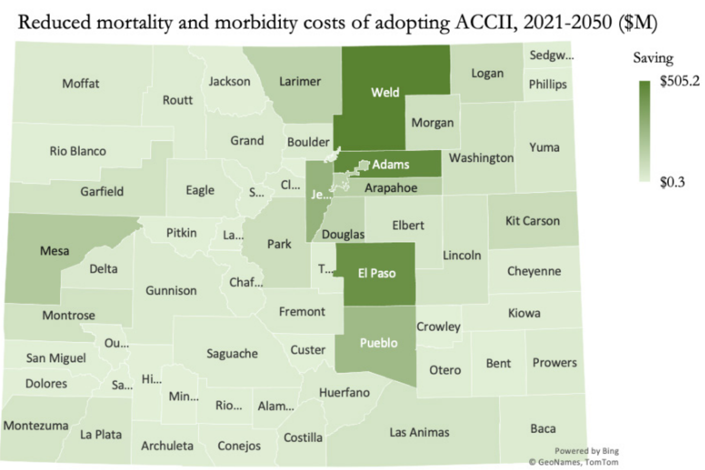



Figure 13: Economic benefits of reduced mortality and morbidity from PM2.5 and NOx pollution

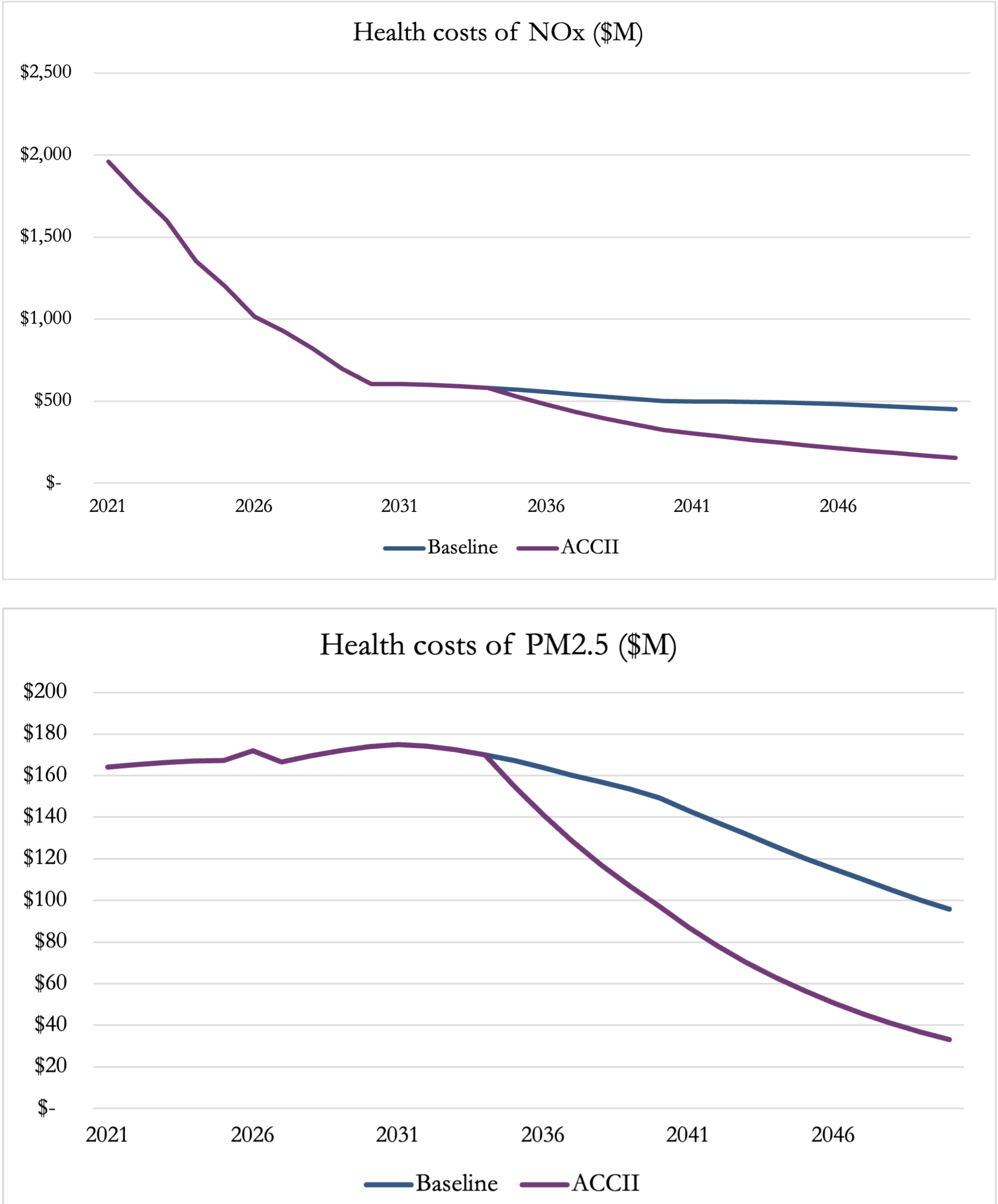



Figure 12: Health costs of NOx and PM 2.5 under baseline and ACCII scenarios

## ACCII Reduces Maintenance and Fuel Costs for Vehicle Owners

Though EVs typically have higher up-front purchase prices compared to ICE, consumers can save a lot on operating expenses in the long-run. Over the lifetime of a conventional gas-powered vehicle, fuel and maintenance costs can add up to even more than the original purchase price.[14] As Table 3 shows, BEVs and PHEVs will both cost consumers about $4,600 less to repair and maintain over their lifetimes, compared with ICE models when discounted to the present value.

EV owners also save on lifetime fuel costs due to the difference between gas and electricity prices. Figure 14 shows the present value (at the time of purchase) of future fuel savings from the vehicle. **Electric car and SUV owners will save an average of $9,850 and electric pickup truck owners will save $14,500 over the lifetime of their vehicles compared to internal combustion vehicles.**

Based on estimates of new EV adoption in each county every year under baseline and ACCII scenarios, we project total savings from fuel cost at the county-level. We assume all new EVs will be cars and SUVs so we use the more conservative saving value of $9,850 per new EV (Figure 15).


**Table 3:** Lifetime maintenance and repair costs by vehicle type

| Vehicle type | Lifetime maintenance & repair cost | Livetime savings vs. ICE |
|---|---|---|
| ICE | $9,200 | -- |
| BEV | $4,600 | $4,600 |
| PHEV | $4,600 | $4,600 |

Source: Consumer Reports[15]

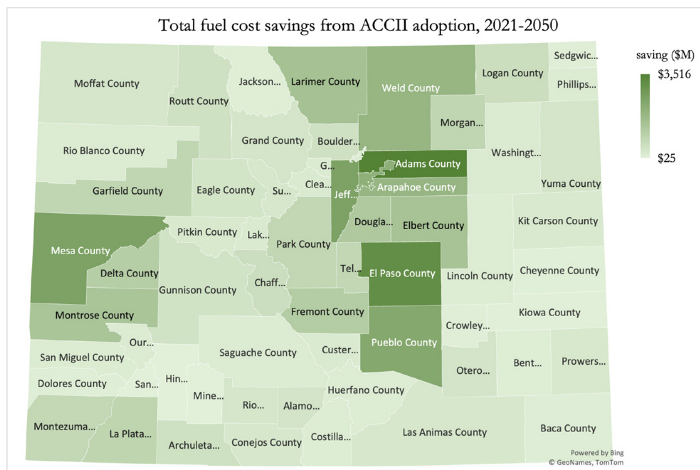



Figure 15: Fuel cost savings by county

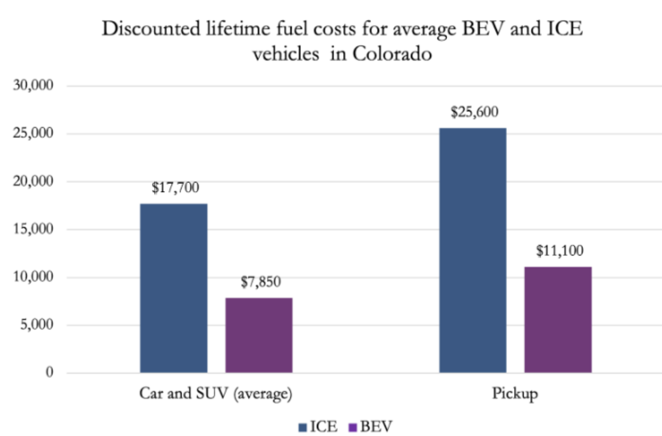



Figure 14: Lifetime fuel costs of average electric and ICE vehicles
Source: Consumer Reports[16]


14 https://advocacy.consumerreports.org/wp-content/uploads/2020/10/EV-Ownership-Cost-Final-Report-1.pdf

15 ibid

16 ibid


# BREAKING DOWN BARRIERS

## ACCII Promotes Racial and Socioeconomic Equity

The Inflation Reduction Act extends the light-duty EV tax credit of up to $7,500 per vehicle through 2032, which will reduce the upfront costs of purchasing EVs and allow millions more consumers to utilize this credit and more easily switch to an EV. Adoption of ACCII helps expedite a secondary EV market, which allows families with lower incomes to purchase EVs at more affordable prices.

However, in order for EVs to become popular among all drivers, it is crucial that our charging infrastructure caters to a diverse population. This means accommodating significant g oups of drivers who heavily rely on public chargers, as well as meeting the needs of drivers in rural areas who require public chargers to have enough power for their daily commutes. Currently, charger installations tend to be concentrated in higher-income areas, aligning with early EV sales. **However, for the ownership of EVs to be as practical as that of ICE vehicles, future charger installations should be strategically planned across areas representing all income levels.**

Colorado should advance legislation like ACCII in the 2024 and other future legislative sessions to ensure that rural and low-income areas are able to reap the benefits of EV transition.

# APPENDIX 1. DATA:

In this analysis, we have utilized multiple data sources to get accurate information on the historical trends of EV adoption in Colorado.

- EV registration: https://www.atlasevhub.com/materials/state-ev-registration-data/#data
- Total Vehicle Registration: https://cdor.colorado.gov/data-and-reports/cdor-annual-reports
- Vehicle Survivability: https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/809952
- Charger Infrastructure: https://afdc.energy.gov/fuels/electricity_locations.html#/fi d/nearest?fuel=ELEC
- Average vehicle emission rates: https://www.bts.gov/content/estimated-national-average-vehicle-emissions-rates-vehicle-vehicle-type-using-gasoline-and
- VMT: We use a combination of state highway data[17] and a multiplier based on the length of local roads in each county. We use CDOT's 20-year projections of the annual average daily traffic ount to estimate increases in VMT in each county.
  - https://dtdapps.coloradodot.info/otis/FileReports
  - https://data.colorado.gov/Transportation/Local-Roads-in-Colorado/qvrk-xsmj
  - https://dtdapps.coloradodot.info/otis/TrafficData#ui 0/2/2/station/100205/criteria//1/true/true/
- Demographic and jobs: https://demography.dola.colorado.gov/assets/html/economy.html
- Median Household Income: https://data.census.gov/table?q=median+household+income&g=040XX00US08$0500000&tid=ACSST5Y2021.S1901&moe=false
- Socially and economically burdened areas: https://experience.arcgis.com/experience/8f07415d8a0b4e9e9a500fc774c0b865

17 https://dtdapps.coloradodot.info/otis/FileReports

# APPENDIX 2. DATA PREPROCESSING:

The EV data set characterizes EV (BEV and PHEV) registration over multiple periods of time that captures the genesis of EV adoption. The data comes in different snapshots from DMV. We observed that snapshots would not accurately represent the number of registered vehicles before 2020. Instead, we used the vehicle registration dates and removed duplicate observations to calculate the total number of electric vehicles registered annually. Note that this represents the total number of vehicles on the road. To calculate the number of new EVs per year, we have subtracted the previous-year total EVs from the current year. Since EVs are relatively newer, we ignored the ratio of decommissioned cars for EVs.

Similarly, we utilized total car registrations (including EV and ICE cars) to calculate the share of EVs sold. To calculate the number of new cars each year, we cannot simply compare the total car numbers for two consecutive years without considering the survivability of the cars. For this purpose, we employ the model and fi   dings from a study on car survivability in the US. We created a simulation experiment to calculate the distribution of car ages in a steady state. Consequently, we derived an aggregate estimate of the survivability of total cars (89%) based on a steady-state distribution of cars. This allowed us to estimate the number of outgoing cars and derive the number of new cars each year. This measure is crucial for the analytic model.

# APPENDIX 3. MODEL SPECIFICATION:

To estimate the EV adoption per county, we have utilized a logistic regression model presented in Equation 1. The left-hand side represents the probability of an individual choosing an EV over a non-EV car, and  is a vector including all the information that affects the decision-making process (such as available charging infrastructure, electricity price, gasoline prices, etc.).

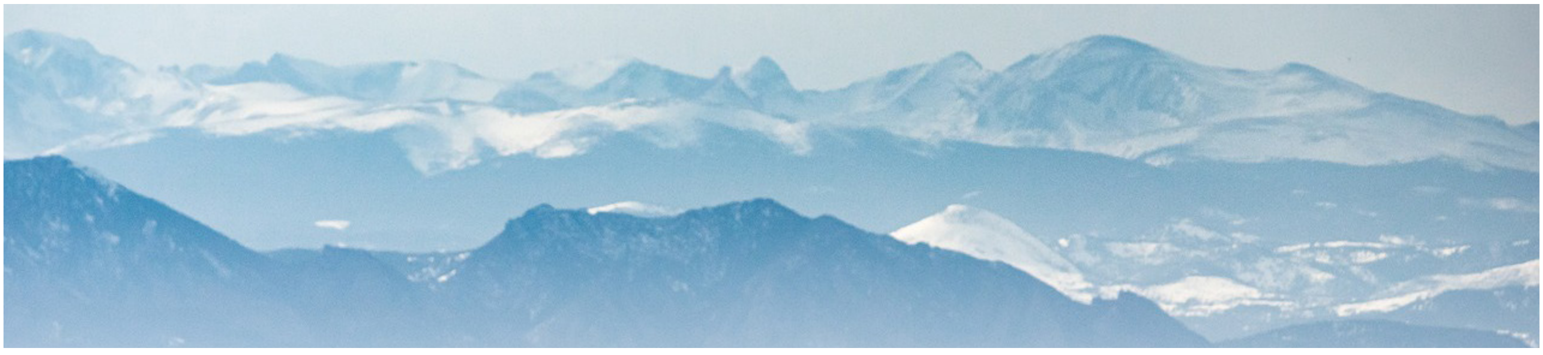
$$Pr(EV) = \frac{e^{X\beta}}{1+e^{X\beta}} \qquad (1)$$

This model is widely used in adoption studies, in economics and social sciences, since its functional form follows a natural s-curve, which is common in adopting new technologies. However, the model is formalized as an individual-level model, whereas our data set is aggregated at the county level. It can easily be shown that the model in Equation 1 can be formulated to show the market shares (e.g., EV) at the aggregated level. Thus, we can rewrite Equation 1 to represent the aggregated market share of new EVs each year in Equation 2. The left-hand side is the logarithm of the odds ratio of EVs.

$$log\left(\frac{EV\ Share}{Non-EV\ Share}\right) = X\beta \qquad (2)$$

One major benefit of  eformulated Equation 2 is that we can run a linear regression to estimate the adoption of EVs. All we need to do is to calculate the logarithm of the odds ratio of EVs: i.e., the new EV market share divided by the non-EV market share.

For the set of variables, we use charging infrastructure represented by the number of public chargers available in each county. We used level 2 AC charging and DC fast charging (also known as level 3) in our analysis. Note that level 1 AC charging is the 120V outlet available at each house. We also use demographic and economic data for Colorado counties, including population, migration, and total number of jobs. To capture the time effect in the adoption process, we added the years that passed from the inception of mass-market EVs. This variable helps us to incorporate many unobservable factors that evolved from the early days of EVs, such as faster charging times and car prices. Finally, and most importantly, we utilize county fi ed effects to accommodate the heterogeneity across different counties. In other words, the model allows each county to have an independent baseline. This is a crucial step to model adoption variation across the state.



# APPENDIX 3.1 PROJECTIONS

The estimated model results in a good fit s owing that the model assumptions are compatible with the true data generation process (R2=0.87).

The next step is to project the adoption of EVs from 2023 to 2050 using the estimated model. First, we need to project our independent variables for the projected years. We mostly use linear extrapolation whenever suitable for the data. However, we can employ different projections that refle t different paths or policies for future years.

The model's outcome is the relative share of EVs for each year and county. Once we have an estimate of the total cars being sold in the future, we can convert the results into the share of EVs and eventually to the total number of EV and non-EV cars. In calculating the cumulative number of EVs and non-EVs in the future, we also adjusted for the survivability of the cars. One caveat is that the confide ce intervals of the projections would widen as we go further in the future. This behavior is independent of model choice and a natural outcome of problem definition

# APPENDIX 3.2 ACCI POLICY IMPLICATIONS

We apply separate projections under ACCII, in which the adoption is considered 100% after 2035. Thus, until 2035, the projections for the total EVs and non-EVs are the same for both ACCII and baseline. However, after 2035, all the new cars sold are EVs under ACCII. Note that there will be non-EVs (ICE) still on the road as it takes time for those cars to be decommissioned.

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