COLORADO
Energy Office

Colorado Priority Climate Action Plan

March 2024

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List of Acronyms

Departments/Regulatory Bodies

APCD - Air Pollution Control Division

CDA - Colorado Department of Agriculture

CDOT - Colorado Department of Transportation

CDPHE - Colorado Department of Public Health and Environment

CEO - Colorado Energy Office

DNR - Department of Natural Resources

DOE - Federal Department of Energy

DOLA - Department of Local Affairs

DORA - Department of Regulatory Affairs

ECMC - Energy & Carbon Management Commission

EPA - Federal Environmental Protection Agency

OEDIT - Office of Economic Development and International Trade

PUC - Public Utilities Commission

Other Terms

BAU - Business As Usual

BIL - Bipartisan Infrastructure Law

BPS - Building Performance Standards

BRT - Bus Rapid Transit

CCAP - Comprehensive Climate Action Plan

CEP - Clean Energy Plan

CEJST - US Council on Environmental Quality's Climate and Economic Justice Screening Tool

CO2 - Carbon dioxide

DRCOG - Denver Regional Council of Governments

EIA - U.S. Energy Information Agency

EPS - Energy Policy Simulator

EV - Electric Vehicle

FRD - Facility Reported Data

GHG - Greenhouse Gas

GHG Rule - Colorado's GHG Transportation Planning Standard

ICE - Internal Combustion Engine

IECC - International Energy Conservation Code

IRA - Inflation Reduction Act

LIDAC - Low Income and Disadvantaged Communities

NIFC - National Interagency Fire Center

PCAP - Priority Climate Action Plan

RMI - RMI, formerly Rocky Mountain Institute

STIP - Statewide Transportation Improvement Program

MMT - Million metric tons

MPO - Metropolitan Planning Organization

VMT - Vehicle miles traveled

ZEV - Zero-Emission Vehicle

Introduction

Colorado recently updated its Greenhouse Gas Pollution Reduction Roadmap (Roadmap 2.0) to both quantify progress to-date and chart a path forward for the state's decarbonization strategy. The plan was developed with input from state agencies including the Colorado Energy Office (CEO), Colorado Department of Public Health and Environment (CDPHE), Colorado Department of Transportation (CDOT), Department of Natural Resources (DNR), Colorado Department of Agriculture (CDA), Department of Local Affairs (DOLA) the Public Utilities Commission (PUC) at the Department of Regulatory Affairs (DORA) and Office of Economic Development and International Trade (OEDIT), as well as input from the public, local governments and industry and other stakeholders. The update includes identification and development of new Near Term Actions that the state committed as additional steps to continue making investments and adopting new technological and policy innovations to get us closer to our long-term decarbonization goals.

A subset of these Near Term Actions have been selected for the Priority Climate Action Plan (PCAP), as well as actions focused on local government and tribal actions, as they represent the work that will bring the state of Colorado closer to meeting our greenhouse gas and pollution reduction goals with the highest-impact and achievable policy priorities. The focus of this PCAP is long-term strategies that take advantage of unprecedented federal funding, work towards our goal of net-zero greenhouse gas emissions, save Coloradans money, improve air quality, and deploy new clean energy solutions, including geothermal energy, clean hydrogen, industrial efficiency and electrification, and carbon management, as well as expanding partnerships with local governments.

CPRG Overview

The Colorado Energy Office received a CPRG planning grant in July of 2023 and as part of that funding must submit this Priority Climate Action Plan (PCAP) with specific GHG reduction strategies by March 1, 2024. The plan articulates measures that will enable the state of Colorado to:

1. Implement ambitious measures that will achieve significant cumulative GHG reductions by 2030 and beyond;
2. Pursue measures that will achieve substantial community benefits such as reduction of criteria air pollutants (CAPs) and hazardous air pollutants (HAPs), particularly in low-income and disadvantaged communities;

3. Complement other funding sources to maximize these GHG reductions and community benefits; and,
4. Pursue innovative policies and programs that are replicable and can be scaled up across multiple jurisdictions.

Measures that are identified in this PCAP are eligible actions to seek federal funding under the Environmental Protection Agency's CPRG Implementation grant opportunity. Applications for the General Competition Implementation grants are due April 1, 2024.

Scope of the PCAP

Colorado's PCAP spans the entire state. This report is organized into three sections related to greenhouse gas reduction measures: statewide priority measures, local government priority measures and Ute Mountain Ute priority measures. Measures often include both policy changes and incentives as policy adoption paired with project funding can achieve much greater GHG benefits (and often related co-pollutant benefits) than incentive/project funding alone. The Ute Mountain Ute Tribe has provided priority reduction measures specific to their needs, lands and within their authority to implement as a sovereign entity.

The statewide priorities identify measures that have significant GHG impact associated with activities that are not controlled by local authority whereas the local government priorities emphasize activities that local governments, municipalities or other eligible entities as defined by the EPA have agency to make the most impact. The local government priorities that Colorado is including in its PCAP have also been developed in collaboration with the Denver Metropolitan Statistical Area led by the Denver Regional Council of Governments (DRCOG). DRCOG is developing its own PCAP, and wherever possible the State has worked with DRCOG to ensure that the two entities do not apply for implementation funding for overlapping programs.

Colorado GHG Reporting and Climate Action Context

Colorado has adopted a whole-of-government approach to tackling greenhouse gas (GHG) emissions and mitigating its contribution to global warming, setting science-based targets that align with those established by the Paris Agreement in 2015. From first tracking emissions in 1990, to establishing a Renewable Portfolio Standard (RPS) in 2004, and executive orders in 2008 and 2017 establishing the first emission reduction goals, many additional climate action measures have been developed since 2019, when the legislature adopted economy-wide GHG emissions reduction goals.

The Colorado Department of Public Health and Environment (CDPHE) has been assessing emissions of GHGs since 1990. Since the state created Colorado's first technical climate change assessment in 1998, the government has published inventory reports in 2002, 2007, 2014, 2019, 2021, and 2023[1].

In 2019, the legislature adopted and Governor Polis signed HB19-1261[2], which set economy-wide GHG reduction goals for the state of 26% below 2005 levels by 2025, 50% by 2030 and 90% by 2050. In 2023, SB23-016[3] amended the targets set by HB19-1261 to include reductions of 65% by 2035, 75% by 2040, and 90% by 2045, while also revising the 2050 target to net zero emissions. After adoption of HB19-1261, the administration conducted a technical analysis and stakeholder process to develop the state's first GHG Pollution Reduction Roadmap[4], a strategic plan for the near term actions the administration would pursue to make progress towards the short- and long-term goals. The state has completed approximately 95% of the identified near term actions. In many cases implementation will continue for decades, but the policies have been adopted and programs begun.

The state worked during 2023 to update the Greenhouse Gas Pollution Reduction Roadmap ("Roadmap 2.0"), including an updated forecast of emissions and a new set of Near Term Actions that will guide implementation in the state. Findings from Roadmap 2.0 have been used to inform this PCAP and the Comprehensive Climate Action Plan (CCAP) due in July of 2025. Roadmap 2.0 builds on extensive work carried out by the Colorado Department of Public Health and Environment to conduct greenhouse gas inventories. The inventory is conducted every two years, and an update was released in late 2023. The 2023 inventory relies on both reported and modeled data.

Approach to Developing the PCAP

Methodology

As discussed above, the development of the PCAP coincided with the update of the state's Greenhouse Gas Pollution Reduction Roadmap. The Roadmap process included extensive modeling to build on CDPHE's existing greenhouse gas inventory work and forecast Colorado's emissions trajectory, including an updated baseline trajectory that accounts for the State's actions since the 2021 release of the original Roadmap, as well as the impacts of recent federal legislation. In addition, the Roadmap process

[1] APCD Climate Change Program
[2] HB19-1261
[3] SB23-016
[4] Colorado GHG Pollution Reduction Roadmap

included extensive public engagement to ensure that the priorities of Coloradans were key to the development of a priority action plan by the state.

The development of the PCAP relied heavily on the 2023 Greenhouse Gas inventory as well as a projection of emissions to 2050. The primary data sources used in the 2023 Inventory included the State Inventory Tool (SIT), the Inventory of U.S. Greenhouse Gas Emissions and Sinks by State (referred to as the National Inventory (NI) by State), reported data or facility reported data (FRD), and the Division's internal analysis of oil and gas operations. Within each of these resources exist numerous datasets and sources that provide detailed activity data, emission factors, and/or emissions data. This Inventory also relies upon data from the Colorado Energy and Carbon Management Commission (ECMC), U.S. Energy Information Agency (EIA), Wildland Fire Emissions Information System, and National Interagency Fire Center (NIFC). Data sources for each major sector or subsector within the inventory are provided in Table 1.

Table 1. Sector/Subsector Data Sources

Sector/Subsector	2021	2023
Electric Power	SIT	FRD, NI, EIA
Residential & Commercial (Buildings)	SIT	SIT
Industrial Fuel Use	SIT	SIT, FRD
Transportation	SIT	SIT
Oil & Natural Gas Systems	APCD, SIT	APCD, FRD, ECMC
Coal Mining	SIT	NI
Non-Energy Use of Fossil Fuels	-	SIT
Industrial Processes & Product Uses	SIT	FRD, NI, EIA
Agriculture	SIT	NI
LULUCF	SIT	NI, NIFC
Waste	SIT	FRD, NI

Projected emissions for 2021 through 2050 were developed for Roadmap 2.0 by the Colorado Energy Office in partnership with RMI, an independent, non-partisan, nonprofit focused on clean energy transition. RMI's work included updated projections of emissions under three policy scenarios: Business as Usual (BAU), Baseline, and Near-Term Actions, all spanning 2021 through 2050. RMI calibrated Colorado's Energy Policy Simulator (EPS) model to align with historical 2020 estimates provided by the CDPHE.

Engagement

Public engagement was a key part of the development of the Roadmap 2.0, including the development, refinement and prioritization of the actions in this PCAP, as well as the modeling of the emissions trajectory. There were multiple goals for public engagement. These include:

- Providing accessible and fact based information on the impact of climate change on Coloradans
- Educating the public on Colorado's statutory targets, and key programs and policies to reduce emissions and meet those targets
- Gathering input on the key concerns of Coloradans and their ideas for the most important actions the state can take to reduce emissions
- Getting feedback on the list of near term actions that state agency staff shared

To ensure that a diverse set of stakeholders could participate in the Roadmap update process, and particularly that members of disproportionately impacted communities were included, public meetings were held across the state and virtually in early summer and late fall 2023. Meetings were held in:

- Craig |June 22, 2023 & December 6, 2023
- Durango | June 20, 2023 & December 4, 2023
- Grand Junction | June 21, 2023 & December 5, 2023
- Greeley | June 8, 2023 & December 11, 2023
- Montbello (Denver) | May 18, 2023 & December 13, 2023
- Pueblo | June 13, 2023 & November 28, 2023
- Trinidad | May 24, 2023 & November 29, 2023
- Virtually | June 27, 2023, August 7, 2023 & December 11, 2023

In addition to this community engagement related to statewide actions, the Colorado Energy Office also engaged local governments to develop the set of local government actions included in this document. More information about public engagement, particularly with LIDAC communities is below in the Colorado Low Income and Disadvantaged Communities Benefit Analysis.

Statewide, Local Government and Tribal Actions

This document presents priority actions for statewide implementation, as well as priority actions focused on local government, and priority actions being submitted on behalf of the Ute Mountain Ute tribe.

The statewide priority actions largely follow the development of a larger set of actions as part of the Greenhouse Gas Pollution Reduction Roadmap Update. That document includes 49 "Near Term Actions" the state is committed to getting underway in 2024, 2025 and 2026. The short set of actions identified in this PCAP are a subset of the actions identified in the Roadmap. They have been selected for inclusion largely because they meet the goals of the larger CPRG program and they lack current funding sources and would be strong potential candidates for the Implementation Grant portion of CPRG.

Colorado chose to include a separate set of priority local government focused actions in the PCAP. These actions were selected recognizing that the authority and role of local governments is extremely important in reducing emissions, but is distinct from that of the State government. Engagement with local governments statewide through public meetings and surveys informed the list of priority local government actions.

Estimates of Emissions Reductions

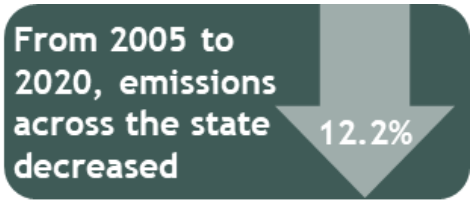
Emission reductions associated with actions in this PCAP are modeled in two ways. Broad actions, particularly most of those in the Statewide section, that do not yet have specific proposals or funding "asks", are shown simply as the total available emissions in a sector or subsector that are available to reduce. In other cases, particularly in the local government section where more specific actions are proposed, a range of emissions reductions associated with that type of action are provided based on example jurisdictions in different contexts across the state. Additional details on the methodology for modeling the local government actions are provided in Appendix B.

PCAP Elements

Greenhouse Gas (GHG) Inventory

The 2023 Colorado Greenhouse Gas (GHG) Inventory presents historical GHG emissions estimates for the State of Colorado for the years 2005 through 2020. Emissions are separated into five sectors in alignment with Intergovernmental Panel on Climate Change (IPCC) and the U.S. Environmental Protection Agency (EPA) standards: Energy; Agriculture; Industrial Processes and Product Uses (IPPU); Waste; and Land Use, Land Use Change, and Forestry (LULUCF). Each of these is divided further into subsectors, categories, and subcategories to various levels where applicable, to provide the most finely detailed view of emissions that is practicable.

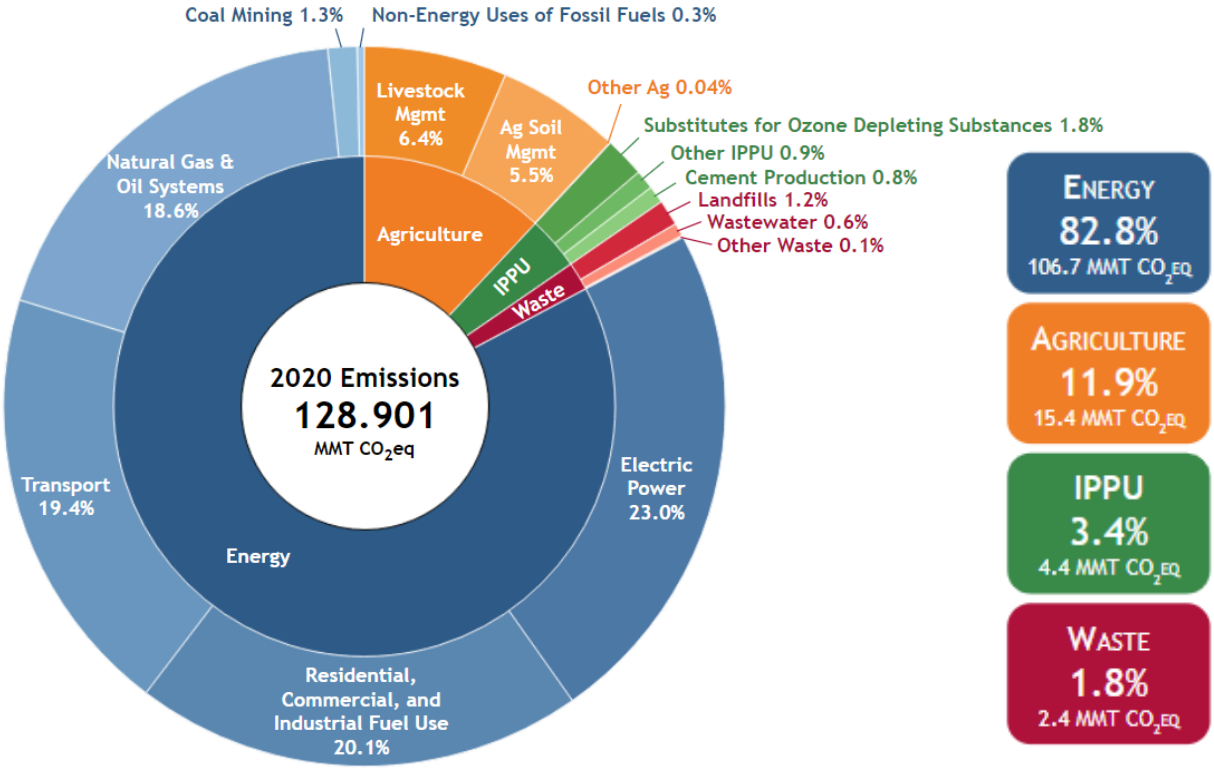
In 2020, statewide GHG emissions in Colorado were 128.901 MMT CO_2eq, including emissions from the Energy, Industrial Processes and Product Uses (IPPU), Agriculture, and Waste sectors.[5] This represents an emission reduction of 17.926 MMT CO_2eq or 12.2% from the 2005 baseline.



The Energy sector contributed the majority of the state's emissions, and most emissions were carbon dioxide (CO_2). Agriculture is the next largest contributor to statewide emissions, and nitrous oxide (N_2O) and methane (CH_4) are the prominent GHGs in that sector. Fluorinated gases (F-gases) are only accounted for in the IPPU sector, where they contributed over half of the sector's total emissions in 2020. F-gases trap substantially more heat than CO_2 in the atmosphere over their lifetimes. 2020 shares of emissions are provided in the figures by sector and subsector in Figure 1.

[5] Statewide emissions including emissions from the Land Use, Land-Use Change, and Forestry (LULUCF) sector were 141.134 MMT CO_2eq in 2020.

Figure 1: 2020 GHG Emission Shares by Sector and Subsector



Emissions from land use, land use change, and forestry (LULUCF) are typically reported separately from the other sectors in state totals. In 2020, the LULUCF sector emitted 12.2 MMT CO2eq, an increase of 34% (3.1 MMT CO2eq) since 2005.

Table 2: 2020 Emissions by GHG and Sector (MMT CO_2eq)

Sector	CO2	CH4	N2O	F-Gases	Total
Agriculture	0.038	7.389	7.968	0.000	15.394
Energy	81.311	24.995	0.415	0.000	106.721
Coal Mining	*0.064*	*1.629*	*0.000*	*0.000*	*1.693*
Electric Power	*29.546*	*0.043*	*0.099*	*0.000*	*29.688*
Natural Gas and Oil Systems	*1.433*	*22.556*	*0.000*	*0.000*	*23.989*
Non-Energy Use of Fossil Fuels	*0.386*	*0.000*	*0.000*	*0.000*	*0.386*
Residential Fuel Use	*4.286*	*0.027*	*0.006*	*0.000*	*4.319*
Commercial Fuel Use	*12.379*	*0.596*	*0.013*	*0.000*	*12.987*
Industrial Fuel Use	*8.497*	*0.108*	*0.016*	*0.000*	*8.621*
Transportation	*24.721*	*0.037*	*0.281*	*0.000*	*25.038*
IPPU	1.767	0.008	0.070	2.582	4.426

Waste	0.000	1.954	0.405	0.000	2.359
Statewide, excluding LULUCF	**83.115**	**34.346**	**8.858**	**2.582**	**128.901**

Table 2 summarizes 2020 emissions by GHG and sector, with additional detail provided for the Energy sector.

The majority of Colorado's 2020 GHG emissions (64%) are attributed to CO_2, while CH_4 accounted for about a quarter (27%) of CO_2eq statewide emissions (Figure 2). N_2O made up around 7%, and all F-gases combined (including NF_3, SF_6, HFCs, HFEs, and PFCs) contributed around 2% to 2020 statewide emissions.

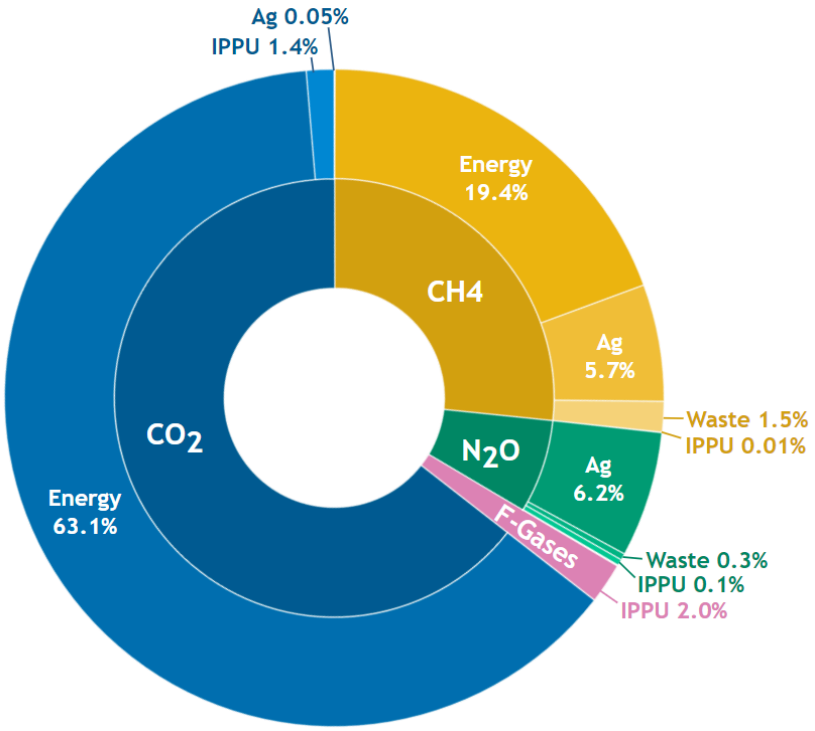


Figure 2: 2020 GHG Emissions by Sector and GHG

GHG Reduction Targets

With the passage of HB 19-1261[6] and then SB 23-016[7], "Colorado shall strive to increase renewable energy generation and eliminate statewide greenhouse gas pollution by the middle of the twenty-first century and have goals of achieving, at a minimum: a 26% reduction by 2025, a 50% reduction by 2030, a 65% reduction by 2035, a 75% reduction by 2040, a 90% reduction by 2045, and net zero emissions by 2050, all measured relative to 2005 levels", (§ 25-7-102(2)(g), C.R.S.). "Statewide GHG pollution" is defined in § 25-7-103(22.5), C.R.S., as "the total net statewide anthropogenic emissions of CO_2, CH_4, N_2O, HFCs, PFCs, NF_3, and SF_6, expressed as CO_2eq calculated using a methodology and data on radiative forcing and atmospheric persistence deemed appropriate by the Air Quality Control Commission."

[6] HB19-1261
[7] SB23-016

GHG Emissions Projections

This section provides modeled projections of GHG emissions for 2021 through 2050, as well as comparisons between projections and statutory targets. Projections provided in this section are also a component of the update to the Colorado Greenhouse Gas Pollution Reduction Roadmap (Roadmap 2.0)[8], which the State developed in collaboration with RMI. The projections for Roadmap 2.0 are based on the Colorado Energy Policy Simulator (EPS), co-developed by RMI and Energy Innovation[9].

The analysis for the Roadmap update provides data under several policy scenarios. Most relevant for the PCAP are:

- The Business As Usual (BAU) scenario[10] projects current trends, ignoring state policy actions and incorporating publicly available forecasts for energy demand and economic behaviors. It also reflects Inflation Reduction Act (IRA) tax credits and major formula funded provisions in the IRA and Infrastructure Investment and Jobs Act. This is considered a worst case scenario devoid of any level of intentional intervention, or any of the policies adopted over the past three years.
- The Roadmap Baseline scenario[11] models trends the same way as in the BAU scenario, but factors in state policy actions that are "on the books" as of the end of 2023.

There are limitations to what actions can both be quantified and modeled appropriately. For this reason, these models may be conservative, meaning that the models may underpredict reductions that will occur as a result of policies that have been adopted in the past three years and those to come in modeling of the near term actions identified in the Roadmap 2.0. Furthermore, as with all models of any kind that predict future trends, uncertainties can be rather large and tend to grow larger the further out the forecast extends. These uncertainties can be attributed to assumptions around policy efficacy, incentive uptake, and rule compliance.

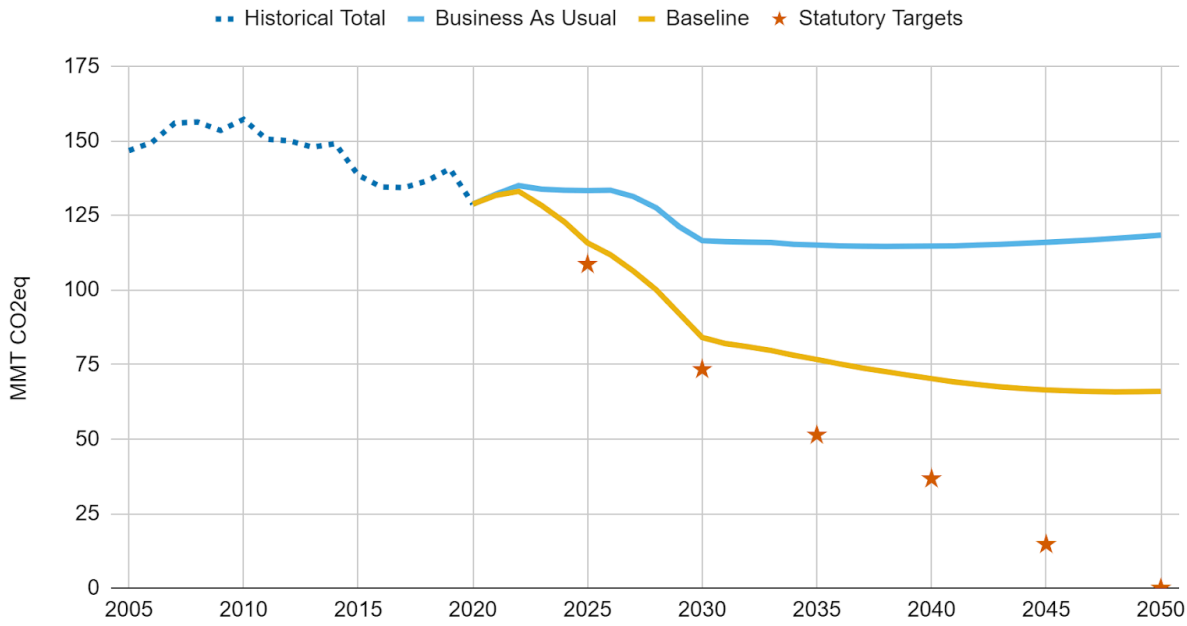
The Business As Usual (BAU) scenario reflects what would have happened if the state had not made major changes in policies and investment to reduce emissions since 2020. This is considered a worst case scenario devoid of any level of intentional intervention, or any of the policies adopted over the past three years. The Baseline

[8] Colorado GHG Pollution Reduction Roadmap 2.0
[9] Energy Policy Simulator
[10] *EPS BAU*
[11] *EPS Baseline 11.02*

scenario models factors in state policy actions that are “on the books” as of the end of 2023, as well as some of the additional impact of major federal legislation.

Notably, the Roadmap baseline modeling shows expected GHG emissions reductions based on current policies and incentives. Without any new rules or laws beyond what is already underway as of fall 2023, Colorado is more than 80% of the way to meeting its statutory goal of a 50% emissions reduction in 2030 from 2005 levels.

Figure 3. Statewide Total Historic Emissions, Updated Baseline & Statutory Targets
Shown in Million Metric Tons Carbon Dioxide Equivalent (MMT CO2eq) and excluding emissions from land-use



Statewide GHG Reduction Priority Measures

As part of its Greenhouse Gas Pollution Reduction Roadmap process, 49 Near Term Actions were identified, which were modeled to bring the state much closer to the 2030 target, collectively achieving a projected 48% emissions reduction by 2030. A small subset of these were chosen to be included in the PCAP as “statewide priorities.” The statewide priorities identify measures that have significant GHG impact and are largely controlled by state authority or best served by statewide action as opposed to local government or tribal governments.

Statewide Industrial Measures

SW Industry 1: Monitor and Reduce Methane Emissions from Landfills and Coal Mines

Description: This action would develop additional policies and programs to enable landfill, coal mine, and coal seep methane capture and methane monitoring. Colorado proposes building on an existing aerial and ground methane monitoring program that includes methane measurement from: satellite observations, large and small planes, drones, ground vehicles, and continuous ground based sensors. The initial program has been focused on oil and gas monitoring, but the monitoring efforts have also yielded beneficial information on landfills, agricultural operations, and coal mines. In addition, Colorado will work to build on existing pilots to capture natural methane seepage and use the recovered methane to generate electricity. These efforts can include monitoring and evaluation of prior pilots as well as expanding these efforts to new project sites.

Estimated GHG reductions by 2030, 2050:

About 2.2 MMTCO2e is emitted annually from waste (1.3 from landfills and 0.8 from wastewater treatment). Currently, Colorado has 59 active landfills.

Coal mines in Colorado emit roughly 1.7 MMTCO2e annually (80% of which comes from active and abandoned underground mines).

Over time, these emissions are projected to increase if no further action is taken to reduce emissions. This sector represents a significant area of additional emission reductions. Table 3 below and Table 1 in Appendix A provide information on the forecasted total emissions from these two sources. More exact emission reduction potential will be developed should a specific proposal be included in the implementation grant phase.

Table 3: Forecasted Total Emissions from Coal Mine and Landfill Emissions based on 2023 Colorado Greenhouse Gas Inventory (MMTCO2E)

Year	Estimated Coal Mine Total Emissions	Estimated Landfill Emissions (63% of Waste Emissions)
TOTAL to 2030	**5.77**	**13.0347**
TOTAL to 2050	**22.71**	**52.9011**

Implementing Agency or Agencies: This action will be implemented by the Colorado Department of Public Health and Environment in partnership with the Department of Natural Resources.

Geographic Location: Statewide

Funding Sources:

Colorado has dedicated initial funding from state sources, including severance tax dollars to fund initial pilots on methane monitoring, capture and reuse. While there are dedicated federal funds for methane, monitoring and building out additional capture and reuse has not been funded in any Colorado awards to date.

Metrics for Tracking Progress:

Colorado will use the data generated in pilots to evaluate metrics for tracking project performance into the future. A first tier analysis is the overall viability of the project--it was designed and implemented as a pilot project, so the overall efficacy will need to be determined before it can be considered for scalability or other applications.

Implementation Schedule and Milestones:

The specific implementation schedule and KPIs have not been developed yet, but will be as projects develop. Generally, the project will consist of project design and scoping, procurement, project implementation with regular check-ins and updates with the contractor(s), draft reporting and review, and finalization of established project deliverables.

SW Industry 2: Invest in Industrial Decarbonization, including from Cement

Description: Meeting Colorado's goal of net-zero greenhouse gas emissions by 2050 will require significant research, innovation, and investment for Colorado's industrial facilities, including cement – both those currently regulated by existing GHG rules and those that are not. CEO will lead an effort to analyze and invest in industrial decarbonization. This would include analyzing emissions from smaller manufacturing operations, and identifying high-priority existing and emerging on-site emission reductions strategies for different industrial facilities. Many of these facilities are located in low income communities and communities of color, so the reduction in co

pollutants from industrial decarbonization projects, and the economic activity from these investments, will have significant equity benefits.

This measure would require CEO, in consultation with other state agencies, to develop a statewide strategy that recognizes the unique circumstances of each major industrial emitter while building a framework to achieve deep emissions reductions from industry while retaining competitiveness of Colorado manufacturing. This effort will include a focus on reducing co-pollutants, especially in disproportionately impacted communities and in the ozone nonattainment area. This effort will explore the landscape of industrial decarbonization strategies, fit to each need, and how the state can support Colorado companies in achieving deep decarbonization. This effort will require significant stakeholder work, including working with the individual facilities, worker organizations, and engaging with nearby communities.

The strategy will also look at the demand side, and where there are opportunities to build market demand through public procurement, consideration of life cycle emissions in building codes, advance market commitments, and voluntary carbon markets. The strategy will include analyzing the role of a broad range of emerging CDR and CCS technologies in assisting hard-to-abate industries in reaching net-zero. The results of this strategy will inform ongoing agency work, including the deployment of industrial clean air grants and tax credits, and will also help to guide potential future regulatory strategies.

In addition, even while developing a longer term strategy, CEO will build on existing industrial decarbonization funding, including the industrial clean air grants authorized through SB 22-193, and industrial competitive decarbonization tax credits authorized through HB 23-1272, and on existing regulatory requirements (the “GEMM1” and “GEMM2” rules), which require 20% GHG reductions from the manufacturing sector by 2030, as well as regulatory strategies under development targeting emissions reductions from the midstream oil and gas industry. These investments will support transformative technologies such as industrial heat pumps, thermal energy storage, use of clean hydrogen, and industrial carbon capture. In order to expand the reach of these programs, the Energy Office will seek additional federal funding made available by the Inflation Reduction Act, with a particular focus on industrial decarbonization investments that will also reduce local air pollution in disproportionately impacted communities. Colorado is also interested in programs that specifically target the cement industry.

Estimated GHG reductions by 2030, 2050:

Industrial emissions result from combustion of fuels for industrial use, such as heating and cooling, powering engines, or producing steam for industrial processes. The

Industrial Processes and Product Use sector includes estimated carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O) emissions resulting from industrial activities in Colorado. Subsectors of emission sources within the IPPU sector include Minerals, Chemicals, Metals, Electronic Manufacturing, Uses of Ozone Depleting Substances Substitutes (ODS Substitutes), and Other Product Manufacture and Use (OPMU).

This sector represents a significant area of additional emission reductions. Table 4 below and Table 2 in Appendix A provide information on the forecasted total emissions from these two sources. More exact emission reduction potential will be developed should a specific proposal be included in the implementation grant phase.

Table 4: Forecasted Total Emissions from Industrial Fuel Combustion and Industrial Processes & Product Uses based on 2023 Colorado Greenhouse Gas Inventory (MMTCO2E)

Year	Emissions from Industrial Fuel Combustion	Emissions from Industrial Processes & Product Uses
Total to 2030	83.53	31.86
Total to 2050	290.82	100.75

Implementing Agency or Agencies: The Colorado Energy Office will lead this action, building off its existing experience and expertise in industrial decarbonization.

Geographic Location: Statewide

Funding Sources: While the state of Colorado has provided significant state funding to support industrial decarbonization, this is an area of continued need. Pennsylvania recently produced a roadmap estimating industrial decarbonization would come at a cost of nearly $35 billion. Though there are differences in our industrial sector business makeup, this data provides evidence regarding the expense associated with decarbonizing a state's industrial sector. Colorado looks to continue building off of its significant investment in industrial decarbonization by accessing additional federal funding.

Metrics for Tracking Progress:

- Number of qualified facilities/organizations applying for the funding, number of qualified facilities/organizations successfully implementing projects within the given timeline.

- Amount of CO2e and other co-pollutants reduced at each participating site, both on an annual basis and over the duration of the program.
- Amount of CO2e and other co-pollutants reduced at each participating state and across the coalition region, both on an annual basis and over the duration of the program.

Implementation Schedule and Milestones: Specific dates will be determined based on the scale of the program but would include procurement of a third-party implementor to administer the program and issue subgrants to industry partners. The proposed projects would need to go through the state solicitation process and a technical and merit review before completing contracting. Then applicants would execute the project(s) and while the state agency monitors for compliance and reporting. If funds allow, additional rounds of awards could be made.

SW Industry 3: Enable and Invest in the Clean Hydrogen Economy

Description: In order to create a clean hydrogen economy, the state will evaluate where there are regulatory gaps (such as for underground hydrogen storage or pipeline permitting) and develop a regulatory framework to address hydrogen projects in a manner that enables hydrogen projects to move forward and appropriately protects the public health, safety, welfare of disproportionately impacted communities, as well as the environment and wildlife resources.

The state will also continue to seek federal funding to support the development of the clean hydrogen economy in the region. Should it secure additional funding, Colorado will support clean hydrogen economic development activities for the technology's use in hard-to-decarbonize industrial operations as well as aviation, heavy duty transportation, long duration energy storage, load-following services in the power sector, replacing existing gray hydrogen applications with clean hydrogen, and, when appropriate, process heat.

Colorado has already adopted the nation's first tax credit for use of clean hydrogen in hard to decarbonize sectors, and legislation creating a regulatory framework for utility investment in clean hydrogen.

Estimated GHG reductions by 2030, 2050:

Clean hydrogen can displace fossil fuel use in industrial operations, aviation, heavy duty transportation, long duration energy storage and other uses. While a specific evaluation of the potential emission reductions from a given project is not feasible without project detail, an analysis by Colorado's largest electric utility, Xcel Energy,

estimated that investments in hydrogen focused on the power sector could reduce carbon emissions by more than .75 MMTCO2E per year.[12]

Table 5: Estimated GHG reductions from Displacement of Fossil Fuel Use by Clean Hydrogen

Year	Emissions Reduced by Switch to Clean Hydrogen
Total to 2030	5.25
Total to 2050	20.25

Implementing Agency or Agencies: The Department of Natural Resources will implement this action in partnership with the Colorado Energy Office.

Geographic Location: Statewide

Funding Sources: While Colorado applied in a multi-state coalition for funding from the Department of Energy to support investment in clean hydrogen, it was not awarded. No other funding sources have been identified.

Metrics for Tracking Progress: Will be developed as specific projects are proposed.

Implementation Schedule and Milestones: The specific implementation schedule and KPIs have not been developed yet, but will be as projects develop. Generally, the project will consist of project design and scoping, procurement, project implementation with regular check-ins and updates with the contractor(s), draft reporting and review, and finalization of established project deliverables.

SW Industry 4: Address Embodied Carbon and Consumption-based Emissions

Description: This measure will include completing a statewide consumption-based emissions inventory that identifies the impact of greenhouse gas emission reductions through material reuse, recycling, composting, and source reduction. This consumption-based emissions inventory will account for those emissions reductions from recyclable materials that are currently diverted in Colorado. The consumption-based emissions inventory will also identify potential reductions in greenhouse gas emissions, if more materials were diverted for recycling or composting, or if the materials were never generated, due to source reduction and

[12] https://energynews.biz/xcel-plans-to-build-hydrogen-hub-in-colorado/

reuse. This analysis will inform future local recycling or composting programs, as well as the Colorado Department of Agriculture Soil Health Program, and could also lead to future policy decisions on sourcing and procurement. This can inform implementation of existing buy clean legislation, as well as implementation of programs flowing from recent producer responsibility legislation.

Estimated GHG reductions by 2030, 2050:

As Colorado has not yet conducted a consumption based inventory, there is no current information available on the emission reductions that would be possible through analysis and subsequent policy action. A review of Oregon's work to conduct a consumption based inventory found that the total emissions inventory for 2015 on a consumption basis were higher (88.7 MMTCO2E) than the sector based traditional inventory (62.6 MMTCO2E).[13]

This suggests that, were Colorado similar to Oregon in its consumption patterns, total consumption based emissions for the State of Colorado could exceed the emissions from the traditional sector based inventory, which excluding land use, land use change and forestry (LULUCF) summed to 128.901 $MMTCO_2eq$ in 2020.

Implementing Agency or Agencies: This action will be implemented by the Colorado Department of Public Health and Environment.

Geographic Location: Statewide

Funding Sources: There is no existing funding for this measure.

Metrics for Tracking Progress: Should funding be secured, Colorado could follow the initial inventory with a set of policies and priority actions to reduce emissions identified by the inventory, and determine a regular interval of subsequent consumption based inventories to track progress.

Implementation Schedule and Milestones: If funding is awarded, key milestones will include releasing an RFP for a vendor to support this inventory work, contracting with the vendor, initial draft report, completed report, analysis of next steps and potential policy actions, and subsequent inventories.

[13] Oregon DEQ Consumption and Sector based inventories for 2015 available online https://www.oregon.gov/deq/ghgp/Pages/GHG-Oregon-Emissions.aspx

Statewide Building Measure

SW Buildings 1: Support Large Buildings Decarbonization

Description: Beginning in 2022, HB 21-1286, or the Energy Performance for Buildings law, directed the Colorado Energy Office to develop a statewide benchmarking program that requires commercial, multifamily, and public buildings that are 50,000-square-feet or more to report their annual energy use to the Colorado Energy Office. HB 21-1286 also created sector-wide greenhouse gas (GHG) reduction targets for buildings. The law calls for a 7% reduction by 2026 and 20% by 2030 (from a 2021 baseline) with building performance standards (BPS) which set targets, such as specific levels of energy or GHG emission performance for covered buildings. CEO and CDPHE conducted a rulemaking in August 2023 and adopted rules for the covered buildings under this program.

CEO will seek funding to support BPS adoption and implementation including with local governments to: 1) provide streamlined access to state reporting data; 2) sharing of model ordinances; and facilitation in establishing cohorts with neighboring communities (see more in Measure B2 for local governments).

CEO also anticipates significant support is needed to help large commercial buildings to reduce their emissions. This includes building evaluation resources, case studies, low interest financing and technical assistance for building owners and operators, and direct funding to reduce the cost of energy efficiency upgrades and electrification. In addition, this funding could support larger investments that go beyond a single building such as geothermal energy networks.

Estimated GHG reductions by 2030, 2050:

The Colorado Greenhouse Gas Inventory does not identify “commercial buildings” as a sector. Emissions from this sector include onsite fossil fuel consumption (largely natural gas), as well as potential reductions in electricity use through energy efficiency. Emission reductions related to reductions in electricity consumption are not included in this estimation.

The Residential, Commercial, Industrial (RCI) Fuel Use subsector includes estimated carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O) emissions resulting from the combustion of fuels. This covers fuel use by end users for heating homes and businesses and by commercial and industrial users to generate heat used in industrial processes. In 2020, Commercial combustion emissions accounted for about 16.7% of the RCI total sector emissions at 4.319 MMT CO_2eq. The proportional contributions of

residential, commercial, and industrial emissions have remained relatively stable over time.

While emissions are forecasted to decline over time, this sector nonetheless represents a significant area of additional emission reductions. Table 6 below and Table 3 in Appendix A provide information on the forecasted total emissions from these two sources. More exact emission reduction potential will be developed should a specific proposal be included in the implementation grant phase.

Table 6: Forecasted Total Emissions from Commercial Fuel Combustion based on 2023 Colorado Greenhouse Gas Inventory (MMTCO2E)

Year	Emissions from Commercial Fuel Combustion
Total by 2030	30.71
Total by 2050	76.39

Implementing Agency or Agencies: The Colorado Energy Office will lead this action with support from the Colorado Department of Public Health and Environment.

Geographic Location: Statewide

Funding Sources: The current standard covers more than 8,000 commercial and multifamily buildings for a total of more than 1 billion sq. ft across the state. As adopted by the Colorado Air Quality Control Commission in August 2023, the Colorado Building Performance Standard (BPS) will require about 60% of covered buildings to produce improvements that reduce energy or emissions by more than 13% before 2026 and 29% by 2030. Of covered buildings, more than a quarter (2,000) are in disproportionately impacted communities (as defined by a variety of factors including demography, energy burden, and climate risk). Based on impact analysis conducted by the Pacific Northwest National Laboratory, cost-effective building efficiency and electrification upgrades that produce the required emissions reductions under this law range from $.05-$12.50/sq.ft., translating to $150M - $7B in investment needed by 2026. Colorado is seeking multiple paths to significantly grow and expand currently available resources in support of these improvements to large commercial buildings.

Metrics for Tracking Progress: Will be developed as specific projects are proposed.

Implementation Schedule and Milestones: The specific implementation schedule and KPIs have not been developed yet, but will be as projects develop. Generally, the project will consist of project design and scoping, procurement, project implementation with regular check-ins and updates with the contractor(s), draft reporting and review, and finalization of established project deliverables.

Statewide Agriculture Measure

SW Agriculture 1: Expand Methane and Nitrous Oxide Emission Reductions from Agricultural Operations

Description: Colorado Department of Agriculture will lead efforts to promote methane (CH4) and nitrous oxide (N2O) emissions reduction strategies in agriculture and create policy and program recommendations. CDA will work with Colorado State University, industry partners, farmers, ranchers, and other stakeholders to help promote and potentially fund:

- Current technologies and opportunities focused on supporting ranchers in their work to reduce methane emissions from animal agriculture, as well as identifying existing barriers to lower methane production agriculture, and potential strategies for overcoming barriers to implementation.
- Current technologies, strategies, and barriers to reducing agricultural N2O emissions, including efficient fertilizer applications.
- Potential solutions and incentives for methane capture, anaerobic digestion, including biodigesters, and enteric fermentation reduction strategies.

Estimated GHG reductions by 2030, 2050:

The Agriculture sector in Colorado includes Livestock Management, Agricultural Soil Management, Urea Fertilization, Liming, Field Burning of Agricultural Residues, and Rice Cultivation. Emissions from these subsectors are dominated by comparable shares of methane (CH_4) and nitrous oxide (N_2O) with small amounts of carbon dioxide (CO_2).

Emissions from this sector are currently forecasted to grow over time. This sector represents a significant area of additional emission reductions. Table 7 below and Table 4 in Appendix A provide information on the forecasted total emissions from these two sources. More exact emission reduction potential will be developed should a specific proposal be included in the implementation grant phase.

Table 7: Forecasted Total Emissions from Agriculture based on 2023 Colorado Greenhouse Gas Inventory (MMTCO2E)

Year	Emissions from Agriculture
Total to 2030	117.89
Total to 2050	476.97

Implementing Agency or Agencies: This action would be led by the Colorado Department of Agriculture.

Geographic Location: Statewide

Funding Sources: There are federal funding sources for renewable energy projects (like installing anaerobic digesters) that could include methane reduction, however these funding sources do not specifically target methane or nitrous oxide. Colorado has no existing funding source specific to this measure.

Metrics for Tracking Progress:

- Number of agricultural stakeholders, including farmers and ranchers, who participate in any planning or outreach efforts.
- Number of agricultural operations, including dairies, feedlots, and agricultural businesses, applying for the funding, number of qualified facilities/ organizations successfully methane or nitrous oxide reducing projects.
- Amount of CO2e and other co-pollutants reduced at each participating operation, and compiled statewide.

Implementation Schedule and Milestones: If funded, Colorado would work with a to-be-identified multistate coalition to identify methane and nitrous oxide reduction strategies, including new technologies, voluntary programs, and other incentives, that could be implemented in Colorado. Colorado Dept of Agriculture (CDA) would also engage agricultural stakeholders, including research partners and commodity groups, to ensure any program met the needs and existing barriers faced by Colorado farmers, ranchers, dairymen, and agricultural businesses.

Statewide Review of Authority to Implement

The Near Term Action list identified as part of the Roadmap 2.0 update categorizes actions into Regulatory, Legislative, and Administrative actions. Regulatory actions require new rulemaking processes. By their nature, legislative actions will require either new funding or new authority (or both) to implement. Administrative actions are those agencies can take without new funding or authority. This PCAP presents administrative actions that state agencies have existing authority to undertake, assuming there is available funding and resources to implement as well as regulatory actions for which statutory authority has already been granted. The measures contained regarding local governments constitute a list of voluntary actions available to Colorado communities for CPRG Implementation.

Local Government GHG Reduction Priority Measures

The local government priority measures were selected because they can provide significant GHG emissions reduction benefits, advance other state priorities such as improved air quality and equity, are aligned with local government priorities based on stakeholder engagement, and Colorado local governments have the authority and ability to implement them.

The State of Colorado plans to apply for a CPRG implementation grant to run a Colorado Local Climate Action Accelerator (CLCAA) program that would provide subgrants to local governments to implement these measures, though local governments could also apply to the EPA individually to implement measures. If awarded, the CLCAA would be developed to incentivize widespread local government progress on equitable climate action. The CLCAA would offer sub-grants from the state to local governments for technical assistance to support adoption of policies in sectors where local governments can make the most impact, combined with equity-focused incentive funding for implementation.

Transportation Measures

In 2020, transportation energy usage contributed to approximately 19.4% of Colorado's GHG emissions.[14] Transportation emissions are impacted by the type of fuel used to power vehicles, the efficiency of vehicles, and the total amount of vehicle

[14] 2023 Colorado Statewide Inventory of Greenhouse Gas Emissions and Sinks, Table 2.4, The 19.4% figure is out of statewide emissions excluding land use, land use change, and forestry, which is typically reported separately from the other sectors in state totals.

miles traveled (VMT). Local governments have authority over the design and operation of local roads and streets, and have policy options available to encourage walking, biking, and transit use, as well as electric vehicle and lower-emissions vehicle adoption. Reducing GHG emissions from transportation can be achieved by local governments by: 1) Shifting Travel to Active Transportation and Transit: Biking and walking do not generate any GHG emissions, and buses and trains generate fewer GHG emissions per rider than single-occupancy vehicles. 2) Zero Emission and Energy Efficient Vehicle Adoption: Electric vehicles (EVs) do not generate direct GHG emissions, and more fuel efficient internal combustion engine (ICE) vehicles generate less direct GHG emissions than less fuel efficient ICE vehicles. The state of Colorado has robust existing policies and programs that support new EV charging infrastructure and the adoption of EVs, and the EV related priority measures identified in the transportation (vehicle registration fees), buildings (EV ready codes), and land use (EV charging permitting) sectors are intended to support EV adoption without overlapping with existing state efforts. While we show these in a separate category, because they are such high impact actions, local government land use plans and zoning codes are perhaps the highest impact decisions local governments make that determine how much VMT is generated.

LG Transportation 1: Plan and implement high quality active transportation infrastructure

Description: This measure includes the expansion of high quality bicycle and pedestrian infrastructure, with the goal of reducing VMT and associated GHG emissions by encouraging a shift from driving to active transportation modes. Fully connected, high-quality bicycle and pedestrian networks can improve the safety, speed, and convenience of active transportation modes, making biking and walking more attractive to potential cyclists and pedestrians of all ages and abilities.

GHG emissions reduction modeling notes: Because it is not yet known what Colorado local governments will implement which measures, GHG emissions reduction for all local government measures are modeled for example jurisdictions of different sizes and contexts. Population and household growth rates are applied based on projections from the State Demography Office for different regions of the state. Results are reported relative to the state's Roadmap 2.0 baseline, which incorporates already adopted state policies, including for example vehicle emissions and sales standards, building performance standards, and electricity sector policies.[15] All GHG emissions

[15] Included policies and modeling assumptions for the Roadmap Baseline scenario are included on the EPS model website.

reduction modeling assumptions, methodology, and data sources can be found in Appendix B.

Table 8: LG Transportation 1 Estimated GHG Emissions Reductions Estimates (Metric tons)

Context	Population	Population growth rate[16]	2025-2030 GHG Reduction	2025-2050 GHG Reduction
Urban	200,000	High (>25%)	13,200	86,200
Suburban	80,000	Medium (10-25%)	700	5,000
Rural	10,000	Medium (10-25%)	-	100

GHG emissions estimates are based on the per capita estimated increase in miles of bike lanes, shared use paths, and sidewalks modeled in the CDOT GHG Planning Standard Cost Benefit Analysis[17], annual VMT reductions per mile of new bike and pedestrian infrastructure from the Colorado Department of Transportation Greenhouse Gas Mitigation Measures Policy Directive[18], and GHG emissions factor per VMT reduction. GHG emissions reductions modeling assumptions, methodology, and data sources are found in Appendix B.

Implementing Agency or Agencies: Local governments can develop and adopt plans for sidewalks on high traffic routes, networks of protected bike lanes, off-street trails, lane conversions, and pedestrian-only zones; establish dedicated local funding for active transportation improvements; and adopt robust complete streets policies and street design standards that ensure active transportation infrastructure is built as part of planned roadway improvement projects and new developments. Implementation of this measure may also include local governments, the state, or other entities providing funding to build high quality active transportation infrastructure projects.

Geographic Location: The potential geographic scope of this action is within any Colorado local government jurisdiction. However, the type of strategies employed will vary by land use context, with more intensive active transportation infrastructure such as protected bike lanes and pedestrian only zones being more appropriate in urban contexts, and other infrastructure types such as shared use paths being more appropriate in suburban and rural contexts.

[16] Population growth rates are based on total population growth by 2050 as forecasted by the State Demography Office for the example jurisdictions and regions.
[17] Colorado Department of Transportation, Cost-Benefit Analysis For Rules Governing Statewide Transportation Planning.
[18] Colorado Department of Transportation, Greenhouse Gas Mitigation Measures Policy Directive, 28

Funding Sources: The Colorado Statewide Transportation Improvement Program (STIP)[19] and Metropolitan Planning Organization (MPO) Transportation Improvement Programs[20] are the primary planning processes for local governments to obtain funding for active transportation projects from sources such as the Transportation Alternatives Program or the Congestion Mitigation & Air Quality Program. Local governments may also fund active transportation projects through federal, state, and local discretionary grant programs, and local funding sources such as special assessment districts, development impact fees, and sales tax increments.

The cost benefit analysis that supported Colorado's GHG Transportation Planning Standard (GHG Rule) found that the long range Regional Transportation Plans from Colorado's 5 metropolitan planning organizations (MPOs) included $28 billion dollars of projects through 2050, and estimates the percentage of this amount that would need to be spent on mitigation measures (including active transportation and transit) to achieve the GHG reduction targets of the GHG Rule[21], as shown below in Table 9:

Table 9: Net Neutral Investment Levels and Dollars Shifted to Multimodal Transportation and other Environmentally Beneficial Transportation Investments (net present value, millions of 2021 dollars)

Years	Total RTPs + 10-Year Plan	Total Shift to Mitigation	Percent Shift
2022-2025	$3,842.07	$417.90	11%
2026-2030	$4,802.59	$974.90	21%
2031-2040	$9,605.17	$2,655.80	28%
2041-2050	$9,605.17	$2,691.50	28%

The analysis estimated that to achieve the GHG emissions reduction goals of the GHG rule, 250 miles of new bicycle infrastructure and will need to be built annually[22], and 1,900 miles of new sidewalks will need to be improved or built by 2030 and 4,700 by 2050.[23] The analysis estimated the cost of constructing and maintaining these active transportation improvements as shown below in Table 10.

[19] Colorado Statewide Transportation Improvement Program
[20] Colorado Statewide Transportation Improvement Program, MPO TIP Amendments
[21] Colorado Department of Transportation, Cost-Benefit Analysis For Rules Governing Statewide Transportation Planning, Table 1, p. 1-2
[22] Colorado Department of Transportation, Cost-Benefit Analysis For Rules Governing Statewide Transportation Planning, p. 19
[23] Colorado Department of Transportation, Cost-Benefit Analysis For Rules Governing Statewide Transportation Planning, p. 13

Table 10: Costs for Bicycle, Pedestrian, and Micro-Mobility Facilities, Policies, Initiatives (millions of 2021 dollars)[24]

Description	2022-2025	2026-2030	2031-2040	2041-2050
Sidewalk Infrastructure Costs	$100	$112	$187	$32
Bicycle Infrastructure Costs	$46	$50	$84	$15
Maintenance	$46	$145	$496	$566

In 2023 the Revitalizing Main Streets program, a discretionary state grant program that funds active transportation infrastructure, awarded 30 of the 44 local government applicants with over $6M for active transportation infrastructure projects.

Increasing the expansion rate of Colorado's pedestrian and bicycle infrastructure as suggested by the GHG rule will require significant investment beyond existing funding. CPRG funding for active transportation planning and implementation will help Colorado local governments meet this goal by more rapidly expanding active transportation infrastructure in their jurisdictions.

Metrics for Tracking Progress: Key metrics to track progress could include miles of new bicycle or pedestrian infrastructure planned or funded, and the number of jurisdictions with adopted roadway design standards with active transportation requirements, adopted complete streets policies, or dedicated local revenue for active transportation. If awarded an implementation grant to support local governments, the state will work with local governments to develop metrics to track progress relevant to the active transportation strategies they pursue.

LG Transportation 2: Plan and implement bus rapid transit and other transit priority measures

Description: This measure includes the planning and implementation of transit priority measures on major transit routes to improve reliability and service, with the goal of reducing VMT and associated GHG emissions by encouraging a shift from driving to transit. Bus rapid transit (BRT) elements such as bus lanes, queue jumps, and transit priority signals can improve the speed and reliability of transit service, making bus ridership more convenient and attractive to potential passengers, and supportive infrastructure such as high-quality bus stops, elevated platforms, and off-board fare

[24] Colorado Department of Transportation, Cost-Benefit Analysis For Rules Governing Statewide Transportation Planning, Table A.3, p. 13

collection can increase passenger comfort, improve reliability, and attract additional riders of all ages and abilities.

Table 11: LG Transportation 2 Estimated GHG Emissions Reductions Estimates (Metric tons)

Context	Population	Population growth rate	2025-2030 GHG Reduction	2025-2050 GHG Reduction
Urban	200,000	High (>25%)	4,100	30,900
Suburban	80,000	Medium (10-25%)	1,600	11,700
Rural	10,000	Medium (10-25%)	200	1,500

GHG emissions estimates are based on the planned bus rapid transit investments from representative Colorado local government transportation plans including the Denver Regional Council of Government's Long Range Transportation Plan[25], annual VMT reductions based on estimates of bus rapid transit annual vehicle revenue miles and avoided VMT from the Colorado Department of Transportation Greenhouse Gas Mitigation Measures Policy Directive[26], and GHG emissions factor per VMT reduction. GHG emissions reductions modeling assumptions, methodology, and data sources are found in Appendix B.

Implementing Agency or Agencies: Local governments can partner with transit agencies and the state to plan, fund, and construct high-quality bus infrastructure along high volume corridors that serve major residential, commercial, and employment centers. In some cases, local governments own the streets, signals, and sidewalks where transit agencies operate, and so are important partners in implementing transit priority measures. In some cases, transit routes also operate on state highways and necessitate cooperation with CDOT.

Geographic Location: The potential geographic scope of this action is within any Colorado local government jurisdiction. However, intensive and higher cost infrastructure investments such as bus rapid transit may be most cost effective in urban and suburban areas with greater potential ridership, as well as some rural resort areas.

[25] DRCOG 2050 Regional Transportation Plan
[26] Colorado Department of Transportation, Greenhouse Gas Mitigation Measures Policy Directive.

Funding Sources: The Colorado Statewide Transportation Improvement Program (STIP)[27] and Metropolitan Planning Organization (MPO) Transportation Improvement Programs[28] are the primary planning processes for local governments and transit agencies to obtain funding for transit projects from sources such as the Transportation Alternatives Program or the Congestion Mitigation & Air Quality Program. These entities may also fund transit projects using other sources such as local and state taxes, state and federal discretionary grant programs, and value capture methods such as special assessment districts and development impact fees.

As examples, the North Front Range MPO includes three BRT corridors in its long range transportation plan, with an estimated cost by the transit agency who would implement them of $91M.[29] DRCOG's long range transportation plan also includes several BRT corridors, which collectively are estimated to cost over $1 billion to implement.[30] While these projects are identified in fiscally-constrained plans, each project does not yet have specific funding sources secured.

CPRG funding for transit infrastructure planning and implementation will help Colorado local governments reduce transportation emissions by more rapidly expanding transit infrastructure in their jurisdictions.

Metrics for Tracking Progress: Key metrics to track progress could include miles of routes with new transit priority infrastructure planned or funded (e.g. transit priority signals, queue jumps) and the number of jurisdictions with new transit priority plans. If awarded an implementation grant to support local governments, the state will work with local governments to develop metrics to track progress relevant to the transit priority strategies they pursue.

LG Transportation 3: Adopt and implement policies to encourage transit and active transportation use and reduce parking

Description: This measure includes the local government adoption and implementation of transportation demand management (TDM) policies and programs intended to reduce vehicle miles traveled (VMT) and associated GHG emissions from major trip generators such as employment, commercial, and residential centers. TDM policies include a range of approaches designed to reduce VMT by encouraging a shift from single occupancy driving to transit, biking, walking, or carpooling, or by reducing the demand for trips. Strategies designed to shift trips from driving to other modes

[27] Colorado Statewide Transportation Improvement Program
[28] Colorado Statewide Transportation Improvement Program, MPO TIP Amendments
[29] North Front Range MPO 2050 Regional Transportation Plan; Fort Collins Transit Master Plan.
[30] Regional Transportation Plan | DRCOG.

include those that reduce barriers to using transit, biking, or walking, such as free of reduced price transit passes, e-bike programs, supportive bicycle and pedestrian infrastructure, carpooling incentives, and education programs; and those that discourage the use of personal vehicles, such as pricing parking, shared and unbundled parking policies, parking cash-out policies, and reductions in on-site parking. Trip reduction strategies can include, for example, employer teleworking and flexible work schedule policies.

Table 12: LG Transportation 3 Estimated GHG Emissions Reductions Estimates (Metric tons)

Context	Population	Population growth rate	2025-2030 GHG Reduction	2025-2050 GHG Reduction
Urban	200,000	High (>25%)	126,600	330,800
Suburban	80,000	Medium (10-25%)	49,400	123,400
Rural	10,000	Medium (10-25%)	6,200	15,800

GHG emissions estimates are based on an average of estimated VMT reductions from two common TDM policies: 1) employer parking cash out policies, and 2) employer provided transit passes. The estimates also estimate GHG reduction per VMT reduced. GHG emissions reductions modeling assumptions, methodology, and data sources are found in Appendix B.

Implementing Agency or Agencies: Local governments can adopt policies requiring TDM strategies in existing and/or planned developments, provide local funds or other incentives to developments or employers to adopt strategies, or use a combination of policies and funding. The state can provide technical assistance and funding to support these efforts.

Metropolitan planning organizations and transportation management associations and organizations will be key partners, as they have experience managing TDM programs in their territories, and can assist with coordinating local government policies and programs with existing regional TDM efforts. Transit agencies will also be key partners in TDM strategies, as they can coordinate transit infrastructure and services with planned developments, and may be able to provide free or reduced cost transit passes, particularly in LIDAC communities.

Geographic Location: The potential geographic scope of this action is within any Colorado local government jurisdiction. However, the TDM strategies employed may

vary with land use context and access to transit and active transportation services and infrastructure. In urban and denser suburban areas with greater access to active transportation and transit, strategies designed to disincentivize single occupancy vehicle travel may be most appropriate, as residents have greater access to viable alternative transportation modes. In rural and lower density suburban areas with less access to active transportation and transit, strategies to encourage active transportation, use of microtransit, carpooling and teleworking may be more appropriate.

Funding Sources: TDM planning and implementation is often funded by employers, developers, and local governments, with additional assistance from metropolitan planning organizations (DRCOG, NFRMPO, GVMC), transportation management associations/organizations (TMA/TMO), and the Colorado Department of Transportation (CDOT) through for example the 2019 Statewide TDM Plan, TDM Seed Funding Grant, TMO Innovation Grant, and TMO Support Grants.

The three CDOT TDM grant programs have seen substantial interest from eligible entities, including local governments. The TDM Seed Funding grant has awarded 3 grantees of 4 applicants, the TDM Innovation Grant has awarded 22 grantees of 39 applicants, and the TMO Support Grant has awarded 16 grants to Colorado TMOs. Awardees of these programs include for-profit, non-profit, governmental, and quasi-governmental entities.

CPRG funding will complement these existing funding streams and fulfill unmet funding needs for TDM planning and implementation.

Metrics for Tracking Progress: Key metrics to track progress could include local TDM policy adoption, changes in single occupancy vehicle trips, vehicles miles traveled, parking spaces added to new developments, parking space utilization, transit ridership and transit pass program utilization. If awarded an implementation grant to support local governments, the state will work with local governments to develop metrics to track progress relevant to the transportation demand management strategies they pursue.

LG Transportation 4: Implement differentiated vehicle registration and other fees based on vehicle size or efficiency

Description: This measure includes the adoption of county vehicle registration or other fee policies that incentivize the purchase and use of zero-emission and lower-emission light-duty vehicles, and/or disincentivize the use of higher-emission vehicles based on vehicle size or efficiency, with the goal of reducing associated GHG

emissions from vehicles. Local governments can assess higher vehicle registration, annual residential parking, or other fees for higher emitting vehicles, and can also reduce fees for lower emitting vehicles. Fee increases or reductions could be applied at the time of purchase of new, used, and/or leased vehicles; could be applied differently to different classes of vehicles; and could use a linear fee model (calculating fees based on exact GHG emissions) or a stepwise fee model (vehicles sorted into fee categories based on GHG emissions thresholds).

Table 13: LG Transportation 4 Estimated GHG Emissions Reductions Estimates (Metric tons)

Context	Population	Population growth rate	2025-2030 GHG Reduction	2025-2050 GHG Reduction
Urban	200,000	High (>25%)	74,100	527,600
Suburban	80,000	Medium (10-25%)	28,600	191,000
Rural	10,000	Medium (10-25%)	3,600	24,800

GHG emissions estimates are based on estimated changes in vehicle fuel efficiency, projected statewide VMT, and GHG emissions factors. Estimated GHG emissions reductions reflect an assumed feebate structure based on global best practices for a feebate rate and efficiency thresholds. Fee structures and resulting GHG reductions will vary. GHG emissions reductions modeling assumptions, methodology, and data sources are found in Appendix B.

Implementing Agency or Agencies: State enabling legislation may be needed for counties to apply an emissions, efficiency, weight, or size-based registration fee program, which the state intends to study and consider for the 2025 legislative session. If approved, county governments would then be able to adopt and implement differential fees for vehicle registration based on vehicle size, efficiency, fuel type, or other factors. Local governments could also establish other differentiated fees, such as for annual residential street parking fees.

Geographic Location: The potential geographic scope of this action is within any Colorado local government. If implementing this action through vehicle registration fees, the scope would be within any county or combined city-county, as vehicle registration fees are administered at the County level in Colorado.

Funding Sources: There is currently no Colorado county with differentiated vehicle registration fees based on emissions, fuel type, or size, and there is no existing

funding that supports adoption of this measure. CPRG funding would support Colorado municipalities and counties to adopt this measure.

Metrics for Tracking Progress: Key metrics to track progress could include the percentages of new and used vehicle registrations that are electric vehicles and other low-emitting vehicles, the registration of vehicles by fuel economy, and the number of jurisdictions that adopt differential vehicle fees based on vehicle size or efficiency. If awarded an implementation grant to support local governments, the state will work with local governments to develop metrics to track progress relevant to the vehicle fee strategies they pursue.

Building Measures

In 2020, fuel combustion in residential and commercial building energy usage contributed to approximately 10% of Colorado's GHG emissions.[31] Local governments have the authority to adopt building energy codes that comply with or exceed codes set by the state Energy Code Board before required dates, adopt performance standards that meet or exceed state requirements or apply to a broader set of covered buildings, and implement incentive and financing programs for energy efficiency, electrification, and on-site renewable improvements. Reducing GHG emissions from buildings can be achieved by local governments through the following pathways: 1) Energy Efficiency: More efficient building envelopes and appliances reduce both electricity and fossil fuel usage, and associated GHG emissions; 2) Electrification: Highly efficient electric heat pumps, heat pump water heaters, and cooking appliances eliminate site GHG emissions from fossil fuel usage, and 3) On-Site Renewable Energy: On-site solar and wind generation allows buildings to offset all or some of their electricity usage, reducing GHG emissions from utility-scale electricity generation.

LG Buildings 1: Adopt state minimum building energy codes, including electric, solar, and EV-ready provisions

Description: This measure includes adoption of building energy codes that meet the minimum requirements of House Bills 22-1362 and 23-1233 earlier than is required by state law, with the goal of reducing building energy usage and associated GHG emissions through greater energy efficiency, reduced on-site fossil fuel usage, and increased on-site renewable energy generation. The state minimum requirements include adoption of the 2021 International Energy Conservation Code (IECC) and the

[31] 2023 Colorado Statewide Inventory of Greenhouse Gas Emissions and Sinks, Table 3.4. The 10% figure is out of statewide emissions excluding land use, land use change, and forestry, which is typically reported separately from the other sectors in state totals.

Colorado model electric ready and solar ready code designed to prepare new homes and buildings for electric vehicles, rooftop solar, and high-efficiency electric appliances.

Table 14: LG Buildings 1 Estimated GHG Emissions Reductions Estimates (Metric tons)

Context	Population	Population growth rate	2025-2030 GHG Reduction	2025-2050 GHG Reduction
Urban	200,000	High (>25%)	22,200	60,600
Suburban	80,000	Medium (10-25%)	11,500	35,100
Rural	10,000	Medium (10-25%)	1,000	2,800

GHG emissions estimates are based on the estimated number of local governments that would adopt the state minimum building energy codes, the level of efficiency of existing building energy codes in adopting jurisdictions (assumed to be the 2015 IECC for this purpose), percentage of new or retrofitted buildings that would comply with adopted building codes, regional growth rates, expected reductions in energy usage from increased energy efficiency and building electrification regardless of code adoption, and GHG emissions factors. GHG emissions reductions modeling assumptions, methodology, and data sources are found in Appendix B.

Implementing Agency or Agencies: The state (through the Energy Code Board) is responsible for developing model building energy codes that serve as the state's minimum requirements when a jurisdiction adopts or updates any building code. Local governments have the authority to adopt building energy codes that meet or exceed state minimums within their jurisdictions, and the state can provide technical assistance and funding to support these efforts. Compliance with adopted building energy codes can be improved by providing robust incentives for energy efficiency, electrification, and on-site renewable energy projects, and through proactive local government staff training.

Geographic Location: The potential geographic scope of this action is within any Colorado local government jurisdiction that has yet to adopt the state minimum building energy codes.

Funding Sources: Building energy code adoption is funded by local governments, with assistance from utilities, state agencies and federal agencies. While Colorado currently has the Energy Code Adoption and Enforcement Grant Program which provides grants to local governments to support their adoption of building energy

codes that meet or exceed state requirement, the program will be able to fund about 65 local governments (out of a total of 273 municipalities and 64 counties in Colorado). Other sources of funding include $2M from the FEMA Building Resilient Infrastructure and Communities (BRIC) grant and $2.5M from the Department of Energy Resilient and Efficient Codes Implementation Grant. As of February 2024, 27 Colorado local governments have adopted building energy codes that meet or exceed state minimum requirements, and the remaining 313 local governments are required to adopt state minimum building energy codes the next time they update their codes, which is likely within the next 3-6 years. This is a significant effort that will require a commensurate level of support. The existing funding is limited and is unlikely to meet this demand at the scale and pace necessary, and CPRG funding will enable more local governments to adopt climate-friendly building energy codes sooner.

Metrics for Tracking Progress: Key metrics to track progress could include the number of local governments that adopt state minimum building energy codes, including the model solar and electric ready codes. If awarded an implementation grant to support local governments, the state will work with local governments to develop metrics to track progress relevant to the building energy code strategies they pursue.

LG Buildings 2: Adopt building energy codes and performance standards that exceed state requirements

Description: This measure includes adoption of building energy codes that exceed the minimum requirements of House Bills 22-1362 and 23-1233, such as electric-preferred, all-electric, passive house, net zero energy provisions, or embodied carbon provisions. This may also include adopting policies that exceed the building performance standards of the Air Quality Control Commission Regulation 28, Part C, such as measures that expand covered buildings or strengthen building performance targets for covered buildings. Buildings that exceed the requirements of the state minimum energy codes and building performance standards will further reduce building energy usage and associated GHG emissions through greater energy efficiency, reduced on-site fossil fuel usage, and increased on-site renewable energy generation.

Table 15: LG Buildings 2 Estimated GHG Emissions Reductions Estimates (Metric tons) - Electric preferred building energy code adoption

Context	Population	Population growth rate	2025-2030 GHG Reduction	2025-2050 GHG Reduction
Urban	200,000	High (>25%)	74,500	545,800

Suburban	80,000	Medium (10-25%)	27,200	189,800
Rural	10,000	Medium (10-25%)	2,400	17,800

Table 16: LG Buildings 2 Estimated GHG Emissions Reductions Estimates (Metric tons) - Building performance standard

Context	Population	Population growth rate	2025-2030 GHG Reduction	2025-2050 GHG Reduction
Urban	200,000	High (>25%)	105,800	196,900
Suburban	80,000	Medium (10-25%)	52,200	95,100
Rural	10,000	Medium (10-25%)	3,000	5,500

GHG emissions estimates are based on reductions in energy usage from increased energy efficiency and building electrification beyond state minimum building energy codes, the level of efficiency of existing building energy codes in adopting jurisdictions, the scope and stringency of building performance standards, regional growth rates, percentage buildings that would comply with adopted building codes or building performance standards, and GHG emissions factors. GHG emissions reductions modeling assumptions, methodology, and data sources are found in Appendix B.

Implementing Agency or Agencies: Local governments have the authority to adopt building energy codes and building performance standards within their jurisdictions, and the state can provide technical assistance and funding to support these efforts. Compliance with adopted building energy codes and performance standards can be improved by providing robust incentives for energy efficiency, electrification, and on-site renewable energy projects, and through proactive local government staff training.

Geographic Location: The potential geographic scope of this action is within any Colorado local government jurisdiction for adopting building performance standards beyond the state regulations, and any jurisdiction that has adopted the state minimum building energy codes for adopting energy codes that exceed state requirements.

Funding Sources: The first part of this measure, building energy code adoption that exceeds state minimum requirements, is funded by the same limited sources as the previous measure for adopting building energy codes that meet state minimum

requirements. The second part of this measure, local government adoption of building performance standards that exceed state minimum requirements, is not funded by any utility or government programs. However, there are multiple funding sources for building owners to access incentive programs that will help them meet building performance standards.

As most of Colorado's local governments will likely be updating their building codes within the next 3-6 years, many are considering opportunities to go above and beyond state minimum requirements. The technical assistance and training associated with advanced energy codes is significant and costly, and existing funding is limited and is unlikely to meet this demand at the scale and pace necessary. Additionally, many local governments are considering adoption of building performance standards that apply to smaller commercial buildings than the state's program (50,000 sq. ft. or larger) or stronger performance targets than the state has set in Air Quality Control Commission Regulation 28. Modeling for performance targets, public engagement, and benchmarking programs are cost prohibitive to local governments without significant funding support. CPRG funding will enable more local governments to adopt climate-friendly building energy codes or building performance standards that exceed state minimum requirements sooner.

Metrics for Tracking Progress: Key metrics to track progress could include the number of local government that adopt building energy codes and/or building performance standards that exceed state requirements, and the number of local governments that adopt specific types of building energy code measures, such as an electric-preferred code, all-electric code, net-zero code, or passive house-equivalent code, or more stringent building performance policies. If awarded an implementation grant to support local governments, the state will work with local governments to develop metrics to track progress relevant to the building energy code and building performance standard strategies they pursue.

LG Buildings 3: Provide incentives and financing for energy efficiency, electrification, and on-site renewable energy

Description: This measure provides support for local jurisdictions that adopt policies to provide financial incentives to reduce the capital costs of building energy efficiency, electrification, geothermal energy for space and water heating, and on-site renewable energy projects, with the goal of reducing building energy usage and associated GHG emissions and operating costs. Incentives may apply to existing and/or new buildings, public and/or private buildings, or residential and/or commercial buildings according to the needs of the jurisdiction. Incentives should be

designed to stack with other federal, state, and utility incentives and be paired with technical assistance to guide property owners in selecting appropriate projects.

Table 17: LG Buildings 3 Estimated GHG Emissions Reductions Estimates (Metric tons) - for energy efficiency incentives

Context	Population	Population growth rate	2025-2030 GHG Reduction	2025-2050 GHG Reduction
Urban	200,000	High (>25%)	33,600	175,100
Suburban	80,000	Medium (10-25%)	15,800	82,800
Rural	10,000	Medium (10-25%)	1,300	6,500

GHG emissions estimates are based on replacement rates of natural gas appliances and HVAC equipment with electric appliances and equipment; square feet of buildings implementing energy efficiency and electrification measures; energy savings from building electrification and energy efficiency measures; percent of buildings suitable for on-site solar energy; and GHG emission factors for natural gas and the electricity sector. GHG emissions reductions modeling assumptions, methodology, and data sources are found in Appendix B.

Implementing Agency or Agencies: Local governments and the state have the authority to operate incentive programs for these purposes.

Geographic Location: The potential geographic scope of this action is within any Colorado local government jurisdiction.

Funding Sources: Energy efficiency, building electrification, and on-site renewable energy incentives are funded by state and federal agencies, as well as some utilities. The Colorado Energy Office runs several grant and tax credit programs including the High Efficiency Electric Heating and Appliances Grant Program and Colorado Heat Pump Tax Credits. The DOE Home Rebates will provide rebates for energy efficiency and building electrification upgrades. The federal Clean Energy Tax Credits included in the Inflation Reduction Act provide tax relief for on-site renewable energy, high-efficiency appliances, and energy efficiency upgrades.

Despite these existing resources, during CEOs' stakeholder engagement process in support of this application, incentives for energy efficiency, building electrification, and on-site renewable energy had broad support from local governments. Local governments cited numerous examples of planned energy efficiency, building electrification, and on-site renewable energy projects that lack sufficient funding -

particularly for low income households and in affordable housing. CPRG funding for this measure would allow for more local governments in Colorado to support climate friendly buildings projects in their jurisdictions.

Metrics for Tracking Progress: Key metrics to track progress in implementing this measure could include number of incentives awarded in any or all of the incentive categories (energy efficiency, building electrification, on-site renewable energy); the amount of incentive funding awarded in each jurisdiction and in total, and the estimated energy and emissions reductions from these projects. If awarded an implementation grant to support local governments, the state will work with local governments to develop metrics to track progress relevant to the building incentive and financing strategies they pursue.

Land Use Measures

The land use measures in this section reflect actions local governments can take through their land use plans, zoning codes, and related policies to affect residential and commercial development patterns in their jurisdiction. Land use related GHG emissions reported for these measures are a combination of emissions from building energy and transportation energy. Land use GHG emissions also include embodied carbon in the built environment and emissions from the conversion of natural and working lands, though these emissions sources were not able to be quantified for the PCAP.

Low density development at the edge of communities increases GHG emissions by requiring longer trip distances to access jobs and services, increasing car dependence, converting natural lands, and increasing building emissions from larger, detached buildings. Local governments have authority over local comprehensive plans, land use development codes, and land use approval processes, and therefore have unique authority to encourage more climate-friendly development patterns, although many of these are areas of mixed state and local authority where the state may also set certain requirements for local codes. Reducing GHG emissions from land use can be achieved by local governments through: 1) Compact and Infill Development: Enabling and encouraging compact development in infill locations reduces building and transportation greenhouse gas emissions. Compact developments tend to have more attached buildings and smaller units within buildings, which together reduce building energy use. And, locating uses closer together reduces trip distances and supports alternatives to personal vehicles, reducing transportation energy. Locating development near high-quality transit services encourages transit usage, further reducing transportation energy; and 2) Renewable Energy and Electrical Vehicle

Charging: Land use policies that allow for renewable energy generation and electric vehicle charging encourage their development, reducing electricity generation and transportation energy emissions.

LG Land Use 1: Encourage accessory dwelling units (ADUs) and attached homes in all residential areas

Description: This measure includes updating local land use codes to allow ADUs, duplexes, triplexes, and townhomes (also often referred to as "middle housing") as a use by right where single-family homes are allowed to encourage infill development, and eliminating residential occupancy limits that differ based on the occupants' relationships to enable greater utilization of existing homes. This measure also includes eliminating or reducing other land use code barriers that inhibit ADUs and attached homes, such as owner-occupancy requirements, parking requirements, and restrictive dimensional standards. This measure may also include strategies to reduce or waive development fees, expedite permitting, provide incentives or financing, or provide pre-approved building designs for these housing types. Encouraging more compact, infill development and greater residential utilization can reduce GHG emissions associated with household and transportation energy usage.

Table 18: LG Land Use 1 Estimated GHG Emissions Reductions Estimates (Metric tons)

Context	Population	Population growth rate	2025-2030 GHG Reduction	2025-2050 GHG Reduction
Urban	200,000	High (>25%)	112,100	812,300
Suburban	80,000	Medium (10-25%)	63,500	386,100
Rural	10,000	Medium (10-25%)	9,200	66,800

GHG emissions estimates are based on the number of ADUs and middle housing units that could be built under adopted policies; regional growth rates; VMT reductions from housing located nearer jobs, services, and transit based on the Colorado Department of Transportation Greenhouse Gas Mitigation Measures Policy Directive[32]; and GHG emissions reduction estimates from VMT based on electric vehicle adoption rates, fuel economy, and fuel emissions factors. GHG emissions reductions modeling assumptions, methodology, and data sources are found in Appendix B. Additional GHG emissions benefits from reductions in building energy use, embodied carbon, and

[32] Colorado Department of Transportation, Greenhouse Gas Mitigation Measures Policy Directive, 28

avoided natural land conversion are not accounted for in these figures, but would increase the anticipated reductions.[33]

Implementing Agency or Agencies: Local governments have the authority to revise local land use ordinances to broadly allow these housing types, and to provide development and other types of incentives for infill, small-scale housing types that are climate friendly. Robust stakeholder engagement in advance of the proposed adoption of residential upzoning policies can increase public support and the likelihood of adoption. The state can also provide technical assistance and funding to support these efforts.

Geographic Location: The potential geographic scope of this action is within any Colorado local government jurisdiction. However, the scale and impact of strategies employed may vary with land use context. In communities with high housing demand, such as urban, denser suburban, and geographically constrained or resort communities, strategies that encourage ADU and middle housing may be most beneficial. In communities with lower housing demand, such as rural communities that are not resorts and without geographic constraints, ADU and middle housing strategies may still provide useful housing type diversity that can be scaled to the local context.

Funding Sources: Adoption of policies and programs to support ADU and middle housing development is currently funded by local governments, with additional assistance from state programs (e.g. Innovative Affordable Housing Strategies, Strong Communities) and federal programs (e.g. PRO Housing Grants).

The Innovate Affordable Housing Strategies (IAHS) program funded local government housing needs assessments and housing policy adoption, including strategies to encourage ADU and middle housing development. The program awarded $5.4 million to 62 local governments out of 65 who applied, and expended all funds. The ongoing Strong Communities program ($40M total) funds the adoption of land use policies and implementation of projects that support affordable housing development in infill locations, including ADUs and middle housing. The first round of planning grants awarded $1.48 million to 10 local governments out of 12 who applied, and 58 letters of intent were received for infrastructure funding, requesting $165 million in funds—five times more than available funding.

The oversubscription of the state IAHS and Strong Communities program highlights the strong demand for funds for local government housing policy adoption, as well as infrastructure needs to support infill housing development. CPRG funding will

[33] Why State Land Use Reform Should Be a Priority Climate Lever for America - RMI

complement these existing funding streams and fulfill the unmet funding need for local governments to encourage new ADU and middle housing development.

Metrics for Tracking Progress: Key metrics to track progress in implementing this measure could include the number of jurisdictions implementing land use code updates that allow additional ADU and middle housing development; the number of local governments that provide ADU and middle housing incentives; and the value of ADU and middle housing incentives awarded. If awarded an implementation grant to support local governments, the state will work with local governments to develop metrics to track progress relevant to the ADU and middle housing strategies they pursue.

LG Land Use 2: Encourage multi-family housing and mixed-use development near transit and in commercial areas

Description: This measure includes updating local land use codes to allow and encourage multi-family housing and mixed-use residential development within walking distance of rail transit and high quality bus service, and in underutilized commercial and institutional areas. This may also include strategies to reduce or waive development fees in these areas, provide development incentives such as density bonuses, and/or fund development associated infrastructure for infill and transit-oriented development. This measure may also include allowing and encouraging the conversion of underutilized buildings in these areas to residential or mixed uses, such as office to residential conversions. Encouraging more compact, infill development can reduce GHG emissions associated with household and transportation energy usage.

Table 19: LG Land Use 2 Estimated GHG Emissions Reductions (Metric tons)

Context	Population	Population growth rate	2025-2030 GHG Reduction	2025-2050 GHG Reduction
Urban	200,000	High (>25%)	82,800	599,900
Suburban	80,000	Medium (10-25%)	23,500	142,600
Rural	10,000	Medium (10-25%)	3,400	24,700

GHG emissions estimates are based on the number of multifamily housing and mixed-use housing units that could be built under adopted policies; household energy use reductions from small units and attached units; regional growth rates; electric vehicle adoption rates; VMT reductions from housing located nearer jobs, services,

and transit Colorado Department of Transportation Greenhouse Gas Mitigation Measures Policy Directive[34]; and GHG emissions reduction estimates from VMT based on electric vehicle adoption rates, fuel economy, and fuel emissions factors. GHG emissions reductions modeling assumptions, methodology, and data sources are found in Appendix B. Additional GHG emissions benefits from reductions in building energy use, embodied carbon, and avoided natural land conversion are not accounted for in these figures, but would increase the anticipated reductions.[35]

Implementing Agency or Agencies: Local governments have the authority to revise local land use ordinances, and to provide incentives for development types that serve the public interest. Robust stakeholder engagement in advance of the proposed adoption of residential upzoning policies can increase public support and the likelihood of adoption. The state can also provide technical assistance and funding to support these efforts.

Geographic Location: The potential geographic scope of this action is within any Colorado local government jurisdiction. However, the scale of strategies employed may vary with land use context. This measure is most applicable in communities with greater access to transit, more commercial land uses, and greater density, such as urban and denser suburban communities. This measure is somewhat less applicable to lower density suburban and rural areas, but may be applicable at a reduced scale, particularly in rural resort communities.

Funding Sources: This measure is funded by the same limited sources as for measure LGLU1.

Metrics for Tracking Progress: Key metrics to track progress in implementing this measure could include the number of jurisdictions implementing land use code updates that allow additional multifamily and mixed use development; the number of local governments that provide multifamily and mixed use development incentives; and the value of multifamily and mixed use development incentives awarded. If awarded an implementation grant to support local governments, the state will work with local governments to develop metrics to track progress relevant to the multifamily and mixed use development strategies they pursue.

[34] Colorado Department of Transportation, Greenhouse Gas Mitigation Measures Policy Directive, 28
[35] Why State Land Use Reform Should Be a Priority Climate Lever for America - RMI

LG Land Use 3: Implement policies to discourage greenfield development

Description: This measure includes updating land use codes to include transfer of development rights, cluster subdivision, growth boundary, annexation, and other policies intended to discourage greenfield development. Discouraging greenfield development reduces development patterns that are energy and emissions intensive from a buildings and transportation perspective, reduces GHG emissions from the conversion of natural and working lands, and encourages compact, infill development, which reduces GHG emissions associated with household and transportation energy usage.

GHG Emissions Reductions Estimates: This measure supports increased housing density near jobs, services, and transit, and the preservation of natural and working lands, which are key strategies to help achieve Colorado's GHG reduction goals. Policies that discourage low-density greenfield development are most successful when they are complementary to policies that seek to encourage additional housing density within existing development patterns such as LG Land Use 1 and LG Land Use 2, as they have the potential to exacerbate the housing crisis and cause leapfrog development patterns if implemented alone. For the purposes of this PCAP, this measure is considered an enabling and supportive measure to the policies directly supporting compact and infill development (LG Land Use 1 and LG Land Use 2), and so the GHG emissions reductions are not directly quantified. This is also due to the variability in policy types within this measure, and the range in potential impacts based on where they may be implemented.

Implementing Agency or Agencies: Local governments have the authority to revise local land use ordinances, and to enter into agreements with adjacent jurisdictions, and the state can provide technical assistance and funding to support these efforts. Robust stakeholder engagement in advance of the proposed adoption of greenfield development policies can increase public support and the likelihood of adoption.

Geographic Location: The potential geographic scope of this measure is within any Colorado local government jurisdiction. However, this measure is likely to be most impactful in jurisdictions with significant amounts of undeveloped land at their edges that are experiencing significant growth. Urban communities which are fully built out and surrounded by existing development, or geographically constrained rural areas without additional buildable land may not benefit from this measure.

Funding Sources: This measure is funded by the state-level Strong Communities program described in measure LG Land Use 1.

Metrics for Tracking Progress: Key metrics to track progress in implementing this measure could include the number of jurisdictions implementing greenfield development policies; and the area of land where policies are put into place. If awarded an implementation grant to support local governments, the state will work with local governments to develop metrics to track progress relevant to the greenfield development strategies they pursue

LG Land Use 4: Implement robust parking reduction policies

Description: This measure includes updating land use codes to reduce or eliminate minimum vehicle parking requirements, apply parking maximum requirements, and/or other local parking reduction policies, while encouraging or requiring bicycle parking. Reducing vehicle parking in developments and on public roadways can lessen single occupancy vehicle trips and associated GHG emissions, and less required parking in residential developments decreases housing costs and encourages energy efficiency by reducing the costs and building space used for parking.

Table 20: LG Land Use 4 Estimated GHG Emissions Reductions (Metric tons)

Context	Population	Population growth rate	2025-2030 GHG Reduction	2025-2050 GHG Reduction
Urban	200,000	High (>25%)	42,200	281,900
Suburban	80,000	Medium (10-25%)	14,000	81,500
Rural	10,000	Medium (10-25%)	1,000	6,800

GHG emissions estimates are based on regional growth rates, electric vehicle adoption rates, VMT reduction estimates from the Colorado Department of Transportation Greenhouse Gas Mitigation Measures Policy Directive[36], and GHG emissions reductions factors for VMT reductions. GHG emissions reductions modeling assumptions, methodology, and data sources are found in Appendix B. Additional GHG emissions benefits from reductions in building energy use, embodied carbon, and avoided natural land conversion are not accounted for in these figures, but would increase the anticipated reductions.[37]

Implementing Agency or Agencies: Local governments have authority to revise local land use ordinances and adopt other parking reduction policies, and the state can provide technical assistance and funding to support these efforts. Robust stakeholder

[36] Colorado Department of Transportation, Greenhouse Gas Mitigation Measures Policy Directive, 28
[37] Why State Land Use Reform Should Be a Priority Climate Lever for America - RMI

engagement in advance of the proposed adoption of parking reduction policies can increase public support and the likelihood of adoption.

Geographic Location: The potential geographic scope of this action is within any Colorado local government jurisdiction. Parking reduction strategies may be most applicable in urban, denser suburban, and resort communities with a greater demand for parking, and may be less impactful in lower density suburban and rural areas with less parking demand. However, these strategies may be particularly important for revitalization of main street districts in smaller rural Colorado towns.

Funding Sources: This measure is funded by the same limited sources as for measure LGLU1.

Metrics for Tracking Progress: Key metrics to track progress could include the number of adopted local parking reduction ordinances, parking spaces added to new developments, parking space utilization, and on-street parking fees collected. If awarded an implementation grant to support local governments, the state will work with local governments to develop metrics to track progress relevant to the parking reduction strategies they pursue.

LG Land Use 5: Adopt best practices in EV charging permitting

Description: This measure includes updating local land use codes based on the best practices identified by CEO during a recent stakeholder process with local governments and charging developers, and guidance from the upcoming state-developed EV charging permitting model code. These best practices are intended to provide more predictable, transparent, and objective permitting processes for public EV charging projects, as well as improve the permitting process through providing application checklists and staff training, with the goal of reducing permitting timelines.

GHG Emissions Reductions Estimates: This measure supports faster and more predictable permitting times and accelerated development of EV charging infrastructure. Supporting the rapid deployment of a robust network of publicly available EV charging stations will help drive EV adoption and associated GHG emissions reductions. Because this measure supports and enables reaching the state's EV charging and EV adoption goals but does not directly impact them, its GHG emissions reduction impact is not quantified in this PCAP.

Implementing Agency or Agencies: Local governments have authority to revise local land use ordinances and permitting processes. Robust stakeholder engagement in

advance of the proposed adoption of EV charging permitting policies can increase public support and the likelihood of adoption.

Geographic Location: The potential geographic scope of this action is within any Colorado local government jurisdiction. However, it is most applicable to jurisdictions where a significant amount of public EV charging development is anticipated.[38]

Funding Sources: Revisions to local government zoning codes are typically funded by local governments, with assistance from state agencies for some specialized topic areas. There is no existing state funding to support the adoption of EV charging permitting best practices. CPRG funding would support interested Colorado local governments with adopting this measure.

Metrics for Tracking Progress: Key metrics to track progress in implementing this measure could include; the number of local governments adopting EV charging permitting best practices; average permitting times for EV charging projects; and the percentage of EV charging permit applications that are approved. If awarded an implementation grant to support local governments, the state will work with local governments to develop metrics to track progress relevant to the EV charging permitting strategies they pursue.

LG Land Use 6: Reform utility scale renewable energy permitting

Description: This measure includes updating local land use codes to provide more predictable, transparent, and objective permitting processes for renewable energy projects, with the goal of reducing permitting timelines and encouraging the development of renewable energy projects. Faster permitting times can accelerate the development of renewable energy projects, reducing GHG emissions from additional renewable energy resources on the electricity grid.

GHG Emissions Reductions Estimates: This measure supports utility scale renewable energy development, which is a key strategy to help achieve Colorado's GHG reduction goals. Predictable permitting processes with more objective review standards will support the development of additional renewable energy generation in Colorado. Because this measure supports but does not directly impact GHG emissions, its GHG emissions reduction impact is not quantified in this PCAP.

[38] The study Colorado charging infrastructure needs to reach electric vehicle goals by the International Council on Clean Transportation identified the overall number of charging stations needed for light-duty vehicles, as well as the number needed per county by 2030. The state has also completed a similar analysis for medium- and heavy-duty vehicle charging.

Implementing Agency or Agencies: Local governments have authority to revise local land use ordinances, within constraints set by state law. Robust stakeholder engagement in advance of the proposed adoption of renewable energy permitting policies can increase public support and the likelihood of adoption.

Geographic Location: The potential geographic scope of this measure is within any Colorado local government jurisdiction. However, it is most applicable to jurisdictions with significant solar and wind energy development potential based on solar and wind resources, available land, and access to electrical transmission lines.

Funding Sources: Revisions to local government zoning codes are typically funded by local governments, with assistance from state agencies for some specialized topic areas. There is no existing state funding to support the adoption of renewable energy permitting best practices, but the state has applied for $2M in DOE Renewable Energy Siting through Technical Engagement and Planning to establish the Colorado Renewable Energy Technical Assistance Hub to provide local governments with resources and technical assistance to evaluate renewable energy projects proposed in their jurisdiction. CPRG funding would further support Colorado counties to adopt this measure, even if not fully funding the need.

Metrics for Tracking Progress: Key metrics to track progress in implementing this measure could include; the number of local governments adopting renewable energy permitting best practices; average permitting times for renewable energy projects; and the percentage of renewable energy permit applications that are approved. If awarded an implementation grant to support local governments, the state will work with local governments to develop metrics to track progress relevant to the renewable energy permitting strategies they pursue.

Waste Measures

In 2020, waste contributed to approximately 1.8% of Colorado's GHG emissions.[39] Solid waste contributes to GHG emissions through the generation of methane from the anaerobic decay of waste in landfills, greenhouse gas emissions from solid waste combustion facilities, and carbon dioxide from waste hauling vehicles. Local governments have authority over local waste policies, including composting and waste hauling. Reducing emissions through waste strategies can be achieved primarily

[39] 2023 Colorado Statewide Inventory of Greenhouse Gas Emissions and Sinks, Table 2.4, The 1.8% figure is out of statewide emissions excluding land use, land use change, and forestry, which is typically reported separately from the other sectors in state totals.

through composting, solid waste recycling, and reducing transportation emissions related to waste hauling.

LG Waste 1: Adopt jurisdiction-wide waste policies

Description: This measure includes adopting and implementing local policies to reduce waste, increase diversion rates, and reduce emissions associated with waste and waste hauling. These policies may include ordinances to require residential and commercial buildings to offer recycling and composting services, adopting a single waste hauler policy or contract (or several designated single-hauler areas for larger jurisdictions), adopting a policy to require or incentivize diversion of construction waste, or adopting a pay as you throw policy.

Table 21: LG Waste 1 Estimated GHG Emissions Reductions Estimates (Metric tons) - Ordinance requiring recycling and composting services at all buildings

Context	Population	Population growth rate	2025-2030 GHG Reduction	2025-2050 GHG Reduction
Urban	200,000	High (>25%)	96,600	492,200
Suburban	80,000	Medium (10-25%)	46,900	222,200
Rural	10,000	Medium (10-25%)	5,900	28,900

GHG emissions estimates are based on existing statewide waste tonnage, including construction and demolition waste; avoided GHG emissions from landfill diversion due to increased recycling and composting, GHG emissions from composted materials; and GHG emissions reductions from fewer waste hauling vehicles under single waste hauler policies. GHG emissions reductions modeling assumptions, methodology, and data sources are found in Appendix B.

Implementing Agency or Agencies: Local governments have authority to revise local ordinances relating to waste, to negotiate contracts with or license waste companies that operate in their jurisdiction, and to fund supportive infrastructure and materials such as single-stream recycling and composting receptacles or organic waste facilities.

Geographic Location: The potential geographic scope of this action is within any Colorado local government jurisdiction.

Funding Sources: Adoption of local government waste policies is funded by local governments, with assistance from the Colorado Department of Health and Environment (CDPHE).

The Technical Assistance Service Provider (TASP) program funded by the Front Range Waste Diversion Enterprise within CDPHE supports local governments in the front range with waste diversion action plans, recycling center analysis, design, and planning, organics diversion design and implementation, zero waste programming support, and policy design and implementation.The FRWD enterprise has received approximately $30M in grant requests, of which $17M have been funded given available resources and project readiness.

The Recycling Resources Economic Opportunity (RREO) program within CDPHE supports eligible entities statewide, including local governments, to create or expand existing recycling programs, and to provide rebate opportunities for Colorado businesses and organizations that are actively providing recycling services. From 2016-2024, The program has received $88.2M in funding requests, of which the program funded $22.7M, given available resources and project readiness.

The oversubscription of the TASP and RREO programs highlights the strong demand for funds for adopting and implementing local policies to reduce waste. CPRG funding will complement these existing funding streams and help fulfill this unmet funding need.

Metrics for Tracking Progress: Key metrics to track progress in implementing this measure could include number of local governments who have implemented each strategy; require residential and commercial buildings to offer recycling and composting services, a single waste hauler policy or contract, require diversion of construction waste, or a pay as you throw policy.

LG Waste 2: Encourage adoption of zero emission vehicles for hauling waste

Description: This measure includes adopting policies or targets to convert refuse trucks to zero emission vehicles, and providing incentives for vehicles or their infrastructure. Refuse trucks are some of the most inefficient vehicles on the road and can emit significant air pollution in neighborhoods.

Table 22: LG Waste 2 Estimated GHG Emissions Reductions Estimates (Metric tons)

Context	Population	Population growth rate	2025-2030 GHG Reduction	2025-2050 GHG Reduction

Urban	200,000	High (>25%)	9,300	72,700
Suburban	80,000	Medium (10-25%)	3,600	26,000
Rural	10,000	Medium (10-25%)	400	3,400

GHG emissions estimates are based on the average size of local government refuse truck fleets in Colorado, GHG emissions reductions per replacement of a diesel vehicle with a ZEV, and the replacement schedule of diesel refuse trucks to ZEVs. GHG emissions reductions modeling assumptions, methodology, and data sources are found in Appendix B.

Implementing Agency or Agencies: Local governments have the ability to negotiate contracts to require waste companies to use electric vehicles, purchase zero emission refuse trucks if they operate their own fleet, and to obtain additional funding from state and federal programs to purchase zero emission vehicles.

Geographic Location: The potential geographic scope of this action is within any Colorado local government jurisdiction.

Funding Sources: Support for the adoption of ZEV refuse truck and charging infrastructure is currently funded by local governments, state programs, state tax credits, and one of the state's investor-owned electric utilities.

Of 39 applicants, the Clean Fleet Vehicle and Technology Grant Program has awarded 17 eligible entities, including local governments, with $14M for the purchase of zero emission vehicles, 2 of which were for refuse trucks.

The Fleet-ZERO program has awarded 26 eligible entities, including local governments, with approximately $5M for fleet vehicle charging infrastructure, about $700K of which will support refuse trucks vehicles through 4 awards.

The Xcel Energy Municipal Refuse Fleet Electrification pilot program to fund the purchase of ZEV refuse trucks was oversubscribed by 175%.[40]

The state's goal for 35,000 medium- and heavy-duty zero emission vehicles by 2030[41] and the oversubscription of state and utility programs highlight the strong demand and need for funds for zero emission refuse trucks and supportive charging infrastructure. CPRG funding will complement these existing funding streams and help fulfill this unmet funding need.

[40] Xcel Energy Transportation Electrification Pilot Program, April 2023 Semi-Annual report, p.27
[41] Colorado Clean Truck Strategy

Metrics for Tracking Progress: Key metrics to track progress in implementing this measure could include the number of ZEV refuse trucks funded or purchased, and number of jurisdictions that have adopted policies or set goals for ZEV refuse truck adoption. If awarded an implementation grant to support local governments, the state will work with local governments to develop metrics to track progress relevant to the zero emission refuse truck strategies they pursue.

Local Government Priority Measures Implementation Schedule and Milestones

The implementation schedule and key milestones below are illustrative of the typical process for local government policy adoption associated with priority measures. The durations of each step in the process may vary based on the measure selected and on the local government adopting the measure. The schedule assumes Colorado applies for a CPRG implementation grant and is awarded funds to run a local climate action accelerator program that would provide subgrants to local governments, though local governments could also apply for measures individually. The schedule is for the policy adoption component of the climate action accelerator only, and not for the incentive funding component, for which the process and durations would vary widely. If participating in the Accelerator program, local governments would:

1. Develop a plan for adopting a policy associated with a priority measure, including the steps and resources needed for stakeholder engagement, technical and legal analysis, and policy drafting and adoption. (est. 2-4 months)
2. Apply to the State of Colorado for a subgrant for stakeholder engagement support, technical assistance, and/or staff capacity to implement the policy adoption plan. (est. 1-3 months)
3. Develop a detailed draft policy proposal, informed by robust stakeholder engagement and technical analysis. (est. 3-12 months)
4. Work with decision-makers to refine and adopt a final version of the policy. (est. 3-6 months)
5. Implement the policy. (varies widely by measure and jurisdiction)
6. Report on outcomes. (varies widely by measure and jurisdiction)

Local Government Priority Measures Review of Authority to Implement

Local governments have the authority to implement the local government priority measures independently and without obtaining new authority, with a few exceptions:

- *LG Transportation 1 and LG Transportation 2: Plan and implement high quality active transportation infrastructure, dedicated bus lanes, and other transit priority measures:* Active transportation plans and projects that impact state highways may require coordination with the Colorado Department of Transportation.
- *LG Transportation 4: Implement differentiated vehicle registration and other fees based on vehicle size or efficiency:* State enabling legislation may be required in order to grant Colorado counties with the authority to set vehicle registration fees based on vehicle emissions or size.
- *LG Land Use 3: Implement policy to discourage greenfield development:* Policies such as intergovernmental agreements and annexation agreements may require coordination and formal agreements with adjacent local governments.

The remaining measures will not require new external authority, but will require the governing body of the local government (e.g. city council or county commission) to commit their local government to implement measures through allocation of internal staff and financial resources, resources, adoption of planning documents or ordinances, or agreement to participate in grant programs.

Colorado Benefits Analysis

Co-Benefits Analysis

Statewide Measures

The statewide priority measures may provide substantial benefits to Colorado residents, including the primary benefit of mitigating the potential negative impacts of climate change, and the co-benefits of climate mitigation activities such as improved air quality, reduced risks to water quality, improved public health, employment opportunities, and lower household energy use. Tables 23 through 25 below show the benefits that the statewide priority measures may provide to Colorado residents.

Table 23: Climate Risk Benefits

Priority Measure	Activity	Output	Outcome
All	Reduced GHG emissions	Decreased risk of climate change related extreme weather events, wildfires, flooding	Improved economic stability, health, and safety

Table 24: Air and Water Quality Benefits

Priority Measure	Activity	Output	Outcome
SW: Industry 1, 2, 3	Reductions in pollutants related to landfills, coal mines, industrial processes and industrial fuel use	Improved air quality	Improved health
SW: Buildings 1	Reductions in natural gas fueled appliances in building	Improved indoor air quality	Improved health
SW: Agriculture 1	Reductions in pollutants related to agriculture	Improved air and water quality	Improved health

Table 25: Financial Benefits

Priority Measure	Activity	Output	Outcome
SW: Buildings 1	Increased renovation or construction of buildings	Increased employment opportunities	Increased household income
SW: Buildings 1	More energy efficient buildings and appliances	Reduced household energy use	Decreased household energy expenses

Local Government Measures

The local government priority measures may provide substantial benefits to Colorado residents, including the primary benefit of mitigating the potential negative impacts of climate change, and the co-benefits of climate mitigation activities such as improved air quality, more active communities, improved public health and public safety, employment opportunities, and lower household energy and transportation cost savings. Tables 26 through 30 below show the benefits that the local government priority measures may provide to Colorado residents.

Table 26: Climate Risk Benefits

Local Government (LG) Priority Measure	Activity	Output	Outcome
All	Reduced GHG emissions	Decreased risk of	Improved

		climate change related extreme weather events, wildfires, flooding	economic stability, health, and safety

Table 27: Air Quality Benefits

LG Priority Measure	Activity	Output	Outcome
T1, T2, T3, LU1, LU2, LU3, LU4	Reductions in vehicle miles traveled	Decreased vehicle-borne air pollution	Improved health
T4, LU5, W2	Replacement of higher emissions ICE vehicles with lower emitting vehicles or zero emissions vehicles	Decreased vehicle-borne air pollution	Improved health
B1, B2, B3	Reductions in natural gas fueled appliances in building	Improved indoor air quality	Improved health

Table 28: Safety Benefits

LG Priority Measure	Activity	Output	Outcome
T1, T3	Increased safe, high quality pedestrian facilities	Increased access to safe, high, quality pedestrian facilities.	Decreased incidence of pedestrian injuries and fatalities
T1, T2, T3, T4, LU1, LU2, LU3, LU4	Reductions in vehicle miles traveled	Decreased vehicle traffic	Decreased incidence of pedestrian injuries and fatalities

Table 29: Healthy Communities Benefits

LG Priority Measure	Activity	Output	Outcome
T1, T3	Greater access to pedestrian infrastructure	Increased rates of walking	Improved health

T1, T3	Greater access to bicycle infrastructure	Increased rates of biking	Improved health
LU1, LU2, LU3	Greater access to parks and recreation facilities	Increased rates of exercise	Improved health

Table 30: Financial Benefits

Priority Measure	Activity	Output	Outcome
B1, B2, B3, LU1, LU2, LU4, LU5, LU6, T1, T2	Increased renovation or construction of buildings, renewable energy development, EV charging infrastructure, and active transportation and transit infrastructure	Increased employment opportunities	Increased household income
B1, B2, B3, LU1, LU2, LU4	More energy efficient buildings and appliances	Reduced household energy use	Decreased household energy expenses
T1, T2,T3	Greater access to pedestrian, bicycle, and transit infrastructure and services	Greater use of walking, biking, and transit modes	Decreased household transportation costs

Colorado Low Income and Disadvantaged Communities Benefits Analysis

Identify LIDACs and Climate Impacts and Risks

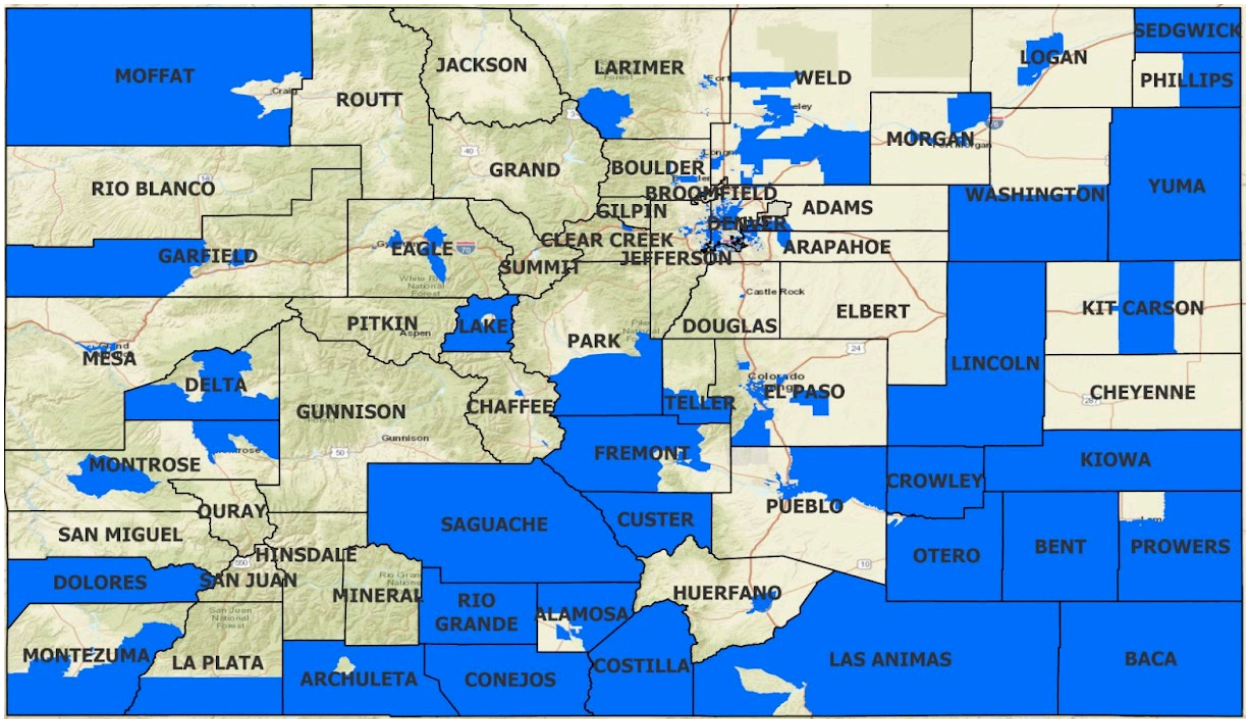
The EPA used data from the Climate and Economic Justice Screening Tool (CEJST)[42] and the Environmental Justice Screening and Mapping Tool (EJScreen)[43] to create the Inflation Reduction Act Disadvantaged Communities Map[44] which can be used to identify Low-Income and Disadvantaged Communities (LIDACS) for the purposes of implementing programs under the IRA, including for the CPRG. Census blocks groups are considered LIDACs according to the parameters of the map if they meet at least one of the following criteria:

[42] Council on Environmental Quality, Climate and Economic Justice Screening Tool
[43] EPA, Environmental Justice Screening and Mapping Tool
[44] EPA, Inflation Reduction Act Disadvantaged Communities Map

- Be within any census tract that is included as disadvantaged in the CEJST
- Any census block group at or above the 90th percentile for any of EJScreen's Supplemental Indexes when compared to the nation or state
- Any of the following geographic areas within the Tribal lands category in EJScreen:
    - Alaska Native Allotments
    - Alaska Native Villages
    - American Indian Reservations
    - American Indian Off-reservation Trust Lands
    - Oklahoma Tribal Statistical Area

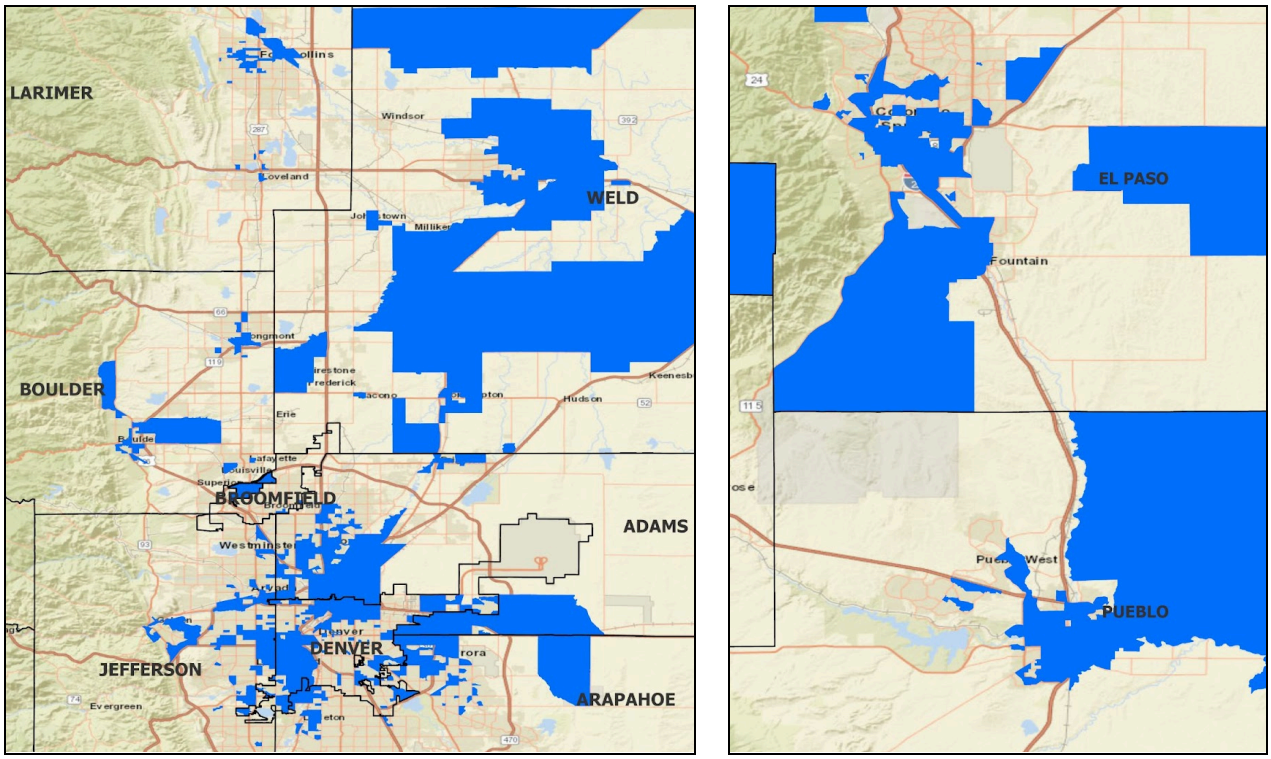
According to the spatial and tabular data downloaded from the Inflation Reduction Act Disadvantaged Communities Map website[45], 1,314 of 4,103 Colorado census block groups meet one of more of these criteria, and are therefore considered LIDACs[46]. Figures 4-6 below show Colorado disadvantaged census block groups, and a complete list is included in Appendix C.

Figure 4: Colorado LIDAC Census Blocks



[45] US EPA, Inflation Reduction Act Disadvantaged Communities Map, ArcGIS Geodatabase and Microsoft Excel Spreadsheet Downloaded February 22, 2024
[46] US EPA, Inflation Reduction Act Disadvantaged Communities Map

Figure 5: Colorado Northern (left) and Colorado Southern (right)Front Range LIDAC Census Blocks



Colorado LIDACs may face increased climate related risks, impacts, and vulnerabilities relative to non-LIDAC communities. According to the EPA report "Climate Change and Social Vulnerability in the United States, socially vulnerable groups may face increased risks to the impacts of climate change.[47] The socially vulnerable groups assessed in the report include low income people, people of color, people with no high school diploma, and people 65 and older. The report assesses the following risks to these populations:

- Assessed Risks Applicable to Colorado:
    - Air Quality and Health
    - Extreme Temperature and Health
    - Extreme Temperature and Labor
    - Inland Flooding and Property
- Assessed Risks Not Applicable to Colorado:
    - Coastal Flooding and Traffic
    - Coastal Flooding and Property

In addition to the risks identified in the EPA report, an increasing number of Coloradans are at risk of impacts from wildfires.[48] Although exposure to wildfire risk is

[47] EPA, Climate Change and Social Vulnerability in the United States Report
[48] 1 Million Coloradans Live in Areas with Elevated Risk of Wildfire | Colorado State Forest Service

not necessarily correlated with income or ethnicity, low income people and people of color are more vulnerable to these risks due to their smaller financial resources and ability to recover from displacement.[49]

Colorado continues to invest in state resources to identify climate hazards and mitigate the impacts on LIDAC communities. These resources include the Climate Preparedness Roadmap[50] recognizing that hazards including extreme heat, wildfires, drought, flooding and post-fire flooding not only have real impacts on natural systems, economic sectors and the built environments, but also have a disproportionate impact on vulnerable people and communities. The Roadmap places a focus on climate adaptation— the state's near-term actions to reduce risks and prepare for the future impacts of climate change.

In 2023 the state also updated the Enhanced State Hazard Mitigation Plan[51] by referencing Justice40 communities and including a "whole community" approach centering on equity and an inclusive planning process. The goal is to reduce risk to populations that face barriers to access and, as such, are disproportionately affected by disasters. This plan is an opportunity to advance a cohesive strategy to counter those barriers, allowing intentional planning and risk reduction for the communities where it is most needed.

Engage with LIDACs to understand community priorities

The development of the statewide and local government PCAP priority measures relied on robust community engagement with LIDAC communities.

The priority measures draw on the near term actions from the pending update to the Colorado Greenhouse Gas Pollution Roadmap 2.0, actions that were determined through a community engagement process that used the recommended best practices in community engagement from the Colorado Environmental Justice Task Force. Two rounds of in-person public meetings were held in communities around the state, in addition to virtual public meetings, and roundtable meetings with technical stakeholders. The format, location, and outreach for every public meeting was informed by a group of local community advisors. Meetings were held in safe, accessible locations in evening hours. Dinner and childcare were provided and both attendees and local community advisors were compensated for their time. Live Spanish interpretation was available and meeting materials were available in both English and Spanish.

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[49] PLOS ONE, The Unequal Vulnerability of Communities of Color to Wildfire, November 2018
[50] Colorado Climate Preparedness Roadmap, December 2023, Colorado Office of Climate Preparedness
[51] Colorado Enhanced State Mitigation Plan, 2023-2028, Colorado Division of Homeland Security and Emergency Management

The feedback of community members was crucial in informing and prioritizing Roadmap actions. Key themes heard throughout the state included:

- Prioritize current needs of Coloradans: affordable housing, energy and transportation, clean air
- Invest in safe streets and reliable public transit
- Educate and collaborate with local communities to understand local challenges and opportunities, and don't assume one size fits all
- Provide incentives to ease clean energy transition
- Support workers impacted by the transition and invest in workforce development

Based on this input, affordability and co benefits were key priorities of the development of both the larger set of near term actions identified in the Roadmap and the shorter list included here as Priority Climate Action Plans. Actions that significantly raised costs, particularly for low income communities, were greatly scrutinized and largely left out.

In addition to community engagement conducted as part of the Roadmap update, the state held a series of meetings with local governments and community organizations, and conducted several publicly accessible surveys to gather feedback on potential priority measures focused on local governments. There were separate meetings for urban, mountain resort, and rural communities to ensure that a wide variety of stakeholder interests were represented. Stakeholders were encouraged to provide feedback on the local government priority measures, and their suggestions on how to prioritize benefits and mitigate disbenefits to LIDACs were incorporated into the priority measures.

Further engagement will be a key element of implementation. As Colorado designs which priority areas are best suited for the implementation grant award, it will determine what additional feedback is needed to ensure benefits are felt in LIDAC communities and the stakeholder work necessary to get input will be built into each of the application areas.

Estimate potential benefits of GHG emission reduction measures to LIDACs

The statewide and local government priority measures will provide substantial benefits to Colorado residents, including mitigating the potential negative impacts of

climate change, and the co-benefits of climate mitigation activities such as improved air quality, improved public health, employment opportunities, and household energy and transportation costs savings. In many cases, relative to non-LIDAC residents, LIDAC residents may obtain greater benefits from climate change mitigation activities due to their increased vulnerability to climate risks, pedestrian and bicyclist injuries and fatalities[52], exposure to outdoor and indoor air pollution[53], unemployment rates, lower household incomes, and higher household building energy[54] and transportation costs[55] relative to household income.[56]

Climate Risk Benefits: All of the statewide and local government priority measures are intended to reduce GHG emissions, which may reduce the near-term and long-term negative impacts of climate change. LIDAC communities have greater vulnerability to climate risks such as the health and economic impacts of extreme temperatures, flooding, and wildfires. Measures that reduce the negative impacts of climate change overall may therefore reduce the health and economic impacts of climate change in LIDAC communities to a greater degree than in non-LIDAC communities.

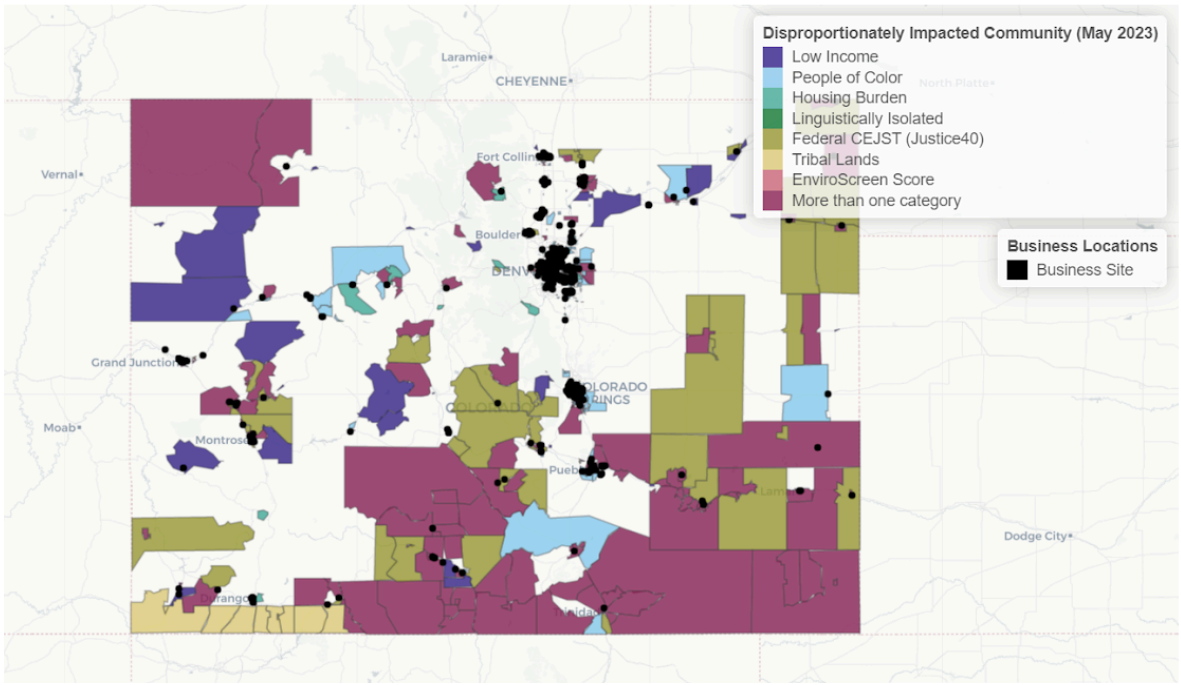
Outdoor Air Quality Benefits: Multiple local government priority measures in the transportation, land use, and waste sectors may decrease vehicle borne air pollution such as nitrous oxides and particulate matter by reducing vehicles miles traveled (Local Government measures T1, T2, T3, T4, LU1, LU2, LU3, LU4) or by replacing higher emitting vehicles with lower and zero emissions vehicles (Local Government measures T4, LU5, W2). Low-income communities and communities of color are often located near highways and major roadways, and may experience greater exposure to air pollution than the general public. Measures that reduce vehicle borne air pollution overall may therefore improve local air quality in LIDAC communities to a greater degree than in non-LIDAC communities

The statewide measures aimed at industrial facilities and methane emissions will reduce air pollution from industrial facilities, landfills and coal mines. Given the history of environmental racism in Colorado, many of these facilities reside in and around low income communities of color. Reducing emissions from these facilities will ensure those benefits will be felt in those communities. Measures that reduce

[52] Race and income disparities in pedestrian injuries: Factors influencing pedestrian safety inequity - ScienceDirect
[53] Air Pollution Inequality in the Denver Metroplex and its Relationship to Historical Redlining | Environmental Science & Technology
[54] Lessons from the Centennial State: Addressing Colorado's Energy Burden
[55] The Household Cost of Transportation: Is it Affordable?.
[56] See above “Identify LIDACs and Climate Impacts and Risks“ section for additional citations.

industrial borne air pollution may therefore improve local air quality in LIDAC communities to a greater degree than in non-LIDAC communities.

Figure 6: Map of Colorado Clean Air Outreach Tool Displaying Disproportionately Impacted Communities



Indoor Air Quality Benefits: Statewide Buildings 1 and local government B1, B2, B3 priority measures in the building sector may improve indoor air quality by replacing natural gas fueled heating, cooling, and cooking appliances with all-electric appliances which also, if properly installed, can improve ventilation. Low-income households experience worse levels of indoor residential air-quality than higher income households, and therefore may benefit from indoor air quality improvements to a greater degree than higher income households.

Pedestrian and Bicyclist Safety Benefits: Multiple local government priority measures in the transportation and land use sectors may decrease pedestrian and bicyclist injuries and fatalities by providing greater access to safe sidewalks, crosswalks, bike lanes, and other bicycle and pedestrian facilities (LGT1), and reducing vehicle traffic on roadways (Local Government measures T1, T2, T3, T4, LU1, LU2, LU3, LU4). Low-income communities and communities of color are less likely to have access to parks and other opportunities for safe walking and bicycling, and are less likely to have sidewalks, marked crosswalks, and street design to support safer, slower speeds. Lower-income neighborhoods are also much more likely to contain major arterial

roads built for high speeds and higher traffic volumes at intersections, exacerbating dangerous conditions for people walking and bicycling. Measures that provide greater access to safe sidewalks, crosswalks, and other pedestrian and bicycle facilities, and reduce vehicle traffic on roadways may therefore reduce bicycle pedestrian injuries and fatalities in LIDAC communities to a greater degree than in non-LIDAC communities.

Employment Benefits: Multiple local government priority measures in the transportation, buildings, and land use sectors (Local Government measures T1, T2,B1, B2, B3, LU1, LU2, LU4, LU5, LU6), and the statewide priority measure to support building performance standards will encourage the construction or renovation of buildings or infrastructure, which will provide employment opportunities in construction and maintenance. Statewide priority measures to invest in industrial decarbonization and in the clean hydrogen economy will also provide additional employment opportunities in the industrial sector. LIDAC residents experience higher rates of unemployment than non-LIDAC residents, and the benefits of employment opportunities may therefore be more impactful in LIDAC communities.

Household Energy Cost Benefits: Multiple local government (LGB1, LGB2, LGB3) and statewide (SWB1) priority measures in the buildings sector may increase building energy efficiency, reducing household energy costs. On average, LIDAC households have lower incomes, lower household savings, and spend a higher percentage of their household incomes on building energy costs than non-LIDAC households. Measures that reduce household building energy costs may therefore provide greater economic benefits to LIDAC households than to non-LIDAC households.

Household Transportation Cost Benefits: Multiple local government priority measures in the transportation sector (LGT1, LGT2,LGT3) may increase access to active transportation and transit, reducing household transportation costs. Additionally, several land use sector actions (LGLU1, LGLU2, LGLU3, LGLU4) can lessen the need for vehicle ownership and vehicle travel, also reducing household transportation costs. On average, LIDAC households have lower incomes, lower household savings, and spend a higher percentage of their household incomes on building energy costs than non-LIDAC households. Measures that reduce household transportation costs may therefore provide greater economic benefits to LIDAC households than to non-LIDAC households.

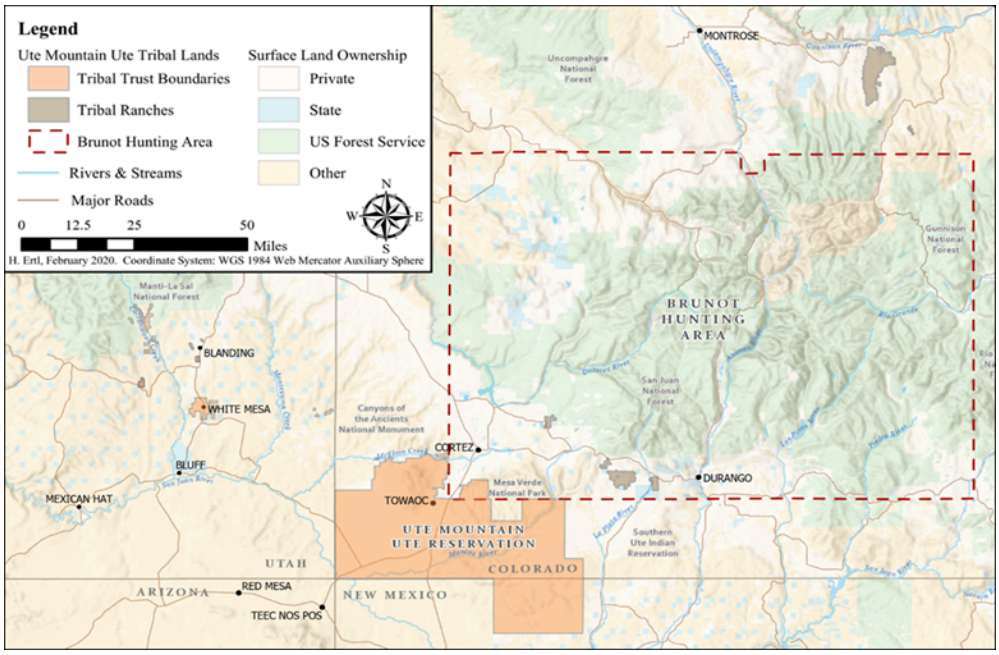
LIDAC Benefit Prioritization: If awarded an implementation grant for the local climate action accelerator, the state would prioritize the benefits of local government priority measures to LIDACs in the following ways:

- *For all measures:* Engage with LIDACs in the design of policies, programs, and projects to implement measures.
- *For transportation infrastructure measures (LGT1, LGT2):* Encourage siting of new active transportation and transit infrastructure to benefit LIDACs.
- *For the transportation demand management measure (LGT3):* Prioritize and/or increase active transportation and transit incentives such as e-bikes and transit passes to income-qualified and LIDAC residents, and disincentives to driving such as reduced parking supply and increased parking pricing should allow exceptions or compensation for income-qualified and LIDAC residents.
- *For building energy efficiency, building electrification, and on-site renewable energy measures (LGB1, LGB2, LGB3):* Prioritize incentives to deed-restricted affordable housing projects, income-qualified homeowners, and projects located in LIDACs.
- *For land use measures that encourage new housing development (LGLU1, LGLU2:* Prioritize fee waivers, expedited permitting, development incentives, and financial incentives for projects in LIDAC communities, for LIDAC homeowners, for deed restricted affordable housing projects, and for projects that provide significant community benefits.
- *For the parking reduction measure (LGLU4):* Allow for additional parking reductions in deed-restricted affordable housing developments and residential developments in LIDAC communities to reduce housing costs and increase housing opportunities.
- *For waste measures (LGW1, LGW2):* Prioritize the implementation of emissions-reducing waste policies in LIDACs, provide free or low cost recycling or composting bins in LIDACs, and prioritize the use of ZEV waste vehicles on routes within LIDACs.

GHG Ute Mountain Ute Tribe Reduction Measures

Geographic location: The Ute Mountain Ute Tribe is a federally-recognized American Indian tribe situated in the Four Corners region on the Colorado Plateau. The 597,288 acres of Trust Land and 27,354 acres of fee land are in the three states of Colorado, Utah, and New Mexico. The Tribal Headquarters is located in Towaoc, Colorado.

Figure 7: Map of the Ute Mountain Ute Territory



Ute Mountain Ute Renewable Energy Measures

The Tribe has parallel goals in both community scale renewable energy projects to save on electrical energy (and by conversion on propane – the main heating fuel) and on commercial renewable energy projects to diversify and transition the Tribe's energy sector economy from oil and gas to renewables.

Community Scale Solar

Two projects have been completed and a third is being implemented currently. The first is a 960 KW (AC) community solar system. It is a net metered system, and electrical cost savings are shared with the residents of Towaoc, CO. We currently have 250 households that are afforded a bill credit on their monthly bills by the local electric cooperative. The second project is focused on saving electrical costs for our Housing Authority rental homes with PV solar installations. This is a total of 131 (AC)

KW on 23 homes and an 11 unit apartment building. The third project is another rooftop solar of 118 (AC) KW. The total for the three is 1,209 KW or approximately 2798 MWh annually. The 960 KW project has saved approximately $102,000 annually on electricity costs in Towaoc with a greenhouse gas savings of 1,711 tons CO2 equivalent saved annually for four years. The second project is ending its one year test phase at this time.

A goal in the long term is to reach net-zero, or generating as much electricity from renewable energy as the Tribe consumes in both communities, Towaoc, CO and White Mesa, Utah. This may only be feasible fully by also reaching electrical energy independence and creating a Tribal utility. Currently, the estimated total is 3-3.5 MW total power (including energy storage for nighttime).

The next phases of community solar for the Tribe include:

- Expansion of the large array project in a manner that does not violate the policies of Tri-State Generation and Transmission- that currently limits distributed generation on their system to less than 1 MW. Adding more generation with 8-12 hours battery storage to get it through the night may be allowable within the policy if control systems isolate the battery power from utility.
- Continued roof top and facility scale systems.
- White Mesa, UT generation and energy independence. Total offset generation and independence may be required as a proposed 144 KW system interconnection was denied. A system impact study identified a need for $360,000 in upgrades making the planned project economically non-viable. With other ancillary factors in the nuclear power industry being undertaken by the utility and the community adjacent to the only operating uranium mill in the nation, the appeal of electrical energy independence is a priority. A conservative estimate is 500-600 KW (AC) to power the town, perhaps more with future housing growth.

Total future solar generation for both communities is estimated at 2.3 MW (5,323,541 KWh) plus future growth. Note: upcoming renewable energy related manufacturing economic development is likely to increase that at least 3-fold.

Estimate of the quantifiable GHG emissions reductions

Based on 2.3 MW as identified need, the following GHG emission reductions are estimated (excepting the carbon footprint of design energy source materials, transportation and construction) to save 4099 tons of CO2 equivalent.[57]

Implementation schedule and milestones

Research and design of 960 KW system battery storage expansion (700-900 KW): 1 year

Barring fatal flaws, funding and implementation of 960 KW system battery storage expansion (700-900 KW): 1-2 years

Additional 800 KW Towaoc distributed generation: 3-5 years

White Mesa Energy Independence through PV solar and battery storage (or other storage technologies): 3-5 years for planning, design, funding and implementation.

Funding sources

Climate Pollution Reduction grants, Department of Energy Tribal Energy Deployment grants, EPA *Solar for All* grants, Bureau of Indian Affairs Department of Energy and Mineral Development grants, USDA grants, state grants, commercial developer partnership benefits, direct Tribal funding.

Metrics for tracking progress

Each project will require its own metrics. Generally, planning and design phases should reach a developable project or fatal flaw juncture within the identified timeframe.

Each project will have its own construction and commissioning metrics for tracking progress. Based on our experience, these would generally include the following steps:

- Identify funding
- Engineering, Procurement and Construction contracting
- Final design
- Interconnection upgrade system and facility studies
- National Environmental Policy Act (NEPA), interconnection and other permitting
- Workforce development and hiring
- Construction
- Commissioning

[57] https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator#results

- Test phase (1 year or more)

Commercial Renewables Measure

The Tribe has two commercial scale solar projects that are reaching the final negotiation phases of land leases for each. Project partners have taken different approaches to the design, NEPA and other permitting, interconnection, power purchase contracting and other preliminary tasks. We anticipate both projects to be under lease in the second quarter of 2024. One is a 756 MW project with battery storage in CO, the other is a 170 MW project with battery storage in NM. During the construction of the CO project, planning and NEPA work will be underway for another project with the same partner, perhaps even larger, in CO.

A small hydroelectric project on the Towaoc Highline Canal is on the horizon and has the unique opportunity for the Tribe to fully fund or to cost-share through grants. It has the potential to generate between 1.4 to 2.2 MW of electricity seasonally, or 5,400,000 to 5,700,000 KWh per year.

Estimate of the quantifiable GHG emissions reductions

Based on the proposed 926 MW of PV solar generation with battery storage, this represents up to 2940 GWh of electrical energy offset. This is more than 2.2 million tons of CO2 equivalent planned.[58]

The small hydroelectric project has the potential to offset 5,700,000 KWh per year, 4389 tons CO2 equivalent annually.[59]

Implementation schedule and milestones

The two commercial solar projects are on course to be commissioned in the next 3 years, with subtly different approaches.

The small hydroelectric project is expected to require:

- 2.5 years pre-construction: funding procurement, EPC contracting, design, permitting, power purchase negotiation and contracting
- 2.5 years construction
- 1 year test phase
- 100+ year project viability

[58] https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator#results
[59] https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator#results

Funding sources

Private partnerships, *Climate Pollution Reduction* grants, investment tax credits

Metrics for tracking progress

Commercial solar: project partners have metrics; Tribe is tracking option agreements, lease agreements, future pre-commissioning payments, future operational payments

Small hydroelectric: upon funding procurement success, pre-construction tracking will be undertaken by a project manager with a focus on maintaining pre-construction task metrics, construction task metrics, and final one year test phase metric will include water quantity vs. electrical generation metrics, revenue generation metrics, O&M cost metrics, and business structure success assessment.

Ute Mountain Ute Fleet Electrification Measure

The Tribe has a fleet of vehicles including passenger vehicles and small trucks, as well as medium and large trucks, vans and others. With the new Kwiyagat Community Academy charter school there will be a need in the future for a school bus or two as the school grows. It is a goal to convert some of the fleet to electric vehicles (EV) in two phases, a test phase and a longer term phase. These phases are intended to be modest, but certainly not absolute. There is some skepticism of the technology, reliable distances in a work day between charges, reliability and reparability by our mechanics.

This goal also includes charging infrastructure. In addition to the Tribal government charging infrastructure, there is an initiative started to install commercial charging stations at the casino resort enterprise (casino, hotel, RV park) and the two travel centers (fueling stations with convenience stores). The Tribe has already been approached by Blink ©, a US-made charging infrastructure company, about the Colorado travel center being an ideal geographic location for the equipment because of the distance to other such facilities.

Base Data Sources:

- Gasoline 19.59 lbs/gal[60]
- Diesel 22.44 lbs/gal[61]
- Average School bus fuel efficiency: 6.02 mpg[62]

[60] https://impactful.ninja/fuel-sources-with-the-highest-carbon-footprint, Grace Smoot
[61] https://impactful.ninja/fuel-sources-with-the-highest-carbon-footprint, Grace Smoot
[62] https://www.atob.com/blog/9-tips-on-how-to-improve-school-bus-mpg#

Estimate of the quantifiable GHG emissions reductions

Test Phase (1-2 years): 2 passenger vehicles (est. 35 mpg); 2 small trucks, (est. 20 mpg); 1 school bus (est. 6.2 mpg diesel)

- Passenger (est. 12,000 miles per year): 342.8 gallons gasoline = 6716 lbs./year CO2 equiv. per vehicle
- Small Truck: (est. 12,000 miles per year): 11,754 lbs./year
- School Bus: (est. 20,000 miles per year): 74,551 lbs./year

TEST PHASE TOTAL: 111,491 lbs/year; 55.7 tons CO2 equiv.

Long Term phase (3-10 years): 10 passenger vehicles, 10 small trucks, 1 school bus (est. 6.2 mpg diesel)

LONG TERM PHASE TOTAL: 333,802 tons CO2 equiv. per year

Implementation schedule and milestones

Research and budding partnerships have already begun to install EV charging stations for the Tribal fleet and for commercial customers. The conversion of targeted passenger vehicles and small trucks in the Tribal fleet will be dependent on the funding mechanisms behind them.

Initial procurement and installation of EV chargers at the Tribal Fleet yard (4 – two fast chargers, two slow chargers) is being targeted for the non-commercial test phase. We are planning to have them at the following locations: Tribal Fleet Yard (2- slow); Tribal Office Complex parking area (1- fast); White Mesa Community Center (1- fast).

Commercial customer EV charging installation is envisioned to include an initial test phase of 5 chargers: Ute Mountain Casino Resort parking area: 2 fast chargers; Ute Mountain Travel Center: 2 fast chargers; White Mesa Travel Center: 1 fast charger. Long term, based on the viability of the initial test phase, will incorporate 2-5 times these amounts.

EV charging stations for Tribal Fleet and Tribal Communities test phase: 2025-2032

Funding sources

Potential funding opportunities include *Climate Pollution Reduction Grants*, Clean School Bus grants, Diesel Emissions Reduction Act (DERA) grants, economic development grants for commercial facilities, Department of Energy clean technology and energy innovation opportunities, several state grant programs for electric school buses, clean fleet vehicles and EV charging infrastructure, other grants not

researched to date, funding as ancillary benefit by commercial renewable energy development partners and direct funding by the Tribe through various funding mechanisms.

Metrics for tracking progress

Test phase:

- Number of Tribal Fleet Vehicles (fuels gallons saved for # of miles, tons carbon equivalent saved)
- % of Tribal Fleet vehicles
- Number of non-commercial EV chargers
- Number of commercial EV chargers

Long Term Phase:

- Number of Tribal Fleet Vehicles (fuels gallons saved for # of miles, tons carbon equivalent saved)
- % of Tribal Fleet vehicles
- Number of non-commercial EV chargers
- Number of commercial EV chargers

Ute Mountain Ute Building Decarbonization

An energy efficiency assessment of three Tribal buildings: the Tribal Office Complex, the Recreation Center, and the Career Center (Human Resources Division) was performed by *Ennovate* approximately 14 years ago, funded by a Department of Energy grant. While some of the recommendations like modern control systems with programmable thermostats have been implemented, many of the large scale investment-intensive recommendations have not. Benefits of the upgrades identified in the study include: reduced energy consumption and utility costs, reduced dependency on volatile propane, renewed mechanical equipment life cycles, better indoor air quality, increased reliability of heating and cooling systems with fewer repairs, enhanced control functionality, and water efficiency.

The facilities assessed were ranked in order of annual utility expenses for the total of the three, $89,325:

- Recreation Center 64.3%
- Tribal Office Complex 22.8%
- Career Center 12.9%

Energy Usage was:

- Recreation Center 76 KBTU/ sq. ft.
- Tribal Office Complex 50 KBTU/ sq. ft.
- Career Center 88 KBTU/ sq. ft.

They projected an annual increase of 3.9% in those costs over time. The breakout of expenses were 49% electricity, 45% propane and 6% water.

Application of these principles on all Tribal government, Bureau of Indian Affairs, Indian Health Service and Tribal Commercial facilities will be considered.

Estimate of the quantifiable GHG emissions reductions

Based on the electricity cost to rate information at the time, it was around 444,000 KWh of power consumed for the three facilities annually. The annual use of propane was measured at 16,078 gal. Savings based on the "gold" standard package of efficiency upgrades were estimated to save 24% of utility costs (includes water efficiency improvements). This equates to 106,560 KWh of electricity and 3,858 gallons of propane. CO2 equivalents are 101,627 lbs. or 50.8 tons and 41,235 lbs. or 20.6 tons, respectively[63,64]. Total savings would be 71.43 tons CO2 equivalent annually.

Implementation schedule and milestones

Revised energy efficiency assessment: 6 months

Energy Efficiency upgrade installation: 1-2 years

Test period: 1 year

Funding sources

Upgrades in 2010 were estimated to cost $1.47M for the "gold" standard package. Funding sources could include *Climate Pollution Reduction* grants, Department of Energy Tribal energy efficiency planning grant, Department of Energy Tribal energy deployment grant, performance contracting, energy efficiency rebates,funding from state building electrification grant programs, direct Tribal funding (some upgrade components could be phased).

Metrics for tracking progress

Comparison of utility bills prior to upgrades and after phases of upgrades and one year test period.

[63] https://www.abraxasenergy.com/energy-resources/toolbox/conversion-calculators/energy/
[64] https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator#results

Workforce Planning Analysis

Like many other states, Colorado is facing intense shortages in critical skilled-trade workers in occupations such as electricians, HVAC, energy efficiency, EV maintenance technicians, and power sector workers. In order to meet its climate goals, Colorado must increase the capacity of current workforce development pipelines in skilled-trades and develop new pipelines for jobs created by emerging climate technologies. In addition, there is an economic development and equity opportunity to remove barriers and increase accessibility to job opportunities in disproportionately impacted communities. The Colorado Governor's Office and State Agency partners in collaboration with the Colorado Workforce Development Council contracted with Luminance LLC (a vendor) to review the workforce aspects of the Bilateral Infrastructure Law and Inflation Reduction Act to help the State identify funding that will benefit the citizens of the state of Colorado in various ways. To facilitate data-driven decision-making, a comprehensive data dashboard has been developed and is accessible at Luminance Data Dashboard. This tool offers a myriad of features for understanding, sorting, and visualizing data—from funding sources to heatmaps, charts, and projections on training needs and hiring challenges.

To avoid potential workforce shortages that may impede implementation of this transformative climate action plan, CEO aims to deploy resources and develop programs intended to train new workers, upskill existing workers, and recruit new workers from diverse backgrounds and/or disproportionately impacted communities throughout the state. The goal is to grow a diverse and inclusive workforce that will both help the state achieve its climate and pollution reduction goals and provide economic opportunity to Coloradans of all backgrounds.

To address this, CEO is embarking on a Climate Workforce Development Plan to identify the various occupations that will play significant roles in meeting the State's climate action goals. Furthermore, CEO aims to quantify the current size of the Colorado climate workforce and estimate how much the climate workforce will need to grow if Colorado is to accomplish its stated climate goals. Lastly, the study will inventory the currently available climate workforce development programs in Colorado, quantify their current capacity for upskilling and new worker training, and identify opportunities to expand these currently available programs or develop new programs that will help the State meet its climate workforce needs.

The completion of the Colorado Climate Workforce Analysis will:

1. Serve as a resource to understand which occupations will play a significant role in implementing the State's climate action plan across key economic sectors
2. Provide accurate data describing the current climate workforce in Colorado including: estimates of the current workforce size, estimates of the demographics of the workforce, and estimates of the workforce density in different regions of the state
3. Model the climate workforce needs required for Colorado to meet its GHG emission reduction targets for 2030 (50% reduction) and 2035 (65% reduction) and compare those needs to the current size of the workforce and its baseline growth rate
4. Summarize the existing workforce development pipelines that are applicable to climate workforce training, estimate current capacity of these pipelines, and identify key gaps or barriers that may eventually slow climate action progress throughout Colorado
5. Identify areas of opportunity and programmatic initiatives that could significantly grow the Colorado climate workforce in an equitable manner and address any key labor shortages or lack of diversity in key occupations

Next Steps

The next steps are to apply for an implementation grant and prepare the Colorado Comprehensive Climate Action (CCAP). The CCAP will include and build on the GHG Inventory, GHG Emissions Projections, GHG Reduction Targets, Quantified GHG Reduction Measures and Low Income/ Disadvantaged Communities Benefits Analysis. The State is also conducting a climate workforce development assessment that will inform key barriers and opportunities, particularly to ensure that LIDAC communities not only benefit from the air quality and other improvements related to Colorado's climate investments, but also from the jobs and economic development. Colorado is also using the CPRG funds to conduct a number of other supplemental studies and analyses on the future of the gas system, opportunities in agriculture and natural working lands, and sustainability within Colorado's state government operations and military installations.

COLORADO
Energy Office

Colorado Priority Climate Action Plan Appendices

Appendix A: Greenhouse Gas Emissions Data for Statewide Priority Measures

Table 1: Forecasted total Emissions from Coal Mine and Landfill Emissions based on 2023 Colorado Greenhouse Gas Inventory (MMTCO2E)

Year	Estimated Coal Mine Total Emissions	Estimated Landfill Emissions (63% of Waste Emissions)
2024	0.99	1.8459
2025	0.88	1.8522
2026	0.86	1.8585
2027	0.81	1.8585
2028	0.78	1.8648
2029	0.75	1.8711
2030	0.7	1.8837
TOTAL to 2030	**5.77**	**13.0347**
2031	0.85	1.8963
2032	0.85	1.9089
2033	0.84	1.9215
2034	0.83	1.9341
2035	0.83	1.9467
2036	0.84	1.9593
2037	0.84	1.9656
2038	0.85	1.9782
2039	0.85	1.9908
2040	0.85	2.0034
2041	0.85	2.0097
2042	0.85	2.016
2043	0.85	2.0223
2044	0.85	2.0286
2045	0.84	2.0349
2046	0.84	2.0412

2047	0.84	2.0475
2048	0.85	2.0475
2049	0.87	2.0538
2050	0.87	2.0601
TOTAL to 2050	**22.71**	**52.9011**

Table 2: Forecasted Total Emissions from Industrial Fuel Combustion and Industrial Processes & Product Uses based on 2023 Colorado Greenhouse Gas Inventory (MMTCO2E)

Year	Emissions from Industrial Fuel Combustion	Emissions from Industrial Processes & Product Uses
2024	12.72	4.98
2025	12.53	4.85
2026	12.24	4.73
2027	11.89	4.67
2028	11.6	4.63
2029	11.37	4.03
2030	11.18	3.97
Total to 2030	**83.53**	**31.86**
2031	10.98	3.92
2032	10.93	3.88
2033	10.83	3.82
2034	10.71	3.4
2035	10.58	3.36
2036	10.48	3.22
2037	10.39	3.25
2038	10.31	3.29
2039	10.26	3.32
2040	10.21	3.36
2041	10.16	3.36
2042	10.14	3.35
2043	10.12	3.34
2044	10.13	3.33

2045	10.13	3.33
2046	10.15	3.38
2047	10.15	3.42
2048	10.17	3.47
2049	10.2	3.52
2050	10.26	3.57
Total to 2050	**290.82**	**100.75**

Table 3: Forecasted Total Emissions from Commercial Fuel Combustion based on 2023 Colorado Greenhouse Gas Inventory (MMTCO2E)

Year	Emissions from Commercial Fuel Combustion
2024	4.79
2025	4.69
2026	4.57
2027	4.43
2028	4.27
2029	4.08
2030	3.88
Total by 2030	**30.71**
2031	3.68
2032	3.48
2033	3.3
2034	3.12
2035	2.93
2036	2.74
2037	2.56
2038	2.39
2039	2.23

2040	2.07
2041	1.93
2042	1.83
2043	1.75
2044	1.7
2045	1.67
2046	1.65
2047	1.64
2048	1.65
2049	1.67
2050	1.69
Total by 2050	**76.39**

Table 4: Forecasted Total Emissions from Agriculture based on 2023 Colorado Greenhouse Gas Inventory (MMTCO2E)

Year	Emissions from Agriculture
2024	16.6
2025	16.68
2026	16.73
2027	16.82
2028	16.92
2029	17.02
2030	17.12
Total to 2030	**117.89**
2031	17.24
2032	17.4
2033	17.51
2034	17.64
2035	17.76
2036	17.84

2037	17.91
2038	17.97
2039	18.02
2040	18.06
2041	18.09
2042	18.12
2043	18.15
2044	18.18
2045	18.19
2046	18.2
2047	18.2
2048	18.2
2049	18.2
2050	18.2
Total to 2050	**476.97**

Appendix B: Greenhouse Gas Emissions Reduction Modeling Methodology for Local Government Priority Measures

Model Overview

Modeling Approach

The purpose of this model is to allow jurisdictional level estimates of GHG emissions reductions from modeled local government actions. A marginal approach is utilized to allow the model to estimate impacts for any jurisdiction in the state. For each action modeled, impacts per metric (household, square foot, person, etc.) are calculated. These values are then used to quantify total impacts based on specific data for a jurisdiction.

The model allows for regional and jurisdiction specific inputs that influence greenhouse gas (GHG) impact calculations from each action. This is done by allowing the user to specify the Colorado Office of Economic Development and International Trade (OEDIT) region within which the jurisdiction is located. Growth factors specific to the selected region are then used in impact calculations. For example, non-residential building code actions are based on total new and retrofitted non-residential square footage. Forecasted employment data from the Colorado Demography Office is used to estimate OEDIT region specific non-residential square footage forecasts. The model will use the region specific forecasts as the base inputs for the action models.

Additionally, building code action impacts are dependent on the current energy code adopted in the jurisdiction. The user can select which code is currently in place and the model will adjust the impacts of the building code actions to account for the actual baseline code of the jurisdiction. This allows the tool to have a flexible baseline to account for regional variations in code adoption and expected growth across the state.

Known policies or actions that will impact GHG emissions outside of those included in the model are accounted for by using baseline data from the Rocky Mountain Institute

Energy Policy Simulator developed for the state's Greenhouse Gas Roadmap Update. Two baselines options were taken from the simulator and can be selected in the model. First, the user can select a "Business-As-Usual" baseline. This baseline accounts for only any changes that are expected to occur outside of any actions taken by the State. This includes low-level electric vehicle and electric equipment adoption and some greening of the grid. Second, the user can select the "Roadmap Baseline". This includes all policies enacted or expected to be enacted by the end of 2023 in Colorado. By providing both a Business-As-Usual (BAU) and the Roadmap Baseline, the model provides a range of impacts for a given jurisdiction dependent on the level of implementation of the Roadmap Baseline.

Action Overlap

Due to timeline constraints and not knowing which set of actions an individual jurisdiction would implement, all actions were modeled separately. The impacts of one action on another were not included in this analysis. For example, if a home were to implement both energy efficiency and electrification measures, the change in fuel type from electrification would impact the baseline energy use (both overall consumption and fuel type) prior to implementing efficiency measures. Not accounting for this overlap may overestimate emissions impacts in the model.

Baseline Data and Forecasts

Electricity Emission Factors

1. Electricity emission factors forecasted from 2020 through 2050 for both the Business-As-Usual baseline and the Roadmap Baseline were taken from the Energy Policy Simulator.

Baseline Transportation Data

1. Vehicle Miles Traveled (VMT) for 2022 were obtained from Google's Environmental Insights Explorer (EIE) for the state of Colorado. VMT are expected to grow at the same rate of population. The Roadmap Baseline scenario models a 9% decrease in VMT by 2050 in comparison to BAU values to account for compliance with 2021 Colorado Department of Transportation rulemaking. Statewide VMT are scaled by population to the region selected in the Impact Summary tab.

2. Some electric vehicle (EV) adoption is expected even without any direct action taken by the state. EV adoption rates for both the business-as-usual and Roadmap Baseline scenarios were taken from Rocky Mountain Institute's (RMI) Energy Policy Simulator (EPS).
3. A breakdown of vehicles by fuel type was estimated from vehicle registration data for the state of Colorado in 2022 from the Department of Energy's Alternative Fuels Data Center.
4. The breakdown of vehicles by size (passenger and light-duty truck) was estimated from the Colorado Department of Public Health & Environment 2023 Colorado State Greenhouse Gas Inventory.
5. Fuel efficiency changes for internal combustion engine vehicles were obtained from the Energy Information Agency (EIA)'s Annual Energy Outlook for 2023. Existing vehicle fuel efficiency values were estimated from the total stock average.
6. EV fuel efficiencies were obtained from National Renewable Energy Laboratory (NREL)'s Annual Transportation Baseline data. NREL fuel efficiency values are provided in 5-year intervals starting in 2020 through 2050, fuel efficiencies were linearly interpolated between the NREL reported values for intermediate years. The mid-case scenario was used for forecasting fuel efficiencies for light-duty medium sized battery electric vehicles. These projected values were used for passenger and light-duty vehicles.
7. Fuel economy for new internal combustion engine vehicles was obtained from the EIA's Annual Energy Outlook for 2023. The roadmap baseline includes a 68% increase in fuel economy for new internal combustion vehicles. Fuel economy is increased partially from 2020 to 2026, following a full increase to 68% by 2032, and then remaining constant through 2050 to match the state's emission reductions from 2026-2032 and to model the Advanced Clean Cars fuel economy standard.

Building Square Footage

1. Building square footage data was taken from Google EIE which provides the total area for residential and nonresidential buildings in Colorado. Latest square footage data from Google EIE represents 2022.
2. Square footage was forecasted through 2050 for each OEDIT region to account for regional growth rates using the following approach:
    a. Residential square footage:
        i. Collected state and county level household forecast data through 2050 from the Colorado Demography Office.

ii. Aggregated county level data to get forecasted households through 2050 for each OEDIT region.
iii. Forecasted total statewide residential square footage based on the change in total households forecasted through 2050.
iv. Assigned OEDIT regions a residential square footage value based on the share of total households within each region compared to the state for each year through 2050.

b. Non-residential square footage:
i. Collected state and county level employment forecast data through 2050 from the Colorado Demography Office
ii. Aggregated county level data to get forecasted employment through 2050 for each OEDIT region.
iii. Forecasted total statewide non-residential square footage based on the change in total employment forecasted through 2050.
iv. Assigned OEDIT regions a non-residential square footage value based on the share of employment within each region compared to the state for each year through 2050.

Building Equipment Types and Efficiency

1. The BAU baseline in the Energy Policy Simulator assumes low level electrification based on NREL's Electrification Future Study (EFS) reference case.
2. Forecasted equipment stock data from the EFS reference case was used to calculate the share of each equipment type used for space heating, water heating, and cooking (commercial only).
3. These data are used to determine the amount of equipment that is already electrified in the BAU baseline to ensure any actions do not double count savings from electrification.
4. The NREL EFS also provides equipment efficiency forecasts. These are used to account for improvements in technology over time.
5. For space heating, some regions of the state will require cold-climate heat pumps while other regions can use standard heat pumps. NREL provides efficiency forecasts for each type of heat pump. A weighted efficiency is estimated using the selected OEDIT region and the share of households in each region that would need a cold climate heat pump (based on the climate zone of the counties within each OEDIT region).

Baseline Building Energy Use

1. Baseline building energy use for both the BAU and Roadmap Baseline is taken from the Energy Policy Simulator.
2. The Energy Policy Simulator provides energy use separately by energy source and building type. No data are available by energy source and building type together.
3. Residential and non-residential energy use by energy source is estimated by applying the share of each building type to each energy source. Note that this assumes that each energy source is utilized the same proportion across building types.
4. For the Roadmap Baseline, multiple versions of the baseline building energy use forecasts were utilized. To separate impacts from the measures included in the baseline, energy use by building type was downloaded for the Roadmap Baseline with the following selections:
    a. Full baseline including all measures.
    b. Baseline excluding residential and commercial energy efficiency measures.
    c. These different baseline energy use data forecasts were used depending on the applicability of the measures included in the baseline to the building segment impacted by the modeled actions (e.g., It was determined that energy savings from building performance standards should not be applied to buildings already meeting energy code standards).

Data Sources

1. Google's Environmental Insights Explorer for the state of Colorado
2. Colorado State Demography Office
3. Rocky Mountain Institute Energy Policy Simulator
4. NREL Electrification Futures Study
5. Energy Information Agency's Annual Energy Outlook for 2023
6. NREL's Annual Transportation Baseline
7. Department of Energy's Alternative Fuels Data Center
8. Colorado Department of Public Health & Environment 2023 Colorado State Greenhouse Gas Inventory

Non-Residential Building Actions

Cross-Action Considerations

1. The Roadmap Baseline includes the following measures for non-residential buildings:
    a. 25% energy efficiency improvement in new equipment components for all commercial buildings by 2030.
    b. 65% electrification of new equipment with a ramp up to 100% implementation by 2030.
2. Actions are modeled as the additional impact on top of what is already included in the baseline (e.g., if 65% of space heating is electrified in the roadmap baseline in 2040, only 35% of the remaining space heating equipment is available to be impacted by the modeled electrification action in 2040).
3. All non-residential actions use total non-residential square footage to calculate marginal impacts of each strategy (kg CO2e/non-residential square foot).

LG Non-Residential Buildings 1: Adopt state minimum building energy codes, including electric, solar, and EV-ready provisions

Assumptions

1. This action is modeled as the expected emissions reductions from accelerating the adoption of the 2021 IECC.
2. Assumed ramp up of adoption of the 2021 IECC by 2025, beginning in 2024.
3. Includes new construction and retrofits.
4. Assumes a 90% compliance rate through enforcement. Note that compliance will vary by measure included in the code. This model assumes that 90% of affected square footage will achieve full compliance.
5. Based on an analysis of NREL ComStock data, it was determined that recently constructed commercial buildings in Colorado have similar energy efficiency to buildings constructed to the 2009 IECC (new building efficiency varies across the state with some jurisdictions adopting latest energy codes and some having no energy codes). This was determined by comparing the average EUI of building types included in ComStock to EUIs of modeled buildings from the Pacific Northwest National Laboratory's (PNNL) Prototype Building Energy Models. A weighted average EUI from ComStock was calculated based on the share of square footage by building type and climate zone. The same was

completed using the PNNL models for building energy codes 2006 - 2021. The 2009 IECC weighted average EUI was closest to the weighted average EUI from the recently constructed buildings in ComStock.

6. Identified efficiency change factors from the 2009 IECC to the following codes using studies from the Department of Energy (See data source section below):
    a. No energy code or pre 2006 IECC.
    b. 2006 IECC.
    c. 2012 IECC.
    d. 2015 IECC.
    e. 2018 IECC.
    f. 2021 IECC.
7. The user can specify the code adoption status of the jurisdiction to be modeled on the "Impact Summary" tab. Based on this selection, the factors described above are used to estimate baseline energy use from new construction at the selected code.

Approach

1. Identified total non-residential new construction and retrofitted square footage.
    a. This value is based on the selected OEDIT region on the "Impact Summary" tab.
    b. New construction square footage is estimated by subtracting the current year's square footage from the previous year's value.
    c. 1% of existing square footage (excluding any new construction in a given year) is assumed to be retrofitted each year.
2. Applied an adoption ramp up to the affected square footage
    a. Assumes 75% adoption by 2024 and 100% by 2025.
3. Calculated total affected and compliant square footage for new construction and retrofits (impacted square footage x adoption rate x compliance rate).
4. Accounted for measures in the baseline that would impact energy use of affected square footage.
    a. For the BAU baseline:
        i. Identified new or retrofitted square footage in each year that has electrified space and water heating in the BAU. This is based on the share of equipment types taken from NREL's EFS reference case (impacted square footage x % of equipment that is a heat pump/heat pump water heater).
        ii. For the Roadmap Baseline:
            1. The Roadmap Baseline includes electrification of 65% of new equipment. This electrification is ramped up to full implementation by 2030.
            2. This electrification is accounted for in this action by the following equation:

        a. (impacted square footage x implementation rate x electrification rate).
    3. The 25% efficiency implementation in the Roadmap Baseline is accounted for by estimating energy use for new construction after electrification and applying the 25% efficiency value and implementation rate.
5. Calculated energy savings already included in baseline electrification:
    a. Calculated energy use for new or retrofitted square footage before code adoption and excluding electrification.
        i. Identified the building type weighted average energy use intensity for buildings constructed in 2015 or later from NREL's ComStock dataset. This EUI has similar efficiency to buildings constructed in alignment with the 2009 EUI.
        ii. Multiplied affected square footage by this EUI.
        iii. Depending on the energy code selected on the "Impact Summary" tab, this value is then multiplied by an efficiency factor to account for the current energy code of the jurisdiction to be modeled. For example, if the input jurisdiction currently has the 2015 IECC in place, the average EUI calculated above would overestimate baseline energy use as it will estimate energy use in the 2009 IECC. Based on studies from PNNL and the Department of Energy, the 2015 IECC is 21.8% more energy efficient than the 2009 IECC. The baseline energy use is reduced by 21.8% to estimate baseline energy use for square footage built to the 2015 IECC.
    b. Calculated energy use for new or retrofitted square footage before code adoption and including electrification.
        i. Estimated reduction in natural gas use and increase in electricity use from the electrification included in the baseline.
6. Determined total energy savings from code adoption
7. Calculated net energy savings from code adoption by subtracting the energy savings already achieved by electrification from total energy savings from code adoption.
8. Split net energy savings by energy source based on the share of energy use by source from the selected baseline (taken from the Energy Policy Simulator).
9. Calculated emission reductions and marginal GHG impacts per square foot.

Data Sources

1. DOE Energy Code Enforcement Funding Task Force Fact Sheet.
2. NREL ComStock
3. UBS Retrofit Revolution Report
4. Code efficiency improvements:
    a. 2006 - 2012: Energy and Energy Cost Savings Analysis of the IECC for Commercial Buildings

b. 2015: Energy and Energy Cost Savings Analysis of the 2015 IECC for Commercial Buildings
c. 2018: Energy and Energy Cost Savings Analysis of the 2018 IECC for Commercial Buildings
d. 2021: Energy and Energy Cost Savings Analysis of the 2021 IECC for Commercial Buildings

LG Non-Residential Buildings 2: Adopt building energy codes and performance standards that exceed state requirements

Assumptions

1. This action includes the following measures:
    a. Electric-preferred energy code.
    b. All-electric energy code.
    c. Passive House standards.
    d. Net-zero energy code.
    e. Building Performance Standards (BPS).
2. All measures are modeled separately within this action. Assumptions for individual measures are described in the "Approach" section below.
3. Savings from this action are assumed to "stack" on top of savings from Action C1. Energy savings are calculated by comparing each included measure to the 2021 IECC (i.e., this action assumes these measures will not be adopted without the 2021 IECC from Action C1).
4. All energy code packages and Passive House are modeled based on the same impacted square footage from Action C1.
5. BPS is modeled for existing square footage only.

Approach

1. Adjusted baseline energy use after 2021 IECC adoption to account for any additional measures that may impact energy use from affected square footage. This provides total baseline energy use after all baseline measures and 2021 IECC adoption. This is then used as the baseline energy use for all code measures from this action.
2. **Electric preferred**
    a. **Assumptions:**
        i. Electric preferred code packages can include a variety of measures. To apply a standardized approach, performance-based compliance pathways were utilized.

ii. The building performance factor approach from ASHRAE 90.1 was used to identify energy use targets for non-residential buildings. These targets were taken from Denver's Energy Code. Denver's Energy Code provides targets by building type and separate targets for all-electric and mixed fuel buildings.
iii. Building type weighted building performance factors for all-electric and mixed fuel buildings were calculated using NREL's ComStock data and the Denver Energy Code target factors.
iv. The building performance factor targets are the target energy use of regulated end uses from a building. Regulated end uses include: HVAC, lighting, hot water, and ventilation. To estimate energy use after the targets are reached the following formula is used:
    1. ((total energy use x % unregulated)+(building performance factor *(total energy use x % regulated))

b. Approach:

i. Identified square footage that is already fully electrified in the baseline.
ii. Estimated baseline energy use for baseline all-electric square footage alone:
    1. Based on square footage with electric equipment identified in the minimum code adoption strategy.
iii. Applied the weighted building performance target for all-electric buildings to this square footage.
iv. Repeated the above steps for mixed fuel square footage but applied the mixed fuel building performance target.
v. Subtracted energy use after building performance targets are met from the baseline energy use to get total savings from electric-preferred measures.
vi. Split energy savings across each energy source based on the BAU baseline energy use by source from the Energy Policy Simulator. The BAU baseline is used as any savings from electrification included in the baseline are already accounted for by assuming that any energy savings from all-electric buildings are from electricity.

c. Data Sources:

i. NREL ComStock
ii. Denver Building Performance Factors

3. All-Electric

a. Assumptions:

i. Includes the electrification of new construction and retrofits that are not already electrified in the selected baseline.
ii. Assumes that any all-electric code package would also include additional efficiency measures beyond the 2021 IECC base code aside from just electrification. The same building performance factor target for all-electric buildings from the electric preferred model is applied in addition to electrification.

b. Approach:

i. Identified square footage not yet electrified in the selected baseline for each end use (space heating, water heating, and cooking).
ii. Estimated natural gas or propane used for each end use. This was done by:
    1. Using NREL EFS equipment type forecasts to determine what portion of the electrified square footage had baseline equipment that was natural gas or propane.
    2. Multiplied the square footage to be electrified by a weighted EUI for each end use based on the 2021 IECC. This was estimated using Pacific Northwest National Laboratory's (PNNL) Prototype Building Models for each building type. A weighted average EUI by building type, end use, and fuel type was then calculated from these prototype models.
iii. Calculated additional electricity use from each electrified end use by:
    1. Converting therms or MMBtu of propane to kBtu.
    2. Multiplying fossil kBtu by the baseline equipment efficiency divided by the upgrade equipment efficiency. The upgrade equipment efficiency is forecasted based on NREL EFS data through 2050 assuming moderate technology advancement (i.e., the model accounts for expected improvements in electric equipment efficiencies over time). Improved efficiencies are only applied to equipment electrified in a given year. Past year's electrification remains constant (i.e., efficiency improvements are only applied to new equipment).
iv. For cooking, not all commercial space has natural gas cooking as an end use. To determine the square footage with this end use, the Commercial Building Energy Consumption Survey was used to determine the share of commercial square footage with cooking

as an end use and the share of commercial space with cooking that uses natural gas. After determining the square footage with natural gas cooking as an end use, this square footage is multiplied by the natural gas cooking EUI with the 2021 IECC from the PNNL models.

v. Total energy use after electrification was estimated for the impacted square footage. The all electric weighted building performance factor target from the electric preferred action is then applied to estimate savings from additional efficiency measures.

vi. Avoided emissions from natural gas and propane use reductions due to electrification were calculated. All savings from any additional efficiency measures are assumed to be from electricity as they are applied to an all-electric building. These savings are subtracted from the additional electricity use from electrification to get the net change in electricity use from this measure.

c. Data Sources:

i. PNNL Prototype Building Models

ii. CBECS tables B22, E1, and E7.

4. Passive Building Standards

a. Assumptions:

i. Passive building standards were integrated into this model using the 2021 Performance Criteria Calculator version 3.3 published by Phius. The calculator determines the maximum amount of source energy intensity that a building, retrofit or new construction, must meet to be in compliance with the standard. The calculator varies source energy criteria based on the selected region and climate zone. This model assumed a location of Denver, Colorado.

b. Approach:

i. Source energy includes any energy used to produce and deliver the energy required for on-site operations. The source energy to site energy ratio for the U.S. is used to estimate the site energy criteria for the passive buildings standard. Source-Site ratios for the U.S. vary based on fuel type. A weighted average source-site ratio was determined based on the energy use split across different fuel types for the commercial sector.

ii. A baseline energy use intensity was calculated by obtaining the total baseline energy and dividing by the total square footage of new and retrofitted construction impacted by the standard.

iii. Energy use savings were estimated by calculating the difference between the target and baseline energy use intensities and multiplying by the impacted square footage. Energy savings were split based on the breakdown of natural gas, propane, and electricity using the Energy Policy Simulator energy use data.

c. Data Sources:

i. Phius 2021 Performance Criteria Calculator v3.3

ii. Energy Star Portfolio Manager Source Energy Technical Reference

5. Adopt Net-Zero Code

a. Assumptions:

i. Net-zero is defined for this model in alignment with the 2021 IECC Appendix CC Zero Energy Commercial Building Provisions. This requires total building energy use to be offset by a combination of on and off site renewable energy.

b. Approach:

i. All energy use for the baseline after implementation of the 2021 IECC was assumed to be offset by this measure. Total energy use in MMBtu is split across natural gas, propane, and electricity using the Energy Policy Simulator energy use data. Data for each baseline was pulled to account for changes in the levels of electrification between each baseline. Energy efficiency measures were excluded from the Roadmap Baseline when exporting energy use data to avoid accounting for building performance standards (BPS) when estimating baseline energy use for square footage that would fall under the code measures.

c. Data Sources:

i. 2021 IECC Appendix CC

6. Building Performance Standards

a. Assumptions:

i. Only applied to existing square footage. Both new and existing buildings that meet the program criteria would need to be compliant with any BPS. However, this model assumes that new construction and retrofits would meet the BPS targets through compliance with the energy code action.

ii. Assumes the BPS would be applied to all buildings 10,000 square feet or greater.

iii. Used Colorado's statewide BPS energy use intensity targets (i.e., this measure expands the range of buildings that must comply with BPS, but not the stringency of the targets).

iv. Assumed the same timeline for compliance (Target 1 reached by 2026 and maintained through 2030. Target 2 reached by 2030 and maintained through 2050).
v. Assumed a linear decrease in the EUI targets between target 1 and 2. Held the 2030 EUI target constant from 2031 through 2050.

b. Approach:

i. 2 square footage buckets were created using ComStock data to estimate the affected square footage from this action: buildings 10,000 - 49,999 sf and buildings >50,000 sf. These bins were created as buildings over 50,000 square feet are already impacted by the BPS targets when the Roadmap Baseline is selected. BPS savings are set to 0 for buildings over 50,000 square feet when the Roadmap Baseline is selected. The share of square footage in each bin was used to estimate actual square footage in each bin for the selected OEDIT region.
ii. A weighted average EUI target was calculated using the EUI targets by building type listed in the Colorado BPS technical resource guide. These targets were matched to corresponding building types in the ComStock dataset and weighted by square footage.
iii. The target EUIs were compared to the baseline weighted average EUI.
iv. The baseline weighted average EUI was estimated from the ComStock dataset for all buildings in Colorado.This value was then forecasted based on the change in EUI from the Energy Policy Simulator from each baseline (BAU and Roadmap Baseline). This accounts for any electrification and efficiency measures in the selected baseline that would already lead to a reduction in EUI prior to the BPS action.
v. The difference between the baseline and target EUI for each year was calculated and multiplied by the impacted square footage within each bin. Energy savings from each bin are then summed and split across fuel types based on the Energy Policy Simulator energy use forecasts for each baseline.

c. Data Sources:

i. NREL ComStock
ii. Colorado BPS Technical Guidance

LG Non-Residential Buildings 3: Provide incentives and financing for energy efficiency, electrification, and on-site renewable energy

Assumptions

1. This action is assumed to only impact existing buildings. New construction and retrofits are assumed to be addressed by the previous two actions.
2. This action includes the following measures:
    a. Electrification.
    b. Energy efficiency.
    c. On-site renewable energy.
3. All measures are modeled separately within this action. Assumptions for individual measures are described in the "Approach" section below.

Approach

1. **Electrification**
    a. **Assumptions:**
        i. Modeled based on equipment replacement timelines. Follows the assumptions of the Energy Policy Simulator in using a 14 year equipment life for all equipment (i.e., in a given year 1/14th of square footage is served by equipment that will be replaced.
        ii. Assumes the financial incentives will equalize the cost of like-for-like and high-efficiency electric equipment when considering replacement equipment. Assumes 50% of equipment to be replaced in a year will be replaced with electric equipment.
        iii. 50% of square footage not electrified on first replacement is assumed to electrify upon second replacement.
        iv. Any electrification and efficiency already included in the selected baseline is excluded to avoid double counting.
        v. Accounted for the replacement of existing non-heat pump electric space and water heating equipment with heat pumps. Applied an adoption reduction factor (50%) to electric equipment replacements assuming that financial incentives and programs would be primarily targeted at fossil fuel equipment.
    b. **Approach:**
        i. Identified total existing non-residential square footage. This is based on the 2023 square footage value for the selected OEDIT region on the "Impact Summary" tab.

ii. Calculated square footage with equipment that will be replaced each year (total square footage by 1/14).
iii. Calculated the share of square footage served by equipment to be replaced split by end use and fuel type (end uses: space heating, water heating, space cooling, and cooking. Fuel types: natural gas, propane, and electricity).
    1. Square footage by end use and fuel type was estimated by multiplying the replacement square footage by the share of each end use served by each fuel type. This share depends on the baseline selected. For the BAU, this was based on the NREL EFS equipment forecasts. For the Roadmap Baseline, the expected share of new equipment already electrified is used to reduce the square footage that can be electrified from this action. This accounts for the share of new equipment expected to be electrified and the implementation timeline of the baseline electrification.
    2. This provides the total square footage each year for each end use and fuel type that can be electrified.
iv. Calculated the square footage electrified each year. Square footage that can be electrified for each end use and fuel type was multiplied by an adoption rate. This rate ramps up to 50% by 2027. This is applied to total square footage on first replacement, and the remaining unelectrified square footage upon second replacement.
v. For space heating, this square footage is further split between furnaces and boilers to account for differences in baseline efficiencies. This split is provided by NREL EFS equipment forecasts.
vi. Total avoided fuel use was estimated using weighted average EUIs by end use taken from CBECS.
    1. Building type EUIs were matched to the building types in ComStock and the weighted average EUI based on the square footage of each building type in Colorado was calculated.
    2. Propane EUIs are not included in CBECS. ComStock was used to estimate average EUI for propane space and water heating.
    3. EUIs were multiplied by the square footage electrified for each end use and fuel type to estimate total avoided fuel use from electrification.

4. When the Roadmap Baseline is selected, avoided fuel use is adjusted by the efficiency factor for each year (25% x implementation %). Total avoided fuel use is reduced by this factor to account for efficiency savings already expected in the Roadmap Baseline.

vii. Additional electricity consumption was estimated by:
   1. Converting avoided fuel use to kBtu.
   2. Multiplying avoided kBtu by the ratio between the efficiency of the baseline equipment and the efficiency of the replacement equipment.
      a. Replacement equipment efficiencies are forecasted through 2050 using NREL's EFS moderate technology advancement scenario (i.e., the replacement equipment efficiency value used for the ratio described above changes each year to account for technology advancement).
      b. For space heating, some regions in Colorado will require a cold climate heat pump. Cold climate heat pumps have different efficiencies to standard heat pumps. A weighted average efficiency for each year through 2050 is calculated based on the share of households in each OEDIT region that are in climate zones 6B and 7.
   3. Converting the resulting kBtu to kWh.

viii. Total avoided baseline fuel use and additional electricity use from electrification were then used to calculate net emission reductions.

c. Data Sources:

i. CBECS Tables B12, B14, B22, and E4.
ii. NREL ComStock
iii. NREL BeOPT Equipment Efficiencies
iv. Minimum SEER ratings: Energy Star

2. Energy Efficiency

a. Assumptions:

i. Assumed a participation in any efficiency incentive program would increase at the same rate as participation in Xcel's Demand Side Management Programs (1.3% increase a year)
ii. Efficiency savings based on a combination of ComStock's efficiency package which includes:
   1. New windows.

2. Wall and roof insulation.
3. LED lighting.
4. Energy Recovery.

b. Approach:

i. Calculated total square footage implementing energy efficiency measures each year.

ii. Calculated baseline EUI for each year.

1. Used the average EUI of buildings in ComStock for 2022.
2. Forecasted this EUI based on the change in energy use included in each of the baseline energy use forecasts from the Energy Policy Simulator. This accounts for any electrification and efficiency already included in the baseline.

iii. Calculated the average percent savings from the selected ComStock efficiency packages.

iv. Calculated the EUI after implementation of the energy efficiency measures by applying the average percent savings to the baseline EUI.

v. Calculated total avoided energy use by multiplying the participating square footage each year by the difference between the baseline and post-efficiency EUIs.

vi. Split total avoided energy use by fuel type based on the share of each fuel type for non-residential buildings in the selected baseline.

vii. Calculated avoided emissions from the avoided energy use by fuel type values.

c. Data Sources:

i. Xcel Demand Side Management Program Status Report

i. NREL ComStock

ii. CBECS Table E2

3. On-Site Renewable Energy

a. Assumptions:

i. Estimated percent of buildings that would be suitable for on-site solar based on an NREL study of Rooftop Solar Photovoltaic Technical Potential.

ii. Estimated the weighted average kW of rooftop solar capacity per square foot of building space. Values taken from an NREL study on commercial building solar breakeven conditions. Values were provided by building type. These were matched to ComStock

building types and a weighted average was calculated based on the square footage of each building type in ComStock.

i. Annual program participation modeled using an NREL study on solar adoption potential.

iii. Used PVWatts to estimate total annual kWh generated per kW of solar installed in Colorado. PVWatts requires a single location to be entered. The value for Denver was used as a proxy for the state. Actual generation will vary by location.

iv. Assumed a 0.5% annual solar degradation factor. Value taken from an NREL study of solar degradation rates and lifetimes.

b. Approach:

i. Estimated the total existing square footage that is eligible for on-site solar.

ii. Calculated the participating square footage each year.

iii. Multiplied participating square footage by the weighted average kW of solar capacity per square foot of building space to estimate total solar capacity added.

iv. Multiplied capacity by the annual kWh generated per kW value to estimate total electricity generation each year.

v. Applied the annual degradation rate to each previous year's generation value to account for efficiency losses of previously installed systems.

c. Data Sources:

i. Affordable and Accessible Solar for All:Barriers, Solutions, and On-Site Adoption Potential

i. Nationwide Analysis of U.S. Commercial Building Solar Photovoltaic (PV) Breakeven Conditions

ii. Rooftop Solar Photovoltaic Technical Potential in the United States: A Detailed Assessment

iii. Overview of Field Experience - Degradation Rates & Lifetimes

iv. PVWatts Calculator

Residential Building Actions

Residential building actions are the same as non-residential actions. Overall approaches remain the same between sectors.

Cross-Action Considerations

1. The Roadmap Baseline includes the following measures for residential buildings:
    a. 25% energy efficiency of new or replaced building components.
    a. 65% electrification of new equipment.
2. Actions are modeled as the additional impact on top of what is already included in the baseline (e.g., if 65% of space heating is electrified in the roadmap baseline in 2040, only 35% of the remaining space heating equipment is available to be impacted by the modeled actions in 2040).
3. All residential actions use total households to calculate marginal impacts of each strategy (kg CO2e/household).

LG Residential Buildings 1: Adopt state minimum building energy codes, including electric, solar, and EV-ready provisions

Assumptions

1. This action is modeled as the expected emissions reductions from accelerating the adoption of the 2021 IECC.
2. Assumed ramp up of adoption of the 2021 IECC by 2025, beginning in 2024.
3. Includes new construction and retrofits.
4. Assumes a 90% compliance rate. Note that compliance will vary by measure included in the code. This model assumes that 90% of affected square footage will achieve full compliance.
5. Based on an analysis of NREL ResStock data, it was determined that recently constructed buildings in Colorado have similar energy efficiency to buildings constructed to the 2012 IECC. This was determined by comparing the average EUI of recently constructed buildings in ResStock to EUIs of modeled buildings from the Pacific Northwest National Laboratory's (PNNL) Prototype Building Energy Models. The 2012 IECC weighted average EUI was closest to the weighted average EUI from the recently constructed buildings in ResStock.
6. Identified efficiency change factors from the 2012 IECC to the following codes:
    a. No energy code or pre 2006 IECC.
    b. 2006 IECC.
    c. 2012 IECC.
    d. 2015 IECC.
    e. 2018 IECC.
    f. 2021 IECC.

7. The user can specify the code adoption status of the jurisdiction to be modeled on the "Impact Summary" tab. Based on this selection, the factors described above are used to estimate baseline energy use from new construction at the selected code.

Approach

1. Identified total residential new construction and retrofitted square footage.
    a. This value is based on the selected OEDIT region on the "Impact Summary" tab.
    b. New construction square footage is estimated by subtracting the current year's square footage from the previous year's value.
    c. 1% of existing square footage (excluding any new construction in a given year) is assumed to be retrofitted each year.
2. Applied an adoption ramp up to the affected square footage
    a. Assumes 75% adoption by 2024 and 100% by 2025.
3. Calculated total affected and compliant square footage for new construction and retrofits (impacted square footage x adoption rate x compliance rate).
4. Accounted for measures in the baseline that would impact energy use of affected square footage. In both the BAU baseline and the Roadmap Baseline, the only measure that is assumed to affect overlap with this action is electrification.
    a. For the BAU baseline:
        i. Identified new or retrofitted square footage in each year that has electrified space and water heating in the BAU. This is based on the share of equipment types taken from NREL's EFS reference case (impacted square footage x % of equipment that is a heat pump/heat pump water heater).
        ii. For the Roadmap Baseline:
            1. The Roadmap Baseline includes electrification of 65% of new equipment. This electrification is ramped up to full implementation by 2030.
            2. This electrification is accounted for in this action by the following equation:
                a. (impacted square footage x implementation rate x electrification rate).
            3. Energy efficiency is accounted for by applying the 25% efficiency factor and the implementation rate to the expected energy use of new construction after electrification.
5. Calculated energy savings already included in baseline electrification:

    a. Calculated energy use for new or retrofitted square footage before code adoption and excluding electrification.
        i. Identified the average energy use intensity for buildings constructed in 2015 or later from NREL's ResStock dataset.
        ii. Multiply affected square footage by this EUI.
        iii. Depending on the energy code selected on the "Impact Summary" tab, this value is then multiplied by an efficiency factor to account for the current energy code of the jurisdiction to be modeled.
        iv. Calculated energy use for new or retrofitted square footage before code adoption and including electrification.
        v. Estimated reduction in natural gas use and increase in electricity use from the electrification included in the baseline.
6. Determined total energy savings from code adoption
7. Calculated net energy savings from code adoption by subtracting the energy savings already achieved by electrification from total energy savings from code adoption.
8. Split net energy savings by energy source based on the share of energy use by source from the selected baseline (taken from the Energy Policy Simulator).
9. Calculated emission reductions and marginal impacts per household.

Data Sources

1. DOE Energy Code Enforcement Funding Task Force Fact Sheet.
2. NREL ResStock
3. UBS Retrofit Revolution Report
4. Code efficiency improvements:
    a. 2006 - 2012: National Energy and Cost Savings for New Single- and Multifamily Homes
    b. 2015: 2015 IECC: Energy Savings Analysis
    c. 2018: Energy Savings Analysis: 2018 IECC for Residential Buildings
    d. 2021: Energy Savings Analysis: 2021 IECC for Residential Buildings

LG Residential Buildings 2: Adopt building energy codes and performance standards that exceed state requirements

Assumptions

1. This action includes the following measures:
    a. Electric-preferred energy code.

b. All-electric energy code.
c. Passive House standards.
d. Net-zero energy code.
e. Building Performance Standards (BPS).

2. All measures are modeled separately within this action. Assumptions for individual measures are described in the "Approach" section below.
3. Savings from this action are assumed to "stack" on top of savings from Action R1. Energy savings are calculated by comparing each included measure to the 2021 IECC (i.e., this action assumes these measures will not be adopted without the 2021 IECC from Action R1).
4. All energy code packages and Passive House are modeled based on the same impacted square footage from Action C1.
5. BPS is modeled for existing multi-family square footage only.

Approach

1. Adjusted baseline energy use after 2021 IECC adoption to account for any additional measures that may impact energy use from affected square footage. This provides total baseline energy use after all baseline measures and 2021 IECC adoption. This is then used as the baseline energy use for all code measures from this action.
2. **Electric preferred**
    a. **Assumptions:**
        i. Electric preferred code packages can include a variety of measures. To apply a standardized approach, performance-based compliance pathways were utilized.
        ii. The required performance compliance from Denver's Energy Code was used. This requires an 18% energy use reduction for mixed fuel buildings and 5% for all-electric buildings.
    b. **Approach:**
        i. Identified square footage that is already fully electrified in the baseline.
        ii. Estimated baseline energy use for baseline all-electric square footage alone:
            1. Based on square footage with electric equipment identified in the minimum code adoption strategy.
        iii. Applied the required efficiency improvement for all-electric buildings to this square footage.
        iv. Repeated the above steps for mixed fuel square footage but applied the mixed fuel efficiency improvement target.

v. Subtracted energy use after building performance targets are met from the baseline energy use to get total savings from electric-preferred measures.
vi. Split energy savings across each energy source based on the BAU baseline energy use by source from the Energy Policy Simulator. The BAU baseline is used as any savings from electrification included in the baseline are already accounted for by assuming that any energy savings from all-electric buildings are from electricity.

c. Data Sources:

i. NREL ResStock
ii. 2022 Denver Energy Code Compliance Pathways

3. All-Electric

a. Assumptions:

i. Includes the electrification of baseline new construction and retrofits that are not already electrified in the selected baseline.
ii. Assumes that any all-electric code package would also include additional efficiency measures beyond the 2021 IECC base code aside from just electrification. The same building performance factor target for all-electric buildings from the electric preferred model is applied in addition to electrification.

b. Approach:

i. Identified square footage not yet electrified in the selected baseline for each fossil fuel end use (space heating, water heating, cooking, and clothes drying).
ii. Estimated natural gas or propane used for each end use. This was done by:
    1. Using NREL EFS equipment type forecasts to determine what portion of the electrified square footage had baseline equipment that was natural gas or propane.
    2. Multiplied the square footage to be electrified by the EUI for each end use based on ResStock.
    3. Calculated additional electricity use from each electrified end use by:
        a. Multiplying fossil kBtu used by the baseline equipment efficiency divided by the upgrade equipment efficiency. The upgrade equipment efficiency is forecasted based on NREL EFS data through 2050 assuming moderate technology advancement.

4. The share of households using natural gas and propane for cooking and clothes drying were estimated based on the share of housing units in ResStock with these fuel types and end uses.

iii. The all electric weighted building performance factor target from the electric preferred action is then applied to estimate savings from additional efficiency measures.

iv. Avoided emissions from natural gas and propane use reductions due to electrification were calculated. All savings from any additional efficiency measures are assumed to be from electricity as they are applied to an all-electric building.

c. Data Sources:

i. NREL ResStock

4. Passive Building Standards

a. Assumptions:

i. Passive building standards were integrated into this model using the 2021 Performance Criteria Calculator version 3.3 published by Phius. The calculator determines the maximum amount of source energy intensity that a building, retrofit or new construction, must meet to be in compliance with the standard. The calculator varies source energy criteria based on the selected region and climate zone. This model assumed a location of Denver, Colorado.

ii. The residential building source energy requirement is given in units of kWh per person. Total energy requirements were estimated by multiplying by population.

b. Approach:

i. Source energy includes any energy used to produce and deliver the energy required for on-site operations. The source energy to site energy ratio for the U.S. is used to estimate the site energy criteria for the passive buildings standard. Source-Site ratios for the U.S. vary based on fuel type. A weighted average source-site ratio was determined based on the energy use split across different fuel types for the commercial sector.

ii. A baseline energy use intensity was calculated by obtaining the total baseline energy and dividing by the total square footage of new and retrofitted construction impacted by the standard.

iii. Energy use savings were estimated by calculating the difference between the target and baseline energy use intensities and multiplying by the impacted square footage. Energy savings were

split based on the breakdown of natural gas, propane, and electricity using the Energy Policy Simulator energy use data.

c. **Data Sources:**
    i. Phius 2021 Performance Criteria Calculator v3.3
    ii. Energy Star Portfolio Manager Source Energy Technical Reference

5. **Adopt Net-Zero Code**
    a. **Assumptions:**
        i. Net-zero is defined for this model in alignment with the 2021 IECC Appendix RC Zero Energy ResidentialBuilding Provisions. This requires total building energy use to be offset by a combination of on and off site renewable energy.
    b. **Approach:**
        i. All energy use for the baseline after implementation of the 2021 IECC was assumed to be offset by this measure. Total energy use in MMBtu is split across natural gas, propane, and electricity using the Energy Policy Simulator energy use data. Data for each baseline was pulled to account for changes in the levels of electrification between each baseline. Energy efficiency measures were excluded from the Roadmap Baseline when exporting energy use data to avoid accounting for building performance standards when estimating baseline energy use for square footage that would fall under the code measures.
    c. **Data Sources:**
        i. 2021 IECC Appendix RC
6. **Building Performance Standards**
    a. **Assumptions:**
        i. Only applied to existing multifamily square footage. Both new and existing buildings that meet the program criteria would need to be compliant with any BPS. However, this model assumes that new construction and retrofits would meet the BPS targets through compliance with the energy code action.
        ii. Assumes the BPS would be applied to all multifamily buildings 10,000 square feet or greater.
        iii. Estimated residential square footage in buildings between 10,000 square feet and 50,000 square feet and 50,000 square feet or greater based on the share of housing units in ResStock in multifamily buildings within these square footage thresholds.
        iv. Used Colorado's statewide BPS energy use intensity targets for multifamily buildings.

v. Assumed the same timeline for compliance (Target 1 reached by 2026 and maintained through 2030. Target 2 reached by 2030 and maintained through 2050).
vi. Assumed a linear decrease in the EUI targets between target 1 and 2. Held the 2030 EUI target constant from 2031 through 2050.
vii. Set savings from multifamily buildings 50,000 square feet and over to 0 when the Roadmap Baseline is selected. These savings are already included in the Roadmap Baseline through the State's existing program.

b. Approach:

i. Calculated a baseline multifamily building EUI based on multifamily records in ResStock. This value was then forecasted based on the change in EUI from the Energy Policy Simulator from each baseline (BAU and Roadmap Baseline). This accounts for any electrification and efficiency measures in the selected baseline that would already lead to a reduction in EUI prior to the BPS action.
ii. The target EUIs were compared to the baseline average EUI.
iii. The difference between the baseline and target EUI for each year was calculated and multiplied by the impacted square footage.Energy savings were then summed and split across fuel types based on the Energy Policy Simulator energy use forecasts for each baseline.

c. Data Sources:

i. NREL ResStock
ii. Colorado BPS Technical Guidance

LG Residential Buildings 3: Provide incentives and financing for energy efficiency, electrification, and on-site renewable energy

Assumptions

1. This action is assumed to only impact existing buildings. New construction and retrofits are assumed to be addressed by the previous 2 actions.
2. This action includes the following measures:
    a. Electrification.
    b. Energy efficiency.
    c. On-site renewable energy.

3. All measures are modeled separately within this action. Assumptions for individual measures are described in the "Approach" section below.

Approach

1. **Electrification**
    a. **Assumptions:**
        i. All assumptions are the same for residential buildings as for non-residential buildings.
    b. **Approach:**
        i. The approach for electrification of residential buildings is the same as for non-residential buildings aside from the following differences:
            1. RECS tables were used to estimate average EUI by fuel type and end use.CBECS was used for non-residential buildings.
            2. Residential equipment type and efficiency forecasts from NREL's EFS were used.
    c. **Data Sources:**
        i. RECS tables CE4.6, HC 4.10, and CE 5.4
        ii. NREL ResStock
        iii. NREL BeOPT Equipment Efficiencies
        iv. Minimum SEER ratings: Energy Star
2. **Energy Efficiency**
    a. **Assumptions:**
        i. Assumes an annual program participation rate based on a Lawrence Berkeley National Laboratory study of utility scale efficiency program participation.
        ii. Efficiency savings based on an NREL study of total potential energy savings from efficiency. This study included savings from electrification. Savings from all non-electrification measures were pulled from this study.
        iii. This study did not include energy savings from energy recovery. Savings from energy recovery were added on top of savings from those included in the NREL study. Savings from energy recovery were taken from a study on already efficient buildings. It is assumed that energy recovery savings are based on energy use after all other efficiency measures are implemented.
    b. **Approach:**
        i. Calculated total square footage implementing energy efficiency measures each year.
        ii. Calculated baseline energy use per household for each year.

1. Used the average energy use per household of buildings in ResStock.
2. Forecasted this energy use per household based on the change in energy use included in each of the baseline energy use forecasts from the Energy Policy Simulator. This accounts for any electrification and efficiency already included in the baseline.

iii. Identified the available percent savings in potential energy efficiency from the NREL study that could be achieved outside of electrification.

iv. Calculated the energy use per household after implementation of the NREL energy efficiency measures by applying the average percent savings to the baseline energy use per household.

v. Calculated the additional energy savings per household from including energy recovery after implementation of other efficiency measures. Subtracted this from the energy use per household after other measures to get total energy use per household after all efficiency improvements.

vi. Calculated total avoided energy use by multiplying the participating square footage each year by the difference between the baseline and post-efficiency energy use per household.

vii. Split total avoided energy use by fuel type based on the share of each fuel type for non-residential buildings in the selected baseline.

viii. Calculated avoided emissions from the avoided energy use by fuel type values.

c. Data Sources:

i. Who is participating in residential energy efficiency programs?

ii. NREL ResStock

iii. Colorado Residential Energy Efficiency Potential

iv. Energy Efficiency Potential in the U.S. Single-Family Housing Stock

3. On-Site Renewable Energy

a. Assumptions:

i. Assumptions for residential on-site renewable energy are the same as for non-residential aside from the following:

1. Assumed the average residential solar system size is 7.15 kW. Based on the average solar system size used in NREL's analyses.

b. Approach:

i. The approach for residential on-site renewable energy is the same as for non-residential.

c. **Data Sources:**
   i. Affordable and Accessible Solar for All: Barriers, Solutions, and On-Site Adoption Potential
   ii. DOE Homeowner's Guide to Going Solar
   iii. Rooftop Solar Photovoltaic Technical Potential in the United States: A Detailed Assessment
   iv. Overview of Field Experience - Degradation Rates & Lifetimes
   v. PVWatts Calculator

Transportation Actions

LG Transportation 1: Plan and implement high quality active transportation infrastructure.

Assumptions

1. Activity and greenhouse gas emissions calculations are limited to on-road light-duty vehicles.
2. On-road emissions are calculated by using annual miles traveled and fuel use split by vehicle type and forecasted over time.
3. Carbon dioxide emissions from ethanol are considered biogenic emissions and are not included in emission totals.

Approach

1. The active transportation strategy is modeled as a decrease in vehicle miles traveled (VMT) due to an increase in access to active transportation infrastructure that results in mode shift to walking and bicycling.
2. Investments in new active transportation infrastructure were modeled based on assumptions from the cost-benefit analysis developed for the CDOT Greenhouse Gas Planning Standard. That analysis assumed 1,900 new or improved sidewalk miles by 2030, and 4,700 by 2050 statewide, and 2,500 miles of bike lanes and shared use paths over a 20-year period. This level of investment was extrapolated to a per capita per year figure to scale these figures to individual local government jurisdictions.
3. Changes in VMT due to investments in active transportation were estimated based on displaced auto miles per facility mile of sidewalks, bike lanes, and shared use paths established by the Greenhouse Gas MItigation Measures Policy

Directive adopted by the Colorado Department of Transportation. These figures are used by the state and metropolitan planning organizations to calculate the benefits of mitigation measures for the GHG Planning Standard, including active transportation investments.

4. VMT is split by the percentage of vehicle registrations by vehicle type and fuel projected for each year. This percentage varies depending on the baseline selected as each baseline includes varying levels of EV adoption. Total fuel consumption per vehicle type and fuel were calculated by multiplying fuel economy by the share of VMT for each vehicle type and fuel type. Annual fuel consumption was used to calculate emissions using grid or fuel emission factors.
5. The total emissions savings from the active transportation strategy were calculated by comparing the greenhouse gas emissions of the baseline scenario to the strategy scenario.

Data Sources

1. Cost-benefit Analysis for Rules Governing Statewide Transportation Planning, Colorado Department of Transportation (estimated miles of active transportation infrastructure built per capita per year)
2. Greenhouse Gas Mitigation Measures Policy Directive, Colorado Department of Transportation (avoided VMT due to active transportation investments)
3. Google's Environmental Insights Explorer for the state of Colorado (current VMT)
4. Colorado EPS (projected VMT, projected vehicle types and fuels, projected grid emissions factors)
5. Department of Energy's Alternative Fuels Data Center (current vehicle registrations)
6. Colorado Department of Public Health & Environment 2023 Colorado State Greenhouse Gas Inventory (breakdown of registered vehicles by size)
7. Energy Information Agency's Annual Energy Outlook for 2023 (fuel economy)
8. NREL's Annual Transportation Baseline (EV fuel economy)

LG Transportation 2: Plan and implement bus rapid transit and other transit priority measures.

Assumptions

1. Activity and greenhouse gas emissions calculations are limited to on-road light-duty vehicles.

2. On-road emissions are calculated by using annual miles traveled and fuel use split by vehicle type and forecasted over time.
3. Carbon dioxide emissions from ethanol are considered biogenic emissions and are not included in emission totals.
4. Any potential increase in emissions from the anticipated increase in bus mileage or usage due to Bus Rapid Transit (BRT) measures has not been considered. These emissions are considered to be de minimis and are not expected to significantly impact the emissions reductions from this action.

Approach

1. The transit priority strategy is modeled as a decrease in vehicle miles traveled (VMT) due to an increase in high quality transit service with transit priority measures that results in mode shift to transit.
2. Investments in new transit priority measures were modeled based on weighted average facility miles per 10,000 residents planned for jurisdictions with planned BRT lines in the DRCOG Regional Transportation Plan for 2050. The approach assumes these facilities will get built over 25 years starting in 2025.
3. Changes in VMT due to investments in transit priority measures were estimated based on displaced auto miles per 100,000 vehicle revenue miles affected by transit priority measures established by the Greenhouse Gas Mitigation Measures Policy Directive adopted by the Colorado Department of Transportation. These figures are used by the state and metropolitan planning organizations to calculate the benefits of mitigation measures for the GHG Planning Standard, including transit priority investments.
4. Vehicle revenue miles affected by the transit priority measures were estimated by assuming each line on average would run 15 minute service for 12 hours per day and 30 minute service for 8 hours per day each weekday, and 15 minute service for 12 hours per day on weekends.
5. VMT is split by the percentage of vehicle registrations by vehicle type and fuel projected for each year. Total fuel consumption per vehicle type and fuel were calculated by multiplying fuel economy by the share of VMT for each vehicle type and fuel type. Annual fuel consumption was used to calculate emissions using grid or fuel emission factors.
6. The total emissions savings from the active transportation strategy were calculated by comparing the greenhouse gas emissions of the baseline scenario to the strategy scenario.

Data Sources

1. Regional Transportation Plan 2050 | DRCOG (planned BRT lines)

2. Greenhouse Gas Mitigation Measures Policy Directive, Colorado Department of Transportation (avoided VMT due to transit priority measures)
3. Google's Environmental Insights Explorer for the state of Colorado (current VMT)
4. Colorado EPS (projected VMT, projected vehicle types and fuels, projected grid emissions factors)
5. Department of Energy's Alternative Fuels Data Center (current vehicle registrations)
6. Colorado Department of Public Health & Environment 2023 Colorado State Greenhouse Gas Inventory (breakdown of registered vehicles by size)
7. Energy Information Agency's Annual Energy Outlook for 2023 (fuel economy)
8. NREL's Annual Transportation Baseline (EV fuel economy)

LG Transportation 3: Adopt and implement policies to encourage transit use and reduce parking (TDM).

Assumptions

1. Activity and greenhouse gas emissions calculations are limited to on-road light-duty vehicles.
2. On-road emissions are calculated by using annual miles traveled and fuel use split by vehicle type and forecasted over time.
3. Carbon dioxide emissions from ethanol are considered biogenic emissions and are not included in emission totals.

Approach

1. The TDM strategy is modeled as a decrease in vehicle miles traveled (VMT) due to the adoption of jurisdiction-wide policies to encourage transit use and other active modes.
2. Changes in VMT due to TDM policies were estimated based on the results of a 2023 Federal Highway Administration Study “An Assessment of the Expected Impacts of City-Level Parking Cash-Out and Commuter Benefits Ordinances”. The measure models the average results across 9 cities in the FHWA study for two different policies: 1) a city-level parking cashout policy (an ordinance in which employers must offer employees the option to cash-out their parking on a monthly basis), and 2) a city-level commuter benefit policy (an ordinance that requires employers providing free/subsidized parking to offer employees a transit or vanpool benefit paid by the employer). On average, the study

estimates a city-level parking cashout policy reduces VMT by 7.1% and a city-level commuter benefit policy reduces VMT by 3.6%.

3. VMT is split by the percentage of vehicle registrations by vehicle type and fuel projected for each year. Total fuel consumption per vehicle type and fuel were calculated by multiplying fuel economy by the share of VMT for each vehicle type and fuel type. Annual fuel consumption was used to calculate emissions using grid or fuel emission factors.
4. The total emissions savings from the active transportation strategy were calculated by comparing the greenhouse gas emissions of the baseline scenario to the strategy scenario.

Data Sources

1. An Assessment of the Expected Impacts of City-Level Parking Cash-Out and Commuter Benefits Ordinances (change in VMT due to TDM policies)
2. Google's Environmental Insights Explorer for the state of Colorado (current VMT)
3. Colorado EPS (projected VMT, projected vehicle types and fuels, projected grid emissions factors)
4. Department of Energy's Alternative Fuels Data Center (current vehicle registrations)
5. Colorado Department of Public Health & Environment 2023 Colorado State Greenhouse Gas Inventory (breakdown of registered vehicles by size)
6. Energy Information Agency's Annual Energy Outlook for 2023 (fuel economy)
7. NREL's Annual Transportation Baseline (EV fuel economy)

LG Transportation 4: Implement differentiated vehicle registration and other fees based on vehicle size or efficiency

Assumptions

1. Activity and greenhouse gas emissions calculations are limited to on-road light-duty vehicles.

Approach

1. The feebate strategy is modeled as a fee on inefficient light-duty vehicles that is rebated to buyers of efficient light-duty vehicles.
2. The strategy was modeled using RMI’s Energy Policy Simulator for Colorado.

3. Fees were modeled as linearly increasing from 0% to 100% of the global best practice rate from 2024 to 2030, and then remaining constant through 2050. The global best practice rate is defined by RMI's EPS as $2,000 per hundredth gallon/mile with a pivot point of 25 miles per gallon.
4. The total emissions savings from the feebate strategy were calculated by comparing the greenhouse gas emissions of the baseline scenario to the strategy scenario from the EPS model.
5. Emission savings are scaled by population to account for differences in regional growth.

Data Sources

1. Colorado EPS

Land Use Actions

LG Land Use 1: Encourage accessory dwelling units (ADUs) and attached homes in all residential areas.

Assumptions

1. Activity and greenhouse gas emissions calculations are limited to on-road light-duty vehicles.
2. On-road emissions are calculated by using annual miles traveled and fuel use split by vehicle type and forecasted over time.

Approach

1. The ADU and middle housing strategy is modeled as a decrease in vehicle miles traveled (VMT) due to the adoption of jurisdiction-wide policies to enable greater residential density in single-family zones. Reductions due to building energy use were not yet included.
2. Changes in VMT due to the ADU and middle housing strategy were estimated based on the change in VMT per residential unit and re-zoned acre established by the Greenhouse Gas Mitigation Measures Policy Directive adopted by the Colorado Department of Transportation. The estimates incorporate a factor for the elasticity of VMT with respect to residential density, and assume a percent density increase of 150%, from 8 dwelling units per acre (a typical residential density) to 20 dwelling units per acre (assuming between 2-3 times the current level of density based on a shift from allowing one unit per lot to up to three).

3. Acres rezoned per household from single-family to allow ADUs and up to triplexes were estimated based on an analysis of publicly available zoning data from Colorado communities in urban, suburban, and rural contexts.
4. The VMT impacts of the policy are expected to begin in 2025 and phase in through 2050 as household growth increases. For regions that are not expecting household growth, the expected emissions benefits are set to zero.
5. VMT is split by the percentage of vehicle registrations by vehicle type and fuel projected for each year. Total fuel consumption per vehicle type and fuel were calculated by multiplying fuel economy by the share of VMT for each vehicle type and fuel type. Annual fuel consumption was used to calculate emissions using grid or fuel emission factors.
6. The total emissions savings from the ADU and middle housing strategy were calculated by comparing the greenhouse gas emissions of the baseline scenario to the strategy scenario.

Data Sources

1. Greenhouse Gas Mitigation Measures Policy Directive, Colorado Department of Transportation (avoided VMT due to re-zoning increased density in the form of ADUs and middle housing)
2. Analysis of Colorado communities' zoning data (average per capita single-family zoned areas for urban, suburban, and rural contexts).
3. Google's Environmental Insights Explorer for the state of Colorado (current VMT)
4. Colorado EPS (projected VMT, projected vehicle types and fuels, projected grid emissions factors)
5. Department of Energy's Alternative Fuels Data Center (current vehicle registrations)
6. Colorado Department of Public Health & Environment 2023 Colorado State Greenhouse Gas Inventory (breakdown of registered vehicles by size)
7. Energy Information Agency's Annual Energy Outlook for 2023 (fuel economy)
8. NREL's Annual Transportation Baseline (EV fuel economy)

LG Land Use 2: Encourage multi-family housing and mixed-use development near transit and in commercial areas.

Assumptions

1. Activity and greenhouse gas emissions calculations are limited to on-road light-duty vehicles.
2. On-road emissions are calculated by using annual miles traveled and fuel use split by vehicle type and forecasted over time.

Approach

1. The multi-family housing strategy is modeled as a decrease in vehicle miles traveled (VMT) due to the adoption of jurisdiction-wide policies to enable greater density near high-quality transit. Reductions due to building energy use were not yet included.
2. Changes in VMT due to the multi-family housing strategy were estimated based on the change in VMT per residential unit and re-zoned acre established by the Greenhouse Gas Mitigation Measures Policy Directive adopted by the Colorado Department of Transportation. The policy was modeled based on the estimated acres of area rezoned for mixed-use transit-oriented development (TOD) accommodating at least 25 residential units/acre and 150 jobs/acre, within ½ mile of fixed-guideway transit stations.
3. Acres rezoned per household were based on an analysis of publicly available zoning data from Colorado communities with high-quality transit service (including light rail, commuter rail, bus rapid transit, and frequent bus).
4. The VMT impacts of the policy are expected to begin in 2025 and phase in through 2050 as household growth increases. For regions that are not expecting household growth, the expected emissions benefits are set to zero.
5. VMT is split by the percentage of vehicle registrations by vehicle type and fuel projected for each year. Total fuel consumption per vehicle type and fuel were calculated by multiplying fuel economy by the share of VMT for each vehicle type and fuel type. Annual fuel consumption was used to calculate emissions using grid or fuel emission factors.
6. The total emissions savings from the multi-family housing strategy were calculated by comparing the greenhouse gas emissions of the baseline scenario to the strategy scenario.

Data Sources

1. Greenhouse Gas Mitigation Measures Policy Directive, Colorado Department of Transportation (avoided VMT due to re-zoning increased density near transit)
2. Analysis of Colorado communities' zoning data (average per capita acreage near high-quality transit).
3. Google's Environmental Insights Explorer for the state of Colorado (current VMT)
4. Colorado EPS (projected VMT, projected vehicle types and fuels, projected grid emissions factors)
5. Department of Energy's Alternative Fuels Data Center (current vehicle registrations)
6. Colorado Department of Public Health & Environment 2023 Colorado State Greenhouse Gas Inventory (breakdown of registered vehicles by size)
7. Energy Information Agency's Annual Energy Outlook for 2023 (fuel economy)
8. NREL's Annual Transportation Baseline (EV fuel economy)

LG Land Use 3: Implement policies to discourage greenfield development.

This measure is considered an enabling and supportive measure to the other land use policies so GHG emissions reductions for this action are not directly quantified.

LG Land Use 4: Implement robust parking reduction policies.

Assumptions

1. Activity and greenhouse gas emissions calculations are limited to on-road light-duty vehicles.
2. On-road emissions are calculated by using annual miles traveled and fuel use split by vehicle type and forecasted over time.

Approach

1. The parking reduction strategy is modeled as a decrease in vehicle miles traveled (VMT) due to the adoption of jurisdiction-wide policies to reform parking mandates that result in greater density and less private vehicle reliance.
2. Changes in VMT due to the parking strategy were estimated based on the change in VMT per residential unit established by the Greenhouse Gas Mitigation Measures Policy Directive adopted by the Colorado Department of

Transportation. The scenario modeled includes eliminating minimum and setting low maximum parking requirements for residential uses, and estimates the impact of a one space per unit parking reduction.

3. The VMT impacts of the policy are expected to begin in 2025 and phase in through 2050 as household growth increases. For regions that are not expecting household growth, the expected emissions benefits are set to zero.
4. VMT is split by the percentage of vehicle registrations by vehicle type and fuel projected for each year. Total fuel consumption per vehicle type and fuel were calculated by multiplying fuel economy by the share of VMT for each vehicle type and fuel type. Annual fuel consumption was used to calculate emissions using grid or fuel emission factors.
5. The total emissions savings from the parking reduction strategy were calculated by comparing the greenhouse gas emissions of the baseline scenario to the strategy scenario.

Data Sources

1. Greenhouse Gas Mitigation Measures Policy Directive, Colorado Department of Transportation (avoided VMT due to reforming parking mandates)
2. Google's Environmental Insights Explorer for the state of Colorado (current VMT)
3. Colorado EPS (projected VMT, projected vehicle types and fuels, projected grid emissions factors)
4. Department of Energy's Alternative Fuels Data Center (current vehicle registrations)
5. Colorado Department of Public Health & Environment 2023 Colorado State Greenhouse Gas Inventory (breakdown of registered vehicles by size)
6. Energy Information Agency's Annual Energy Outlook for 2023 (fuel economy)
7. NREL's Annual Transportation Baseline (EV fuel economy)

LG Land Use 5: Adopt best practices in EV charging permitting.

This measure is considered an enabling and supportive measure to the other land use policies so GHG emissions reductions for this action are not directly quantified.

LG Land Use 6: Reform utility scale renewable energy permitting.

This measure is considered an enabling and supportive measure to the other land use policies so GHG emissions reductions for this action are not directly quantified.

Waste Actions

LG Waste 1: Adopt jurisdiction-wide waste policies.

Assumptions

1. The greenhouse gas emission impacts from each of the proposed policies was limited to emissions from landfilling and composting materials. The avoided emissions from virgin materials from recycling were not considered in this analysis.
2. The proposed actions were assumed to be limited to commercial, residential, and construction and demolition (C&D) waste and do not include industrial waste impacts.
3. Each of the proposed ordinances and policies are modeled separately and independently to assess their impact on greenhouse gas emissions reductions.
4. All policies and ordinances are expected to begin in 2025 and continue through 2050.
5. Assumes the Business as Usual and Roadmap Baseline ZEV adoption projections for medium- and heavy-duty vehicles are the same for refuse trucks.

Approach

1. **Baseline**
    a. Waste tonnage data was obtained for 2022 from various sources and forecasted to grow at the rate of population up to 2050.
        i. Statewide landfilled, recycled, and composted waste tonnage for 2022 was obtained from the Colorado Department of Public Health & Environment (CDPHE) waste dashboard. Statewide waste tonnage data was converted to per capita values by dividing by the state population.
        ii. Construction and Demolition (C&D) waste was estimated from the Boulder County Construction & Demolition Waste Report. The Boulder County report estimates 1.977 pounds per capita of C&D waste are generated each day. Additionally, the report assumes 95% of C&D is landfilled, 5% is recycled, and 0% is composted.
    b. Regional waste tonnage was estimated by multiplying the statewide waste tonnage per capita values by regional population. Regional waste tonnage is estimated to grow over time following population changes for the region.

c. Greenhouse gas emissions were calculated based on waste tonnage, waste composition, emission factors, landfill oxidation factors, and landfill gas collection efficiency.
    i. The composition of landfilled waste was obtained from the CDPHE's Waste Composition of Municipal Solid Waste Disposal study from 2018. Colorado state average values were used.
    ii. The composition of recycled and composted waste was obtained from CDPHE's 2022 Colorado Recycling Totals dashboard.
    iii. The composition of C&D waste was obtained from the Boulder County Construction & Demolition Waste Report.
    iv. Landfill emission factors were obtained from ICLEI's U.S. Community Protocol for Accounting and Reporting of Greenhouse Gas Emissions.
    v. A weighted average of collected efficiency rate for all landfills in Colorado was developed from the EPA's LMOP Landfill and Landfill Gas Energy Database for Colorado. The calculated weighted average efficiency rate was developed based on the total waste in place per open landfill in the state. Landfills without gas capturing systems were assigned an efficiency of 0% and landfills with gas capturing systems were assigned an efficiency of 75%.
d. Transportation emissions from refuse trucks were estimated from VMT, fuel efficiency, and EV adoption values.
    i. The total number of refuse trucks in Colorado is estimated to be 81 trucks per 100,000 people, according to the Environmental Research & Education Foundation (EREF) Waste Collection Vehicle Survey.
    ii. Each refuse truck is expected to travel 75 miles per day according to Atlas Public Policy's study on Medium- and Heavy-Duty Charging Infrastructure in the State of Colorado. It is assumed that refuse trucks operate 7-days a week, 365 days per year, and travel a total of 27,375 miles per year.
    iii. It is assumed that some refuse trucks will be converted to electric vehicles without any additional policy action from the state. Baseline electric vehicle adoption for refuse vehicles is estimated from RMI's Energy Policy Simulator (EPS)'s forecasted fleet composition for medium- and heavy-duty vehicles.
    iv. It is assumed that all refuse trucks are either diesel or battery electric vehicles.

v. The fuel economy for a diesel refuse truck is assumed to be 1.7 miles per gallon, according to Argonne National Laboratory's AFLEET tool.
vi. The fuel economy for electric refuse trucks is assumed to be 3.2 kWh per mile, according to a DOE study on medium- and heavy-duty fleet electrification.

2. **Adopt an ordinance requiring residential and commercial building recycling and composting services**
    a. With universal access to recycling, the amount of recyclable waste that is diverted from landfills is assumed to be 34%. This diversion rate was estimated from the Recycling Partnership's State of Recycling Study, which found that of homes that have access to recycling, only 59% use their recycling service. Furthermore, Recycling Partnership's study found that households that recycle do not recycle everything. Of the homes that recycle, only 57% of recyclable materials are put into recycling bins (the remaining 43% of recyclable materials are landfilled).
    b. With universal access to composting, the amount of compostable waste that is diverted from landfills is assumed to be 30%. This diversion rate is estimated from the City of Boise's enactment of a citywide curbside composting program. The City of Boise found that 30% of residential waste was diverted from landfills and composted after the enactment of the citywide curbside composting program.
    c. Greenhouse gas emission impacts were calculated by estimating the avoided emissions from diverting the increased recycled and composted waste from the landfill. The increased greenhouse gas emissions from composting were also considered in impact calculations.
3. **Adopt a single waste hauler policy or contract**
    a. Average waste diversion and transportation emission impacts from single hauler policies were estimated from the City of Arvada's Residential Hauling Study in 2011.
        i. The Arvada study found an average increase of 17% in composting and recycling combined from adopting a single hauler policy and a Pay-As-You-Throw (PAYT) policy.
        ii. To isolate the impacts of only the single hauler system, the increased diversion rate from Arvada's study was subtracted from the average waste diversion rate from a PAYT policy.
        iii. The average waste diversion from a PAYT policy is assumed to increase by 11%. Therefore, the average increase in diversion from only a single hauler policy is assumed to be 6%.

iv. The model assumes a 33% average annual reduction in refuse truck greenhouse gas emissions from adopting a single hauler.

b. Transportation impacts from the Arvada study were scaled by population to assess the impacts for all regions included in this study.
c. Greenhouse gas emission impacts were calculated by estimating the avoided emissions from diverting the increased recycled and composted waste from the landfill and increased greenhouse gas emissions from composting. Reduction in transportation emissions were also included in this analysis.

4. **Adopt a policy to require or incentivize diversion of construction waste**
    a. This policy was modeled assuming a requirement of 85% diversion rate of C&D materials starting in 2024. This diversion rate was estimated from Perks Deconstruction's Zero Waste approach to salvaging C&D waste.
    b. All C&D waste diversion is assumed to be recycled. No composting or reuse of C&D materials is considered.
    c. Greenhouse gas emission impacts were calculated by estimating the avoided emissions from diverting the increased recycled materials.
5. **Adopt a Pay-As-You-Throw (PAYT) policy**
    a. PAYT policies result in a reduction in landfilled waste and an increase in diverted waste.
    b. It was assumed that an average annual 30% reduction in landfilled waste can be expected from PAYT policies. This assumption is a conservative estimate based on studies from Massachusetts and New Hampshire. A 2020 Massachusetts study found an average annual 30% reduction in landfilled waste from PAYT policies. A 2018 New Hampshire study found that unit-based pricing fees reduced municipal waste disposal between 42-52% annually.
    c. The average waste diversion from a PAYT policy is assumed to increase by 11%. Existing studies show that composting and recycling programs divert 8-13% more waste by weight with unit price programs.
    d. Greenhouse gas emission impacts were calculated by estimating the avoided emissions from diverting the increased recycled and composted waste from the landfill and increased greenhouse gas emissions from composting.

Data Sources

1. Medium- and Heavy-Duty Charging Infrastructure In The State of Colorado
2. Environmental Research & Education Foundation - Waste Collection Vehicle Survey

3. Argonne National Laboratory's Alternative Fuel Life-Cycle Environmental and Economic Transportation (AFLEET) Tool
4. DOE Study of Quantitative Evaluation of MD/HD Vehicle Electrification using Statistical Data
5. Colorado Department of Public Health & Environment 2022 Waste Diversion dashboard
6. Boulder County Construction & Demolition Waste Report
7. Colorado Integrated Solid Waste & Materials Management Plan
8. The Recycling Partnership's "State of Recycling: Present and Future of Residential Recycling in the U.S" study
9. City of Biose's Citywide Composting Program
10. City of Arvada's Residential Hauling Study in 2011
11. What is pay-as-you-throw? A waste expert explains - 2020 Massachusetts PAYT Study
12. Pay-As-You Throw Trash Policy Cuts Solid Waste Disposal - 2018 New Hampshire Article
13. EPA Pay-As-You-Throw Lessons Learned About Unit Pricing

LG Waste 2: Encourage adoption of zero emission vehicles for hauling waste.

Assumptions

1. Assumes no refuse trucks in a fleet are battery electric vehicles to start.
2. Assumes that 4% of a refuse truck fleet turns over each year (implied 25 year vehicle life) and in the measure scenario, all new vehicles are battery electric.
3. Assumes the Business as Usual and Roadmap Baseline ZEV adoption projections for medium- and heavy-duty vehicles are the same for refuse trucks.
4. Baseline medium- and heavy-duty truck ZEV adoption is assumed to occur regardless of this action. ZEV adoption from this action is in addition to any adoption included in the baseline.

Approach

1. The ZEV refuse truck strategy is modeled as a decrease in diesel refuse trucks in a fleet, and an increase in battery-electric refuse trucks as the fleet retires old vehicles and purchases new ones.
2. A typical refuse truck fleet size per 100,000 residents is modeled based on a forthcoming national survey from the Environmental Research and Education Foundation. Typical annual mileage per refuse truck is modeled based on

recent data from the Medium- and Heavy-Duty Charging Infrastructure in the State of Colorado study.
3. Emissions from electricity and diesel use are modeled over time as the fleet shifts from all diesel to battery-electric vehicles, using estimates for fuel economy for each vehicle type and emissions factors for diesel and electricity.
4. The total emissions savings from the ZEV refuse truck strategy were calculated by comparing the greenhouse gas emissions of the baseline scenario to the strategy scenario.

Data Sources

1. Medium- and Heavy-Duty Charging Infrastructure in the State of Colorado (VMT per refuse truck)
2. Environmental Research & Education Foundation (EREF) Waste Collection Vehicle Survey (forthcoming) (refuse trucks per 100,000 people in Colorado)
3. Alternative Fuel Life-Cycle Environmental and Economic Transportation (AFLEET) Tool and Gao, Z., Lin, Z., Davis, S. C., & Birky, A. K. (2018). Quantitative Evaluation of MD/HD Vehicle Electrification using Statistical Data. Transportation Research Record. (refuse truck fuel economy)
4. Colorado EPS (projected vehicle types and fuels, projected grid emissions factors)

Appendix C: Colorado Low Income and Disadvantaged Communities

According to the spatial and tabular data downloaded from the Inflation Reduction Act Disadvantaged Communities Map website[1], 1,314 of 4,103 Colorado census block groups meet one of more of these criteria, and are therefore considered LIDACs[2]. Figures 4-6 below show Colorado disadvantaged census block groups, and a complete list is included in Table 1 below.

[1] US EPA, Inflation Reduction Act Disadvantaged Communities Map, ArcGIS Geodatabase and Microsoft Excel Spreadsheet Downloaded February 22, 2024
[2] US EPA, Inflation Reduction Act Disadvantaged Communities Map

Table 1. List of Colorado Low Income and Disadvantaged Communities Block Groups

Census Block Group ID	US Supplemental Index >=90%	State Supplemental Index >=90%	CEJST Disadvantaged	Alaska Native Allotments	Alask Native Villages	American Indian Reservations	Off-Reservation Trust Lands	Oklahoma Tribal Statistical Area	Disadvantaged
80010078011	Yes	Yes	Yes	No	No	No	No	No	Yes
80010078012	Yes	Yes	Yes	No	No	No	No	No	Yes
80010078021	Yes	Yes	Yes	No	No	No	No	No	Yes
80010078022	Yes	Yes	Yes	No	No	No	No	No	Yes
80010078023	Yes	Yes	Yes	No	No	No	No	No	Yes
80010079001	Yes	Yes	Yes	No	No	No	No	No	Yes
80010079002	No	No	Yes	No	No	No	No	No	Yes
80010079003	No	Yes	Yes	No	No	No	No	No	Yes
80010079004	Yes	Yes	Yes	No	No	No	No	No	Yes
80010080001	No	Yes	Yes	No	No	No	No	No	Yes
80010080002	Yes	Yes	Yes	No	No	No	No	No	Yes
80010080003	Yes	Yes	Yes	No	No	No	No	No	Yes
80010080004	No	No	Yes	No	No	No	No	No	Yes
80010080005	No	No	Yes	No	No	No	No	No	Yes
80010080006	No	Yes	Yes	No	No	No	No	No	Yes
80010081001	No	Yes	Yes	No	No	No	No	No	Yes
80010082001	No	Yes	Yes	No	No	No	No	No	Yes
80010082002	Yes	Yes	Yes	No	No	No	No	No	Yes
80010082003	No	No	Yes	No	No	No	No	No	Yes
80010083081	No	No	Yes	No	No	No	No	No	Yes
80010083082	Yes	Yes	Yes	No	No	No	No	No	Yes
80010083083	Yes	Yes	Yes	No	No	No	No	No	Yes
80010083091	Yes	Yes	Yes	No	No	No	No	No	Yes
80010083092	No	No	Yes	No	No	No	No	No	Yes
80010083093	Yes	Yes	Yes	No	No	No	No	No	Yes
80010083541	Yes	Yes	No	No	No	No	No	No	Yes
80010083552	No	Yes	No	No	No	No	No	No	Yes
80010085054	No	Yes	No	No	No	No	No	No	Yes
80010085056	No	Yes	No	No	No	No	No	No	Yes

Table 1. List of Colorado Low Income and Disadvantaged Communities Block Groups

Census Block Group ID	US Supplemental Index >=90%	State Supplemental Index >=90%	CEJST Disadvantaged	Alaska Native Allotments	Alask Native Villages	American Indian Reservations	Off-Reservation Trust Lands	Oklahoma Tribal Statistical Area	Disadvantaged
80010085061	Yes	Yes	Yes	No	No	No	No	No	Yes
80010085062	Yes	Yes	Yes	No	No	No	No	No	Yes
80010085063	Yes	Yes	Yes	No	No	No	No	No	Yes
80010085064	No	Yes	Yes	No	No	No	No	No	Yes
80010085065	Yes	Yes	Yes	No	No	No	No	No	Yes
80010085073	No	Yes	No	No	No	No	No	No	Yes
80010085075	Yes	Yes	No	No	No	No	No	No	Yes
80010085081	Yes	Yes	No	No	No	No	No	No	Yes
80010085332	No	Yes	No	No	No	No	No	No	Yes
80010085333	No	Yes	No	No	No	No	No	No	Yes
80010085334	Yes	Yes	No	No	No	No	No	No	Yes
80010085342	No	Yes	No	No	No	No	No	No	Yes
80010085352	Yes	Yes	No	No	No	No	No	No	Yes
80010085552	No	Yes	No	No	No	No	No	No	Yes
80010085553	No	Yes	No	No	No	No	No	No	Yes
80010085622	No	Yes	No	No	No	No	No	No	Yes
80010085641	No	Yes	No	No	No	No	No	No	Yes
80010085655	Yes	Yes	No	No	No	No	No	No	Yes
80010086031	Yes	Yes	Yes	No	No	No	No	No	Yes
80010086042	No	Yes	No	No	No	No	No	No	Yes
80010086061	No	Yes	No	No	No	No	No	No	Yes
80010086063	No	Yes	No	No	No	No	No	No	Yes
80010087051	Yes	Yes	Yes	No	No	No	No	No	Yes
80010087052	Yes	Yes	Yes	No	No	No	No	No	Yes
80010087053	Yes	Yes	Yes	No	No	No	No	No	Yes
80010087054	Yes	Yes	Yes	No	No	No	No	No	Yes
80010087061	Yes	Yes	Yes	No	No	No	No	No	Yes
80010087062	Yes	Yes	Yes	No	No	No	No	No	Yes
80010087063	Yes	Yes	Yes	No	No	No	No	No	Yes

Table 1. List of Colorado Low Income and Disadvantaged Communities Block Groups

Census Block Group ID	US Supplemental Index >=90%	State Supplemental Index >=90%	CEJST Disadvantaged	Alaska Native Allotments	Alask Native Villages	American Indian Reservations	Off-Reservation Trust Lands	Oklahoma Tribal Statistical Area	Disadvantaged
80010087091	No	No	Yes	No	No	No	No	No	Yes
80010087092	Yes	Yes	Yes	No	No	No	No	No	Yes
80010087093	Yes	Yes	Yes	No	No	No	No	No	Yes
80010087094	Yes	Yes	Yes	No	No	No	No	No	Yes
80010087095	Yes	Yes	Yes	No	No	No	No	No	Yes
80010087096	Yes	Yes	Yes	No	No	No	No	No	Yes
80010088011	Yes	Yes	Yes	No	No	No	No	No	Yes
80010088012	Yes	Yes	Yes	No	No	No	No	No	Yes
80010088013	Yes	Yes	Yes	No	No	No	No	No	Yes
80010088021	Yes	Yes	Yes	No	No	No	No	No	Yes
80010088022	Yes	Yes	Yes	No	No	No	No	No	Yes
80010088023	Yes	Yes	Yes	No	No	No	No	No	Yes
80010089011	Yes	Yes	Yes	No	No	No	No	No	Yes
80010089012	Yes	Yes	Yes	No	No	No	No	No	Yes
80010090011	No	Yes	No	No	No	No	No	No	Yes
80010090012	No	Yes	No	No	No	No	No	No	Yes
80010090031	No	Yes	No	No	No	No	No	No	Yes
80010090033	Yes	Yes	No	No	No	No	No	No	Yes
80010090042	No	Yes	No	No	No	No	No	No	Yes
80010090043	No	Yes	No	No	No	No	No	No	Yes
80010091013	No	Yes	No	No	No	No	No	No	Yes
80010091031	Yes	Yes	Yes	No	No	No	No	No	Yes
80010091032	Yes	Yes	Yes	No	No	No	No	No	Yes
80010091041	Yes	Yes	Yes	No	No	No	No	No	Yes
80010091042	No	Yes	Yes	No	No	No	No	No	Yes
80010092021	Yes	Yes	Yes	No	No	No	No	No	Yes
80010092022	Yes	Yes	Yes	No	No	No	No	No	Yes
80010092023	No	Yes	Yes	No	No	No	No	No	Yes
80010092031	No	Yes	Yes	No	No	No	No	No	Yes

Table 1. List of Colorado Low Income and Disadvantaged Communities Block Groups

Census Block Group ID	US Supplemental Index >=90%	State Supplemental Index >=90%	CEJST Disadvantaged	Alaska Native Allotments	Alask Native Villages	American Indian Reservations	Off-Reservation Trust Lands	Oklahoma Tribal Statistical Area	Disadvantaged
80010092032	No	Yes	Yes	No	No	No	No	No	Yes
80010092033	Yes	Yes	Yes	No	No	No	No	No	Yes
80010092041	No	Yes	No	No	No	No	No	No	Yes
80010092042	No	Yes	No	No	No	No	No	No	Yes
80010092043	No	Yes	No	No	No	No	No	No	Yes
80010092071	No	Yes	No	No	No	No	No	No	Yes
80010093043	Yes	Yes	No	No	No	No	No	No	Yes
80010093045	No	Yes	No	No	No	No	No	No	Yes
80010093081	No	Yes	No	No	No	No	No	No	Yes
80010093084	No	Yes	No	No	No	No	No	No	Yes
80010093091	No	Yes	Yes	No	No	No	No	No	Yes
80010093092	Yes	Yes	Yes	No	No	No	No	No	Yes
80010093093	Yes	Yes	Yes	No	No	No	No	No	Yes
80010093101	No	Yes	No	No	No	No	No	No	Yes
80010093102	No	Yes	No	No	No	No	No	No	Yes
80010093103	No	Yes	No	No	No	No	No	No	Yes
80010093104	Yes	Yes	No	No	No	No	No	No	Yes
80010093161	No	Yes	Yes	No	No	No	No	No	Yes
80010093162	Yes	Yes	Yes	No	No	No	No	No	Yes
80010093163	No	Yes	Yes	No	No	No	No	No	Yes
80010093164	Yes	Yes	Yes	No	No	No	No	No	Yes
80010093165	Yes	Yes	Yes	No	No	No	No	No	Yes
80010093181	Yes	Yes	Yes	No	No	No	No	No	Yes
80010093182	Yes	Yes	Yes	No	No	No	No	No	Yes
80010093183	Yes	Yes	Yes	No	No	No	No	No	Yes
80010093191	Yes	Yes	Yes	No	No	No	No	No	Yes
80010093192	Yes	Yes	Yes	No	No	No	No	No	Yes
80010093193	Yes	Yes	Yes	No	No	No	No	No	Yes
80010093201	Yes	Yes	Yes	No	No	No	No	No	Yes

Table 1. List of Colorado Low Income and Disadvantaged Communities Block Groups

Census Block Group ID	US Supplemental Index >=90%	State Supplemental Index >=90%	CEJST Disadvantaged	Alaska Native Allotments	Alask Native Villages	American Indian Reservations	Off-Reservation Trust Lands	Oklahoma Tribal Statistical Area	Disadvantaged
80010093202	Yes	Yes	Yes	No	No	No	No	No	Yes
80010093211	Yes	Yes	No	No	No	No	No	No	Yes
80010093213	Yes	Yes	No	No	No	No	No	No	Yes
80010093222	Yes	Yes	No	No	No	No	No	No	Yes
80010093231	No	Yes	No	No	No	No	No	No	Yes
80010093232	No	Yes	No	No	No	No	No	No	Yes
80010093234	Yes	Yes	No	No	No	No	No	No	Yes
80010094013	No	Yes	No	No	No	No	No	No	Yes
80010094072	Yes	Yes	No	No	No	No	No	No	Yes
80010095011	Yes	Yes	No	No	No	No	No	No	Yes
80010095021	Yes	Yes	No	No	No	No	No	No	Yes
80010095022	No	Yes	No	No	No	No	No	No	Yes
80010095531	Yes	Yes	Yes	No	No	No	No	No	Yes
80010095532	Yes	Yes	Yes	No	No	No	No	No	Yes
80010096031	No	Yes	No	No	No	No	No	No	Yes
80010096032	No	Yes	No	No	No	No	No	No	Yes
80010096034	No	Yes	No	No	No	No	No	No	Yes
80010096035	Yes	Yes	No	No	No	No	No	No	Yes
80010096042	No	Yes	No	No	No	No	No	No	Yes
80010096043	Yes	Yes	No	No	No	No	No	No	Yes
80010096061	No	Yes	No	No	No	No	No	No	Yes
80010096062	No	Yes	No	No	No	No	No	No	Yes
80010096071	No	Yes	No	No	No	No	No	No	Yes
80010096073	Yes	Yes	No	No	No	No	No	No	Yes
80010097511	Yes	Yes	Yes	No	No	No	No	No	Yes
80010097512	No	Yes	Yes	No	No	No	No	No	Yes
80010150001	Yes	Yes	Yes	No	No	No	No	No	Yes
80010150002	Yes	Yes	Yes	No	No	No	No	No	Yes
80010150003	Yes	Yes	Yes	No	No	No	No	No	Yes

Table 1. List of Colorado Low Income and Disadvantaged Communities Block Groups

Census Block Group ID	US Supplemental Index >=90%	State Supplemental Index >=90%	CEJST Disadvantaged	Alaska Native Allotments	Alask Native Villages	American Indian Reservations	Off-Reservation Trust Lands	Oklahoma Tribal Statistical Area	Disadvantaged
80039600001	No	No	Yes	No	No	No	No	No	Yes
80039600002	No	No	Yes	No	No	No	No	No	Yes
80039602012	No	Yes	No	No	No	No	No	No	Yes
80039602013	No	Yes	No	No	No	No	No	No	Yes
80039602021	No	Yes	No	No	No	No	No	No	Yes
80039602022	Yes	Yes	No	No	No	No	No	No	Yes
80039602023	Yes	Yes	No	No	No	No	No	No	Yes
80039603001	No	No	Yes	No	No	No	No	No	Yes
80039603002	Yes	Yes	Yes	No	No	No	No	No	Yes
80039603003	Yes	Yes	Yes	No	No	No	No	No	Yes
80039603004	No	Yes	Yes	No	No	No	No	No	Yes
80050055511	Yes	Yes	Yes	No	No	No	No	No	Yes
80050055512	Yes	Yes	Yes	No	No	No	No	No	Yes
80050055513	Yes	Yes	Yes	No	No	No	No	No	Yes
80050055521	No	Yes	Yes	No	No	No	No	No	Yes
80050055522	Yes	Yes	Yes	No	No	No	No	No	Yes
80050055523	Yes	Yes	Yes	No	No	No	No	No	Yes
80050055533	Yes	Yes	No	No	No	No	No	No	Yes
80050057011	No	Yes	No	No	No	No	No	No	Yes
80050057012	No	Yes	No	No	No	No	No	No	Yes
80050057022	No	Yes	No	No	No	No	No	No	Yes
80050059512	No	Yes	No	No	No	No	No	No	Yes
80050060001	No	Yes	No	No	No	No	No	No	Yes
80050061001	No	Yes	No	No	No	No	No	No	Yes
80050062001	No	Yes	No	No	No	No	No	No	Yes
80050064001	No	No	Yes	No	No	No	No	No	Yes
80050064002	No	Yes	Yes	No	No	No	No	No	Yes
80050064003	No	No	Yes	No	No	No	No	No	Yes
80050065011	Yes	Yes	No	No	No	No	No	No	Yes

Table 1. List of Colorado Low Income and Disadvantaged Communities Block Groups

Census Block Group ID	US Supplemental Index >=90%	State Supplemental Index >=90%	CEJST Disadvantaged	Alaska Native Allotments	Alask Native Villages	American Indian Reservations	Off-Reservation Trust Lands	Oklahoma Tribal Statistical Area	Disadvantaged
80050065023	No	Yes	No	No	No	No	No	No	Yes
80050066011	No	Yes	Yes	No	No	No	No	No	Yes
80050066012	No	Yes	Yes	No	No	No	No	No	Yes
80050066013	No	Yes	Yes	No	No	No	No	No	Yes
80050066014	Yes	Yes	Yes	No	No	No	No	No	Yes
80050066033	No	Yes	No	No	No	No	No	No	Yes
80050066042	No	Yes	No	No	No	No	No	No	Yes
80050066043	No	Yes	No	No	No	No	No	No	Yes
80050068592	No	Yes	No	No	No	No	No	No	Yes
80050071111	No	Yes	No	No	No	No	No	No	Yes
80050072011	No	Yes	Yes	No	No	No	No	No	Yes
80050072012	No	Yes	Yes	No	No	No	No	No	Yes
80050072013	Yes	Yes	Yes	No	No	No	No	No	Yes
80050072021	Yes	Yes	Yes	No	No	No	No	No	Yes
80050072022	Yes	Yes	Yes	No	No	No	No	No	Yes
80050072023	Yes	Yes	Yes	No	No	No	No	No	Yes
80050073011	No	Yes	Yes	No	No	No	No	No	Yes
80050073012	Yes	Yes	Yes	No	No	No	No	No	Yes
80050073021	Yes	Yes	Yes	No	No	No	No	No	Yes
80050073022	Yes	Yes	Yes	No	No	No	No	No	Yes
80050073023	Yes	Yes	Yes	No	No	No	No	No	Yes
80050073024	Yes	Yes	Yes	No	No	No	No	No	Yes
80050074001	Yes	Yes	Yes	No	No	No	No	No	Yes
80050074002	Yes	Yes	Yes	No	No	No	No	No	Yes
80050074003	Yes	Yes	Yes	No	No	No	No	No	Yes
80050074004	Yes	Yes	Yes	No	No	No	No	No	Yes
80050075001	No	Yes	Yes	No	No	No	No	No	Yes
80050075002	Yes	Yes	Yes	No	No	No	No	No	Yes
80050076001	No	No	Yes	No	No	No	No	No	Yes

Table 1. List of Colorado Low Income and Disadvantaged Communities Block Groups

Census Block Group ID	US Supplemental Index >=90%	State Supplemental Index >=90%	CEJST Disadvantaged	Alaska Native Allotments	Alask Native Villages	American Indian Reservations	Off-Reservation Trust Lands	Oklahoma Tribal Statistical Area	Disadvantaged
80050076002	No	Yes	Yes	No	No	No	No	No	Yes
80050076003	Yes	Yes	Yes	No	No	No	No	No	Yes
80050076004	Yes	Yes	Yes	No	No	No	No	No	Yes
80050077022	No	Yes	No	No	No	No	No	No	Yes
80050077033	Yes	Yes	No	No	No	No	No	No	Yes
80050077041	No	No	Yes	No	No	No	No	No	Yes
80050077042	Yes	Yes	Yes	No	No	No	No	No	Yes
80050077043	Yes	Yes	Yes	No	No	No	No	No	Yes
80050800001	Yes	Yes	Yes	No	No	No	No	No	Yes
80050800002	No	Yes	Yes	No	No	No	No	No	Yes
80050801001	Yes	Yes	Yes	No	No	No	No	No	Yes
80050801002	Yes	Yes	Yes	No	No	No	No	No	Yes
80050801003	No	Yes	Yes	No	No	No	No	No	Yes
80050806001	No	Yes	No	No	No	No	No	No	Yes
80050807001	No	Yes	Yes	No	No	No	No	No	Yes
80050807002	No	No	Yes	No	No	No	No	No	Yes
80050807003	No	No	Yes	No	No	No	No	No	Yes
80050807004	Yes	Yes	Yes	No	No	No	No	No	Yes
80050808001	Yes	Yes	Yes	No	No	No	No	No	Yes
80050808002	No	Yes	Yes	No	No	No	No	No	Yes
80050809001	Yes	Yes	Yes	No	No	No	No	No	Yes
80050809002	No	Yes	Yes	No	No	No	No	No	Yes
80050810011	No	No	Yes	No	No	No	No	No	Yes
80050810021	No	No	Yes	No	No	No	No	No	Yes
80050810022	No	No	Yes	No	No	No	No	No	Yes
80050810023	Yes	Yes	Yes	No	No	No	No	No	Yes
80050811011	Yes	Yes	No	No	No	No	No	No	Yes
80050811013	No	Yes	No	No	No	No	No	No	Yes
80050811021	No	Yes	No	No	No	No	No	No	Yes

Table 1. List of Colorado Low Income and Disadvantaged Communities Block Groups

Census Block Group ID	US Supplemental Index >=90%	State Supplemental Index >=90%	CEJST Disadvantaged	Alaska Native Allotments	Alask Native Villages	American Indian Reservations	Off-Reservation Trust Lands	Oklahoma Tribal Statistical Area	Disadvantaged
80050811022	No	Yes	No	No	No	No	No	No	Yes
80050812001	No	Yes	Yes	No	No	No	No	No	Yes
80050812002	No	Yes	Yes	No	No	No	No	No	Yes
80050812003	Yes	Yes	Yes	No	No	No	No	No	Yes
80050813002	No	Yes	No	No	No	No	No	No	Yes
80050816001	No	Yes	No	No	No	No	No	No	Yes
80050818001	Yes	Yes	Yes	No	No	No	No	No	Yes
80050818002	No	Yes	Yes	No	No	No	No	No	Yes
80050818003	Yes	Yes	Yes	No	No	No	No	No	Yes
80050819001	No	No	Yes	No	No	No	No	No	Yes
80050819002	No	No	Yes	No	No	No	No	No	Yes
80050819003	Yes	Yes	Yes	No	No	No	No	No	Yes
80050819004	Yes	Yes	Yes	No	No	No	No	No	Yes
80050820001	Yes	Yes	Yes	No	No	No	No	No	Yes
80050820002	No	No	Yes	No	No	No	No	No	Yes
80050820003	Yes	Yes	Yes	No	No	No	No	No	Yes
80050821003	Yes	Yes	No	No	No	No	No	No	Yes
80050823002	Yes	Yes	No	No	No	No	No	No	Yes
80050824001	No	No	Yes	No	No	No	No	No	Yes
80050824002	No	No	Yes	No	No	No	No	No	Yes
80050824003	Yes	Yes	Yes	No	No	No	No	No	Yes
80050826001	No	Yes	No	No	No	No	No	No	Yes
80050826002	No	Yes	No	No	No	No	No	No	Yes
80050826004	Yes	Yes	No	No	No	No	No	No	Yes
80050827001	No	Yes	No	No	No	No	No	No	Yes
80050831001	No	Yes	No	No	No	No	No	No	Yes
80050834003	No	Yes	No	No	No	No	No	No	Yes
80050835004	Yes	Yes	No	No	No	No	No	No	Yes
80050838003	No	Yes	No	No	No	No	No	No	Yes

Table 1. List of Colorado Low Income and Disadvantaged Communities Block Groups

Census Block Group ID	US Supplemental Index >=90%	State Supplemental Index >=90%	CEJST Disadvantaged	Alaska Native Allotments	Alask Native Villages	American Indian Reservations	Off-Reservation Trust Lands	Oklahoma Tribal Statistical Area	Disadvantaged
80050840002	No	Yes	No	No	No	No	No	No	Yes
80050841003	No	Yes	No	No	No	No	No	No	Yes
80050844002	No	Yes	No	No	No	No	No	No	Yes
80050857001	No	Yes	No	No	No	No	No	No	Yes
80050857004	No	Yes	No	No	No	No	No	No	Yes
80050869001	No	Yes	No	No	No	No	No	No	Yes
80050869002	Yes	Yes	No	No	No	No	No	No	Yes
80050870001	No	No	Yes	No	No	No	No	No	Yes
80050870002	Yes	Yes	Yes	No	No	No	No	No	Yes
80050870003	No	Yes	Yes	No	No	No	No	No	Yes
80050871001	Yes	Yes	No	No	No	No	No	No	Yes
80050872001	No	Yes	No	No	No	No	No	No	Yes
80050872003	Yes	Yes	No	No	No	No	No	No	Yes
80079404001	No	No	Yes	No	No	Yes	No	No	Yes
80079404002	No	No	Yes	No	No	Yes	No	No	Yes
80079742022	No	Yes	No	No	No	No	No	No	Yes
80079743001	No	No	Yes	No	No	No	No	No	Yes
80079743002	No	No	Yes	No	No	No	No	No	Yes
80079743003	No	No	Yes	No	No	No	No	No	Yes
80079744001	No	No	Yes	No	No	No	No	No	Yes
80079744002	No	No	Yes	No	No	No	No	No	Yes
80079744003	No	No	Yes	No	No	No	No	No	Yes
80099646001	No	Yes	Yes	No	No	No	No	No	Yes
80099646002	No	No	Yes	No	No	No	No	No	Yes
80099647001	No	No	Yes	No	No	No	No	No	Yes
80099647002	No	Yes	Yes	No	No	No	No	No	Yes
80119667011	No	Yes	Yes	No	No	No	No	No	Yes
80119667021	No	No	Yes	No	No	No	No	No	Yes
80119667022	No	Yes	Yes	No	No	No	No	No	Yes

Table 1. List of Colorado Low Income and Disadvantaged Communities Block Groups

Census Block Group ID	US Supplemental Index >=90%	State Supplemental Index >=90%	CEJST Disadvantaged	Alaska Native Allotments	Alask Native Villages	American Indian Reservations	Off-Reservation Trust Lands	Oklahoma Tribal Statistical Area	Disadvantaged
80119667023	No	Yes	Yes	No	No	No	No	No	Yes
80119667024	No	Yes	Yes	No	No	No	No	No	Yes
80130121051	No	Yes	No	No	No	No	No	No	Yes
80130121052	Yes	Yes	No	No	No	No	No	No	Yes
80130121071	Yes	Yes	No	No	No	No	No	No	Yes
80130122042	Yes	Yes	No	No	No	No	No	No	Yes
80130122052	No	Yes	No	No	No	No	No	No	Yes
80130122061	Yes	Yes	No	No	No	No	No	No	Yes
80130122062	No	Yes	No	No	No	No	No	No	Yes
80130122071	Yes	Yes	No	No	No	No	No	No	Yes
80130122072	No	Yes	No	No	No	No	No	No	Yes
80130123002	No	Yes	No	No	No	No	No	No	Yes
80130124011	Yes	Yes	No	No	No	No	No	No	Yes
80130124012	Yes	Yes	No	No	No	No	No	No	Yes
80130124014	Yes	Yes	No	No	No	No	No	No	Yes
80130125071	No	Yes	No	No	No	No	No	No	Yes
80130125072	No	Yes	No	No	No	No	No	No	Yes
80130126051	Yes	Yes	No	No	No	No	No	No	Yes
80130126052	Yes	Yes	No	No	No	No	No	No	Yes
80130126091	Yes	Yes	No	No	No	No	No	No	Yes
80130126101	Yes	Yes	No	No	No	No	No	No	Yes
80130126102	Yes	Yes	No	No	No	No	No	No	Yes
80130126103	Yes	Yes	No	No	No	No	No	No	Yes
80130127014	No	Yes	No	No	No	No	No	No	Yes
80130127071	Yes	Yes	Yes	No	No	No	No	No	Yes
80130127072	No	No	Yes	No	No	No	No	No	Yes
80130132101	No	Yes	No	No	No	No	No	No	Yes
80130132113	Yes	Yes	No	No	No	No	No	No	Yes
80130132124	No	Yes	No	No	No	No	No	No	Yes

Table 1. List of Colorado Low Income and Disadvantaged Communities Block Groups

Census Block Group ID	US Supplemental Index >=90%	State Supplemental Index >=90%	CEJST Disadvantaged	Alaska Native Allotments	Alask Native Villages	American Indian Reservations	Off-Reservation Trust Lands	Oklahoma Tribal Statistical Area	Disadvantaged
80130133022	No	Yes	No	No	No	No	No	No	Yes
80130133023	No	Yes	No	No	No	No	No	No	Yes
80130133082	No	Yes	No	No	No	No	No	No	Yes
80130134011	Yes	Yes	Yes	No	No	No	No	No	Yes
80130134012	No	No	Yes	No	No	No	No	No	Yes
80130134013	No	No	Yes	No	No	No	No	No	Yes
80130135051	No	Yes	Yes	No	No	No	No	No	Yes
80130135052	No	Yes	Yes	No	No	No	No	No	Yes
80130135053	No	No	Yes	No	No	No	No	No	Yes
80130137044	No	Yes	No	No	No	No	No	No	Yes
80130608011	Yes	Yes	No	No	No	No	No	No	Yes
80130608023	No	Yes	No	No	No	No	No	No	Yes
80130609003	Yes	Yes	No	No	No	No	No	No	Yes
80140306003	Yes	Yes	No	No	No	No	No	No	Yes
80140308002	No	Yes	No	No	No	No	No	No	Yes
80150001001	Yes	Yes	Yes	No	No	No	No	No	Yes
80150001002	No	Yes	Yes	No	No	No	No	No	Yes
80150001003	No	No	Yes	No	No	No	No	No	Yes
80150004041	No	Yes	No	No	No	No	No	No	Yes
80190148001	No	No	Yes	No	No	No	No	No	Yes
80190148002	No	No	Yes	No	No	No	No	No	Yes
80219748001	No	No	Yes	No	No	No	No	No	Yes
80219748002	No	Yes	Yes	No	No	No	No	No	Yes
80219749001	No	No	Yes	No	No	No	No	No	Yes
80219749002	No	Yes	Yes	No	No	No	No	No	Yes
80219749003	No	No	Yes	No	No	No	No	No	Yes
80219749004	No	Yes	Yes	No	No	No	No	No	Yes
80239726001	No	No	Yes	No	No	No	No	No	Yes
80239726002	No	No	Yes	No	No	No	No	No	Yes

Table 1. List of Colorado Low Income and Disadvantaged Communities Block Groups

Census Block Group ID	US Supplemental Index >=90%	State Supplemental Index >=90%	CEJST Disadvantaged	Alaska Native Allotments	Alask Native Villages	American Indian Reservations	Off-Reservation Trust Lands	Oklahoma Tribal Statistical Area	Disadvantaged
80239727001	Yes	Yes	Yes	No	No	No	No	No	Yes
80239727002	No	No	Yes	No	No	No	No	No	Yes
80259696011	No	No	Yes	No	No	No	No	No	Yes
80259696012	Yes	Yes	Yes	No	No	No	No	No	Yes
80259696021	No	Yes	Yes	No	No	No	No	No	Yes
80259696022	No	Yes	Yes	No	No	No	No	No	Yes
80279701011	No	No	Yes	No	No	No	No	No	Yes
80279701012	No	No	Yes	No	No	No	No	No	Yes
80279701013	No	No	Yes	No	No	No	No	No	Yes
80279701014	No	No	Yes	No	No	No	No	No	Yes
80279701021	No	No	Yes	No	No	No	No	No	Yes
80279701022	No	No	Yes	No	No	No	No	No	Yes
80279701023	No	No	Yes	No	No	No	No	No	Yes
80299648001	No	No	Yes	No	No	No	No	No	Yes
80299648002	No	No	Yes	No	No	No	No	No	Yes
80299648003	No	No	Yes	No	No	No	No	No	Yes
80299648004	No	No	Yes	No	No	No	No	No	Yes
80299649001	No	No	Yes	No	No	No	No	No	Yes
80299649002	No	No	Yes	No	No	No	No	No	Yes
80299649003	No	No	Yes	No	No	No	No	No	Yes
80299650011	No	No	Yes	No	No	No	No	No	Yes
80299650012	No	No	Yes	No	No	No	No	No	Yes
80299650013	No	Yes	Yes	No	No	No	No	No	Yes
80299650021	No	No	Yes	No	No	No	No	No	Yes
80299650022	No	No	Yes	No	No	No	No	No	Yes
80299651001	Yes	Yes	Yes	No	No	No	No	No	Yes
80299651002	No	No	Yes	No	No	No	No	No	Yes
80299651003	No	No	Yes	No	No	No	No	No	Yes
80299652011	No	No	Yes	No	No	No	No	No	Yes

Table 1. List of Colorado Low Income and Disadvantaged Communities Block Groups

Census Block Group ID	US Supplemental Index >=90%	State Supplemental Index >=90%	CEJST Disadvantaged	Alaska Native Allotments	Alask Native Villages	American Indian Reservations	Off-Reservation Trust Lands	Oklahoma Tribal Statistical Area	Disadvantaged
80299652012	No	No	Yes	No	No	No	No	No	Yes
80299652021	No	No	Yes	No	No	No	No	No	Yes
80299652022	No	Yes	Yes	No	No	No	No	No	Yes
80310002011	No	Yes	No	No	No	No	No	No	Yes
80310002021	Yes	Yes	No	No	No	No	No	No	Yes
80310004012	Yes	Yes	No	No	No	No	No	No	Yes
80310004034	Yes	Yes	No	No	No	No	No	No	Yes
80310004042	No	Yes	No	No	No	No	No	No	Yes
80310004043	No	Yes	No	No	No	No	No	No	Yes
80310005031	Yes	Yes	No	No	No	No	No	No	Yes
80310006002	Yes	Yes	No	No	No	No	No	No	Yes
80310006003	Yes	Yes	No	No	No	No	No	No	Yes
80310007031	Yes	Yes	No	No	No	No	No	No	Yes
80310007032	Yes	Yes	No	No	No	No	No	No	Yes
80310007041	No	Yes	No	No	No	No	No	No	Yes
80310007051	No	Yes	Yes	No	No	No	No	No	Yes
80310007052	Yes	Yes	Yes	No	No	No	No	No	Yes
80310007053	Yes	Yes	Yes	No	No	No	No	No	Yes
80310007061	No	No	Yes	No	No	No	No	No	Yes
80310007062	No	No	Yes	No	No	No	No	No	Yes
80310008001	Yes	Yes	Yes	No	No	No	No	No	Yes
80310009021	Yes	Yes	Yes	No	No	No	No	No	Yes
80310009022	No	Yes	Yes	No	No	No	No	No	Yes
80310009023	Yes	Yes	Yes	No	No	No	No	No	Yes
80310009024	Yes	Yes	Yes	No	No	No	No	No	Yes
80310009025	No	Yes	Yes	No	No	No	No	No	Yes
80310009031	Yes	Yes	Yes	No	No	No	No	No	Yes
80310009032	Yes	Yes	Yes	No	No	No	No	No	Yes
80310009033	No	Yes	Yes	No	No	No	No	No	Yes

Table 1. List of Colorado Low Income and Disadvantaged Communities Block Groups

Census Block Group ID	US Supplemental Index >=90%	State Supplemental Index >=90%	CEJST Disadvantaged	Alaska Native Allotments	Alask Native Villages	American Indian Reservations	Off-Reservation Trust Lands	Oklahoma Tribal Statistical Area	Disadvantaged
80310009034	Yes	Yes	Yes	No	No	No	No	No	Yes
80310009035	Yes	Yes	Yes	No	No	No	No	No	Yes
80310009041	Yes	Yes	Yes	No	No	No	No	No	Yes
80310009042	Yes	Yes	Yes	No	No	No	No	No	Yes
80310009043	Yes	Yes	Yes	No	No	No	No	No	Yes
80310009044	Yes	Yes	Yes	No	No	No	No	No	Yes
80310009051	Yes	Yes	Yes	No	No	No	No	No	Yes
80310009052	Yes	Yes	Yes	No	No	No	No	No	Yes
80310009053	Yes	Yes	Yes	No	No	No	No	No	Yes
80310009054	Yes	Yes	Yes	No	No	No	No	No	Yes
80310010001	Yes	Yes	Yes	No	No	No	No	No	Yes
80310010002	Yes	Yes	Yes	No	No	No	No	No	Yes
80310010003	No	No	Yes	No	No	No	No	No	Yes
80310011011	Yes	Yes	Yes	No	No	No	No	No	Yes
80310011012	Yes	Yes	Yes	No	No	No	No	No	Yes
80310011013	Yes	Yes	Yes	No	No	No	No	No	Yes
80310011014	No	No	Yes	No	No	No	No	No	Yes
80310011024	No	Yes	No	No	No	No	No	No	Yes
80310013011	Yes	Yes	Yes	No	No	No	No	No	Yes
80310013012	Yes	Yes	Yes	No	No	No	No	No	Yes
80310013013	Yes	Yes	Yes	No	No	No	No	No	Yes
80310013014	Yes	Yes	Yes	No	No	No	No	No	Yes
80310013015	Yes	Yes	Yes	No	No	No	No	No	Yes
80310013021	Yes	Yes	Yes	No	No	No	No	No	Yes
80310013022	Yes	Yes	Yes	No	No	No	No	No	Yes
80310013023	Yes	Yes	Yes	No	No	No	No	No	Yes
80310014011	Yes	Yes	Yes	No	No	No	No	No	Yes
80310014012	Yes	Yes	Yes	No	No	No	No	No	Yes
80310014013	Yes	Yes	Yes	No	No	No	No	No	Yes

Table 1. List of Colorado Low Income and Disadvantaged Communities Block Groups

Census Block Group ID	US Supplemental Index >=90%	State Supplemental Index >=90%	CEJST Disadvantaged	Alaska Native Allotments	Alask Native Villages	American Indian Reservations	Off-Reservation Trust Lands	Oklahoma Tribal Statistical Area	Disadvantaged
80310014014	Yes	Yes	Yes	No	No	No	No	No	Yes
80310014015	No	Yes	Yes	No	No	No	No	No	Yes
80310014021	Yes	Yes	Yes	No	No	No	No	No	Yes
80310014022	Yes	Yes	Yes	No	No	No	No	No	Yes
80310014023	Yes	Yes	Yes	No	No	No	No	No	Yes
80310014024	Yes	Yes	Yes	No	No	No	No	No	Yes
80310014025	No	No	Yes	No	No	No	No	No	Yes
80310015001	Yes	Yes	Yes	No	No	No	No	No	Yes
80310015002	Yes	Yes	Yes	No	No	No	No	No	Yes
80310015003	Yes	Yes	Yes	No	No	No	No	No	Yes
80310015004	Yes	Yes	Yes	No	No	No	No	No	Yes
80310016012	Yes	Yes	No	No	No	No	No	No	Yes
80310016031	No	Yes	No	No	No	No	No	No	Yes
80310016033	Yes	Yes	No	No	No	No	No	No	Yes
80310016034	No	Yes	No	No	No	No	No	No	Yes
80310016035	No	Yes	No	No	No	No	No	No	Yes
80310017041	Yes	Yes	No	No	No	No	No	No	Yes
80310017062	Yes	Yes	No	No	No	No	No	No	Yes
80310017071	Yes	Yes	No	No	No	No	No	No	Yes
80310018001	Yes	Yes	Yes	No	No	No	No	No	Yes
80310018002	Yes	Yes	Yes	No	No	No	No	No	Yes
80310018003	No	Yes	Yes	No	No	No	No	No	Yes
80310019011	Yes	Yes	Yes	No	No	No	No	No	Yes
80310019012	No	Yes	Yes	No	No	No	No	No	Yes
80310019013	No	No	Yes	No	No	No	No	No	Yes
80310021013	No	Yes	No	No	No	No	No	No	Yes
80310023001	No	Yes	No	No	No	No	No	No	Yes
80310024021	No	Yes	No	No	No	No	No	No	Yes
80310024022	No	Yes	No	No	No	No	No	No	Yes

Table 1. List of Colorado Low Income and Disadvantaged Communities Block Groups

Census Block Group ID	US Supplemental Index >=90%	State Supplemental Index >=90%	CEJST Disadvantaged	Alaska Native Allotments	Alask Native Villages	American Indian Reservations	Off-Reservation Trust Lands	Oklahoma Tribal Statistical Area	Disadvantaged
80310024041	No	No	Yes	No	No	No	No	No	Yes
80310024042	No	No	Yes	No	No	No	No	No	Yes
80310024051	Yes	Yes	Yes	No	No	No	No	No	Yes
80310024052	No	Yes	Yes	No	No	No	No	No	Yes
80310024053	No	Yes	Yes	No	No	No	No	No	Yes
80310026041	Yes	Yes	No	No	No	No	No	No	Yes
80310026042	No	Yes	No	No	No	No	No	No	Yes
80310027041	No	Yes	No	No	No	No	No	No	Yes
80310027051	Yes	Yes	No	No	No	No	No	No	Yes
80310028022	No	Yes	No	No	No	No	No	No	Yes
80310028024	No	Yes	No	No	No	No	No	No	Yes
80310030032	No	Yes	No	No	No	No	No	No	Yes
80310030041	No	Yes	No	No	No	No	No	No	Yes
80310031021	No	Yes	No	No	No	No	No	No	Yes
80310031022	No	Yes	No	No	No	No	No	No	Yes
80310032042	No	Yes	No	No	No	No	No	No	Yes
80310035011	Yes	Yes	Yes	No	No	No	No	No	Yes
80310035012	Yes	Yes	Yes	No	No	No	No	No	Yes
80310035013	Yes	Yes	Yes	No	No	No	No	No	Yes
80310035021	Yes	Yes	Yes	No	No	No	No	No	Yes
80310035022	Yes	Yes	Yes	No	No	No	No	No	Yes
80310036011	Yes	Yes	Yes	No	No	No	No	No	Yes
80310036012	No	No	Yes	No	No	No	No	No	Yes
80310036013	Yes	Yes	Yes	No	No	No	No	No	Yes
80310036014	No	Yes	Yes	No	No	No	No	No	Yes
80310036021	Yes	Yes	Yes	No	No	No	No	No	Yes
80310036022	Yes	Yes	Yes	No	No	No	No	No	Yes
80310036023	No	Yes	Yes	No	No	No	No	No	Yes
80310036024	Yes	Yes	Yes	No	No	No	No	No	Yes

Table 1. List of Colorado Low Income and Disadvantaged Communities Block Groups

Census Block Group ID	US Supplemental Index >=90%	State Supplemental Index >=90%	CEJST Disadvantaged	Alaska Native Allotments	Alask Native Villages	American Indian Reservations	Off-Reservation Trust Lands	Oklahoma Tribal Statistical Area	Disadvantaged
80310036025	Yes	Yes	Yes	No	No	No	No	No	Yes
80310036031	No	Yes	No	No	No	No	No	No	Yes
80310036033	No	Yes	No	No	No	No	No	No	Yes
80310037032	No	Yes	No	No	No	No	No	No	Yes
80310038013	No	Yes	No	No	No	No	No	No	Yes
80310041011	No	Yes	Yes	No	No	No	No	No	Yes
80310041012	Yes	Yes	Yes	No	No	No	No	No	Yes
80310041013	No	No	Yes	No	No	No	No	No	Yes
80310041014	No	Yes	Yes	No	No	No	No	No	Yes
80310041021	Yes	Yes	Yes	No	No	No	No	No	Yes
80310041022	No	Yes	Yes	No	No	No	No	No	Yes
80310041023	No	Yes	Yes	No	No	No	No	No	Yes
80310041024	No	No	Yes	No	No	No	No	No	Yes
80310041031	No	Yes	No	No	No	No	No	No	Yes
80310041043	No	Yes	No	No	No	No	No	No	Yes
80310041101	Yes	Yes	No	No	No	No	No	No	Yes
80310043081	No	Yes	No	No	No	No	No	No	Yes
80310043091	No	Yes	No	No	No	No	No	No	Yes
80310044031	No	Yes	No	No	No	No	No	No	Yes
80310044032	No	Yes	No	No	No	No	No	No	Yes
80310044041	No	No	Yes	No	No	No	No	No	Yes
80310044042	Yes	Yes	Yes	No	No	No	No	No	Yes
80310044043	Yes	Yes	Yes	No	No	No	No	No	Yes
80310044044	Yes	Yes	Yes	No	No	No	No	No	Yes
80310045031	Yes	Yes	Yes	No	No	No	No	No	Yes
80310045032	Yes	Yes	Yes	No	No	No	No	No	Yes
80310045033	Yes	Yes	Yes	No	No	No	No	No	Yes
80310045041	Yes	Yes	Yes	No	No	No	No	No	Yes
80310045042	Yes	Yes	Yes	No	No	No	No	No	Yes

Table 1. List of Colorado Low Income and Disadvantaged Communities Block Groups

Census Block Group ID	US Supplemental Index >=90%	State Supplemental Index >=90%	CEJST Disadvantaged	Alaska Native Allotments	Alask Native Villages	American Indian Reservations	Off-Reservation Trust Lands	Oklahoma Tribal Statistical Area	Disadvantaged
80310045043	Yes	Yes	Yes	No	No	No	No	No	Yes
80310045051	Yes	Yes	Yes	No	No	No	No	No	Yes
80310045052	Yes	Yes	Yes	No	No	No	No	No	Yes
80310045053	Yes	Yes	Yes	No	No	No	No	No	Yes
80310045061	Yes	Yes	Yes	No	No	No	No	No	Yes
80310045062	Yes	Yes	Yes	No	No	No	No	No	Yes
80310045063	Yes	Yes	Yes	No	No	No	No	No	Yes
80310046011	Yes	Yes	No	No	No	No	No	No	Yes
80310046012	No	Yes	No	No	No	No	No	No	Yes
80310046013	Yes	Yes	No	No	No	No	No	No	Yes
80310046014	No	Yes	No	No	No	No	No	No	Yes
80310046021	Yes	Yes	Yes	No	No	No	No	No	Yes
80310046022	Yes	Yes	Yes	No	No	No	No	No	Yes
80310046023	No	No	Yes	No	No	No	No	No	Yes
80310046024	Yes	Yes	Yes	No	No	No	No	No	Yes
80310046031	Yes	Yes	Yes	No	No	No	No	No	Yes
80310046032	No	Yes	Yes	No	No	No	No	No	Yes
80310046033	Yes	Yes	Yes	No	No	No	No	No	Yes
80310046034	No	Yes	Yes	No	No	No	No	No	Yes
80310046035	Yes	Yes	Yes	No	No	No	No	No	Yes
80310047003	Yes	Yes	No	No	No	No	No	No	Yes
80310047004	No	Yes	No	No	No	No	No	No	Yes
80310047006	Yes	Yes	No	No	No	No	No	No	Yes
80310050011	No	Yes	No	No	No	No	No	No	Yes
80310050031	No	No	Yes	No	No	No	No	No	Yes
80310050032	No	Yes	Yes	No	No	No	No	No	Yes
80310050041	No	Yes	Yes	No	No	No	No	No	Yes
80310050042	Yes	Yes	Yes	No	No	No	No	No	Yes
80310050043	No	No	Yes	No	No	No	No	No	Yes

Table 1. List of Colorado Low Income and Disadvantaged Communities Block Groups

Census Block Group ID	US Supplemental Index >=90%	State Supplemental Index >=90%	CEJST Disadvantaged	Alaska Native Allotments	Alask Native Villages	American Indian Reservations	Off-Reservation Trust Lands	Oklahoma Tribal Statistical Area	Disadvantaged
80310051024	No	Yes	No	No	No	No	No	No	Yes
80310051041	No	Yes	Yes	No	No	No	No	No	Yes
80310051042	Yes	Yes	Yes	No	No	No	No	No	Yes
80310053001	No	Yes	No	No	No	No	No	No	Yes
80310055021	No	Yes	No	No	No	No	No	No	Yes
80310055032	No	Yes	No	No	No	No	No	No	Yes
80310055034	No	Yes	No	No	No	No	No	No	Yes
80310068101	Yes	Yes	No	No	No	No	No	No	Yes
80310068141	No	Yes	Yes	No	No	No	No	No	Yes
80310068142	No	Yes	Yes	No	No	No	No	No	Yes
80310068143	No	No	Yes	No	No	No	No	No	Yes
80310068144	No	No	Yes	No	No	No	No	No	Yes
80310068165	No	Yes	No	No	No	No	No	No	Yes
80310069021	Yes	Yes	No	No	No	No	No	No	Yes
80310069023	Yes	Yes	No	No	No	No	No	No	Yes
80310069031	No	Yes	No	No	No	No	No	No	Yes
80310069032	Yes	Yes	No	No	No	No	No	No	Yes
80310070061	No	Yes	Yes	No	No	No	No	No	Yes
80310070062	Yes	Yes	Yes	No	No	No	No	No	Yes
80310070063	No	Yes	Yes	No	No	No	No	No	Yes
80310070371	Yes	Yes	Yes	No	No	No	No	No	Yes
80310070372	No	Yes	Yes	No	No	No	No	No	Yes
80310070373	No	No	Yes	No	No	No	No	No	Yes
80310070882	No	Yes	No	No	No	No	No	No	Yes
80310070884	No	Yes	No	No	No	No	No	No	Yes
80310070901	No	No	Yes	No	No	No	No	No	Yes
80310070911	No	No	Yes	No	No	No	No	No	Yes
80310070912	No	No	Yes	No	No	No	No	No	Yes
80310070913	No	No	Yes	No	No	No	No	No	Yes

Table 1. List of Colorado Low Income and Disadvantaged Communities Block Groups

Census Block Group ID	US Supplemental Index >=90%	State Supplemental Index >=90%	CEJST Disadvantaged	Alaska Native Allotments	Alask Native Villages	American Indian Reservations	Off-Reservation Trust Lands	Oklahoma Tribal Statistical Area	Disadvantaged
80310070914	No	No	Yes	No	No	No	No	No	Yes
80310083041	Yes	Yes	Yes	No	No	No	No	No	Yes
80310083042	Yes	Yes	Yes	No	No	No	No	No	Yes
80310083043	Yes	Yes	Yes	No	No	No	No	No	Yes
80310083051	Yes	Yes	Yes	No	No	No	No	No	Yes
80310083052	Yes	Yes	Yes	No	No	No	No	No	Yes
80310083053	Yes	Yes	Yes	No	No	No	No	No	Yes
80310083061	No	No	Yes	No	No	No	No	No	Yes
80310083062	No	Yes	Yes	No	No	No	No	No	Yes
80310083063	No	Yes	Yes	No	No	No	No	No	Yes
80310083064	Yes	Yes	Yes	No	No	No	No	No	Yes
80310083121	Yes	Yes	Yes	No	No	No	No	No	Yes
80310083122	No	Yes	Yes	No	No	No	No	No	Yes
80310083123	No	Yes	Yes	No	No	No	No	No	Yes
80310083861	No	Yes	Yes	No	No	No	No	No	Yes
80310083862	No	Yes	Yes	No	No	No	No	No	Yes
80310083871	No	No	Yes	No	No	No	No	No	Yes
80310083872	No	Yes	Yes	No	No	No	No	No	Yes
80310083873	No	Yes	Yes	No	No	No	No	No	Yes
80310083881	Yes	Yes	No	No	No	No	No	No	Yes
80310083884	No	Yes	No	No	No	No	No	No	Yes
80310083892	No	Yes	No	No	No	No	No	No	Yes
80310083893	No	Yes	No	No	No	No	No	No	Yes
80310083903	No	Yes	No	No	No	No	No	No	Yes
80310083912	No	Yes	No	No	No	No	No	No	Yes
80310119023	No	Yes	No	No	No	No	No	No	Yes
80310119024	No	Yes	No	No	No	No	No	No	Yes
80310119032	No	Yes	No	No	No	No	No	No	Yes
80310120151	No	Yes	No	No	No	No	No	No	Yes

Table 1. List of Colorado Low Income and Disadvantaged Communities Block Groups

Census Block Group ID	US Supplemental Index >=90%	State Supplemental Index >=90%	CEJST Disadvantaged	Alaska Native Allotments	Alask Native Villages	American Indian Reservations	Off-Reservation Trust Lands	Oklahoma Tribal Statistical Area	Disadvantaged
80310120152	No	Yes	No	No	No	No	No	No	Yes
80310120162	No	Yes	No	No	No	No	No	No	Yes
80310153003	No	Yes	No	No	No	No	No	No	Yes
80310154001	No	Yes	No	No	No	No	No	No	Yes
80310154004	No	Yes	No	No	No	No	No	No	Yes
80310154005	Yes	Yes	No	No	No	No	No	No	Yes
80310155001	No	Yes	No	No	No	No	No	No	Yes
80310155004	No	Yes	No	No	No	No	No	No	Yes
80310156001	Yes	Yes	Yes	No	No	No	No	No	Yes
80310156002	Yes	Yes	Yes	No	No	No	No	No	Yes
80310156003	Yes	Yes	Yes	No	No	No	No	No	Yes
80310156004	Yes	Yes	Yes	No	No	No	No	No	Yes
80310157001	Yes	Yes	No	No	No	No	No	No	Yes
80310157002	Yes	Yes	No	No	No	No	No	No	Yes
80310157004	Yes	Yes	No	No	No	No	No	No	Yes
80330001001	No	No	Yes	No	No	No	No	No	Yes
80330001002	No	No	Yes	No	No	No	No	No	Yes
80330001003	No	No	Yes	No	No	No	No	No	Yes
80350139054	No	Yes	No	No	No	No	No	No	Yes
80350144071	No	Yes	No	No	No	No	No	No	Yes
80370002005	No	Yes	No	No	No	No	No	No	Yes
80370004011	Yes	Yes	No	No	No	No	No	No	Yes
80370004021	Yes	Yes	No	No	No	No	No	No	Yes
80370004041	No	Yes	No	No	No	No	No	No	Yes
80370005043	Yes	Yes	No	No	No	No	No	No	Yes
80410001031	No	No	Yes	No	No	No	No	No	Yes
80410001032	No	No	Yes	No	No	No	No	No	Yes
80410001041	No	Yes	Yes	No	No	No	No	No	Yes
80410001042	No	No	Yes	No	No	No	No	No	Yes

Table 1. List of Colorado Low Income and Disadvantaged Communities Block Groups

Census Block Group ID	US Supplemental Index >=90%	State Supplemental Index >=90%	CEJST Disadvantaged	Alaska Native Allotments	Alask Native Villages	American Indian Reservations	Off-Reservation Trust Lands	Oklahoma Tribal Statistical Area	Disadvantaged
80410001043	No	Yes	Yes	No	No	No	No	No	Yes
80410002024	No	Yes	No	No	No	No	No	No	Yes
80410003011	No	No	Yes	No	No	No	No	No	Yes
80410003012	Yes	Yes	Yes	No	No	No	No	No	Yes
80410003013	Yes	Yes	Yes	No	No	No	No	No	Yes
80410003021	Yes	Yes	Yes	No	No	No	No	No	Yes
80410003022	Yes	Yes	Yes	No	No	No	No	No	Yes
80410003023	Yes	Yes	Yes	No	No	No	No	No	Yes
80410007001	Yes	Yes	No	No	No	No	No	No	Yes
80410008001	No	Yes	No	No	No	No	No	No	Yes
80410008002	No	Yes	No	No	No	No	No	No	Yes
80410011011	No	Yes	Yes	No	No	No	No	No	Yes
80410011012	Yes	Yes	Yes	No	No	No	No	No	Yes
80410011041	No	No	Yes	No	No	No	No	No	Yes
80410011042	No	Yes	Yes	No	No	No	No	No	Yes
80410013013	Yes	Yes	No	No	No	No	No	No	Yes
80410013023	No	Yes	No	No	No	No	No	No	Yes
80410014001	No	No	Yes	No	No	No	No	No	Yes
80410014002	No	No	Yes	No	No	No	No	No	Yes
80410014003	No	No	Yes	No	No	No	No	No	Yes
80410015001	No	No	Yes	No	No	No	No	No	Yes
80410015002	No	No	Yes	No	No	No	No	No	Yes
80410016002	Yes	Yes	No	No	No	No	No	No	Yes
80410017001	No	Yes	No	No	No	No	No	No	Yes
80410019011	No	Yes	Yes	No	No	No	No	No	Yes
80410019012	No	No	Yes	No	No	No	No	No	Yes
80410019021	No	Yes	Yes	No	No	No	No	No	Yes
80410019022	Yes	Yes	Yes	No	No	No	No	No	Yes
80410020001	No	Yes	Yes	No	No	No	No	No	Yes

Table 1. List of Colorado Low Income and Disadvantaged Communities Block Groups

Census Block Group ID	US Supplemental Index >=90%	State Supplemental Index >=90%	CEJST Disadvantaged	Alaska Native Allotments	Alask Native Villages	American Indian Reservations	Off-Reservation Trust Lands	Oklahoma Tribal Statistical Area	Disadvantaged
80410020002	No	No	Yes	No	No	No	No	No	Yes
80410020003	No	No	Yes	No	No	No	No	No	Yes
80410020004	No	Yes	Yes	No	No	No	No	No	Yes
80410021011	Yes	Yes	Yes	No	No	No	No	No	Yes
80410021012	No	Yes	Yes	No	No	No	No	No	Yes
80410021013	No	Yes	Yes	No	No	No	No	No	Yes
80410021021	No	Yes	No	No	No	No	No	No	Yes
80410021022	Yes	Yes	No	No	No	No	No	No	Yes
80410021023	No	Yes	No	No	No	No	No	No	Yes
80410022002	No	Yes	No	No	No	No	No	No	Yes
80410022003	No	Yes	No	No	No	No	No	No	Yes
80410023001	No	Yes	Yes	No	No	No	No	No	Yes
80410023002	Yes	Yes	Yes	No	No	No	No	No	Yes
80410025023	No	Yes	No	No	No	No	No	No	Yes
80410027001	No	No	Yes	No	No	No	No	No	Yes
80410027002	Yes	Yes	Yes	No	No	No	No	No	Yes
80410027003	No	Yes	Yes	No	No	No	No	No	Yes
80410028011	Yes	Yes	Yes	No	No	No	No	No	Yes
80410028012	Yes	Yes	Yes	No	No	No	No	No	Yes
80410028021	No	Yes	Yes	No	No	No	No	No	Yes
80410028022	No	Yes	Yes	No	No	No	No	No	Yes
80410028023	No	Yes	Yes	No	No	No	No	No	Yes
80410028024	No	No	Yes	No	No	No	No	No	Yes
80410029011	Yes	Yes	Yes	No	No	No	No	No	Yes
80410029012	Yes	Yes	Yes	No	No	No	No	No	Yes
80410029013	No	No	Yes	No	No	No	No	No	Yes
80410029014	Yes	Yes	Yes	No	No	No	No	No	Yes
80410029021	Yes	Yes	Yes	No	No	No	No	No	Yes
80410029022	Yes	Yes	Yes	No	No	No	No	No	Yes

Table 1. List of Colorado Low Income and Disadvantaged Communities Block Groups

Census Block Group ID	US Supplemental Index >=90%	State Supplemental Index >=90%	CEJST Disadvantaged	Alaska Native Allotments	Alask Native Villages	American Indian Reservations	Off-Reservation Trust Lands	Oklahoma Tribal Statistical Area	Disadvantaged
80410030011	No	No	Yes	No	No	No	No	No	Yes
80410033034	No	Yes	No	No	No	No	No	No	Yes
80410038011	No	Yes	No	No	No	No	No	No	Yes
80410038012	No	Yes	No	No	No	No	No	No	Yes
80410040091	No	Yes	Yes	No	No	No	No	No	Yes
80410041003	No	Yes	No	No	No	No	No	No	Yes
80410041004	Yes	Yes	No	No	No	No	No	No	Yes
80410044031	No	No	Yes	No	No	No	No	No	Yes
80410044041	No	No	Yes	No	No	No	No	No	Yes
80410044042	No	No	Yes	No	No	No	No	No	Yes
80410044051	No	No	Yes	No	No	No	No	No	Yes
80410044052	No	No	Yes	No	No	No	No	No	Yes
80410044053	No	No	Yes	No	No	No	No	No	Yes
80410044061	No	No	Yes	No	No	No	No	No	Yes
80410044062	No	No	Yes	No	No	No	No	No	Yes
80410045011	Yes	Yes	Yes	No	No	No	No	No	Yes
80410045012	No	Yes	Yes	No	No	No	No	No	Yes
80410045013	Yes	Yes	Yes	No	No	No	No	No	Yes
80410045061	No	Yes	Yes	No	No	No	No	No	Yes
80410045062	No	Yes	Yes	No	No	No	No	No	Yes
80410045063	No	Yes	Yes	No	No	No	No	No	Yes
80410045064	No	No	Yes	No	No	No	No	No	Yes
80410045071	No	No	Yes	No	No	No	No	No	Yes
80410045072	No	No	Yes	No	No	No	No	No	Yes
80410045073	Yes	Yes	Yes	No	No	No	No	No	Yes
80410045121	No	No	Yes	No	No	No	No	No	Yes
80410045122	No	No	Yes	No	No	No	No	No	Yes
80410045131	Yes	Yes	Yes	No	No	No	No	No	Yes
80410045132	No	Yes	Yes	No	No	No	No	No	Yes

Table 1. List of Colorado Low Income and Disadvantaged Communities Block Groups

Census Block Group ID	US Supplemental Index >=90%	State Supplemental Index >=90%	CEJST Disadvantaged	Alaska Native Allotments	Alask Native Villages	American Indian Reservations	Off-Reservation Trust Lands	Oklahoma Tribal Statistical Area	Disadvantaged
80410045133	Yes	Yes	Yes	No	No	No	No	No	Yes
80410046031	No	Yes	No	No	No	No	No	No	Yes
80410050001	No	No	Yes	No	No	No	No	No	Yes
80410050002	No	No	Yes	No	No	No	No	No	Yes
80410050003	Yes	Yes	Yes	No	No	No	No	No	Yes
80410050004	No	No	Yes	No	No	No	No	No	Yes
80410051122	Yes	Yes	No	No	No	No	No	No	Yes
80410051224	No	Yes	No	No	No	No	No	No	Yes
80410052011	Yes	Yes	Yes	No	No	No	No	No	Yes
80410052012	No	No	Yes	No	No	No	No	No	Yes
80410052013	Yes	Yes	Yes	No	No	No	No	No	Yes
80410052014	Yes	Yes	Yes	No	No	No	No	No	Yes
80410053001	No	Yes	Yes	No	No	No	No	No	Yes
80410053002	No	Yes	Yes	No	No	No	No	No	Yes
80410053003	No	No	Yes	No	No	No	No	No	Yes
80410053004	No	Yes	Yes	No	No	No	No	No	Yes
80410054001	No	Yes	Yes	No	No	No	No	No	Yes
80410054002	No	Yes	Yes	No	No	No	No	No	Yes
80410054003	Yes	Yes	Yes	No	No	No	No	No	Yes
80410054004	Yes	Yes	Yes	No	No	No	No	No	Yes
80410055022	No	Yes	No	No	No	No	No	No	Yes
80410055023	Yes	Yes	No	No	No	No	No	No	Yes
80410055024	No	Yes	No	No	No	No	No	No	Yes
80410060001	Yes	Yes	Yes	No	No	No	No	No	Yes
80410060002	No	No	Yes	No	No	No	No	No	Yes
80410060003	No	No	Yes	No	No	No	No	No	Yes
80410060004	No	No	Yes	No	No	No	No	No	Yes
80410061001	No	Yes	Yes	No	No	No	No	No	Yes
80410061002	Yes	Yes	Yes	No	No	No	No	No	Yes

Table 1. List of Colorado Low Income and Disadvantaged Communities Block Groups

Census Block Group ID	US Supplemental Index >=90%	State Supplemental Index >=90%	CEJST Disadvantaged	Alaska Native Allotments	Alask Native Villages	American Indian Reservations	Off-Reservation Trust Lands	Oklahoma Tribal Statistical Area	Disadvantaged
80410062001	No	No	Yes	No	No	No	No	No	Yes
80410062002	No	Yes	Yes	No	No	No	No	No	Yes
80410062003	Yes	Yes	Yes	No	No	No	No	No	Yes
80410063012	No	Yes	No	No	No	No	No	No	Yes
80410063021	Yes	Yes	Yes	No	No	No	No	No	Yes
80410063022	Yes	Yes	Yes	No	No	No	No	No	Yes
80410063023	Yes	Yes	Yes	No	No	No	No	No	Yes
80410064001	Yes	Yes	Yes	No	No	No	No	No	Yes
80410064002	No	Yes	Yes	No	No	No	No	No	Yes
80410064003	No	Yes	Yes	No	No	No	No	No	Yes
80410064004	Yes	Yes	Yes	No	No	No	No	No	Yes
80410065011	No	No	Yes	No	No	No	No	No	Yes
80410065012	No	Yes	Yes	No	No	No	No	No	Yes
80410065021	No	Yes	Yes	No	No	No	No	No	Yes
80410065022	No	No	Yes	No	No	No	No	No	Yes
80410065023	No	No	Yes	No	No	No	No	No	Yes
80410065024	Yes	Yes	Yes	No	No	No	No	No	Yes
80410067011	No	Yes	No	No	No	No	No	No	Yes
80410080003	No	Yes	No	No	No	No	No	No	Yes
80439782001	No	No	Yes	No	No	No	No	No	Yes
80439782002	No	Yes	Yes	No	No	No	No	No	Yes
80439782003	No	No	Yes	No	No	No	No	No	Yes
80439783001	No	No	Yes	No	No	No	No	No	Yes
80439783002	No	No	Yes	No	No	No	No	No	Yes
80439783003	No	Yes	Yes	No	No	No	No	No	Yes
80439783004	No	No	Yes	No	No	No	No	No	Yes
80439784002	No	Yes	No	No	No	No	No	No	Yes
80439785002	No	Yes	No	No	No	No	No	No	Yes
80439785003	No	Yes	No	No	No	No	No	No	Yes

Table 1. List of Colorado Low Income and Disadvantaged Communities Block Groups

Census Block Group ID	US Supplemental Index >=90%	State Supplemental Index >=90%	CEJST Disadvantaged	Alaska Native Allotments	Alask Native Villages	American Indian Reservations	Off-Reservation Trust Lands	Oklahoma Tribal Statistical Area	Disadvantaged
80439786001	No	No	Yes	No	No	No	No	No	Yes
80439786002	No	Yes	Yes	No	No	No	No	No	Yes
80439786003	No	Yes	Yes	No	No	No	No	No	Yes
80439786004	No	Yes	Yes	No	No	No	No	No	Yes
80439788001	No	Yes	No	No	No	No	No	No	Yes
80439788003	No	Yes	No	No	No	No	No	No	Yes
80439790011	No	No	Yes	No	No	No	No	No	Yes
80439790012	No	No	Yes	No	No	No	No	No	Yes
80439790013	No	No	Yes	No	No	No	No	No	Yes
80439790021	No	No	Yes	No	No	No	No	No	Yes
80439790022	No	No	Yes	No	No	No	No	No	Yes
80439791001	No	No	Yes	No	No	No	No	No	Yes
80439791002	No	Yes	Yes	No	No	No	No	No	Yes
80439791003	Yes	Yes	Yes	No	No	No	No	No	Yes
80439803001	No	No	Yes	No	No	No	No	No	Yes
80459516002	Yes	Yes	No	No	No	No	No	No	Yes
80459520011	No	No	Yes	No	No	No	No	No	Yes
80459520012	No	No	Yes	No	No	No	No	No	Yes
80459520013	No	No	Yes	No	No	No	No	No	Yes
80459520044	Yes	Yes	No	No	No	No	No	No	Yes
80459521001	No	Yes	No	No	No	No	No	No	Yes
80459521002	No	Yes	No	No	No	No	No	No	Yes
80559606001	No	No	Yes	No	No	No	No	No	Yes
80559606002	No	No	Yes	No	No	No	No	No	Yes
80559606003	Yes	Yes	Yes	No	No	No	No	No	Yes
80590098071	No	Yes	No	No	No	No	No	No	Yes
80590098271	No	Yes	No	No	No	No	No	No	Yes
80590098311	No	Yes	No	No	No	No	No	No	Yes
80590098312	No	Yes	No	No	No	No	No	No	Yes

Table 1. List of Colorado Low Income and Disadvantaged Communities Block Groups

Census Block Group ID	US Supplemental Index >=90%	State Supplemental Index >=90%	CEJST Disadvantaged	Alaska Native Allotments	Alask Native Villages	American Indian Reservations	Off-Reservation Trust Lands	Oklahoma Tribal Statistical Area	Disadvantaged
80590098331	No	Yes	No	No	No	No	No	No	Yes
80590098542	No	Yes	No	No	No	No	No	No	Yes
80590098551	Yes	Yes	No	No	No	No	No	No	Yes
80590098561	No	Yes	No	No	No	No	No	No	Yes
80590098562	No	Yes	No	No	No	No	No	No	Yes
80590098571	No	Yes	No	No	No	No	No	No	Yes
80590101001	No	Yes	No	No	No	No	No	No	Yes
80590101003	No	Yes	No	No	No	No	No	No	Yes
80590101004	Yes	Yes	No	No	No	No	No	No	Yes
80590102081	No	Yes	No	No	No	No	No	No	Yes
80590102112	No	Yes	No	No	No	No	No	No	Yes
80590102113	No	Yes	No	No	No	No	No	No	Yes
80590102125	No	Yes	No	No	No	No	No	No	Yes
80590102134	No	Yes	No	No	No	No	No	No	Yes
80590103071	No	Yes	No	No	No	No	No	No	Yes
80590103084	No	Yes	No	No	No	No	No	No	Yes
80590104021	No	Yes	No	No	No	No	No	No	Yes
80590104023	Yes	Yes	No	No	No	No	No	No	Yes
80590104024	No	Yes	No	No	No	No	No	No	Yes
80590104031	Yes	Yes	No	No	No	No	No	No	Yes
80590104032	Yes	Yes	No	No	No	No	No	No	Yes
80590104033	No	Yes	No	No	No	No	No	No	Yes
80590104034	No	Yes	No	No	No	No	No	No	Yes
80590104051	Yes	Yes	No	No	No	No	No	No	Yes
80590104061	No	No	Yes	No	No	No	No	No	Yes
80590104062	Yes	Yes	Yes	No	No	No	No	No	Yes
80590107012	No	Yes	No	No	No	No	No	No	Yes
80590107021	No	Yes	No	No	No	No	No	No	Yes
80590107023	No	Yes	No	No	No	No	No	No	Yes

Table 1. List of Colorado Low Income and Disadvantaged Communities Block Groups

Census Block Group ID	US Supplemental Index >=90%	State Supplemental Index >=90%	CEJST Disadvantaged	Alaska Native Allotments	Alask Native Villages	American Indian Reservations	Off-Reservation Trust Lands	Oklahoma Tribal Statistical Area	Disadvantaged
80590109013	No	Yes	No	No	No	No	No	No	Yes
80590109014	No	Yes	No	No	No	No	No	No	Yes
80590109021	Yes	Yes	No	No	No	No	No	No	Yes
80590109022	Yes	Yes	No	No	No	No	No	No	Yes
80590110002	Yes	Yes	No	No	No	No	No	No	Yes
80590110003	Yes	Yes	No	No	No	No	No	No	Yes
80590110005	Yes	Yes	No	No	No	No	No	No	Yes
80590110006	Yes	Yes	No	No	No	No	No	No	Yes
80590111011	Yes	Yes	No	No	No	No	No	No	Yes
80590111021	Yes	Yes	No	No	No	No	No	No	Yes
80590113002	Yes	Yes	No	No	No	No	No	No	Yes
80590114011	Yes	Yes	Yes	No	No	No	No	No	Yes
80590114012	Yes	Yes	Yes	No	No	No	No	No	Yes
80590114021	No	No	Yes	No	No	No	No	No	Yes
80590114022	Yes	Yes	Yes	No	No	No	No	No	Yes
80590114023	Yes	Yes	Yes	No	No	No	No	No	Yes
80590115511	Yes	Yes	Yes	No	No	No	No	No	Yes
80590115512	No	Yes	Yes	No	No	No	No	No	Yes
80590115513	No	No	Yes	No	No	No	No	No	Yes
80590115521	Yes	Yes	Yes	No	No	No	No	No	Yes
80590115522	Yes	Yes	Yes	No	No	No	No	No	Yes
80590116011	Yes	Yes	Yes	No	No	No	No	No	Yes
80590116012	No	No	Yes	No	No	No	No	No	Yes
80590116021	No	No	Yes	No	No	No	No	No	Yes
80590116022	Yes	Yes	Yes	No	No	No	No	No	Yes
80590116023	No	Yes	Yes	No	No	No	No	No	Yes
80590117021	Yes	Yes	No	No	No	No	No	No	Yes
80590117111	No	Yes	No	No	No	No	No	No	Yes
80590117261	No	Yes	No	No	No	No	No	No	Yes

Table 1. List of Colorado Low Income and Disadvantaged Communities Block Groups

Census Block Group ID	US Supplemental Index >=90%	State Supplemental Index >=90%	CEJST Disadvantaged	Alaska Native Allotments	Alask Native Villages	American Indian Reservations	Off-Reservation Trust Lands	Oklahoma Tribal Statistical Area	Disadvantaged
80590117291	No	Yes	No	No	No	No	No	No	Yes
80590117292	No	Yes	No	No	No	No	No	No	Yes
80590117293	No	Yes	No	No	No	No	No	No	Yes
80590117301	No	Yes	No	No	No	No	No	No	Yes
80590117323	Yes	Yes	No	No	No	No	No	No	Yes
80590117324	No	Yes	No	No	No	No	No	No	Yes
80590118031	No	Yes	No	No	No	No	No	No	Yes
80590118034	No	Yes	No	No	No	No	No	No	Yes
80590118043	No	Yes	No	No	No	No	No	No	Yes
80590118061	Yes	Yes	No	No	No	No	No	No	Yes
80590118062	No	Yes	No	No	No	No	No	No	Yes
80590118064	No	Yes	No	No	No	No	No	No	Yes
80590118071	No	Yes	No	No	No	No	No	No	Yes
80590118072	No	Yes	No	No	No	No	No	No	Yes
80590120394	No	Yes	No	No	No	No	No	No	Yes
80590120521	No	Yes	No	No	No	No	No	No	Yes
80590120553	No	Yes	No	No	No	No	No	No	Yes
80590158003	Yes	Yes	No	No	No	No	No	No	Yes
80590159002	No	Yes	No	No	No	No	No	No	Yes
80599808001	No	Yes	No	No	No	No	No	No	Yes
80619601001	No	No	Yes	No	No	No	No	No	Yes
80619601002	No	No	Yes	No	No	No	No	No	Yes
80639624001	No	No	Yes	No	No	No	No	No	Yes
80639624002	No	No	Yes	No	No	No	No	No	Yes
80659619001	No	No	Yes	No	No	No	No	No	Yes
80659619002	Yes	Yes	Yes	No	No	No	No	No	Yes
80679403001	No	No	Yes	No	No	Yes	No	No	Yes
80679403002	No	No	Yes	No	No	Yes	No	No	Yes
80679403003	No	No	Yes	No	No	Yes	No	No	Yes

Table 1. List of Colorado Low Income and Disadvantaged Communities Block Groups

Census Block Group ID	US Supplemental Index >=90%	State Supplemental Index >=90%	CEJST Disadvantaged	Alaska Native Allotments	Alask Native Villages	American Indian Reservations	Off-Reservation Trust Lands	Oklahoma Tribal Statistical Area	Disadvantaged
80679404001	No	No	Yes	No	No	Yes	No	No	Yes
80679404002	No	No	Yes	No	No	Yes	No	No	Yes
80679404003	No	No	Yes	No	No	Yes	No	No	Yes
80690001001	No	Yes	No	No	No	No	No	No	Yes
80690002011	No	Yes	No	No	No	No	No	No	Yes
80690004011	No	Yes	No	No	No	No	No	No	Yes
80690005032	Yes	Yes	No	No	No	No	No	No	Yes
80690005033	Yes	Yes	No	No	No	No	No	No	Yes
80690005041	No	Yes	No	No	No	No	No	No	Yes
80690005042	Yes	Yes	No	No	No	No	No	No	Yes
80690005051	No	Yes	No	No	No	No	No	No	Yes
80690005062	No	Yes	No	No	No	No	No	No	Yes
80690006003	Yes	Yes	No	No	No	No	No	No	Yes
80690006004	Yes	Yes	No	No	No	No	No	No	Yes
80690008021	No	Yes	No	No	No	No	No	No	Yes
80690009014	No	Yes	No	No	No	No	No	No	Yes
80690009021	No	Yes	No	No	No	No	No	No	Yes
80690010031	No	Yes	No	No	No	No	No	No	Yes
80690011041	No	Yes	No	No	No	No	No	No	Yes
80690011061	No	Yes	No	No	No	No	No	No	Yes
80690011102	No	Yes	No	No	No	No	No	No	Yes
80690011103	No	Yes	No	No	No	No	No	No	Yes
80690011112	Yes	Yes	No	No	No	No	No	No	Yes
80690011123	Yes	Yes	No	No	No	No	No	No	Yes
80690013041	Yes	Yes	Yes	No	No	No	No	No	Yes
80690013042	Yes	Yes	Yes	No	No	No	No	No	Yes
80690013052	No	Yes	No	No	No	No	No	No	Yes
80690013062	No	Yes	No	No	No	No	No	No	Yes
80690016011	No	Yes	No	No	No	No	No	No	Yes

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Census Block Group ID	US Supplemental Index >=90%	State Supplemental Index >=90%	CEJST Disadvantaged	Alaska Native Allotments	Alask Native Villages	American Indian Reservations	Off-Reservation Trust Lands	Oklahoma Tribal Statistical Area	Disadvantaged
80690016051	Yes	Yes	No	No	No	No	No	No	Yes
80690017064	No	Yes	No	No	No	No	No	No	Yes
80690017073	No	Yes	No	No	No	No	No	No	Yes
80690018041	No	Yes	No	No	No	No	No	No	Yes
80690019023	No	Yes	No	No	No	No	No	No	Yes
80690020071	No	Yes	No	No	No	No	No	No	Yes
80690028014	No	Yes	No	No	No	No	No	No	Yes
80690028031	No	No	Yes	No	No	No	No	No	Yes
80710001001	No	Yes	Yes	No	No	No	No	No	Yes
80710001002	No	No	Yes	No	No	No	No	No	Yes
80710001003	Yes	Yes	Yes	No	No	No	No	No	Yes
80710003002	Yes	Yes	No	No	No	No	No	No	Yes
80710004001	No	No	Yes	No	No	No	No	No	Yes
80710004002	No	No	Yes	No	No	No	No	No	Yes
80710004003	Yes	Yes	Yes	No	No	No	No	No	Yes
80710005001	No	Yes	Yes	No	No	No	No	No	Yes
80710005002	No	No	Yes	No	No	No	No	No	Yes
80710008001	No	No	Yes	No	No	No	No	No	Yes
80710008002	No	No	Yes	No	No	No	No	No	Yes
80710008003	No	No	Yes	No	No	No	No	No	Yes
80739617001	No	No	Yes	No	No	No	No	No	Yes
80739617002	No	No	Yes	No	No	No	No	No	Yes
80739617003	No	No	Yes	No	No	No	No	No	Yes
80739618001	No	Yes	Yes	No	No	No	No	No	Yes
80739618002	No	No	Yes	No	No	No	No	No	Yes
80759660002	No	Yes	No	No	No	No	No	No	Yes
80759661011	No	No	Yes	No	No	No	No	No	Yes
80759661012	No	No	Yes	No	No	No	No	No	Yes
80759661021	No	No	Yes	No	No	No	No	No	Yes

Table 1. List of Colorado Low Income and Disadvantaged Communities Block Groups

Census Block Group ID	US Supplemental Index >=90%	State Supplemental Index >=90%	CEJST Disadvantaged	Alaska Native Allotments	Alask Native Villages	American Indian Reservations	Off-Reservation Trust Lands	Oklahoma Tribal Statistical Area	Disadvantaged
80759661022	No	Yes	Yes	No	No	No	No	No	Yes
80759661023	Yes	Yes	Yes	No	No	No	No	No	Yes
80759661024	Yes	Yes	Yes	No	No	No	No	No	Yes
80759662001	Yes	Yes	No	No	No	No	No	No	Yes
80759662003	Yes	Yes	No	No	No	No	No	No	Yes
80759663001	No	Yes	No	No	No	No	No	No	Yes
80770002001	No	Yes	Yes	No	No	No	No	No	Yes
80770002002	No	No	Yes	No	No	No	No	No	Yes
80770003001	Yes	Yes	Yes	No	No	No	No	No	Yes
80770003002	Yes	Yes	Yes	No	No	No	No	No	Yes
80770004004	No	Yes	No	No	No	No	No	No	Yes
80770005001	No	Yes	Yes	No	No	No	No	No	Yes
80770005002	Yes	Yes	Yes	No	No	No	No	No	Yes
80770006013	Yes	Yes	No	No	No	No	No	No	Yes
80770006021	Yes	Yes	Yes	No	No	No	No	No	Yes
80770006022	Yes	Yes	Yes	No	No	No	No	No	Yes
80770006023	Yes	Yes	Yes	No	No	No	No	No	Yes
80770006024	No	No	Yes	No	No	No	No	No	Yes
80770006025	No	No	Yes	No	No	No	No	No	Yes
80770007001	Yes	Yes	Yes	No	No	No	No	No	Yes
80770007002	No	Yes	Yes	No	No	No	No	No	Yes
80770007003	No	No	Yes	No	No	No	No	No	Yes
80770008011	Yes	Yes	No	No	No	No	No	No	Yes
80770008021	No	Yes	No	No	No	No	No	No	Yes
80770008022	Yes	Yes	No	No	No	No	No	No	Yes
80770009001	Yes	Yes	No	No	No	No	No	No	Yes
80770011041	No	Yes	No	No	No	No	No	No	Yes
80770011042	Yes	Yes	No	No	No	No	No	No	Yes
80770011043	No	Yes	No	No	No	No	No	No	Yes

Table 1. List of Colorado Low Income and Disadvantaged Communities Block Groups

Census Block Group ID	US Supplemental Index >=90%	State Supplemental Index >=90%	CEJST Disadvantaged	Alaska Native Allotments	Alask Native Villages	American Indian Reservations	Off-Reservation Trust Lands	Oklahoma Tribal Statistical Area	Disadvantaged
80770013041	No	Yes	No	No	No	No	No	No	Yes
80770014033	Yes	Yes	No	No	No	No	No	No	Yes
80770017031	No	Yes	No	No	No	No	No	No	Yes
80770017051	No	Yes	Yes	No	No	No	No	No	Yes
80770017052	No	No	Yes	No	No	No	No	No	Yes
80770017053	Yes	Yes	Yes	No	No	No	No	No	Yes
80770017061	No	No	Yes	No	No	No	No	No	Yes
80770017062	Yes	Yes	Yes	No	No	No	No	No	Yes
80770017063	No	Yes	Yes	No	No	No	No	No	Yes
80770017064	No	No	Yes	No	No	No	No	No	Yes
80770017071	Yes	Yes	No	No	No	No	No	No	Yes
80810004001	No	Yes	No	No	No	No	No	No	Yes
80810005006	No	Yes	No	No	No	No	No	No	Yes
80810006001	No	No	Yes	No	No	No	No	No	Yes
80810006002	No	No	Yes	No	No	No	No	No	Yes
80839411001	No	No	Yes	No	No	Yes	No	No	Yes
80839411002	No	No	Yes	No	No	Yes	No	No	Yes
80839691001	No	No	Yes	No	No	No	No	No	Yes
80839691002	No	No	Yes	No	No	No	No	No	Yes
80839691003	No	No	Yes	No	No	No	No	No	Yes
80839693022	No	Yes	No	No	No	No	No	No	Yes
80839694001	No	No	Yes	No	No	No	No	No	Yes
80839694002	Yes	Yes	Yes	No	No	No	No	No	Yes
80839694003	No	Yes	Yes	No	No	No	No	No	Yes
80839694004	No	No	Yes	No	No	No	No	No	Yes
80859661001	No	Yes	No	No	No	No	No	No	Yes
80859662021	No	No	Yes	No	No	No	No	No	Yes
80859662022	Yes	Yes	Yes	No	No	No	No	No	Yes
80859662023	No	No	Yes	No	No	No	No	No	Yes

Table 1. List of Colorado Low Income and Disadvantaged Communities Block Groups

Census Block Group ID	US Supplemental Index >=90%	State Supplemental Index >=90%	CEJST Disadvantaged	Alaska Native Allotments	Alask Native Villages	American Indian Reservations	Off-Reservation Trust Lands	Oklahoma Tribal Statistical Area	Disadvantaged
80859663011	Yes	Yes	Yes	No	No	No	No	No	Yes
80859663012	No	Yes	Yes	No	No	No	No	No	Yes
80859663021	No	Yes	Yes	No	No	No	No	No	Yes
80859663022	No	Yes	Yes	No	No	No	No	No	Yes
80859663023	No	Yes	Yes	No	No	No	No	No	Yes
80859665031	No	No	Yes	No	No	No	No	No	Yes
80859665032	No	Yes	Yes	No	No	No	No	No	Yes
80859666011	No	No	Yes	No	No	No	No	No	Yes
80859666012	No	No	Yes	No	No	No	No	No	Yes
80859666013	Yes	Yes	Yes	No	No	No	No	No	Yes
80870001002	No	Yes	No	No	No	No	No	No	Yes
80870003001	Yes	Yes	Yes	No	No	No	No	No	Yes
80870004001	Yes	Yes	Yes	No	No	No	No	No	Yes
80870004002	No	No	Yes	No	No	No	No	No	Yes
80870004003	No	Yes	Yes	No	No	No	No	No	Yes
80870005001	Yes	Yes	Yes	No	No	No	No	No	Yes
80870005002	No	Yes	Yes	No	No	No	No	No	Yes
80870005003	Yes	Yes	Yes	No	No	No	No	No	Yes
80870006003	Yes	Yes	No	No	No	No	No	No	Yes
80870006004	Yes	Yes	No	No	No	No	No	No	Yes
80870006005	No	Yes	No	No	No	No	No	No	Yes
80870007001	No	Yes	No	No	No	No	No	No	Yes
80870007002	No	Yes	No	No	No	No	No	No	Yes
80870007004	No	Yes	No	No	No	No	No	No	Yes
80870007005	No	Yes	No	No	No	No	No	No	Yes
80899680002	Yes	Yes	No	No	No	No	No	No	Yes
80899681001	Yes	Yes	Yes	No	No	No	No	No	Yes
80899681002	No	Yes	Yes	No	No	No	No	No	Yes
80899681003	Yes	Yes	Yes	No	No	No	No	No	Yes

Table 1. List of Colorado Low Income and Disadvantaged Communities Block Groups

Census Block Group ID	US Supplemental Index >=90%	State Supplemental Index >=90%	CEJST Disadvantaged	Alaska Native Allotments	Alask Native Villages	American Indian Reservations	Off-Reservation Trust Lands	Oklahoma Tribal Statistical Area	Disadvantaged
80899682001	No	No	Yes	No	No	No	No	No	Yes
80899682002	No	No	Yes	No	No	No	No	No	Yes
80899682003	Yes	Yes	Yes	No	No	No	No	No	Yes
80899683001	No	Yes	Yes	No	No	No	No	No	Yes
80899683002	No	No	Yes	No	No	No	No	No	Yes
80899683003	No	Yes	Yes	No	No	No	No	No	Yes
80899683004	No	Yes	Yes	No	No	No	No	No	Yes
80899684001	No	No	Yes	No	No	No	No	No	Yes
80899685001	No	No	Yes	No	No	No	No	No	Yes
80899685002	No	No	Yes	No	No	No	No	No	Yes
80899686001	Yes	Yes	Yes	No	No	No	No	No	Yes
80899686002	Yes	Yes	Yes	No	No	No	No	No	Yes
80899686003	No	No	Yes	No	No	No	No	No	Yes
80899686004	Yes	Yes	Yes	No	No	No	No	No	Yes
80899686005	Yes	Yes	Yes	No	No	No	No	No	Yes
80930005001	No	No	Yes	No	No	No	No	No	Yes
80930005002	No	No	Yes	No	No	No	No	No	Yes
80930005003	No	No	Yes	No	No	No	No	No	Yes
80959676001	No	No	Yes	No	No	No	No	No	Yes
80959676002	No	No	Yes	No	No	No	No	No	Yes
80959676003	No	Yes	Yes	No	No	No	No	No	Yes
80959676004	No	Yes	Yes	No	No	No	No	No	Yes
80990002001	Yes	Yes	Yes	No	No	No	No	No	Yes
80990002002	No	Yes	Yes	No	No	No	No	No	Yes
80990003001	No	Yes	No	No	No	No	No	No	Yes
80990003002	Yes	Yes	No	No	No	No	No	No	Yes
80990003003	Yes	Yes	No	No	No	No	No	No	Yes
80990003004	No	No	Yes	No	No	No	No	No	Yes
80990003006	No	Yes	No	No	No	No	No	No	Yes

Table 1. List of Colorado Low Income and Disadvantaged Communities Block Groups

Census Block Group ID	US Supplemental Index >=90%	State Supplemental Index >=90%	CEJST Disadvantaged	Alaska Native Allotments	Alask Native Villages	American Indian Reservations	Off-Reservation Trust Lands	Oklahoma Tribal Statistical Area	Disadvantaged
80990006001	No	No	Yes	No	No	No	No	No	Yes
80990006002	No	Yes	Yes	No	No	No	No	No	Yes
80990007001	No	Yes	Yes	No	No	No	No	No	Yes
80990007002	No	No	Yes	No	No	No	No	No	Yes
81010002001	No	Yes	Yes	No	No	No	No	No	Yes
81010002002	No	Yes	Yes	No	No	No	No	No	Yes
81010003001	Yes	Yes	Yes	No	No	No	No	No	Yes
81010004001	No	No	Yes	No	No	No	No	No	Yes
81010004002	No	Yes	Yes	No	No	No	No	No	Yes
81010004003	No	No	Yes	No	No	No	No	No	Yes
81010005001	Yes	Yes	No	No	No	No	No	No	Yes
81010005003	No	Yes	No	No	No	No	No	No	Yes
81010006001	Yes	Yes	Yes	No	No	No	No	No	Yes
81010006002	Yes	Yes	Yes	No	No	No	No	No	Yes
81010006003	Yes	Yes	Yes	No	No	No	No	No	Yes
81010008001	Yes	Yes	Yes	No	No	No	No	No	Yes
81010008002	Yes	Yes	Yes	No	No	No	No	No	Yes
81010008003	Yes	Yes	Yes	No	No	No	No	No	Yes
81010009021	Yes	Yes	No	No	No	No	No	No	Yes
81010009022	No	Yes	No	No	No	No	No	No	Yes
81010009024	No	Yes	No	No	No	No	No	No	Yes
81010009031	Yes	Yes	No	No	No	No	No	No	Yes
81010009041	No	No	Yes	No	No	No	No	No	Yes
81010009042	No	No	Yes	No	No	No	No	No	Yes
81010009043	No	No	Yes	No	No	No	No	No	Yes
81010009051	Yes	Yes	Yes	No	No	No	No	No	Yes
81010009052	No	Yes	Yes	No	No	No	No	No	Yes
81010010001	Yes	Yes	Yes	No	No	No	No	No	Yes
81010010002	No	Yes	Yes	No	No	No	No	No	Yes

Table 1. List of Colorado Low Income and Disadvantaged Communities Block Groups

Census Block Group ID	US Supplemental Index >=90%	State Supplemental Index >=90%	CEJST Disadvantaged	Alaska Native Allotments	Alask Native Villages	American Indian Reservations	Off-Reservation Trust Lands	Oklahoma Tribal Statistical Area	Disadvantaged
81010010003	Yes	Yes	Yes	No	No	No	No	No	Yes
81010010004	Yes	Yes	Yes	No	No	No	No	No	Yes
81010011001	Yes	Yes	Yes	No	No	No	No	No	Yes
81010011002	Yes	Yes	Yes	No	No	No	No	No	Yes
81010011003	Yes	Yes	Yes	No	No	No	No	No	Yes
81010012001	Yes	Yes	Yes	No	No	No	No	No	Yes
81010012002	Yes	Yes	Yes	No	No	No	No	No	Yes
81010014001	Yes	Yes	Yes	No	No	No	No	No	Yes
81010015001	Yes	Yes	Yes	No	No	No	No	No	Yes
81010015002	No	Yes	Yes	No	No	No	No	No	Yes
81010016001	No	No	Yes	No	No	No	No	No	Yes
81010016002	No	Yes	Yes	No	No	No	No	No	Yes
81010018001	Yes	Yes	Yes	No	No	No	No	No	Yes
81010018002	No	No	Yes	No	No	No	No	No	Yes
81010018003	No	No	Yes	No	No	No	No	No	Yes
81010019001	No	Yes	Yes	No	No	No	No	No	Yes
81010019002	Yes	Yes	Yes	No	No	No	No	No	Yes
81010020001	Yes	Yes	Yes	No	No	No	No	No	Yes
81010020002	Yes	Yes	Yes	No	No	No	No	No	Yes
81010020003	Yes	Yes	Yes	No	No	No	No	No	Yes
81010020004	Yes	Yes	Yes	No	No	No	No	No	Yes
81010021001	Yes	Yes	Yes	No	No	No	No	No	Yes
81010021002	Yes	Yes	Yes	No	No	No	No	No	Yes
81010022001	Yes	Yes	Yes	No	No	No	No	No	Yes
81010022002	Yes	Yes	Yes	No	No	No	No	No	Yes
81010023001	No	Yes	Yes	No	No	No	No	No	Yes
81010023002	Yes	Yes	Yes	No	No	No	No	No	Yes
81010023003	Yes	Yes	Yes	No	No	No	No	No	Yes
81010023004	Yes	Yes	Yes	No	No	No	No	No	Yes

Table 1. List of Colorado Low Income and Disadvantaged Communities Block Groups

Census Block Group ID	US Supplemental Index >=90%	State Supplemental Index >=90%	CEJST Disadvantaged	Alaska Native Allotments	Alask Native Villages	American Indian Reservations	Off-Reservation Trust Lands	Oklahoma Tribal Statistical Area	Disadvantaged
81010024001	Yes	Yes	Yes	No	No	No	No	No	Yes
81010024002	Yes	Yes	Yes	No	No	No	No	No	Yes
81010025001	Yes	Yes	Yes	No	No	No	No	No	Yes
81010025002	Yes	Yes	Yes	No	No	No	No	No	Yes
81010025003	Yes	Yes	Yes	No	No	No	No	No	Yes
81010026001	Yes	Yes	Yes	No	No	No	No	No	Yes
81010026002	Yes	Yes	Yes	No	No	No	No	No	Yes
81010026003	Yes	Yes	Yes	No	No	No	No	No	Yes
81010027002	No	Yes	No	No	No	No	No	No	Yes
81010027006	No	Yes	No	No	No	No	No	No	Yes
81010028011	No	No	Yes	No	No	No	No	No	Yes
81010028012	No	Yes	Yes	No	No	No	No	No	Yes
81010028013	No	Yes	Yes	No	No	No	No	No	Yes
81010028014	No	No	Yes	No	No	No	No	No	Yes
81010028015	No	No	Yes	No	No	No	No	No	Yes
81010028022	Yes	Yes	No	No	No	No	No	No	Yes
81010029011	Yes	Yes	Yes	No	No	No	No	No	Yes
81010029012	Yes	Yes	Yes	No	No	No	No	No	Yes
81010029013	No	No	Yes	No	No	No	No	No	Yes
81010029121	No	No	Yes	No	No	No	No	No	Yes
81010029122	No	No	Yes	No	No	No	No	No	Yes
81010029161	No	No	Yes	No	No	No	No	No	Yes
81010029162	No	Yes	Yes	No	No	No	No	No	Yes
81010029192	Yes	Yes	No	No	No	No	No	No	Yes
81010029211	No	Yes	No	No	No	No	No	No	Yes
81010030011	Yes	Yes	Yes	No	No	No	No	No	Yes
81010031031	No	Yes	Yes	No	No	No	No	No	Yes
81010031032	Yes	Yes	Yes	No	No	No	No	No	Yes
81010032003	No	Yes	No	No	No	No	No	No	Yes

Table 1. List of Colorado Low Income and Disadvantaged Communities Block Groups

Census Block Group ID	US Supplemental Index >=90%	State Supplemental Index >=90%	CEJST Disadvantaged	Alaska Native Allotments	Alask Native Villages	American Indian Reservations	Off-Reservation Trust Lands	Oklahoma Tribal Statistical Area	Disadvantaged
81010035001	Yes	Yes	Yes	No	No	No	No	No	Yes
81010035002	Yes	Yes	Yes	No	No	No	No	No	Yes
81010036001	Yes	Yes	Yes	No	No	No	No	No	Yes
81010036002	No	No	Yes	No	No	No	No	No	Yes
81039511003	No	Yes	No	No	No	No	No	No	Yes
81059767001	No	Yes	Yes	No	No	No	No	No	Yes
81059767002	No	No	Yes	No	No	No	No	No	Yes
81059767003	Yes	Yes	Yes	No	No	No	No	No	Yes
81059767004	No	Yes	Yes	No	No	No	No	No	Yes
81059768001	Yes	Yes	Yes	No	No	No	No	No	Yes
81059768002	No	No	Yes	No	No	No	No	No	Yes
81059770011	No	No	Yes	No	No	No	No	No	Yes
81059770012	No	No	Yes	No	No	No	No	No	Yes
81059770021	No	No	Yes	No	No	No	No	No	Yes
81059770022	No	No	Yes	No	No	No	No	No	Yes
81099776001	No	No	Yes	No	No	No	No	No	Yes
81099776002	No	No	Yes	No	No	No	No	No	Yes
81099776003	No	No	Yes	No	No	No	No	No	Yes
81099777001	No	No	Yes	No	No	No	No	No	Yes
81099777002	Yes	Yes	Yes	No	No	No	No	No	Yes
81099777003	Yes	Yes	Yes	No	No	No	No	No	Yes
81159683001	No	Yes	Yes	No	No	No	No	No	Yes
81159683002	No	No	Yes	No	No	No	No	No	Yes
81170002021	Yes	Yes	No	No	No	No	No	No	Yes
81170002022	No	Yes	No	No	No	No	No	No	Yes
81190102031	No	No	Yes	No	No	No	No	No	Yes
81190102032	No	No	Yes	No	No	No	No	No	Yes
81190102033	No	No	Yes	No	No	No	No	No	Yes
81190102034	No	No	Yes	No	No	No	No	No	Yes

Table 1. List of Colorado Low Income and Disadvantaged Communities Block Groups

Census Block Group ID	US Supplemental Index >=90%	State Supplemental Index >=90%	CEJST Disadvantaged	Alaska Native Allotments	Alask Native Villages	American Indian Reservations	Off-Reservation Trust Lands	Oklahoma Tribal Statistical Area	Disadvantaged
81219241002	No	Yes	No	No	No	No	No	No	Yes
81230001001	Yes	Yes	Yes	No	No	No	No	No	Yes
81230001002	Yes	Yes	Yes	No	No	No	No	No	Yes
81230001003	Yes	Yes	Yes	No	No	No	No	No	Yes
81230002001	Yes	Yes	Yes	No	No	No	No	No	Yes
81230002002	Yes	Yes	Yes	No	No	No	No	No	Yes
81230004011	Yes	Yes	No	No	No	No	No	No	Yes
81230004012	Yes	Yes	No	No	No	No	No	No	Yes
81230004014	No	Yes	No	No	No	No	No	No	Yes
81230004021	Yes	Yes	Yes	No	No	No	No	No	Yes
81230004022	Yes	Yes	Yes	No	No	No	No	No	Yes
81230004023	Yes	Yes	Yes	No	No	No	No	No	Yes
81230005011	Yes	Yes	Yes	No	No	No	No	No	Yes
81230005012	Yes	Yes	Yes	No	No	No	No	No	Yes
81230005021	Yes	Yes	Yes	No	No	No	No	No	Yes
81230005022	Yes	Yes	Yes	No	No	No	No	No	Yes
81230006001	Yes	Yes	Yes	No	No	No	No	No	Yes
81230007011	Yes	Yes	Yes	No	No	No	No	No	Yes
81230007012	Yes	Yes	Yes	No	No	No	No	No	Yes
81230007031	Yes	Yes	Yes	No	No	No	No	No	Yes
81230007032	Yes	Yes	Yes	No	No	No	No	No	Yes
81230007033	Yes	Yes	Yes	No	No	No	No	No	Yes
81230007034	Yes	Yes	Yes	No	No	No	No	No	Yes
81230007051	No	No	Yes	No	No	No	No	No	Yes
81230007052	No	Yes	Yes	No	No	No	No	No	Yes
81230008001	Yes	Yes	Yes	No	No	No	No	No	Yes
81230008002	Yes	Yes	Yes	No	No	No	No	No	Yes
81230008003	Yes	Yes	Yes	No	No	No	No	No	Yes
81230008004	Yes	Yes	Yes	No	No	No	No	No	Yes

Table 1. List of Colorado Low Income and Disadvantaged Communities Block Groups

Census Block Group ID	US Supplemental Index >=90%	State Supplemental Index >=90%	CEJST Disadvantaged	Alaska Native Allotments	Alask Native Villages	American Indian Reservations	Off-Reservation Trust Lands	Oklahoma Tribal Statistical Area	Disadvantaged
81230009001	No	Yes	No	No	No	No	No	No	Yes
81230010031	Yes	Yes	Yes	No	No	No	No	No	Yes
81230010032	Yes	Yes	Yes	No	No	No	No	No	Yes
81230010033	Yes	Yes	Yes	No	No	No	No	No	Yes
81230010041	Yes	Yes	Yes	No	No	No	No	No	Yes
81230010042	Yes	Yes	Yes	No	No	No	No	No	Yes
81230010043	Yes	Yes	Yes	No	No	No	No	No	Yes
81230010051	Yes	Yes	No	No	No	No	No	No	Yes
81230010052	Yes	Yes	No	No	No	No	No	No	Yes
81230010053	No	Yes	No	No	No	No	No	No	Yes
81230010054	Yes	Yes	No	No	No	No	No	No	Yes
81230010055	No	Yes	No	No	No	No	No	No	Yes
81230010056	No	Yes	No	No	No	No	No	No	Yes
81230010061	Yes	Yes	No	No	No	No	No	No	Yes
81230010062	Yes	Yes	No	No	No	No	No	No	Yes
81230010063	No	Yes	No	No	No	No	No	No	Yes
81230011002	No	Yes	No	No	No	No	No	No	Yes
81230011003	Yes	Yes	No	No	No	No	No	No	Yes
81230011004	Yes	Yes	No	No	No	No	No	No	Yes
81230012011	Yes	Yes	Yes	No	No	No	No	No	Yes
81230012012	Yes	Yes	Yes	No	No	No	No	No	Yes
81230012013	No	Yes	Yes	No	No	No	No	No	Yes
81230013001	Yes	Yes	Yes	No	No	No	No	No	Yes
81230013002	Yes	Yes	Yes	No	No	No	No	No	Yes
81230013003	Yes	Yes	Yes	No	No	No	No	No	Yes
81230013004	Yes	Yes	Yes	No	No	No	No	No	Yes
81230014041	Yes	Yes	No	No	No	No	No	No	Yes
81230014052	No	Yes	No	No	No	No	No	No	Yes
81230014053	No	Yes	No	No	No	No	No	No	Yes

Table 1. List of Colorado Low Income and Disadvantaged Communities Block Groups

Census Block Group ID	US Supplemental Index >=90%	State Supplemental Index >=90%	CEJST Disadvantaged	Alaska Native Allotments	Alask Native Villages	American Indian Reservations	Off-Reservation Trust Lands	Oklahoma Tribal Statistical Area	Disadvantaged
81230014061	No	Yes	No	No	No	No	No	No	Yes
81230014063	Yes	Yes	No	No	No	No	No	No	Yes
81230014092	No	Yes	No	No	No	No	No	No	Yes
81230014171	No	No	Yes	No	No	No	No	No	Yes
81230014172	Yes	Yes	Yes	No	No	No	No	No	Yes
81230015003	Yes	Yes	No	No	No	No	No	No	Yes
81230016001	No	Yes	No	No	No	No	No	No	Yes
81230017001	No	Yes	No	No	No	No	No	No	Yes
81230017003	No	Yes	No	No	No	No	No	No	Yes
81230018001	No	Yes	No	No	No	No	No	No	Yes
81230018002	No	Yes	No	No	No	No	No	No	Yes
81230019052	Yes	Yes	No	No	No	No	No	No	Yes
81230019053	Yes	Yes	No	No	No	No	No	No	Yes
81230019061	Yes	Yes	No	No	No	No	No	No	Yes
81230019091	No	Yes	No	No	No	No	No	No	Yes
81230019102	Yes	Yes	No	No	No	No	No	No	Yes
81230019121	No	Yes	No	No	No	No	No	No	Yes
81230019131	No	Yes	No	No	No	No	No	No	Yes
81230020042	Yes	Yes	No	No	No	No	No	No	Yes
81230020043	No	Yes	No	No	No	No	No	No	Yes
81230020101	No	Yes	No	No	No	No	No	No	Yes
81230021013	Yes	Yes	No	No	No	No	No	No	Yes
81230021082	No	Yes	No	No	No	No	No	No	Yes
81230021083	No	Yes	No	No	No	No	No	No	Yes
81230023001	No	No	Yes	No	No	No	No	No	Yes
81230023002	No	No	Yes	No	No	No	No	No	Yes
81230023003	No	No	Yes	No	No	No	No	No	Yes
81230023004	No	No	Yes	No	No	No	No	No	Yes
81230023005	No	No	Yes	No	No	No	No	No	Yes

Table 1. List of Colorado Low Income and Disadvantaged Communities Block Groups

Census Block Group ID	US Supplemental Index >=90%	State Supplemental Index >=90%	CEJST Disadvantaged	Alaska Native Allotments	Alask Native Villages	American Indian Reservations	Off-Reservation Trust Lands	Oklahoma Tribal Statistical Area	Disadvantaged
81230025024	No	Yes	No	No	No	No	No	No	Yes
81230025025	No	Yes	No	No	No	No	No	No	Yes
81259631001	No	No	Yes	No	No	No	No	No	Yes
81259631002	No	No	Yes	No	No	No	No	No	Yes
81259631003	No	No	Yes	No	No	No	No	No	Yes
81259631004	No	Yes	Yes	No	No	No	No	No	Yes
81259632001	No	No	Yes	No	No	No	No	No	Yes
81259632002	No	No	Yes	No	No	No	No	No	Yes
81259632003	No	No	Yes	No	No	No	No	No	Yes
81259632004	No	No	Yes	No	No	No	No	No	Yes
81259632005	Yes	Yes	Yes	No	No	No	No	No	Yes
201299646001	No	No	Yes	No	No	No	No	No	Yes
310579623002	No	No	Yes	No	No	No	No	No	Yes
311059545001	No	No	Yes	No	No	No	No	No	Yes
350079505005	No	No	Yes	No	No	No	No	No	Yes
350079505006	No	No	Yes	No	No	No	No	No	Yes
350079506001	No	No	Yes	No	No	No	No	No	Yes
350079506005	No	No	Yes	No	No	No	No	No	Yes
350079507003	No	No	Yes	No	No	No	No	No	Yes
350390004021	No	No	Yes	No	No	No	No	No	Yes
350390005001	No	No	Yes	No	No	No	Yes	No	Yes
350399410002	Yes	No	Yes	No	No	Yes	Yes	No	Yes
350450007062	No	No	Yes	No	No	No	No	No	Yes
350459428012	No	Yes	Yes	No	No	Yes	Yes	No	Yes
350459428013	Yes	Yes	Yes	No	No	Yes	No	No	Yes
350459433001	No	No	Yes	No	No	Yes	No	No	Yes
350559523003	No	No	Yes	No	No	No	No	No	Yes
350599502003	No	No	Yes	No	No	No	No	No	Yes
350599502004	No	No	Yes	No	No	No	No	No	Yes

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Census Block Group ID	US Supplemental Index >=90%	State Supplemental Index >=90%	CEJST Disadvantaged	Alaska Native Allotments	Alask Native Villages	American Indian Reservations	Off-Reservation Trust Lands	Oklahoma Tribal Statistical Area	Disadvantaged
400259501001	No	No	Yes	No	No	No	No	No	Yes
490190003022	No	No	Yes	No	No	Yes	Yes	No	Yes
490379420001	No	No	Yes	No	No	Yes	No	No	Yes
490379420002	No	No	Yes	No	No	Yes	No	No	Yes
490379781001	No	No	No	No	No	Yes	Yes	No	Yes
490479402011	No	Yes	Yes	No	No	Yes	No	No	Yes
490479682013	No	Yes	Yes	No	No	No	No	No	Yes
560079676002	No	Yes	No	No	No	No	No	No	Yes
560379716002	No	Yes	No	No	No	No	No	No	Yes