Environmental Justice Impact Assessment (EJIA)

Climate Mitigation - Larimer County

FINAL REPORT

January - 2025

COLORADO STATE UNIVERSITY

LARIMER COUNTY

CLIMATE SMART FUTURE Ready

This **Environmental Justice Impact Assessment (EJIA)** represents a collaborative effort between Larimer County, Colorado State University, and community partners. The assessment was led by Dr. David Rojas-Rueda, Assistant Professor in the Department of Radiological and Health Sciences at Colorado State University, in partnership with the Larimer County Office of Sustainability and Climate Action.

EMOZA Community Planning, a locally-based consulting firm specializing in equitable community engagement, conducted extensive outreach efforts across Larimer County's diverse communities. Their work ensured meaningful participation from disproportionately impacted communities through multilingual engagement, accessible forums, and culturally responsive methods.

This report, finalized on December 9, 2024, serves as a foundational component of Larimer County's Climate Smart and Future Ready plan. The assessment's findings and recommendations will guide the County's approach to implementing climate mitigation strategies while advancing environmental justice goals.

Project Team:

- Principal Investigator: Dr. David Rojas-Rueda, Colorado State University
- Community Engagement Lead: EMOZA Community Planning
- Technical Support: Larimer County Office of Sustainability and Climate Action
- Advisory Support: Larimer County - Equity, Diversity, and Inclusion Advisory Board

Citation: Rojas-Rueda, D. (2024). Environmental Justice Impact Assessment (EJIA) of Climate Mitigation in Larimer County. Colorado State University. Produced in partnership with EMOZA Community Planning and Larimer County Office of Sustainability and Climate Action.

Table of Contents

Environmental Justice Impact Assessment (EJIA): Advancing Climate Action in Larimer County

How Larimer County's climate strategies promote equity, resilience, and sustainability.

Key Findings

🚌 **Priority Actions:** Public transportation and energy efficiency scored highest.

🌎 **Equity Impact:** 59 census block groups identified as disproportionately impacted.

🌿 **Co-Benefits:** Cleaner air, cost savings, and improved community resilience.

🚧 **Risks to Address:** Construction disruptions and equitable funding challenges.

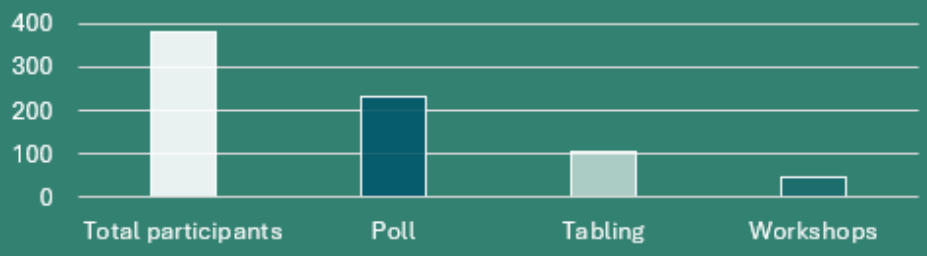
Key Climate Actions:

🚌 **Public Transportation:** Expand and improve transit options.

☀️ **Renewable Energy:** Promote solar and wind projects in underserved areas.

🏘️ **15-Minute Communities**: Design neighborhoods where essential services are accessible within a short walk or bike ride.

Public Input: Focus on transportation, home energy savings, and job creation.



Nearly 400 participants: 82% English speakers, 18% Spanish speakers.

"Together, we can build a climate-smart, equitable future for Larimer County."

Glossary

15-Minute Communities: A community design concept where residents can access essential services and amenities (e.g., grocery stores, parks, healthcare) within a 15-minute walk or bike ride from their homes.

Active Transportation: Modes of transportation that involve human-powered movement, such as walking, biking, and using scooters.

Building Standards: A set of regulations and codes that govern the design, construction, and renovation of buildings, often including energy efficiency and resilience requirements.

Census Block Group: A census block group is the smallest geographic unit for which the U.S. Census Bureau publishes sample data. It generally encompasses a population of 600 to 3,000 people.

Colorado EnviroScreen 2.0: Environmental Justice mapping tool that combines environmental, health, and demographic indicators to identify communities that are disproportionately burdened by environmental hazards.

Climate Mitigation: Efforts that people, communities and governments take to reduce or prevent the emission of greenhouse gases.

DI Communities: Disproportionately Impacted Communities. Communities that have been historically marginalized and overburdened by environmental hazards, economic disparities, and social inequities.

Electric Mobility: Modes of transportation that use electric power, such as electric vehicles (EVs), electric bikes (e-bikes), and electric scooters.

Emissions: Substances released into the atmosphere. Emissions are measured as concentrations, typically as a percent of the atmosphere or a ratio like parts per million (PPM).

Energy Efficiency: Using less energy to perform the same tasks or services, often through technological upgrades or behavioral changes.

Environmental Justice: The fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies.

Environmental Justice Impact Assessment (EJIA): A systematic process to evaluate a proposed project or policy's potential environmental and human health impacts on historically marginalized and overburdened communities.

Equity: The fair and just distribution of benefits and burdens, ensuring that everyone has the opportunity to thrive, regardless of their background or circumstances.

Equity-Priority Communities: Communities that have been historically marginalized and overburdened by environmental hazards, economic disparities, and social inequities.

Federal Poverty Line: The minimum income level determined by the federal government to be necessary to meet basic needs.

Greenhouse Effect: Trapping and build-up of heat in the atmosphere (troposphere) near the Earth's surface. This process is natural and essential for life on earth. Some of the heat returning toward space from the Earth's surface is absorbed by water vapor, carbon dioxide, ozone, and several other gases in the atmosphere and then re-radiated back toward the Earth's surface. As the atmospheric concentrations of these greenhouse gases rise, the average temperature of the lower atmosphere will continue to increase.

Greenhouse Gases (GHG): Gases that trap heat in the atmosphere. Greenhouse gases include water vapor (H2O), carbon dioxide (CO2), methane (CH4), nitrous oxide (N2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF6).

Multimodal Mobility Options Fund (MMOF): A fund dedicated to supporting and expanding various modes of transportation, including public transit, active transportation, and electric mobility.

North Front Range Metropolitan Planning Organization (NFRMPO): The regional planning organization responsible for transportation planning in the North Front Range region, including Larimer County.

Public Transportation: Transportation services provided for shared use by the public, such as buses, trains, and subways.

Renewable Energy: Energy derived from sources that naturally replenish over time, such as solar, wind, geothermal, and hydropower.

Resilience: The capacity to prepare for disruptions, to recover from shocks and stresses, and to adapt and grow from a disruptive experience.

Resilience Hubs: Community facilities or locations designed to provide essential services and support during emergencies or disruptions, enhancing community resilience.

Social vulnerability: Characteristics and situations of a person or group that influence their capacity to anticipate, cope with, resist, or recover from the impact of a hazard. Social vulnerability is determined by various pre-existing social and economic characteristics.

Vulnerable Populations: Groups of people who are more susceptible to harm or who have limited resources to adapt to change, such as low-income households, communities of color, older adults, and people with disabilities.

0. Executive summary

The County's Climate Smart Future Ready (CSFR) initiative encompasses 17 comprehensive strategies, of which seven were identified through modeling to have the highest potential impact on greenhouse gas emissions reduction. Each CSFR strategy is supported by a dedicated action team that brings together diverse stakeholders, including County departments, local municipal governments, private sector entities, non-profit organizations, and academic institutions. While these action teams provide valuable subject matter expertise aligned with their respective focus areas, they may not inherently represent the full spectrum of equity, diversity, and inclusion perspectives present in the community. This Environmental Justice Impact Assessment (EJIA), therefore, serves a crucial role in providing equity-centered guidance to inform and strengthen the work of these action teams.

The assessment systematically evaluates the seven highest-impact climate strategies to identify potential impacts on historically marginalized and overburdened communities. This EJIA will help action teams integrate environmental justice into their implementation planning and decision-making processes by providing detailed equity analysis and specific recommendations. This approach ensures that climate actions advance rather than impede environmental justice while maximizing benefits and minimizing potential harm across all communities.

The EJIA uses a comprehensive framework that integrates community engagement, data analysis, and a weighted scoring system to evaluate each strategy's potential impacts on vulnerable populations, including low-income households, communities of color, and rural communities.

The assessment identified several key findings:

- Public transportation and energy efficiency emerged as the top-performing strategies, offering significant benefits and manageable risks.
- The distribution of benefits and burdens varied across strategies and communities, requiring targeted approaches to ensure equitable outcomes:
    - Low-income households benefit most from energy efficiency cost savings and improved public transportation access
    - Communities of color show strong positive outcomes from 15-minute community development and enhanced transit accessibility
    - Rural communities face unique challenges in transportation access but show strong potential benefits from distributed renewable energy
    - Linguistically isolated communities require enhanced outreach and multilingual program support across all strategies
- Implementation feasibility considerations, such as resource requirements, institutional capacity, and timelines, are crucial in achieving equity goals.
- Co-benefits, such as air quality improvements and health benefits, are significant, but potential risks, including displacement pressures and cost burdens, must be mitigated

Based on these findings, the EJIA provides specific recommendations for each climate strategy, emphasizing equitable implementation, community engagement, and ongoing monitoring. By incorporating these recommendations, Larimer County can advance its climate goals while ensuring that all communities benefit from a just and sustainable transition.

The geographic analysis identified 59 census block groups meeting the definition of Disproportionately Impacted Communities, representing 78,653 residents (22% of the county population). Two areas showed particularly high environmental burden scores (>80th percentile on Colorado EnviroScreen 2.0), highlighting priority zones for climate action implementation. The geographic distribution of environmental burdens demonstrates the need for targeted, location-specific approaches within each climate strategy to ensure equitable outcomes across the county.

Table 0. Identified Short-Term Action-Oriented Climate Strategies Across CSFR Action Teams

Action Team	Timeline	Action
Regional Mobility Team	Immediate (0-6 months)	Prioritize transit expansion in census blocks 080690013042 and 080690020071, where environmental burden scores exceed the 80th percentile.
Regional Mobility Team	Near-term (6-12 months)	Implement/maintain fare equity programs targeting the 78,653 residents in identified Disproportionately Impacted Communities.
Disaster Mitigation and Adaptation Team	Immediate (0-6 months)	Begin resilience hub development in Fort Collins and Loveland high-impact areas.
Regional Mobility Team	Near-term (6-12 months)	Develop anti-displacement measures for 15-minute community implementation.
Energy Efficiency and Electrification Team	Immediate (0-6 months)	Launch energy efficiency programs targeting the 24,886 residents in identified high energy burden areas.
Grid Resilience and Renewables Team	Near-term (6-12 months)	Develop multilingual outreach programs for renewable energy adoption.
Energy Code Team	Immediate (0-6 months)	Begin stakeholder engagement for building code updates in identified vulnerable areas.
Energy Code Team	Near-term (6-12 months)	Develop compliance support systems for small property owners.

0.1. How To Use This Report

This Environmental Justice Impact Assessment (EJIA) report is structured to inform and guide implementation. Each section builds upon previous findings to create a comprehensive framework for action:

0. Executive Summary: Provides a concise overview of the assessment's purpose, key findings, and recommendations.

1. Introduction: Establishes context through background information on Larimer County and the Climate Smart Future Ready (CSFR) plan, defining scope and objectives.

2. Methodology: Details the EJIA framework and analytical approach, including data collection, community engagement, and analysis techniques that form the foundation for identifying priority areas.

3. Community Engagement: Documents the participatory process that informed strategy refinement and implementation approaches, ensuring recommendations reflect community needs and priorities.

4. Assessment Findings: Presents detailed analysis results, identifying specific geographic and demographic priorities for intervention.

5. Co-Benefits and Risks: Analyzes potential positive and negative impacts to guide implementation safeguards and maximize benefits.

6. Recommendations: Translates findings into concrete, action team-specific actions with clear timelines and responsibilities.

7. Monitoring and Evaluation: Establishes frameworks for tracking progress, ensuring accountability, and enabling adaptive management.

10. Appendix: Contains supplemental information, including detailed data tables and engagement materials.

Implementation Guide for Action Teams:

- Begin with relevant priority areas in Section 4
- Cross-reference with recommended actions in Section 6
- Implement monitoring frameworks from Section 7
- Report progress through established feedback channels

This assessment aims to inform thoughtful implementation that advances climate and equity goals while building community resilience. The findings and recommendations are intended to support county decision-makers in maximizing positive impacts for historically marginalized communities while mitigating potential harms.

1. Introduction

1.1. Background and Context

Larimer County faces significant challenges in ensuring that climate action strategies promote environmental justice while effectively reducing greenhouse gas emissions. With a population of over 360,000 spread across urban centers like Fort Collins and Loveland, rural agricultural communities, and mountain towns like Estes Park, the county's diverse geography and demographics require careful consideration of how climate initiatives affect different communities.

Historical patterns of development and infrastructure investment have left some communities with disproportionate environmental burdens and limited access to resources - patterns that could be either ameliorated or exacerbated by new climate actions (Mohai et al., 2009; Schlosberg & Collins, 2014).

Recent analysis using Colorado EnviroScreen 2.0 data has identified several areas within the county where residents face elevated environmental risks, limited transportation access, higher energy burdens, and other challenges that intersect with climate vulnerabilities. These communities, which include both urban neighborhoods and rural areas, require particular attention in evaluating how proposed climate strategies may affect their well-being and ability to thrive.

1.2. Purpose and Scope

This Environmental Justice Impact Assessment (EJIA) provides a systematic evaluation of seven key climate strategies proposed in Larimer County's Climate Smart Future Ready (CSFR) plan. The primary objectives are to:

1. Assess the potential positive and negative impacts of each strategy on historically marginalized and overburdened communities
2. Identify opportunities to maximize benefits and minimize harms through thoughtful program design
3. Ensure climate actions advance rather than impede environmental justice
4. Develop concrete recommendations for equitable implementation

The assessment examines both quantitative metrics and qualitative community input to understand how proposed strategies may affect different populations, with a particular focus on communities identified as disproportionately impacted through Colorado EnviroScreen 2.0 and state statutory definitions:

- Low-income communities
- Communities of color
- Housing cost-burdened communities
- Linguistically isolated communities
- Communities with high cumulative impact scores (>80th percentile on CO EnviroScreen 2.0)

- Rural and isolated communities, particularly those facing transportation and service access barriers
- Additional vulnerable populations identified through community engagement, including elderly residents, youth, and people with disabilities

These communities require particular attention in evaluating how proposed climate strategies may affect their well-being and ability to thrive (Levy & Patz, 2015; Chakraborty, 2006).

1.3. Actions Evaluated

The seven core climate actions assessed in this EJIA were selected for evaluation based on their significant modeled greenhouse gas (GHG) emission reduction potential. Combined, these strategies represent the highest impact opportunities for emissions reduction in Larimer County:

- Energy utility actions: 35% reduction potential
- Energy actions: 3.2% reduction potential
- Transportation actions: 3.2% reduction potential

The seven strategies evaluated, with their corresponding code linked to the original actions, are:

1. **Public Transportation Enhancement (IC2)**
2. **Building Energy Efficiency (E2)**
3. **15-Minute Communities (IC1)**
4. **Renewable Energy Expansion (E3)**
5. **Active Transportation (IC3)**
6. **Building Standards (E1)**
7. **Electric Mobility (ST1)**

Each action was extracted and summarized based on an original list of actions described by the CSFR work and was evaluated for its potential impacts across multiple dimensions, with particular attention to how benefits and burdens may be distributed among different communities.

Table 1.1. Summary of the Climate Smart Future Ready original actions, corresponding strategies, tactics, and milestones

Action (Code)	Strategy	Tactics (Code)	Milestones
1. Update Building Codes for Efficiency and Resilience (E1)	S3: Advance Energy Efficiency and Electrification of New and Existing Buildings	- Develop code language for battery storage, microgrids, and demand-side management (E1.1). - Engage stakeholders for consensus on code language (E1.2).	- Code updates initiated by January 2024. - All municipalities aligned with state code by July 2025.

2. Education and Incentives for Building Electrification (E2)	S3: Advance Energy Efficiency and Electrification of New and Existing Buildings	- Conduct gap assessments of existing electrification programs (E2.4). - Provide scholarships for training and education for contractors (E2.3). - Develop specific targeted incentives and rebates for electrification (E2.6).	- Gap assessment completed by end of Year 1. - Training programs initiated in Year 1.
3. Renewable Energy Installations and Grid Expansion (E3)	S4: Advance Renewable Energy and Grid Resilience Across the County	- Promote local renewable energy adoption including agrivoltaics (E3.1). - Improve grid reliability and resilience in equity-priority communities (E3.2). - Collaborate with regional stakeholders to develop equitable renewable energy projects (E3.5).	- Increase renewable installations by Year 3. - Initial grid upgrades in targeted communities by Year 2.
4. Enhance Electric Vehicle and E-bike Infrastructure (ST1)	S9: Accelerate Infrastructure and Adoption of Electric Vehicles and E-bikes	- Develop workplace, home, and community-wide charging plans (ST1.2). - Implement Larimer County EV Charging Station (EVCS) plan (ST1.1). - Develop equity-centered programming for EV infrastructure (ST1.6).	- EVCS plan implementation initiated in Year 1. - Community outreach and engagement started Year 1.
5. Regional Transportation Equity (IC1)	S10: Enhance and Expand Regional Transportation	- Assess potential locations for resilience hubs (IC1.1). - Align regional transportation to create 15-minute communities (IC1.2).	- Needs assessment completed by Year 1. - Resilience hubs developed by Year 3.
6. Coalition for Cross-Boundary Transit Improvement (IC2)	S10: Enhance and Expand Regional Transportation	- Engage urban and rural communities to identify transit solutions (IC2.1). - Conduct regional study to investigate transportation gaps (IC2.2). - Increase funding for multimodal transit options (IC2.3).	- Regional study completed in Year 2. - Funding strategies implemented by Year 3.
7. Improve Biking and Walking Infrastructure (IC3)	S11: Expand Non-Motorized and Active Transportation Infrastructure	- Conduct community assessments of transportation barriers (IC3.1). - Identify quick win projects for biking and walking safety improvements (IC3.3).	- Community assessment completed by Year 2. - Quick win projects deployed as funding is available.

2. Methodology for Climate Mitigation Actions Environmental Justice Impact Assessment

HIGHLIGHTS

- This section explains the framework for evaluating the potential impacts of climate strategies on communities.
- It details the data collection methods, community engagement process, and analysis techniques.
- The framework prioritizes community engagement, data-driven analysis, and transparency.
- It uses a weighted scoring system to assess equity, benefits, and risks of climate actions.
- Sensitivity analysis methods are applied to evaluate the robustness of rankings.

2.1. Overview of the Environmental Justice Impact Assessment (EJIA) Framework

The Environmental Justice Impact Assessment (EJIA) Framework provides a structured approach to evaluate climate actions with a focus on equity, benefits, and risks. This seven-step process ensures that climate strategies are assessed comprehensively to address the needs of vulnerable populations, maximize benefits, and mitigate risks. Below is an outline of the overall approach and the seven steps designed to facilitate informed decision-making and effective implementation.

Overall Approach

The EJIA integrates qualitative and quantitative methods to assess the equity, benefits, and risks of proposed climate actions. The framework prioritizes:

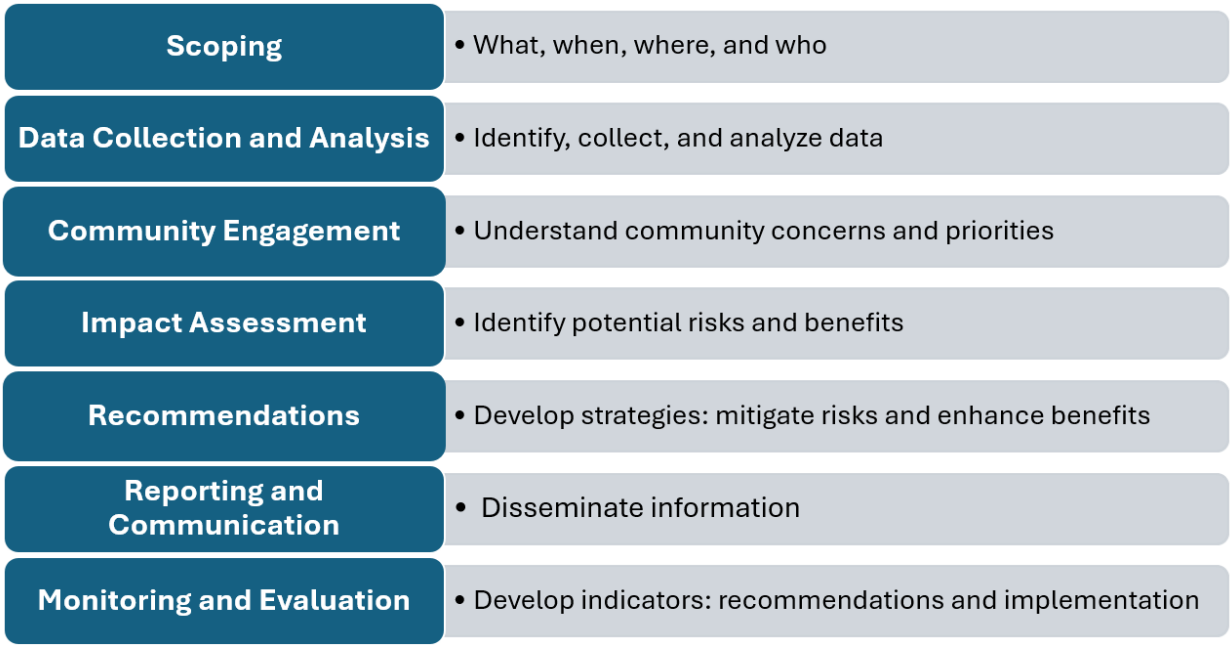
1. **Community Engagement:** Actively involving diverse stakeholders to capture concerns and priorities.
2. **Data-Driven Analysis:** Leveraging data to evaluate potential impacts of actions.
3. **Transparency:** Documenting methodologies and outcomes for accountability.

The Seven Steps of the EJIA Framework

1. Scoping: Define the scope of the assessment by identifying what actions are being evaluated, when and where the actions will take place, and who will be impacted and involved in the process.
2. Data Collection and Analysis: Identify and gather relevant data, including demographic information, environmental exposure data (e.g., air quality, traffic exposure), and economic and social indicators.
3. Community Engagement: Engage communities through workshops (in-person and online), surveys (accessible in multiple languages), and tabling events to gather localized input.

4. Impact Assessment: Evaluate the potential risks and benefits of each climate action based on equity (e.g., accessibility, inclusivity), environmental and economic benefits, and implementation risks and challenges.
5. Recommendations: Develop strategies to mitigate identified risks, enhance benefits for vulnerable populations, and align actions with community priorities and policy goals.
6. Reporting and Communication: Disseminate findings through reports and summaries for policymakers and community-friendly formats (e.g., infographics, one-pagers in multiple languages).
7. Monitoring and Evaluation: Develop indicators to track the implementation progress of recommendations, the long-term impacts of actions on equity and environmental outcomes, and establish a feedback mechanism for continuous improvement.

Figure 2.1. Environmental Justice Impact Assessment Framework



2.2. Analysis Overview

This analysis summarizes the activities done in the scoping, data collection, and analysis, integration of community engagement, and impact assessment steps of the EJIA framework. The analysis process evaluates seven climate mitigation strategies for CSFR Action Teamsusing a refined weighted scoring system that prioritizes equity while also considering benefits and risks. The methodology integrates insights from community engagement and environmental justice impact assessments, along with enhanced sensitivity analysis techniques.

2.3. Analysis Implementation Steps

- Assessing climate actions: Assessing each climate action using an Environmental Justice Impact Assessment framework and providing quantitative metrics for each category in the assessment.
- Data Integration: Combine quantitative metrics with qualitative feedback from community engagement.
- Scoring and Ranking: Calculate scores for each strategy based on the weighted formula and rank strategies by final weighted scores.
- Sensitivity Analysis: Apply updated sensitivity analysis methods to evaluate ranking robustness and identify strategies that are consistently high-ranking and those sensitive to weight changes.
- Recommendation development: A structured analysis of each action and its associated tactics, as detailed in the accompanying EJIA matrix.
- Reporting and communication approach: Development of a technical report (current document) and community fact sheet.
- Monitoring and evaluation approach: Define indicators that help to track implementation, effectiveness, gaps, barriers, and adaptive management.

Figure 2.2. Analysis Implementation Steps

A: Assessing the climate actions

Overview of Climate Action Disaggregation and Analysis

The analysis started with a disaggregation of each climate action into its corresponding tactics. Each tactic was systematically classified into relevant categories, and an analysis was conducted based on the metrics and parameters included in the EJIA matrix (see appendix). This approach ensured a detailed evaluation of each tactic's contributions to the overarching climate action.

Scoping

- **Defining Scope:** Identify the climate actions and their corresponding tactics for evaluation, define the geographic and temporal boundaries of the analysis, and determine the populations and stakeholders impacted by the actions.
- **Purpose:** Establish boundaries for the analysis to ensure all relevant aspects are included while maintaining focus.

Disaggregation of Climate Actions into Tactics

- **Definition of Tactics:** Each climate action was broken down into smaller, actionable components (referred to as tactics) to enable a granular assessment.
- **Purpose:** This step ensured that the evaluation captured the specific contributions of distinct elements within a broader climate action.

Classification of Tactics into Categories

- **Categories for Classification:** Each tactic was classified into one or more predefined categories: equity, focused on accessibility and inclusivity; benefits, highlighting environmental, economic, and health impacts; and risks, identifying barriers to implementation or potential unintended consequences.

Analysis of Tactics Using Column Data

- Each column in the EJIA matrix represented a specific parameter used to evaluate the tactics. The parameters were applied uniformly to assess all tactics.

Table. 2.1. Primary EJIA matrix columns

Column Name	Description	Analysis Category
Tactic Name	The name of the specific tactic under each climate action.	N/A (Identifier)
Category	The classification of the tactic into Equity, Benefits, or Risks.	N/A (Identifier)
GHG Reduction	Quantified potential greenhouse gas reductions from the tactic (in metric tons).	Benefits

Economic Benefits	Estimated economic advantages, such as cost savings or job creation.	Benefits
Public Health Impact	Potential health benefits, such as reduced air pollution or increased activity.	Benefits
Implementation Complexity	Level of difficulty associated with executing the tactic (e.g., low, medium, high).	Risks
Community Acceptance	Assessment of public support for the tactic.	Equity
Equity Impacts	Assessment of both intended and unintended impacts on underrepresented or vulnerable groups.	Equity
Geographic Accessibility	Coverage of the tactic's benefits across different geographic areas.	Equity
Feasibility	Technical and financial viability of the tactic.	Risks
Cost Efficiency	The ratio of benefits to costs for implementing the tactic.	Benefits
Time to Implementation	Estimated time required to fully execute the tactic.	Risks
Stakeholder Support	Level of support from key stakeholders such as government or community groups.	Equity
Scalability	Potential for scaling the tactic to a larger area or population.	Benefits
Technical Feasibility	Assessment of the technical requirements for implementation.	Risks
Co-Benefits	Additional benefits beyond primary objectives, such as biodiversity protection.	Benefits
Barriers to Adoption	Technical, financial, regulatory, or operational challenges to implementing	Risks

	the tactic, excluding equity-related barriers captured under Equity Impacts.	
Resilience Impact	Contribution of the tactic to climate resilience.	Benefits
Energy Efficiency Impact	Improvements in energy use or reductions in waste.	Benefits
Policy Alignment	Consistency of the tactic with existing policies or regulations.	Risks
Behavior Change Potential	Likelihood of influencing long-term behavior changes in the population.	Benefits
Innovation Level	Degree of innovation or novelty of the tactic.	Benefits
Funding Availability	Assessment of current and potential funding sources for the tactic.	Risks
Monitoring Feasibility	Ease of tracking progress and outcomes for the tactic.	Risks

Each parameter was scored using a standardized scale as follows:

Scoring Scale All components are scored on a 0-5 scale:

- 0 = No positive impact/Severe negative impact
- 1 = Minimal positive impact/Significant negative impact
- 2 = Some positive impact/Moderate negative impact
- 3 = Moderate positive impact/Minor negative impact
- 4 = Significant positive impact/Minimal negative impact
- 5 = Exceptional positive impact/No negative impact

Scores for each parameter were aggregated for all tactics within a climate action to determine its overall score in Equity, Benefits, and Risks. Certain parameters, such as GHG Reduction and Equity Impacts, were weighted more heavily depending on the analysis focus.

Data Collection

The data collection process was informed by multiple sources:

- Scientific Evidence: Peer-reviewed literature and studies relevant to the environmental, climate, health, and equity impacts of the assessed actions.
- Expert Knowledge: Expert judgment from environmental epidemiologists to interpret data gaps and validate assumptions (Israel et al., 1998; Mueller et al., 2017).
- Colorado EnviroScreen 2.0 Indicators: Utilized 35 environmental, climate, health, and sociodemographic indicators available at the census block group level in Colorado. These indicators provided granular data on populations and areas disproportionately affected by environmental and climate burdens.

Data gathering methods included integrating quantitative data from Colorado EnviroScreen 2.0 with qualitative insights from community engagement, conducting literature reviews to provide contextual evidence for parameters not fully captured in local data, and conducting expert elicitation to refine data interpretations and identify critical variables.

Both quantitative and qualitative analyses were conducted. Quantitative analysis assessed the environmental, economic, and equity impacts of each tactic using indicators and data from Colorado EnviroScreen 2.0 (Mueller et al., 2015; Rojas-Rueda et al., 2020; Besse et al., 202525), while qualitative analysis complemented these findings with expert knowledge and community feedback. Findings from the literature and localized data were cross-referenced to validate results.

Qualitative and quantitative data were combined to generate a comprehensive understanding of each tactic. Scores were aggregated across categories (Equity, Benefits, Risks) for each climate action. The aggregated scores for all tactics under a climate action were used to calculate its overall Equity, Benefit, and Risk scores.

The geographic analysis incorporated spatial analysis using the following components:

- Utilization of Colorado EnviroScreen 2.0 indicators: Analysis of 35 environmental, climate, health, and sociodemographic indicators at the census block group level
- Comprehensive spatial coverage: Assessment of 243 census block groups across Larimer County
- Multiple criteria integration: Evaluation of areas against Colorado's statutory definition of Disproportionately Impacted Communities.
- Climate vulnerability mapping: Spatial analysis of how climate risks intersect with social and environmental vulnerabilities

B. Data Integration

To integrate the quantitative data from the EJIA matrix with the qualitative insights gathered during community engagement, a structured approach was employed. First, the community feedback was thematically analyzed to identify key concerns and priorities. These themes were then aligned with the scoring components of the EJIA matrix. For instance, community concerns regarding economic barriers were linked to the 'economic inclusivity' component, while feedback on the perceived benefits of air quality improvement was aligned with the 'GHG reduction potential' and 'quality of life enhancements' components.

Next, the scores in the EJIA matrix were adjusted based on the integration findings. For example, if community feedback strongly emphasized the importance of equitable access in rural areas for a

particular strategy, the 'geographic accessibility' and overall 'equity score' for that strategy were adjusted upwards. Similarly, concerns raised about potential negative impacts, such as construction disruptions, led to an increase in the 'risk score.' The magnitude of these adjustments was determined based on the prevalence and emphasis of the corresponding themes in the community feedback.

This integration process ensured that the final scores and rankings reflected both the quantitative assessment of each strategy's potential impacts, and the qualitative insights gathered from the community. The adjusted scores were then used to calculate the final weighted score.

Initial Data Review:

Community Engagement Report: The report extracted community priorities, emphasizing geographic disparities, language barriers, and economic inclusivity. It also identified top-ranked strategies (e.g., public transportation and home energy conservation) and equity concerns (e.g., renter accessibility and representation of marginalized groups).

EJIA Matrix: The initial EJIA matrix was reviewed for baseline scores for Equity, Benefits, and Risks, as well as scoring subcomponents, including geographic accessibility, GHG reduction potential, and implementation complexity.

Mapping Variables Across Datasets:

Community feedback themes were aligned with EJIA scoring components. Equity alignment matched community concerns like economic barriers and language accessibility with equity subcomponents such as economic inclusivity and cultural responsiveness. Benefit alignment linked perceived benefits, such as air quality improvement and household cost savings, to GHG reduction potential and quality of life enhancements. Risk alignment integrated feedback on community disruption and technical feasibility with EJIA risk subcomponents like implementation complexity and resource requirements.

Adjustments to Scores:

- Adjusted EJIA scores based on integration findings:
    - **Example: Public Transportation Strategy**
        - **Original Scores:** Equity = 4.5, Benefit = 4.5, Risk = 2.5.
        - **Adjustment Process:**
            - Community feedback emphasized the importance of equitable access in rural areas and transit affordability, leading to an increase in the Equity Score to 4.8.
            - Feedback highlighted public health improvements and reduced commuting costs, slightly increasing the Benefit Score to 4.6.
            - Concerns about construction disruptions led to a moderate increase in the Risk Score to 2.7.
        - **Adjusted Scores:** Equity = 4.8, Benefit = 4.6, Risk = 2.7.

- **Example: Renewable Energy Installations Strategy**
  - **Original Scores:** Equity = 3.8, Benefit = 4.2, Risk = 3.0.
  - **Adjustment Process:**
    - Community input on geographic disparities in access to renewable energy installations raised the Equity Score to 4.2.
    - Strong support for air quality improvements and job creation increased the Benefit Score to 4.5.
    - Concerns about the complexity of integrating renewable projects into the grid elevated the Risk Score to 3.2.
  - **Adjusted Scores:** Equity = 4.2, Benefit = 4.5, Risk = 3.2.

Translation into Scoring Methodology:

- **Adjusted Scores Translation:**
  - Adjusted scores were recalculated into the final weighted score using the formula:
    - Final Weighted Score = (Equity Score × 0.45) + (Benefit Score × 0.30) + ((5 - Risk Score) × 0.25).
  - **Public Transportation Example:**
    - Final Weighted Score = (4.8 × 0.45) + (4.6 × 0.30) + ((5 - 2.7) × 0.25).
    - Final Weighted Score = 2.16 + 1.38 + 0.575 = 4.115 (Rank: 1).
  - **Renewable Energy Installations Example:**
    - Final Weighted Score = (4.2 × 0.45) + (4.5 × 0.30) + ((5 - 3.2) × 0.25).
    - Final Weighted Score = 1.89 + 1.35 + 0.45 = 3.69 (Rank: 4).

C. Scoring and Ranking

Weighted Scoring Framework

Primary Weights Development The weighting system (45% equity, 30% benefits, 25% risks) was developed through:

1. Expert Judgment: Drawing on environmental epidemiology expertise and review of environmental justice literature (Besse H, 2025; Rojas-Rueda & Morales-Zamora, 2023; Bakkensen et al., 2024).
2. Community Input: Feedback from community engagement sessions (detailed in Section 3) emphasized the importance of prioritizing equity considerations.

Weight Distribution and Application:

- Equity Weight (we) = 45%
- Benefits Weight (wb) = 30%
- Risk Weight (wr) = 25%

Each weight is applied to the aggregate scores derived from the metrics outlined in Table 2.1. The metrics are scored individually and then combined within their respective categories (Equity, Benefits, Risks) (Sexton & Linder, 2010; Harris-Roxas et al., 2012).

Equity Weight (we) emphasizes the importance of equitable outcomes, prioritizes accessibility and community impact and reflects community engagement findings.

Benefits Weight (wb) considers direct and indirect positive impacts, includes environmental and social benefits, and accounts for long-term sustainability.

Risk Weight (wr) evaluate implementation challenges, assesses potential negative impacts, and considers resource requirements.

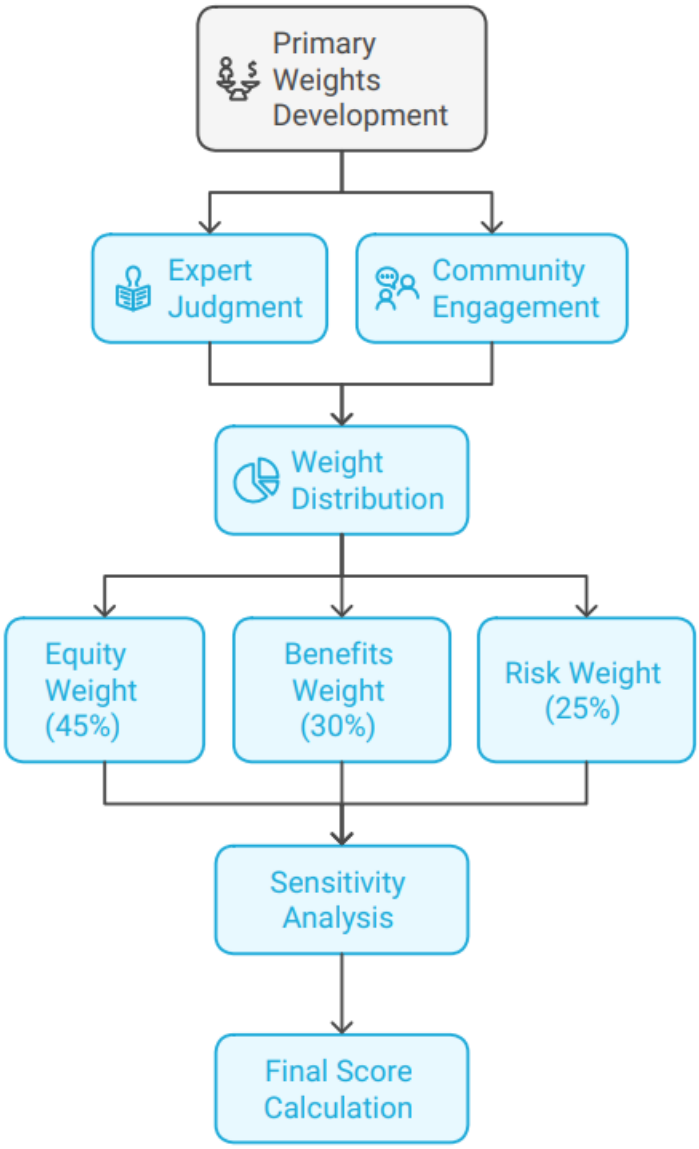
Sensitivity Analysis: To address the inherent subjectivity in weight assignment, the assessment included:

- Monte Carlo simulations varying weights by ±10%
- Alternative weighting scenarios testing different priority configurations
- Documentation of how rankings changed under different weighting schemes (These sensitivity analyses are detailed in the appendix and results of the sensitivity can be consulted in the section 4.4)

Final Score Calculation

Final Weighted Score = (Equity Score × 0.45) + (Benefit Score × 0.30) + ((5-Risk Score) × 0.25)

Figure 2.3. Weighted Scoring Framework



D. Recommendation Development

Objectives

The objective of the recommendation process was to systematically address the identified potential impacts of the proposed climate mitigation strategies (Blue et al., 2021; Walker, 2010). This involved analyzing the distributional effects across various communities, with a particular focus on vulnerable populations. The process aimed to provide specific, measurable, achievable, relevant, and time-bound recommendations to mitigate negative impacts, enhance positive impacts, and overcome implementation barriers faced by these communities. The ultimate goal was to ensure equitable distribution of benefits and costs associated with climate mitigation

actions, promote environmental justice, and contribute to a more sustainable and inclusive transition for the entire county.

Scoping and Objectives

The recommendation development began by revisiting the initial scope and objectives to ensure alignment between the assessment's goals and the recommendations generated. The primary objectives were to:

- Identify potential disproportionate impacts (positive and negative) of climate mitigation strategies on vulnerable communities.
- Develop recommendations to mitigate negative impacts and enhance benefits for these communities.

Intervention Development

Based on the impact analysis, potential interventions were brainstormed to address the identified issues. These interventions focused on the mitigation of negative impacts, proposing specific measures to reduce or eliminate negative impacts on vulnerable communities; enhancement of positive impacts, identifying opportunities to maximize positive impacts for all communities, particularly those historically marginalized; addressing implementation barriers, suggesting strategies to overcome barriers faced by vulnerable communities in accessing benefits or participating in mitigation efforts; and promoting equitable distribution, recommending mechanisms to ensure equitable distribution of benefits and costs across all communities.

Intervention Evaluation and Prioritization

Potential interventions were evaluated using the following criteria: effectiveness, or the likelihood of achieving the desired outcome; feasibility, or the technical, economic, and political viability; equity, or the promotion of health equity and avoidance of exacerbating existing disparities; and sustainability, or the ability to maintain the intervention over the long term.

Recommendation Formulation

Recommendations were formulated to be specific, measurable, achievable, relevant, and time-bound (SMART). Each recommendation included specific action, a clear statement of what should be done, the action team or who is accountable for implementation, a timeline or timeframe for implementation, and indicators or suggestions for monitoring implementation and effectiveness.

E. Reporting and communication approach

Objectives

The reporting and communication phase of this EJIA aimed to disseminate the assessment findings and recommendations in a clear, accessible, and engaging manner. This was to be achieved through the development of four key products: a report summarizing the findings; a comprehensive report in both English and Spanish detailing the EJIA process, key findings, and recommendations; a table summarizing equity recommendations for each GHG reduction action; a map with key priority areas related to GHG reduction actions in Larimer County, based on environmental justice indicators; and a community fact sheet in English and Spanish to provide an overview of the CSFR GHG reduction actions and their importance.

F. Monitoring and evaluation approach

Objectives

The monitoring and evaluation (M&E) framework for this EJIA was designed to track the implementation and effectiveness of the recommendations, ensuring that the County's climate mitigation strategies achieved their intended outcomes while promoting environmental justice and equity. The M&E process focused on tracking implementation, assessing whether recommendations were being implemented as intended and within the proposed timelines, measuring effectiveness, or evaluating whether the implemented recommendations were leading to the desired outcomes, such as reducing negative impacts, enhancing benefits, and promoting equitable distribution of outcomes across communities; identifying gaps and barriers, or identifying any challenges, barriers, or unintended consequences that may arise during implementation; and informing adaptive management, or using the collected data to inform adjustments to the strategies, tactics, or recommendations to optimize outcomes and ensure equitable processes.

2.4. Methodological Limitations and Uncertainty Analysis

This assessment acknowledges several key limitations and sources of uncertainty:

Data Limitations:

- Temporal: Census and environmental data have different collection timeframes (2018-2022 vs. 2024)
- Geographic: Census block group level analysis may mask sub-neighborhood variations
- Demographic: Potential undercounting of vulnerable populations, particularly in linguistically isolated communities

Uncertainty Factors:

- Community Engagement: The engagement process intentionally prioritized participation from disproportionately impacted communities rather than seeking broad county population representation (Fung, 2006; Nieuwenhuijsen et al., 2017). As detailed in the Community Engagement section in the appendix, this focused approach included targeted outreach in specific geographic areas identified through the Colorado EnviroScreen Tool 2.0, multilingual engagement, and culturally responsive methods to create safe spaces for historically underrepresented voices. While this strategy successfully gathered input from nearly 400 participants with enhanced representation from priority communities (e.g., 53% Spanish-speaking participation in workshops), the concentrated nature of this engagement means findings may not reflect perspectives from the broader county population. This methodological choice aligns with environmental justice principles of meaningful involvement from affected communities.
- Implementation Timeline: Resource availability may affect proposed schedules
- Climate Impacts: Changing environmental conditions may affect strategy effectiveness

Mitigation Approaches:

- Regular data updates through a monitoring framework
- Flexible implementation timelines with built-in review points
- Adaptive management protocols for strategy modification

- Enhanced community feedback mechanisms

These limitations inform the conservative approach taken in strategy prioritization and the emphasis on adaptive management in implementation recommendations (Hoppe et al., 2023; Whitmee et al., 2024).

3. Community Engagement

HIGHLIGHTS

- This section presents key findings from the community engagement process and how they shaped the EJIA (detailed methodology in Appendix 10.4)
- Community input directly influenced equity analysis, recommendations, and implementation strategies
- Key findings revealed strong community support for public transportation improvements, energy conservation resources, and renewable energy development
  Community priorities and concerns varied significantly across different language groups and geographic areas
  The section outlines plans for ongoing engagement to ensure continued community input throughout implementation

This community engagement summary complements Larimer County's Environmental Justice Impact Assessment (EJIA) by integrating community perspectives on the seven climate mitigation actions. This effort aimed to deepen understanding of how the actions can be refined to minimize potential negative impacts while maximizing benefits for all residents, with a particular focus on the county's most vulnerable populations. The complete community engagement report is available in the appendix.

3.1. Key Findings

The community engagement process yielded valuable insights into how different segments of the Larimer County community perceive and prioritize the proposed climate mitigation actions. Key findings include:

3.1.1. Action prioritization results

- Overall rankings: Across all engagement methods, the top three priority actions were:
  1. Improve public transportation
  2. Give people resources to use less energy at home and work
  3. Develop more solar and wind power
- Variations by language group: While both English and Spanish speakers prioritized public transportation improvements, Spanish speakers placed a higher emphasis on home energy conservation and renewable energy expansion.
- Differences between engagement methods: The workshops and tabling events revealed stronger support for active transportation improvements among Spanish speakers compared to the online poll results.

Table 3.1. Action Prioritization by Language Group

Climate Mitigation Action	Combined Rank	English Rank	Spanish Rank
Improve public transportation	1	1	3
Resources for home/work energy conservation	2	2	1
Develop more solar and wind power	3	3	2
Better walking and cycling paths	4	4	4
15-minute communities	5	5	5
Building energy efficiency rules	6	6	6
Increase electric mobility	7	7	7

3.1.2. Perceived benefits and concerns

- Common themes across groups: All groups expressed broad support for climate mitigation efforts and recognized potential environmental benefits like improved air quality.
- Differences by language and geography:
    - English speakers emphasized health and environmental benefits but raised concerns about implementation costs and disruption.
    - Spanish speakers prioritized economic impacts like cost savings and job creation but worried about community disruption and financial accessibility.
    - Urban residents in Fort Collins and Loveland focused on system-wide improvements and minimizing local impacts during construction.
    - Rural Estes Park participants emphasized the need for solutions adapted to their tourism-based economy and geographic constraints.
- Illustrative quotes:

"It's important these programs help us save money on bills, but they need to work for renters too, not just homeowners." - Spanish-speaking participant.

"We should leverage this moment to create good jobs and train residents to work in clean energy industries." - Fort Collins participant.

Table 3.2. Perceived Concerns and Opportunities by Language Group

Language	Key Concerns	Key Opportunities
English	Wildlife impact, cost of adoption	Education and training (for businesses, trades people, households, etc.)
Spanish	Community disruptions, financial barriers	Accessibility improvements

Table 3.3. Perceived Concerns and Opportunities by Community Area

Community	Key Concerns	Key Opportunities
Fort Collins	Cost of adoption, equity	Education/training (for businesses, trades people, households, etc.)
Loveland	Infrastructure disruptions	Leverage existing programs and community-based organizations
Estes Park	Local context (rural/seasons)	Community-owned renewable energy provision

3.1.3. Implementation insights

- Equity considerations: Participants emphasized the need to design programs that are financially and linguistically accessible, particularly for low-income households, renters, and non-English speakers.
- Community-specific needs and priorities: Rural and mountain communities highlighted the importance of tailoring actions to their unique economic and geographic contexts.
- Communication and outreach preferences: Spanish speakers emphasized the value of in-person outreach through trusted community organizations, while English speakers expressed interest in digital communications and public meetings.
- Partnership and collaboration opportunities: Participants suggested leveraging existing local programs, collaborating with community-based organizations, and exploring cooperative funding models to enhance equitable implementation.

3.2. Integration of Community Input

3.2.1. Implications for EJIA analysis

The community engagement findings are integral to the EJIA analysis, providing critical context for understanding how the proposed climate mitigation actions may impact different populations (Israel et al., 1998; Nieuwenhuijsen et al., 2017; Rojas-Rueda & Morales-Zamora, 2023). Key implications include:

- Emphasizing accessibility and affordability considerations in the equity analysis
- Assessing geographic variations in potential benefits and burdens
- Identifying community-specific implementation barriers and opportunities

3.2.2. Influence on recommendations and implementation strategies

The community input directly shaped the EJIA's recommendations and proposed implementation strategies:

- Phasing and prioritization of actions based on community needs and preferences
- Development of targeted outreach, education, and technical assistance programs
- Creation of dedicated funding streams and financial support mechanisms for low-income and vulnerable populations
- Emphasis on collaborative governance and ongoing community involvement

3.3. Ongoing Engagement

3.3.1. Importance of continued community involvement

As Climate Smart Future Ready moves forward with implementing climate mitigation actions, ongoing community engagement will be essential to ensure that the strategies remain responsive to evolving needs and priorities. Continued involvement can help to:

- Monitor and evaluate the equitable distribution of benefits and burdens
- Identify and address emerging challenges or unintended consequences
- Foster community ownership and support for climate action initiatives
- Ensure accountability and transparency in the implementation process

The county plans to build on the relationships and insights developed through this EJIA engagement process to establish ongoing feedback loops and participatory decision-making structures (Mueller et al., 2017; Nieuwenhuijsen et al., 2017). This commitment to sustained community partnership will be critical to realizing a just and resilient future for all Larimer County residents.

4. Assessment Findings

HIGHLIGHTS

- This section presents the results of the assessment of the seven climate strategies.
- It highlights the overall performance of each strategy, considering equity, benefits, and risks.
- The section also includes an in-depth equity analysis, examining the distribution of benefits and burdens across communities.
- Additionally, it assesses co-benefits and risks and provides a geographic analysis of disproportionately impacted communities.
- Public transportation and energy efficiency emerged as top-performing strategies.
- The geographic analysis identified 59 census block groups as Disproportionately Impacted Communities.

This section presents the key findings from the assessment of Larimer County's seven climate strategies. The assessment evaluated each strategy across various dimensions, including equity, benefits, risks, implementation feasibility, and co-benefits. The findings highlight the strengths and weaknesses of each strategy and identify key considerations for equitable implementation.

4.1 Overall Strategy Performance

The comprehensive analysis of Larimer County's seven climate strategies revealed distinct patterns in their potential to advance environmental justice while achieving climate goals. Our assessment weighted equity (45%), benefits (30%), and risks (25%) to prioritize environmental justice outcomes while maintaining focus on implementation feasibility.

Figure 4.1. Climate Action EJIA Results (final score). A higher score indicates a stronger commitment to environmental justice.

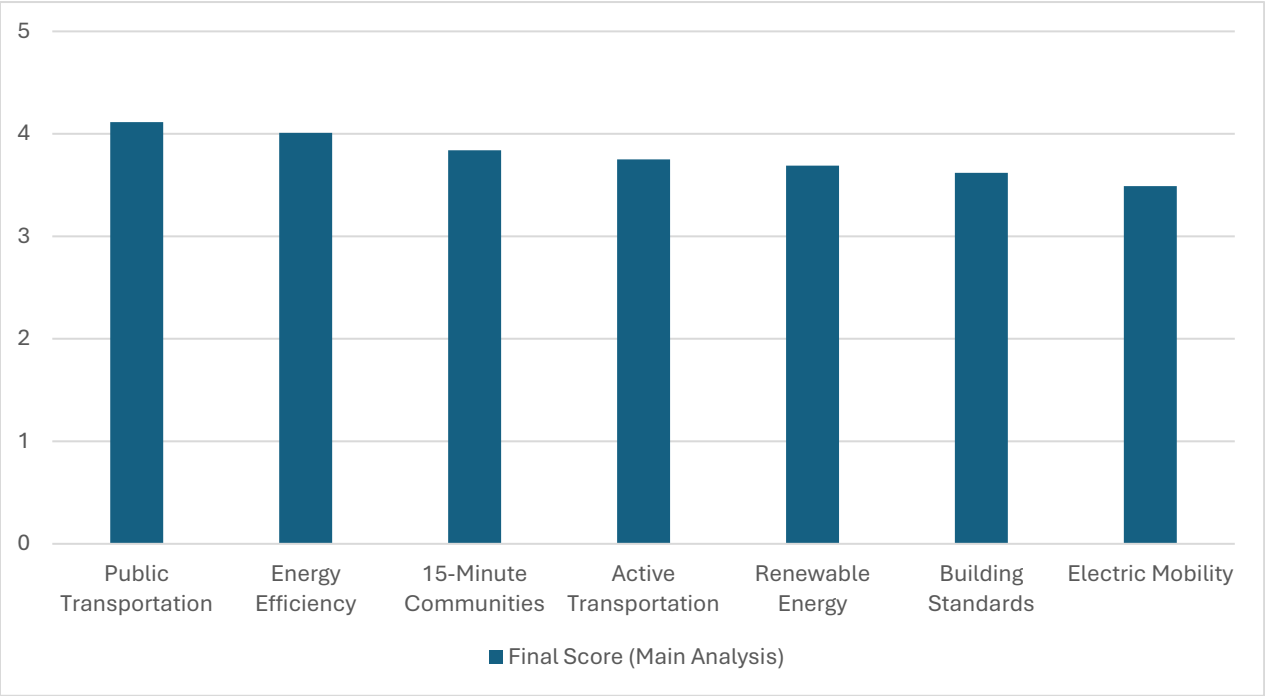


Figure 4.2. Climate Action EJIA Results (by equity, benefit, and risk sub-scores).

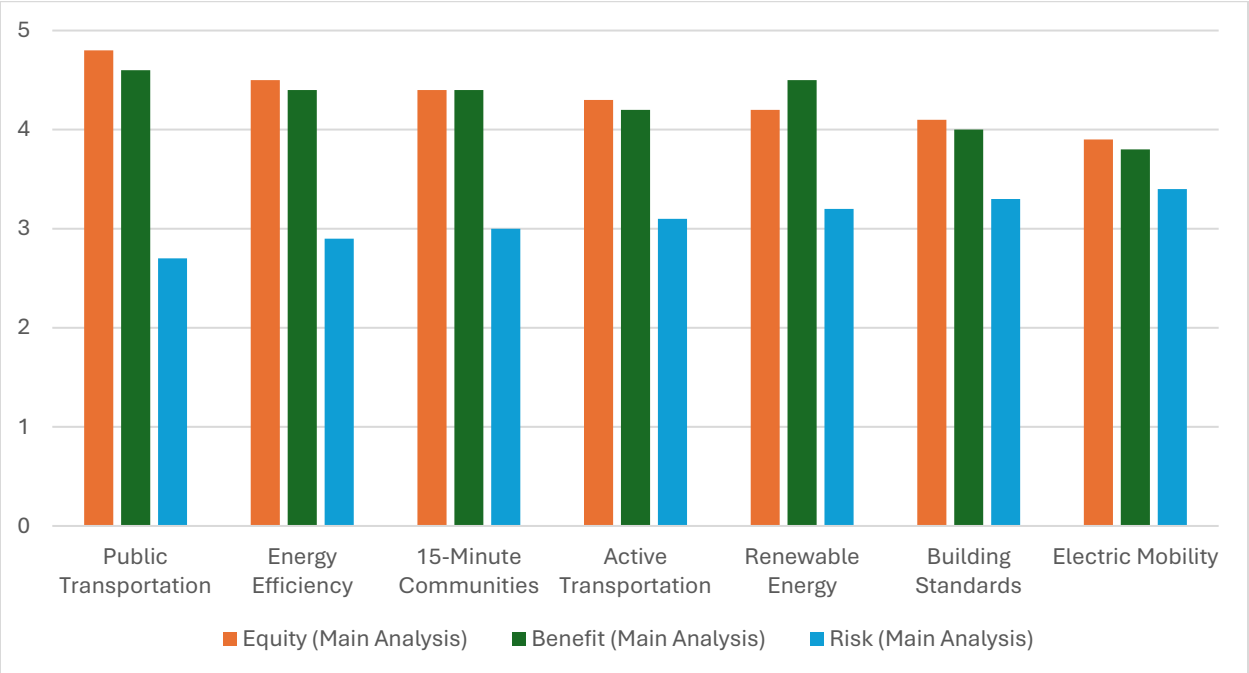
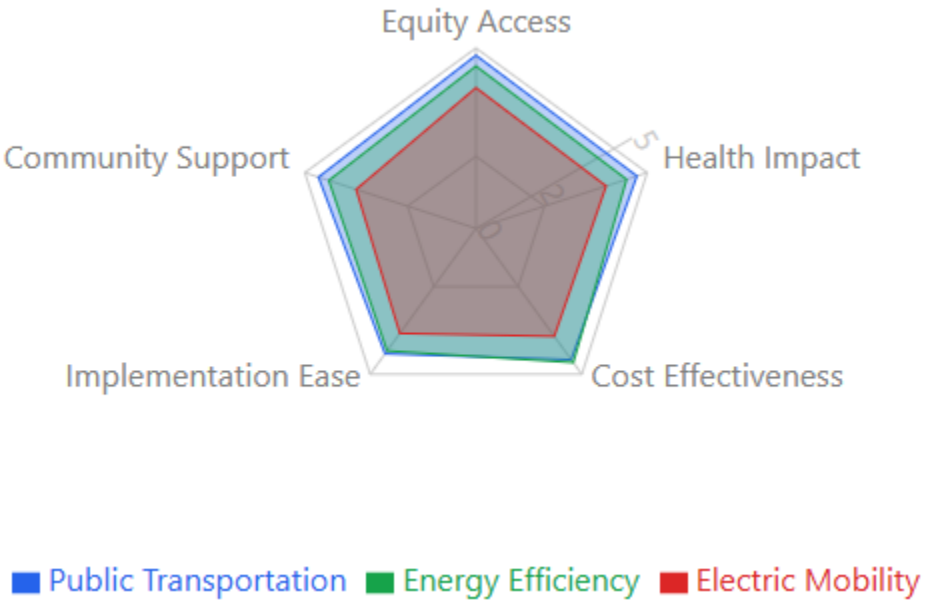


Table 4.1. Climate Action EJIA Results

Strategy	Equity Score (45%)	Benefit Score (30%)	Risk Score (25%)	Final Score	Rank
Public Transportation	4.8	4.6	2.7	4.115	**1**
Energy Efficiency	4.5	4.4	2.9	4.01	**2**
15-Minute Communities	4.4	4.4	3	3.84	**3**
Active Transportation	4.3	4.2	3.1	3.75	**4**
Renewable Energy	4.2	4.5	3.2	3.69	**5**
Building Standards	4.1	4	3.3	3.62	**6**
Electric Mobility	3.9	3.8	3.4	3.49	**7**

Figure 4.3. Performance dimensions spider diagram from three climate actions



Three distinct tiers of performance emerged from the analysis:

Top Performers (Scores > 4.0)

- Public Transportation (4.115): Demonstrated exceptional performance across all metrics, with particularly strong equity scores (4.8) and benefit potential (4.6)
- Energy Efficiency (4.01): Showed balanced strength across dimensions with notable equity benefits (4.5) and manageable risk factors (2.9)

Mid-Range Performers (Scores 3.7-4.0)

- 15-Minute Communities (3.84): Strong equity potential (4.4) balanced against moderate implementation risks (3.0)
- Active Transportation (3.75): Consistent performance across dimensions with good equity scores (4.3)
- Renewable Energy (3.69): High benefit potential (4.5) offset by increased implementation complexity (3.2)

Lower Performers (Scores < 3.7)

- Building Standards (3.62): Moderate equity scores (4.1) with higher implementation risks (3.3)
- Electric Mobility (3.49): Lower relative performance across dimensions, particularly in equity access (3.9)

Key Success Factors

Analysis of the top-performing strategies revealed several critical success factors:

1. **Broad Accessibility**: Top strategies demonstrated potential to benefit diverse populations across geographic and socioeconomic spectrums.
2. **Implementation Feasibility**: Higher-ranking strategies generally showed lower implementation risks and clearer pathways to execution.
3. **Community Support**: Strategies that aligned with expressed community needs and preferences scored higher in equity measures.
4. **Cost-Effectiveness**: Top performers showed favorable cost-benefit ratios, particularly for low-income communities.
5. **Immediate Impact Potential**: Strategies offering near-term benefits while building toward long-term goals performed better.

The spider diagram illustrates how the highest and lowest-ranked strategies compare across key performance dimensions, highlighting the particular strength of public transportation and energy efficiency in equity access and health impacts.

These findings suggest that prioritizing strategies with strong equity scores and manageable implementation risks offers the most promising path forward for Larimer County's climate initiatives.

4.2 Equity Analysis

This section dives deeper into the equity implications of the seven climate strategies, examining how the benefits and burdens are distributed across different communities in Larimer County. Particular attention is given to the impacts on vulnerable populations, such as low-income households, communities of color, and rural communities.

4.2.1. Distribution of Benefits and Burdens

The analysis revealed significant variations in how the benefits and burdens of climate strategies are distributed across Larimer County communities. Analysis of impacts on priority communities identified several key patterns:

Low-Income Households

- Most positively impacted by energy efficiency programs (cost savings).
- Face implementation barriers in electric mobility strategies.
- Benefit significantly from improved public transportation access.

Communities of Color

- Strong positive impacts from 15-minute community development.
- Enhanced access through public transportation improvements.
- Need targeted outreach for energy efficiency programs.

Rural Communities

- Face challenges in accessing some transportation benefits.
- Strong potential benefits from distributed renewable energy.
- Need modified approaches for building efficiency programs.

Linguistically Isolated Communities

- Require enhanced outreach and education programs.
- Benefit from improved transit accessibility.
- Need multilingual program materials and support.

Figure 4.4. Equity scores across the seven climate strategies. Higher scores indicate stronger performance across equity dimensions.

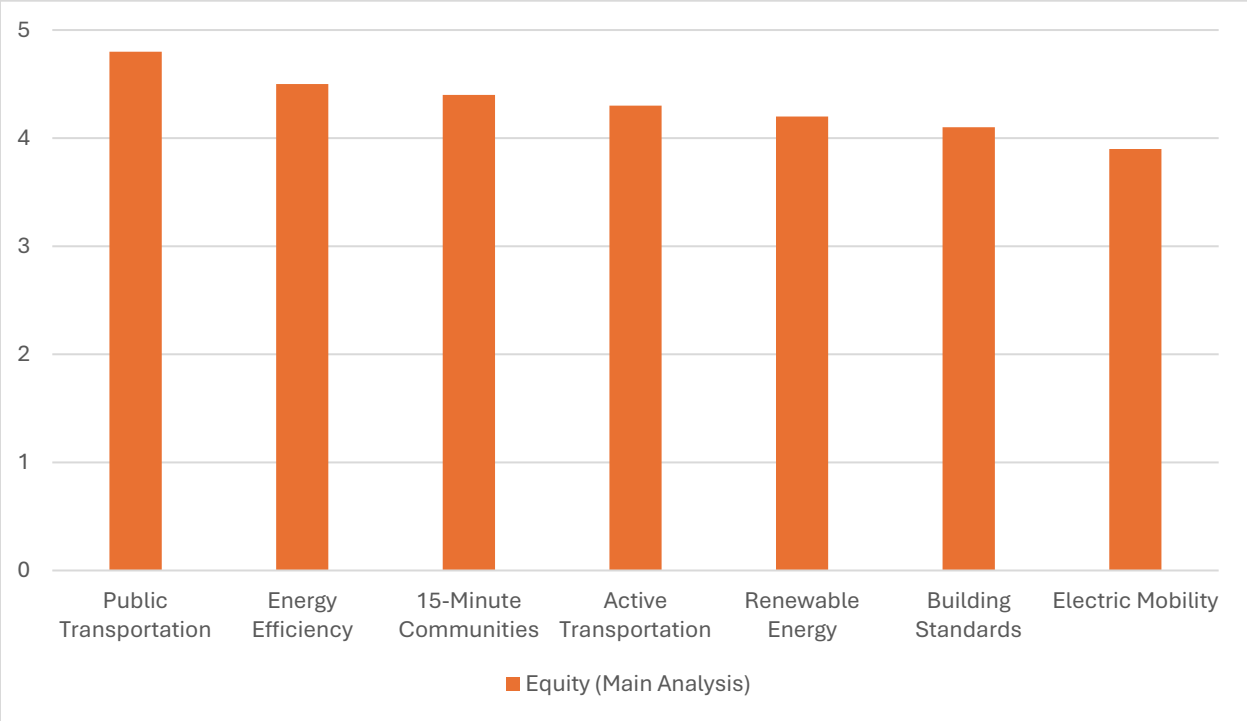


Table 4.2. Distribution of Benefits and Burdens by Strategy

Strategy	Primary Benefits	Potential Burdens
Public Transportation	Reduced transportation costs, improved mobility, air quality improvements	Potential service gaps in rural areas
Energy Efficiency	Lower energy costs, improved indoor air quality, job creation	Upfront costs for low-income households
15-Minute Communities	Improved local access, reduced travel needs, economic development	Potential displacement pressures
Active Transportation	Increased physical activity, reduced traffic congestion, enhanced safety	Infrastructure disruptions, funding availability
Renewable Energy	Air quality improvements, renewable energy adoption, grid resilience	Grid modernization challenges, initial investment barriers
Building Standards	Energy efficiency, reduced emissions, lower long-term costs	Implementation complexity, higher upfront costs
Electric Mobility	Expanded EV adoption, reduced emissions, innovative mobility options	High initial costs, limited charging infrastructure, range anxiety

4.2.2 Strategy Interdependencies and Synergies

The seven climate strategies exhibit significant interconnections that affect their implementation and effectiveness:

Primary Strategy Clusters:

1. Mobility Cluster:

- Public Transportation
- Active Transportation
- Electric Mobility

Key Dependencies:

- Transit route planning affects active transportation infrastructure
- EV charging locations influence transit hub development
- Shared mobility solutions depend on all three strategies

2. Built Environment Cluster

- Energy Efficiency
- Building Standards
- 15-Minute Communities

Key Dependencies:

- Building efficiency programs affect housing affordability
- Community design influences energy usage patterns
- Infrastructure improvements require coordinated timing

3. Energy Systems Cluster

- Renewable Energy
- Energy Efficiency
- Electric Mobility

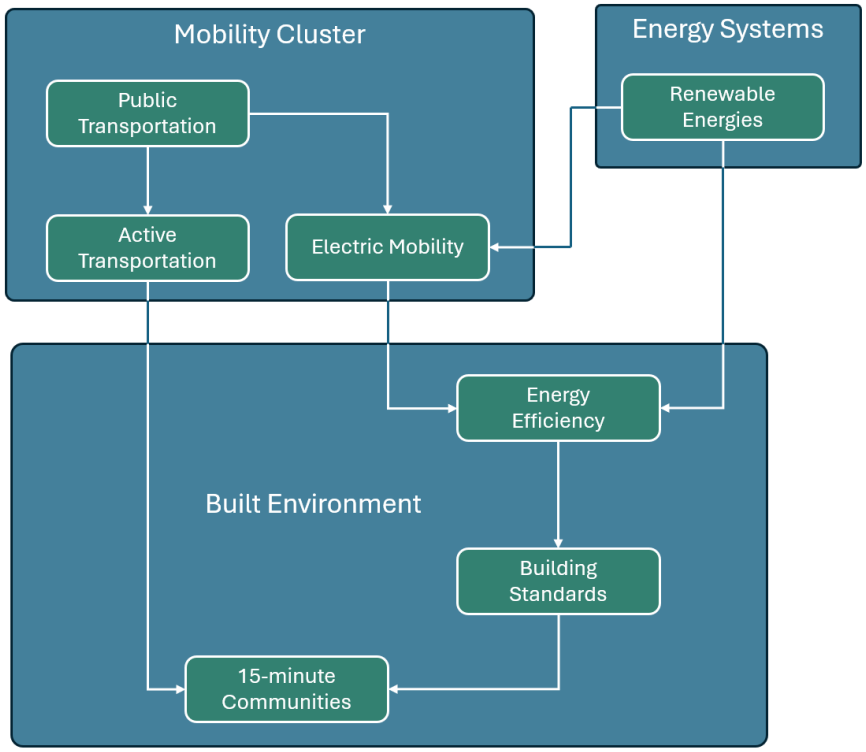
Key Dependencies:

- Grid capacity affects EV charging expansion
- Building efficiency influences renewable energy sizing
- Peak demand management requires coordination

Cross-Strategy Implementation Requirements:

- Coordinate timing of infrastructure improvements
- Align funding mechanisms across departments
- Synchronize community engagement efforts
- Share data collection and monitoring systems

Figure 4.5. Action Interdependency Diagram



4.3 Implementation Feasibility

This section assesses the feasibility of implementing the seven climate strategies, considering factors such as resource requirements, institutional capacity, and timelines. The analysis also highlights how these factors might impact equity-priority communities and identifies potential barriers and opportunities for successful and equitable implementation.

4.3.1. Resource Requirements

The analysis identified varying resource needs across strategies based on expert assessment and synthesis of existing literature (Aldy et al., 2010; Hoppe et al., 2023; Mueller et al., 2015; Mueller et al., 2017; Perrotta, 2023; Pucher & Buehler, 2008; Rojas-Rueda & Morales-Zamora, 2023; Rojas-Rueda et al., 2020; Whitmee et al., 2024). This assessment considered implementation complexity, institutional requirements, and resource intensity across different contexts.Based on this review and analysis, strategies were categorized as follows:

High-Resource Strategies: 15-minute communities, electric mobility infrastructure, and grid modernization for renewables. These require significant financial investment, diverse expertise, and robust community engagement to ensure equitable outcomes.

Moderate-Resource Strategies: Public transportation expansion, energy efficiency programs, and building code updates. These require careful planning and resource allocation to ensure benefits reach underserved communities.

Lower-Resource Strategies: Active transportation improvements, community education programs, and policy updates. While generally more feasible, these still require equitable resource distribution to avoid exacerbating existing disparities.

4.3.2. Institutional Capacity

- Strengths: Larimer County benefits from strong regional planning frameworks, established utility partnerships, and active community organizations. These assets can support equitable implementation if leveraged effectively.
- Gaps: Limited multilingual service capacity, the need for additional technical expertise, and rural service delivery constraints pose challenges to reaching and serving diverse communities.
- Development Needs: Include enhanced data collection and analysis capabilities, expanded community engagement resources, and additional project management capacity, particularly to address equity considerations.

4.3.3. Timeline considerations

Equity in Timelines: Implementation timelines should consider the urgency of needs in equity-priority communities. Prioritizing strategies with shorter timelines for initial benefits can address immediate concerns while building toward long-term goals.

Time-Sensitive Needs: Addressing energy affordability, public transportation access, and health concerns in vulnerable communities requires strategies with near-term impacts.

Long-Term Equity: Long-term strategies, such as 15-minute communities, must incorporate robust equity considerations throughout their implementation to avoid unintended consequences like displacement or gentrification.

4.4 Understanding Strategy Rankings: How Reliable Are They

To ensure the trustworthiness of our strategy rankings, we tested how they might change under different circumstances (sensitivity analysis, please see methods in the appendix). Think of this like stress-testing a bridge—we want to know it's stable under various conditions.

What We Tested

We examined how our rankings might change if we:

- Put more emphasis on equity
- Focused more on benefits
- Worried more about risks

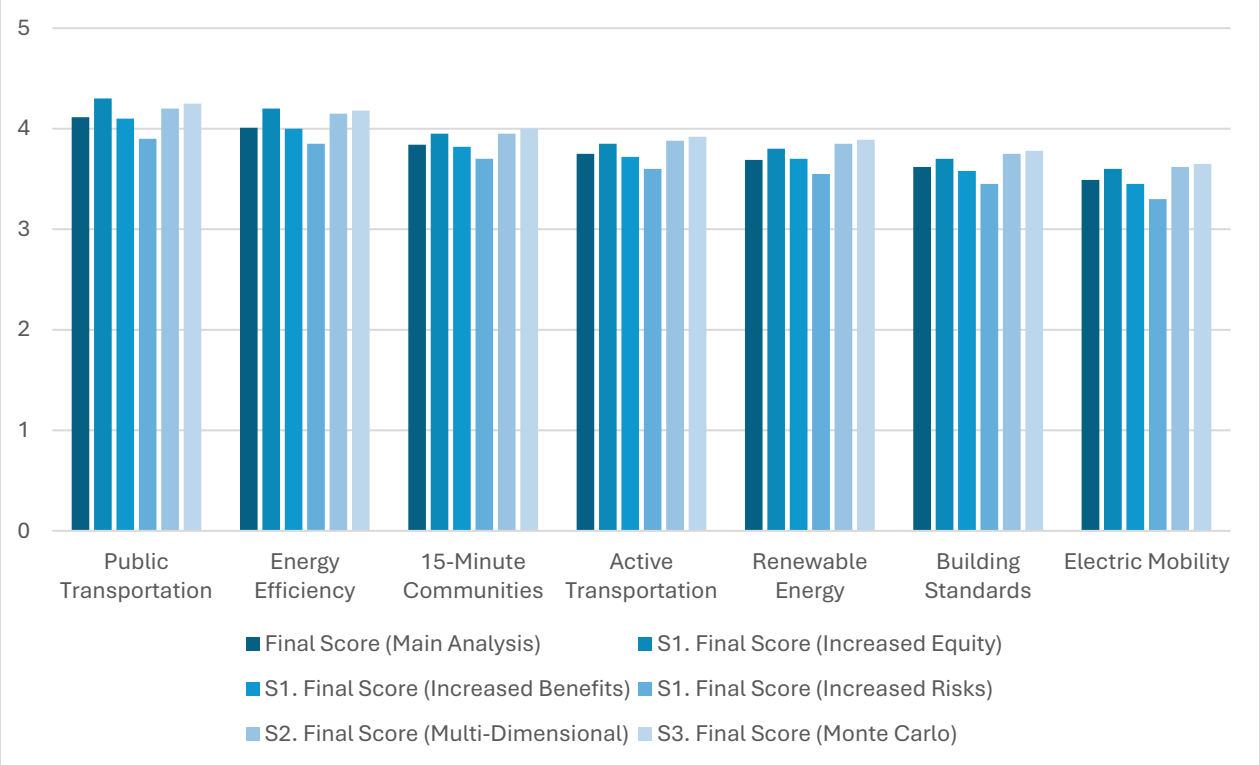
Key Findings Made Simple:

1. **Most Reliable Rankings:**
    - Public Transportation consistently ranked #1
    - Energy Efficiency stayed at #2
    - Electric Mobility remained #7 These rankings didn't change much no matter how we adjusted our priorities.
2. **More Variable Rankings:**
    - 15-Minute Communities moved between #3-4
    - Renewable Energy shifted between #4-5
    - Active Transportation varied between #4-5 These strategies' rankings changed somewhat depending on what we emphasized.

What This Means for Decision-Making:

- We can be very confident about implementing our top two strategies
- Middle-ranked strategies need more careful consideration of local context
- Lower-ranked strategies might need additional support or modification

Figure 4.6. Results of Sensitivity Analyses.



Confidence Levels in Our Rankings:

- Very High Confidence (>90% stable):
    - Public Transportation (#1)
    - Energy Efficiency (#2)
    - Electric Mobility (#7)
- Moderate Confidence (60-90% stable):
    - 15-Minute Communities
    - Renewable Energy
    - Active Transportation

4.4.1. Weight Variation Results

- Equity Weight Variations: The rankings remained stable for the top strategies (Public Transportation, Energy Efficiency) when the equity weight varied between 35-55%. This suggests that these strategies are robust in promoting equity even when the emphasis on equity is slightly reduced. Some rank changes were observed between middle-tier strategies when benefit weights were adjusted, indicating that these strategies are more sensitive to shifts in priorities between benefit and equity considerations.
- Benefit and Risk Weight Variations: Lower sensitivity to risk weight variations was observed, with consistent rankings for top and bottom strategies. This indicates that the risk assessment is important but has a less significant impact on the overall rankings compared to equity and benefit considerations.

4.4.2. Robustness Analysis

- Monte Carlo Simulation: A Monte Carlo simulation (1,000 iterations) demonstrated high confidence rankings (>90% consistency) for Public Transportation (#1), Energy Efficiency (#2), and Electric Mobility (#7). This reinforces the prioritization of these strategies from an equity perspective, as their rankings remain consistent even with variability in weight assignments.
- Moderate Variability: Moderate variability (60-90% consistency) was observed for 15-Minute Communities (#3-4), Renewable Energy (#4-5), and Active Transportation (#4-5). This suggests that the rankings of these strategies are more sensitive to changes in priorities and weightings, requiring careful consideration in the context of the EJIA.
- Key Dependencies: The robustness of the rankings is dependent on factors such as implementation timeline uncertainties, resource availability fluctuations, policy environment changes, and community engagement success. These dependencies highlight the need for ongoing monitoring and evaluation to ensure that equity considerations remain central to the implementation process.

Table 4.3. Monte Carlo Simulation Results

Strategy	Rank 1	Rank 2	Rank 3	Rank 4	Rank 5	Rank 6	Rank 7
Public Transportation	902	91	7	0	0	0	0
Energy Efficiency	96	791	113	0	0	0	0
15-Minute Communities	2	118	602	278	0	0	0
Active Transportation	0	0	278	532	190	0	0
Renewable Energy	0	0	0	190	610	200	0
Building Standards	0	0	0	0	200	600	200
Electric Mobility	0	0	0	0	0	200	800

4.5. Geographic Equity Considerations

The geographic analysis of environmental justice in Larimer County uses the Colorado EnviroScreen 2.0 framework and the state's statutory definition of Disproportionately Impacted (DI) Communities to identify areas requiring particular attention in climate strategy implementation. This analysis examines 243 census block groups across the county, representing a total population of approximately 359,363 residents.

4.5.1. Colorado EnviroScreen 2.0 and Disproportionately Impacted Communities Definitions

The Colorado EnviroScreen 2.0 tool combines environmental, health, and demographic indicators to produce scores ranging from 0 to 100, with higher scores indicating greater cumulative impacts. Under Colorado Revised Statute 24-4-109, disproportionately impacted communities at the census block group scale. The census block group scale is the smallest geographic scale of data available from the U.S. Census Bureau, typically containing 600 to 3,000 people. Disproportionately impacted communities include:

- Low-income communities (>40% of households at/below 200% federal poverty line)
- Communities of color (>40% non-white population)
- Housing cost-burdened communities (>50% spending >30% of income on housing)
- Linguistically isolated communities (>20% limited English proficiency)
- High cumulative impact communities (CO EnviroScreen 2.0 score >80th percentile)
- Colorado EnviroScreen 2.0 score above the 80th percentile.
- Identified as a disadvantaged community in a census tract by the federal Council on Environmental Quality's Climate and Economic Justice Screening Tool.

- Tribal lands
- Mobile home communities that meet the Department of Local Affairs' definition of a mobile home park
- Historically marginalized communities: Communities with a history of environmental racism created through redlining or anti-Black, anti-Hispanic, anti-immigrant, or anti-Indigenous laws, policies, or practices that continue to experience present-day environmental health disparities

4.5.2. Larimer County

Larimer County comprises 243 census block groups with a population of 359,363 residents. Within the county, 59 census block groups, representing 78,653 residents (22% of the population), meet the November 2024 definition of Disproportionately Impacted Communities.

4.5.3. Geographic Analysis Findings

High-Impact Areas

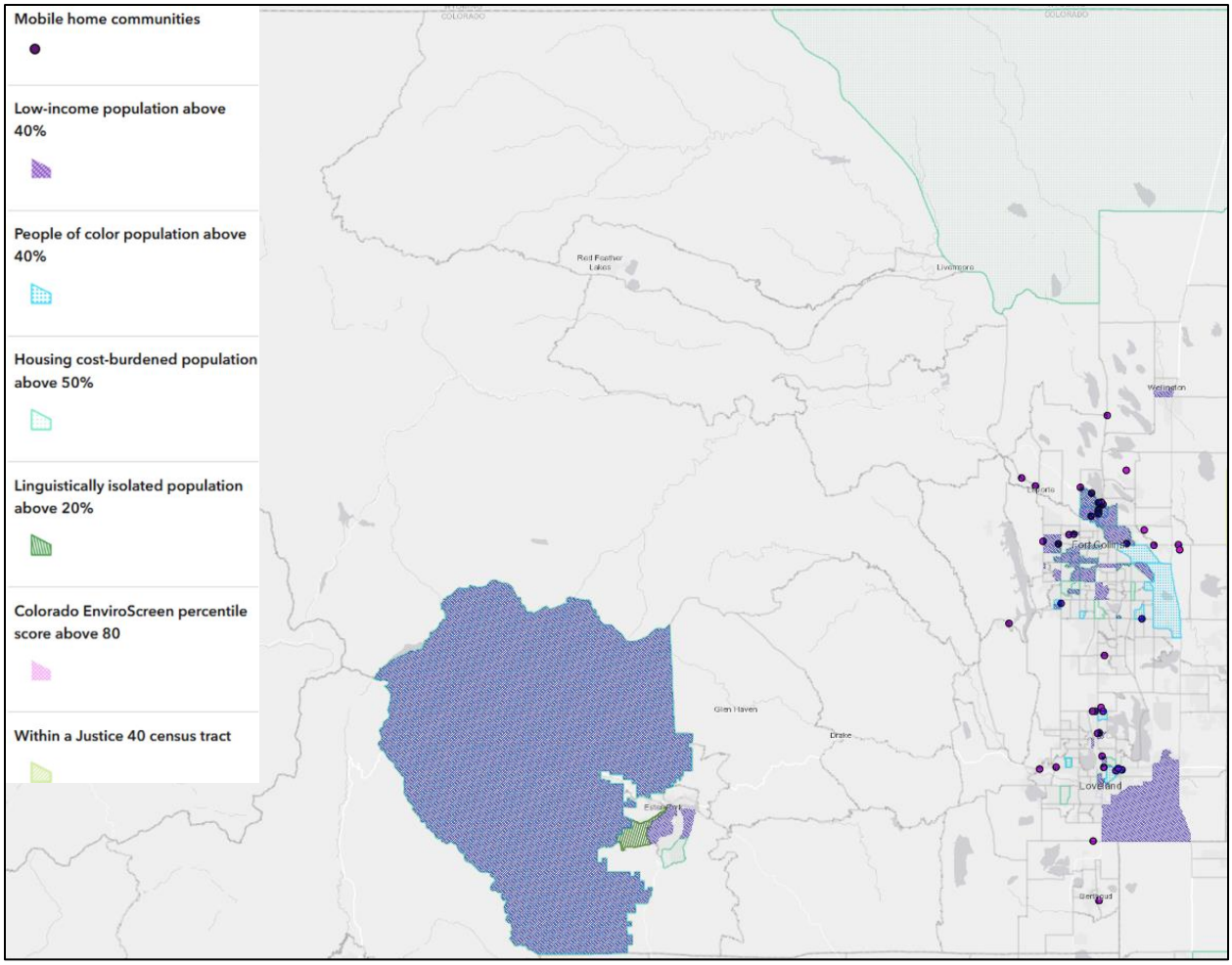
Two census block groups show particularly high environmental burden scores (>80th percentile) (see maps 4.5, 4.6, and 4.7):

1. Census Block Group 080690013042
    - CO EnviroScreen 2.0 Score: 81.43
    - Population: 2,118 residents
    - Key Characteristics:
        - High pollution burden (56.64 percentile)
        - Very high health vulnerability (87.73 percentile)
        - Moderate climate vulnerability (41.59 percentile)
2. Census Block Group 080690020071
    - CO EnviroScreen 2.0 Score: 80.42
    - Population: 1,740 residents
    - Key Characteristics:
        - Very high pollution burden (71.39 percentile)
        - High health vulnerability (75.79 percentile)
        - High climate vulnerability (58.74 percentile)

4.5.4. Geographic Distribution of Environmental Burdens

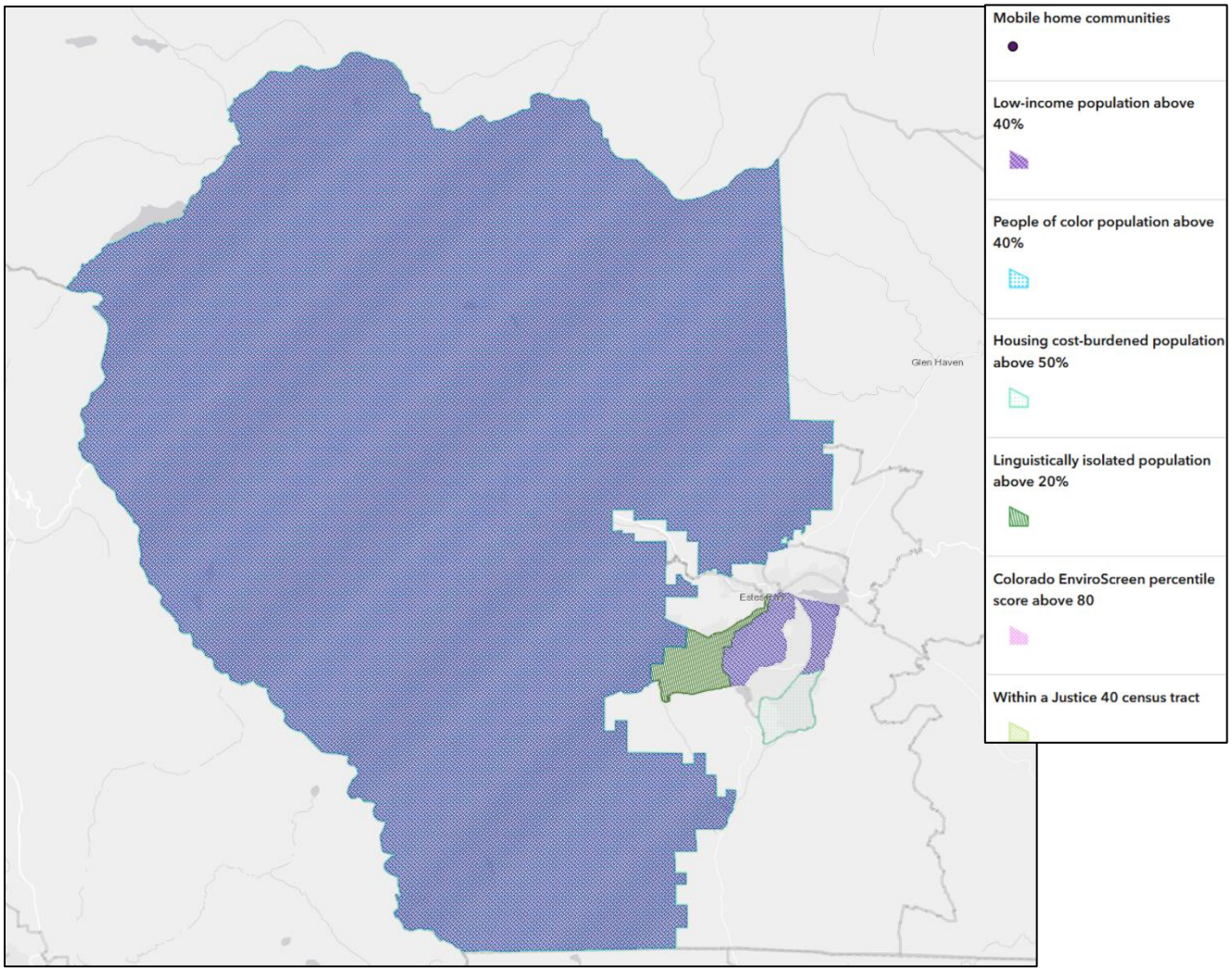
As shown in Map 4.1, DI communities are distributed across several areas of Larimer County. The series of maps (4.2-4.17) illustrate the spatial distribution of different Disproportionately Impacted Communities criteria.

Map 4.1. Disproportionately Impacted Communities in Larimer County (census block group level) based on the Colorado Revised Statute 24-4-109



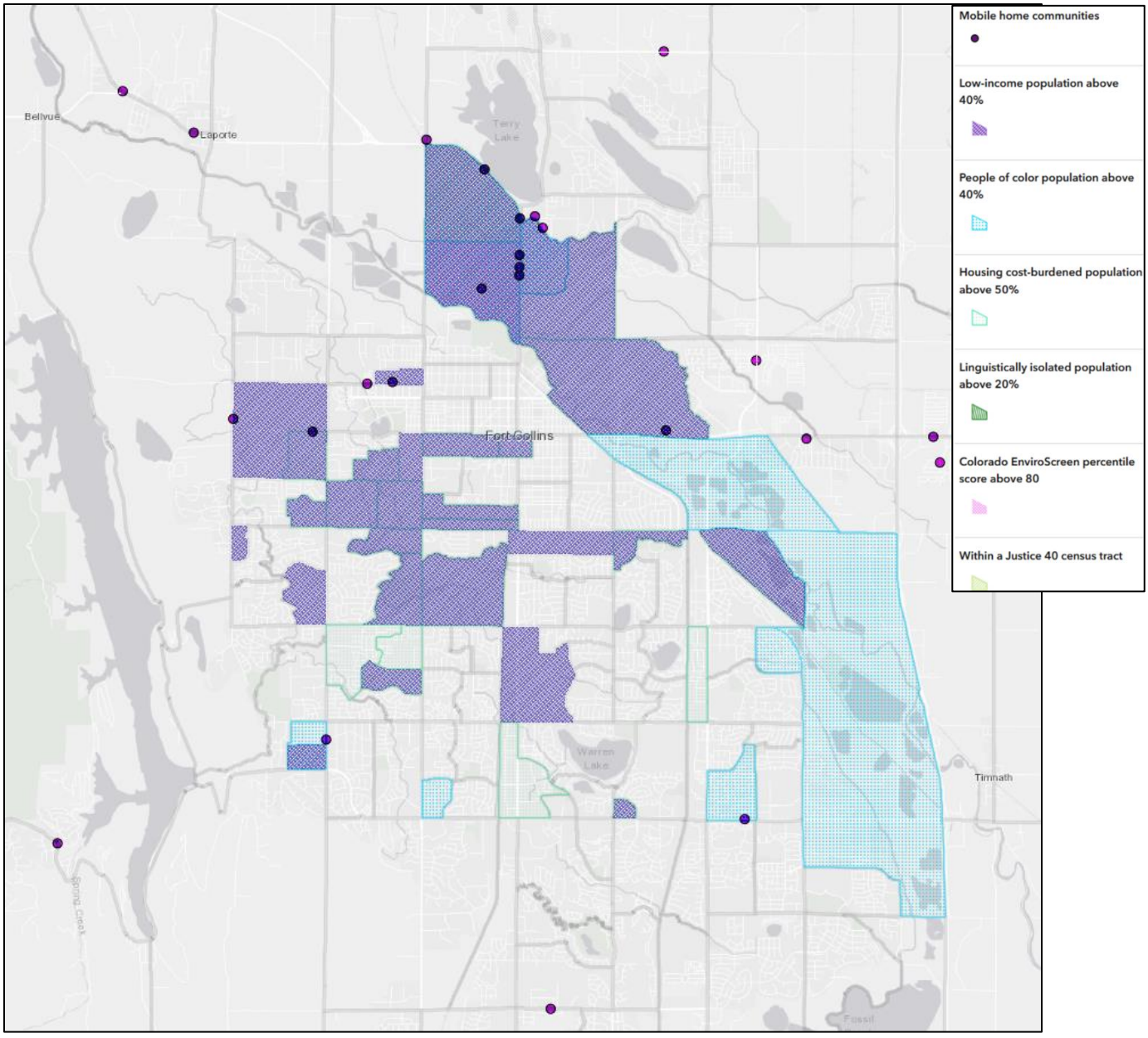
Census Block Groups highlighted in this map: 080690028031, 080690028053, 080690028051, 080690028042, 080690028041, 080690013041, 080690013042, 080690013052, 080690013051, 080690013062, 080690016011, 080690016051, 080690016054, 080690016022, 080690016033, 080690010082, 080690011094, 080690011123, 080690011124, 080690011073, 080690010035, 080690010031, 080690009021, 080690009014, 080690011112, 080690011103, 080690011102, 080690011044, 080690011041, 080690005062, 080690005042, 080690005041, 080690006003, 080690006004, 080690001001, 080690002011, 080690005033, 080690005032, 080690005051, 080690004021, 080690005052, 080690004011, 080690017071, 080690017073, 080690018041, 080690019023, 080690017064, 080690017113, 080690020071, 080690017151, and 080690017132

Map 4.2. Disproportionately Impacted Communities in the Estes Park area (census block group level) based on the Colorado Revised Statute 24-4-109



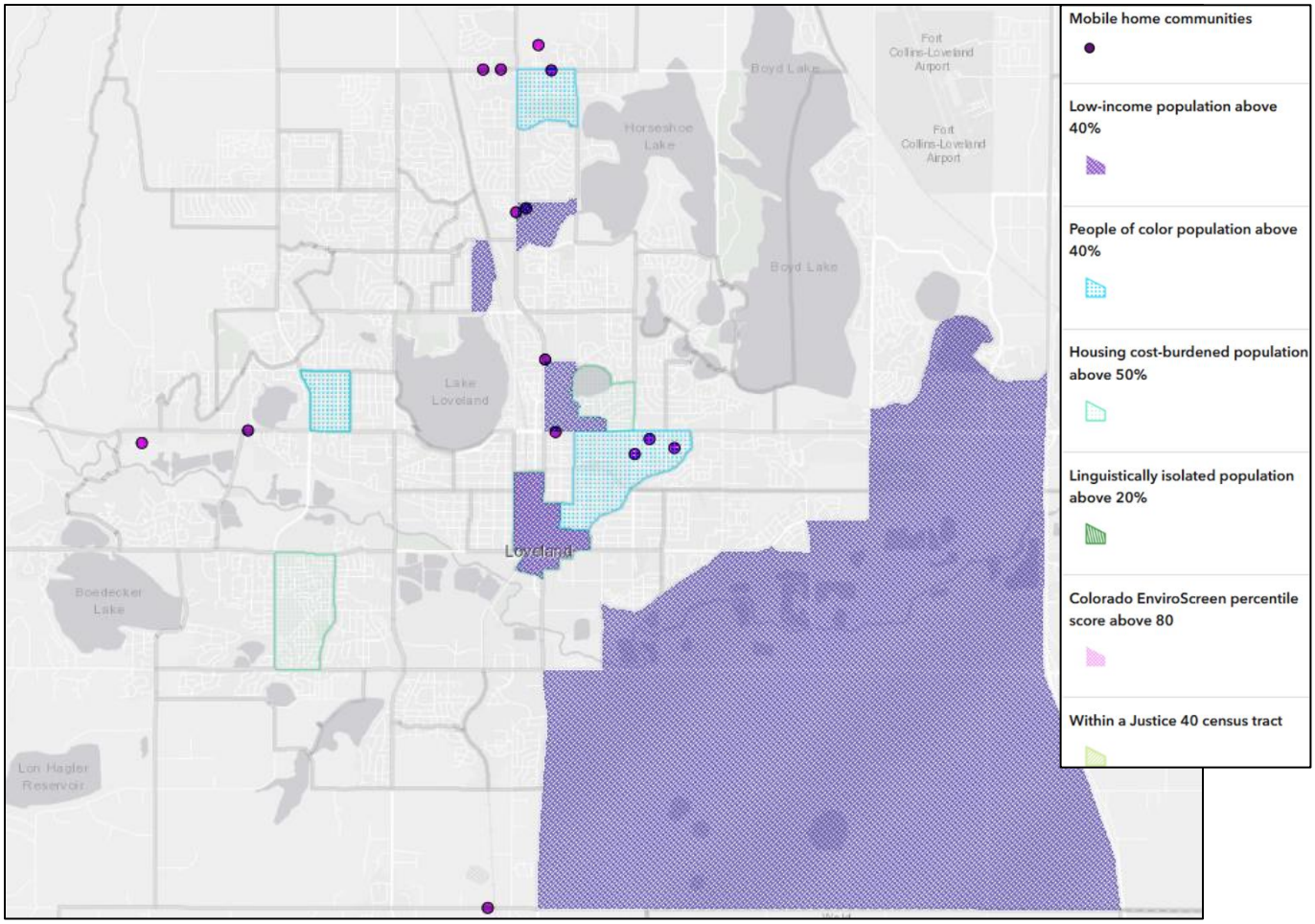
Census Block Groups highlighted in this map: 080690028031, 080690028053, 080690028051, 080690028042, and 080690028041

Map 4.3. Disproportionately Impacted Communities in the Fort Collins area (census block group level) based on the Colorado Revised Statute 24-4-109



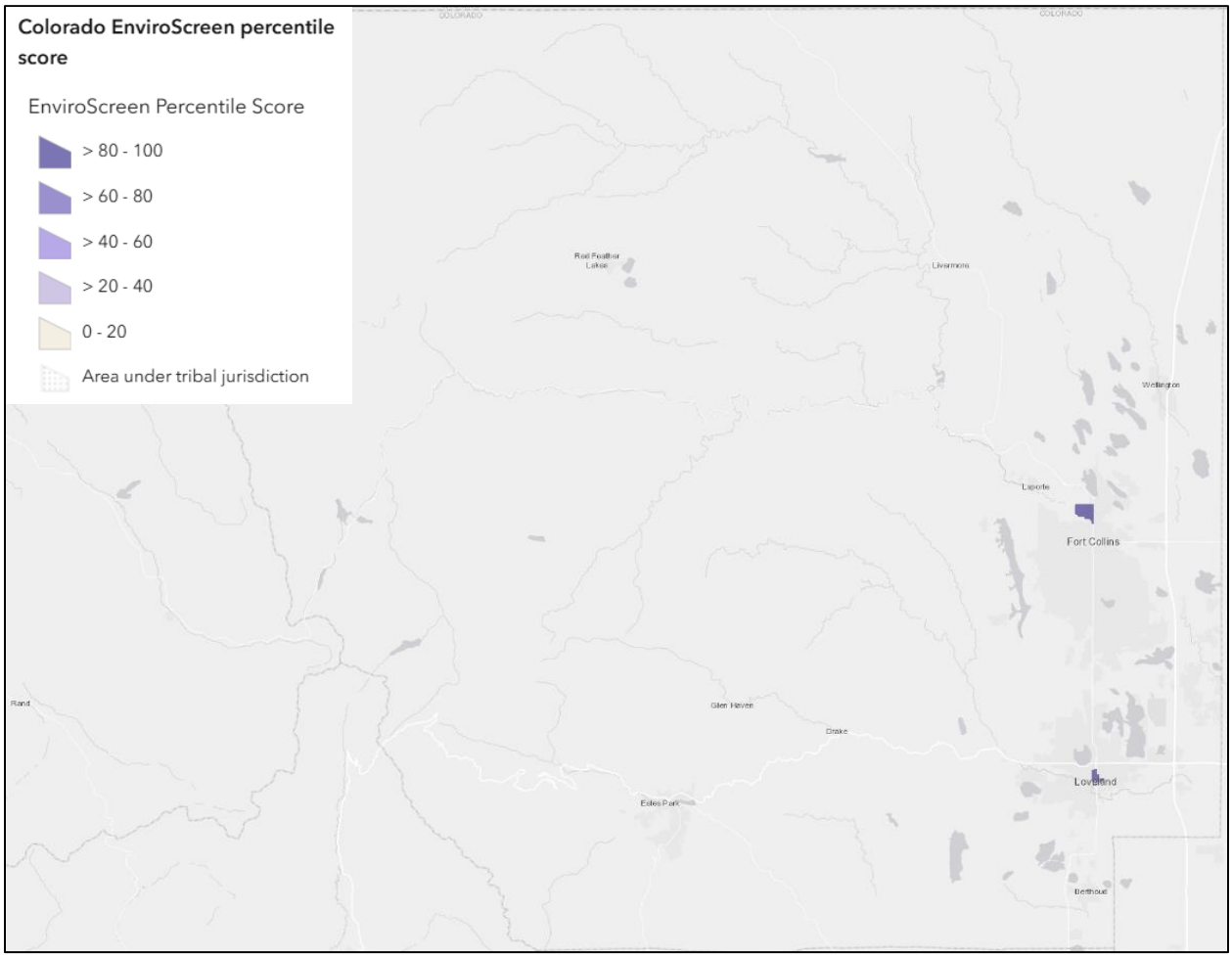
Census Block Groups highlighted in this map: 080690013041, 080690013042, 080690013052, 080690013051, 080690013062, 080690016011, 080690016051, 080690016054, 080690016022, 080690016033, 080690010082, 080690011094, 080690011123, 080690011124, 080690011073, 080690010035, 080690010031, 080690009021, 080690009014, 080690011112, 080690011103, 080690011102, 080690011044, 080690011041, 080690005062, 080690005042, 080690005041, 080690006003, 080690006004, 080690001001, 080690002011, 080690005033, 080690005032, 080690005051, 080690004021, 080690005052, and 080690004011

Map 4.4. Disproportionately Impacted Communities in the Loveland area (census block group level) based on the Colorado Revised Statute 24-4-109

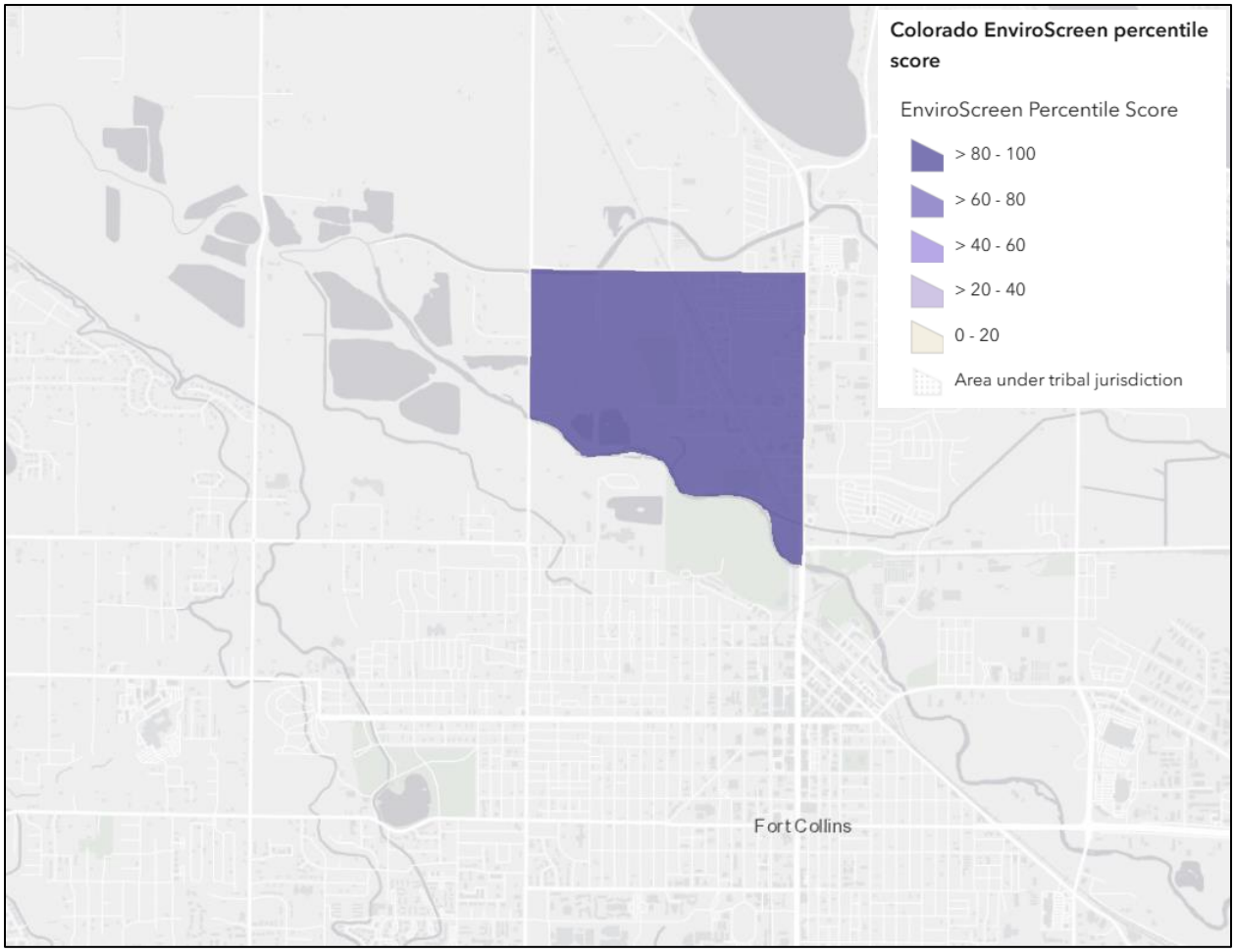


Census Block Groups highlighted in this map: 080690017071, 080690017073, 080690018041, 080690019023, 080690017064, 080690017113, 080690020071, 080690017151, and 080690017132

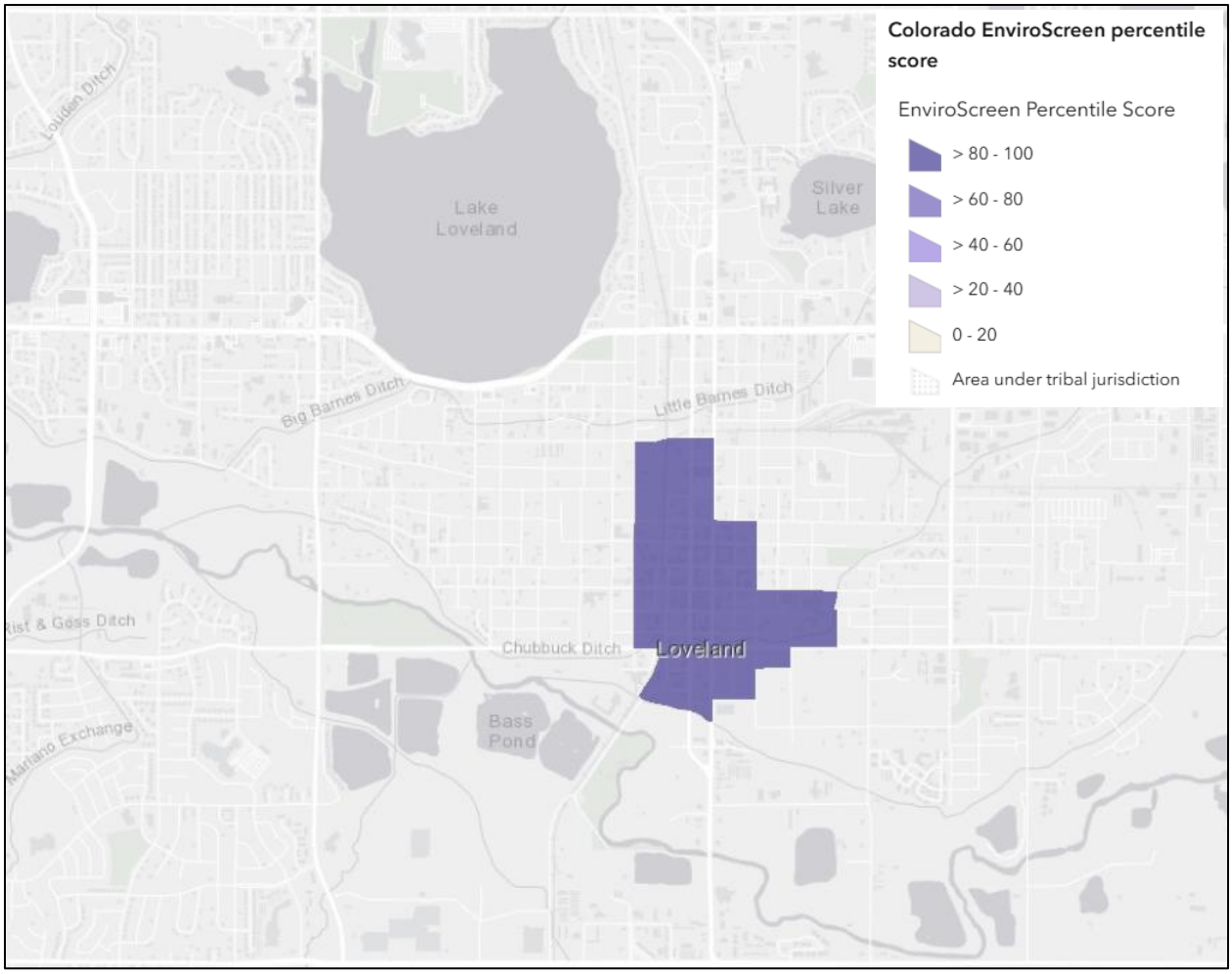
Map 4.5. Colorado EnviroScreen 2.0 Definition of Disproportionately Impacted Communities in Larimer County (census block groups 080690013042 and 080690020071)



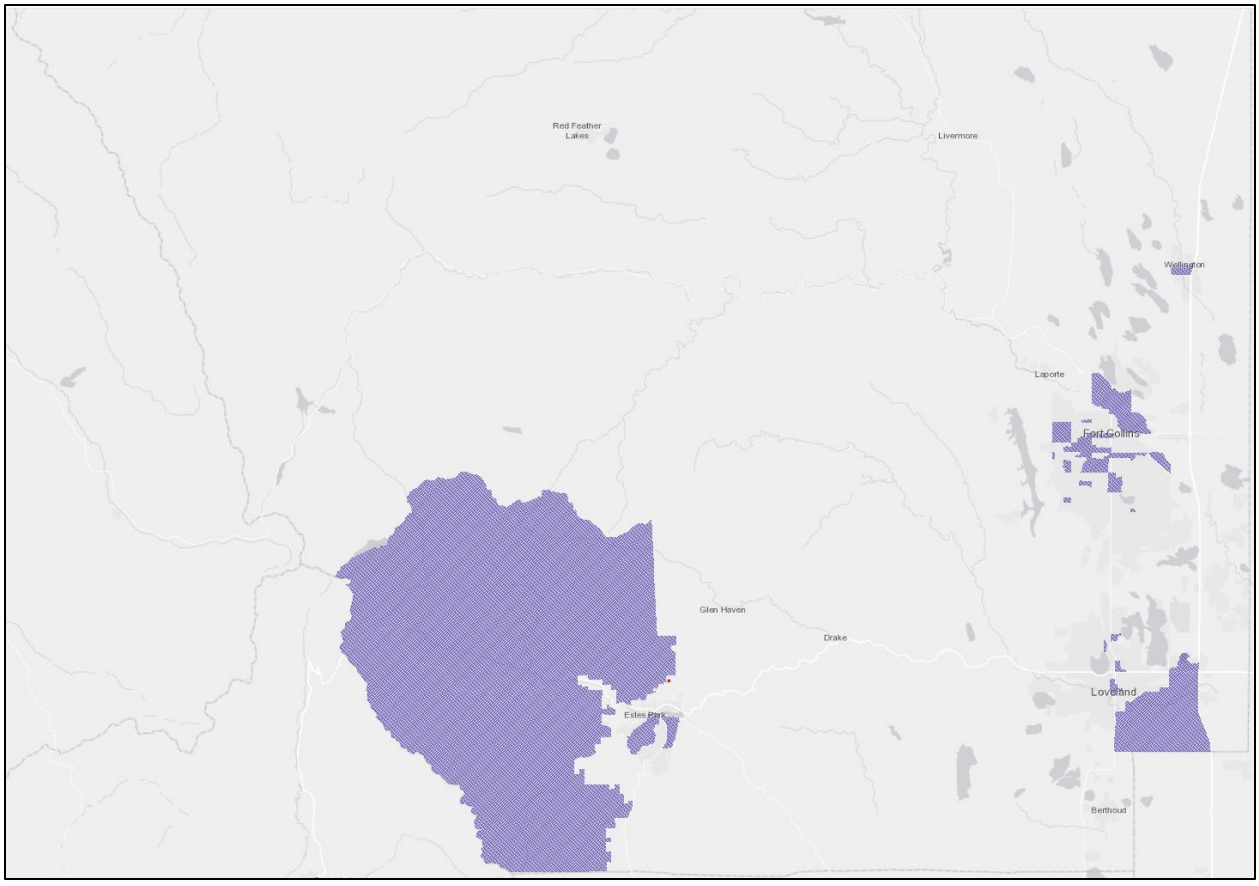
Map 4.6. Colorado EnviroScreen 2.0 Identified Disproportionately Impacted Community in Fort Collins (Census block group: 080690013042)



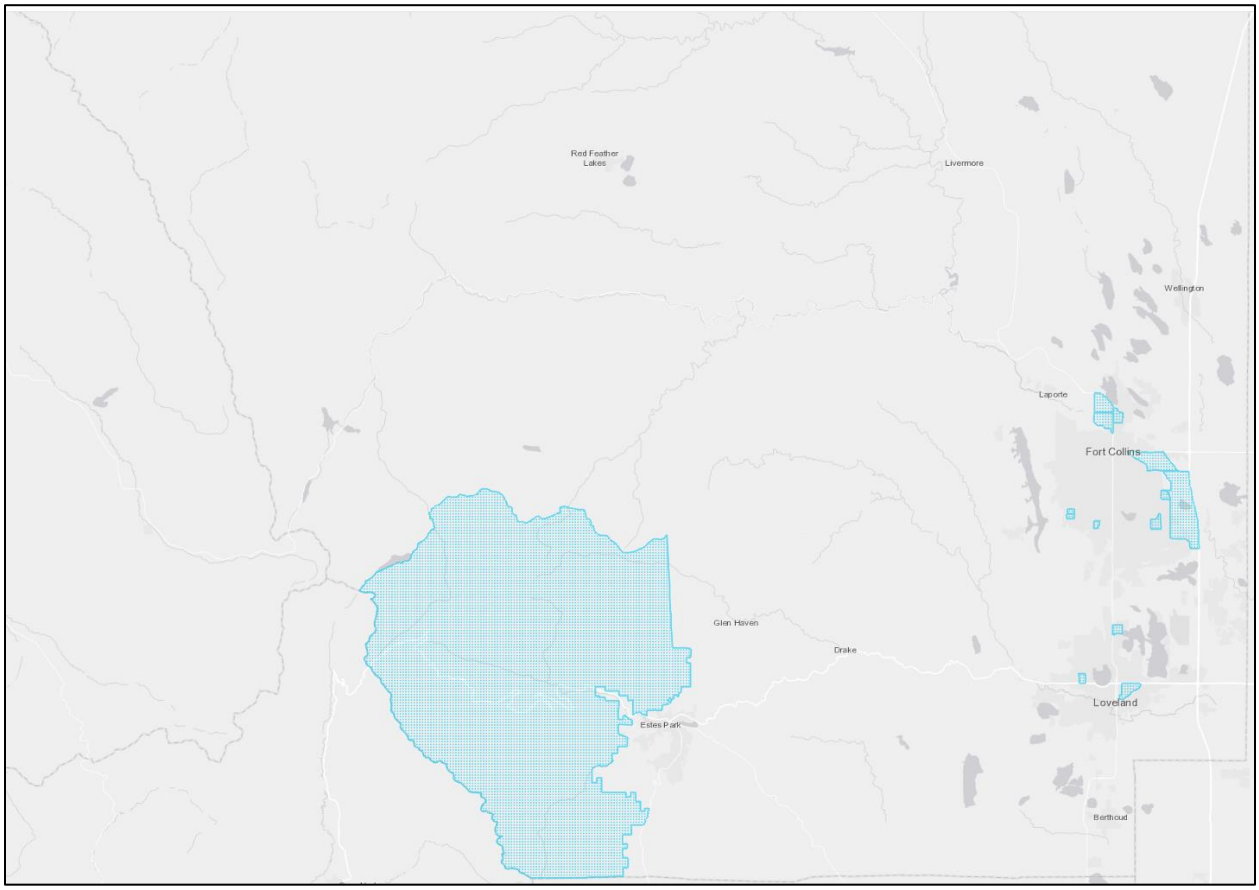
Map 4.7. Colorado EnviroScreen 2.0 Identified Disproportionately Impacted Community in Loveland (Census block group: 080690020071)



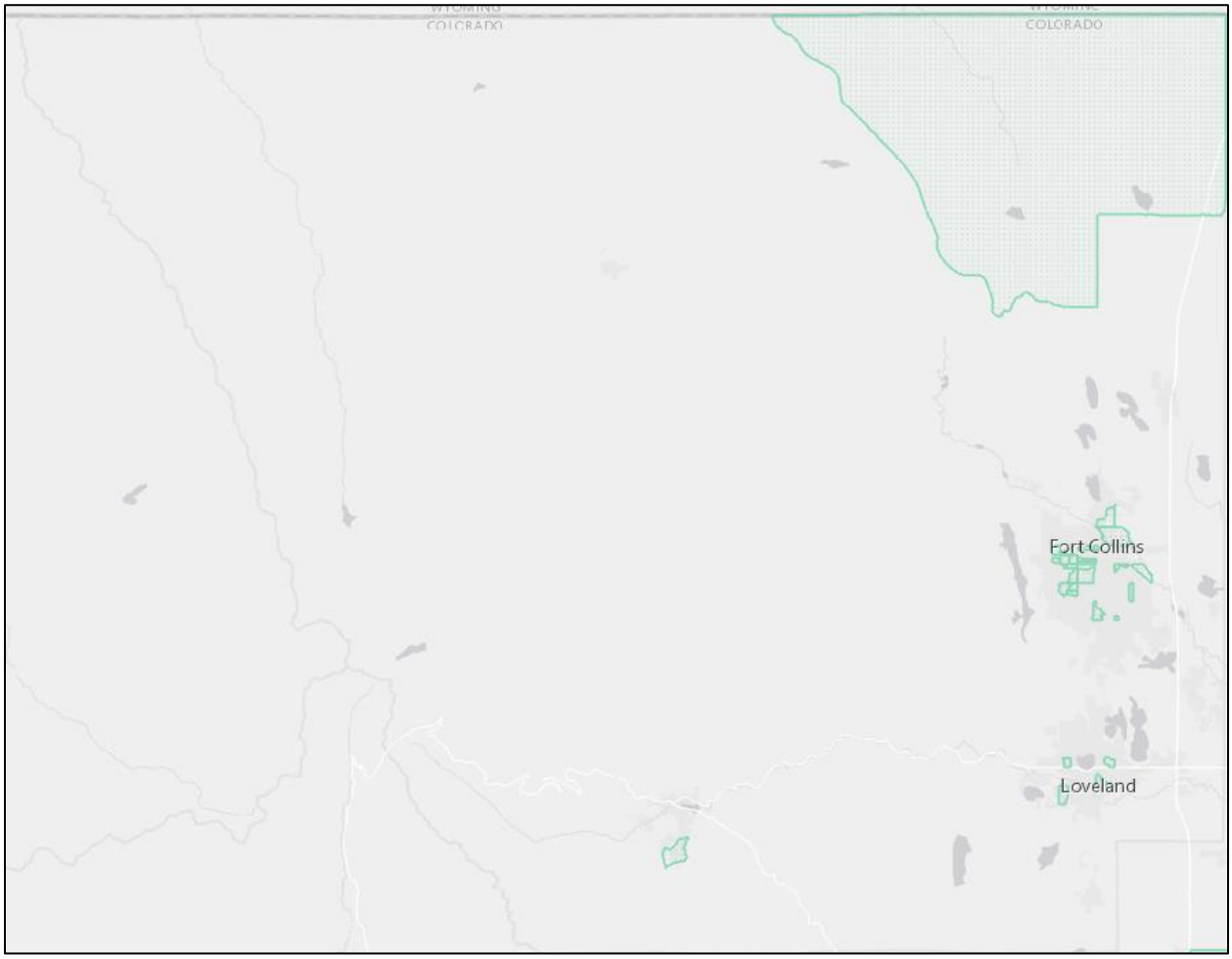
Map 4.8. Low-income population above 40% Definition of Disproportionately Impacted Communities in Larimer County map (census block group level)



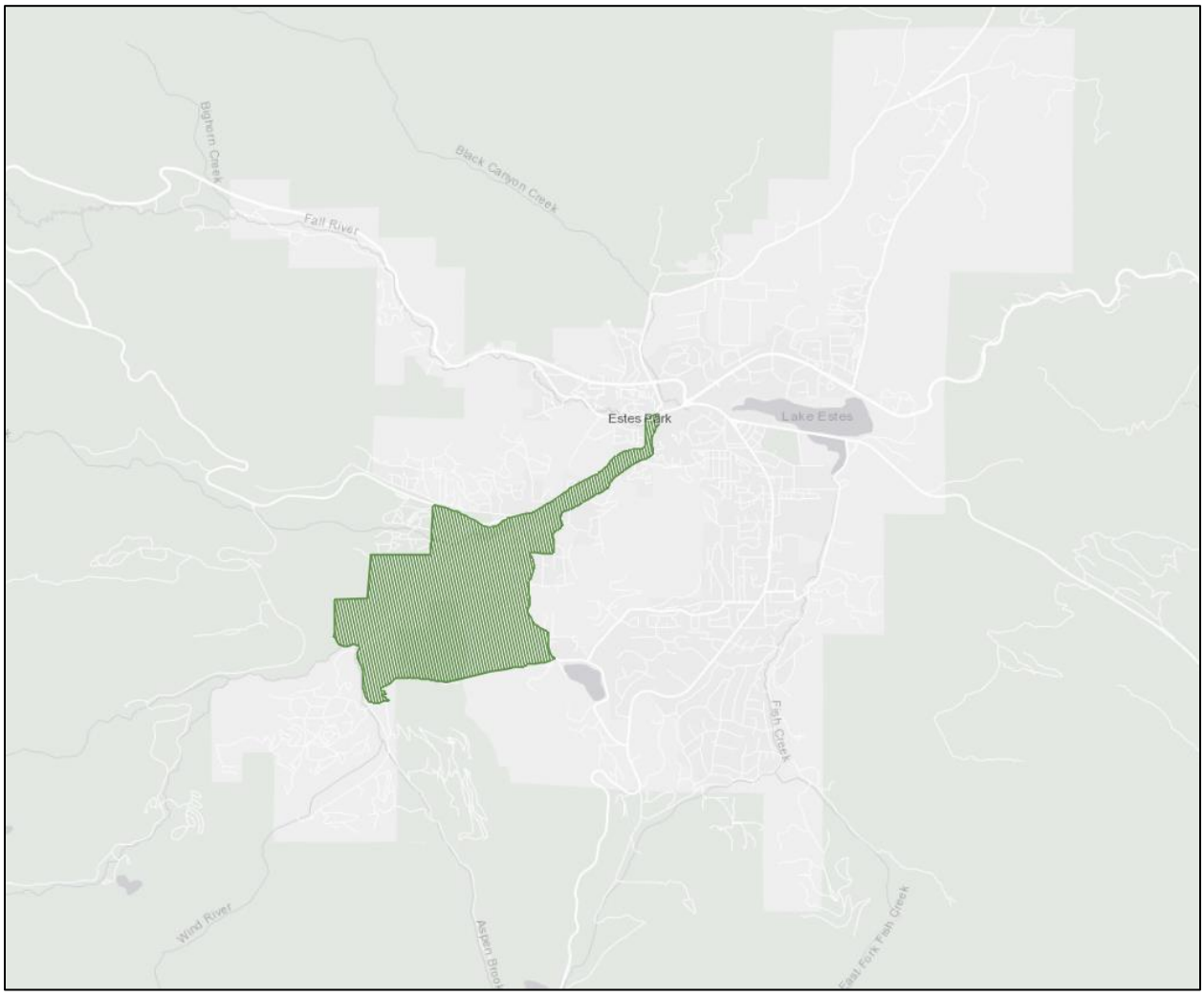
Map 4.9. People of color population above 40% Definition of Disproportionately Impacted Communities in Larimer County map (census block group level)



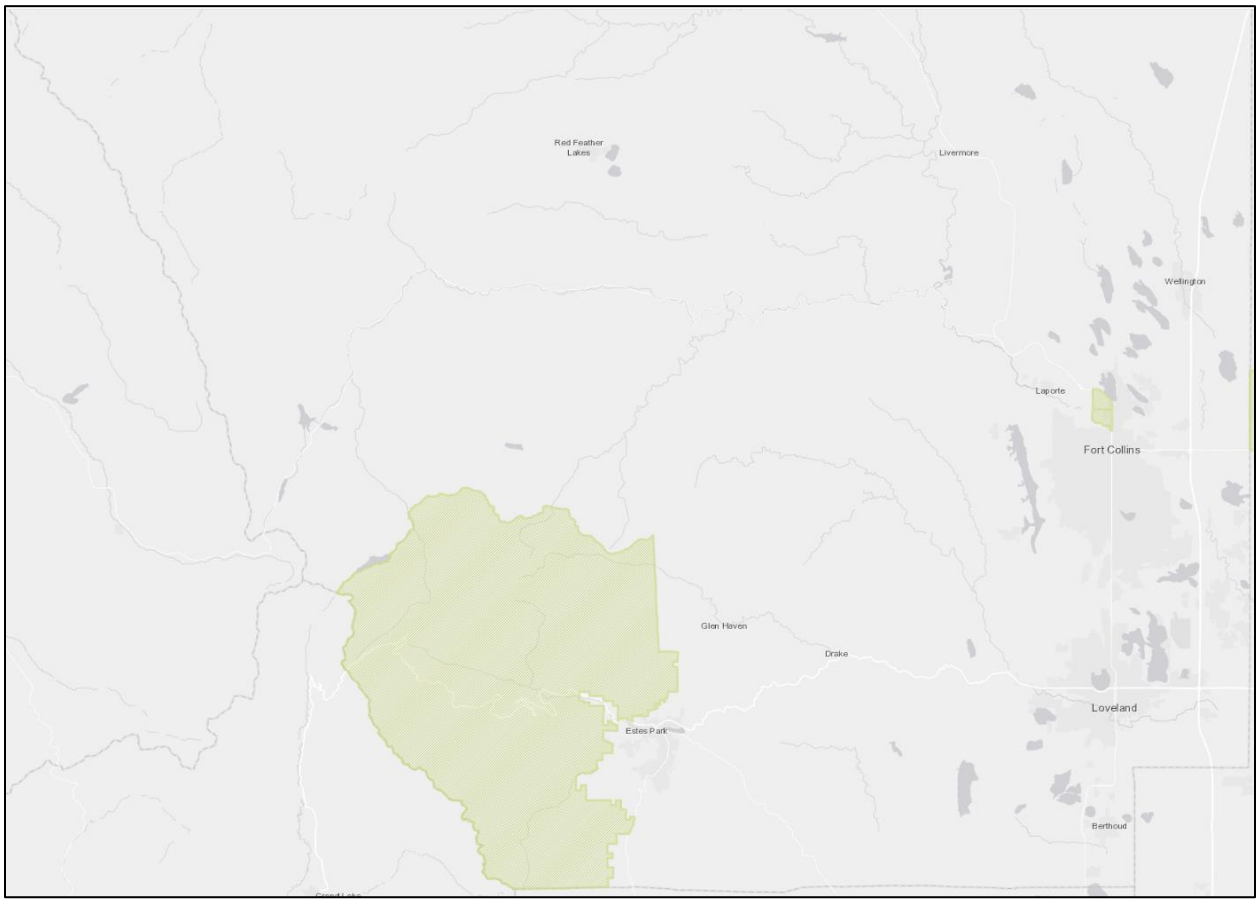
Map 4.10. Housing cost-burdened population above 50% Definition of Disproportionately Impacted Communities in Larimer County map (census block group level)



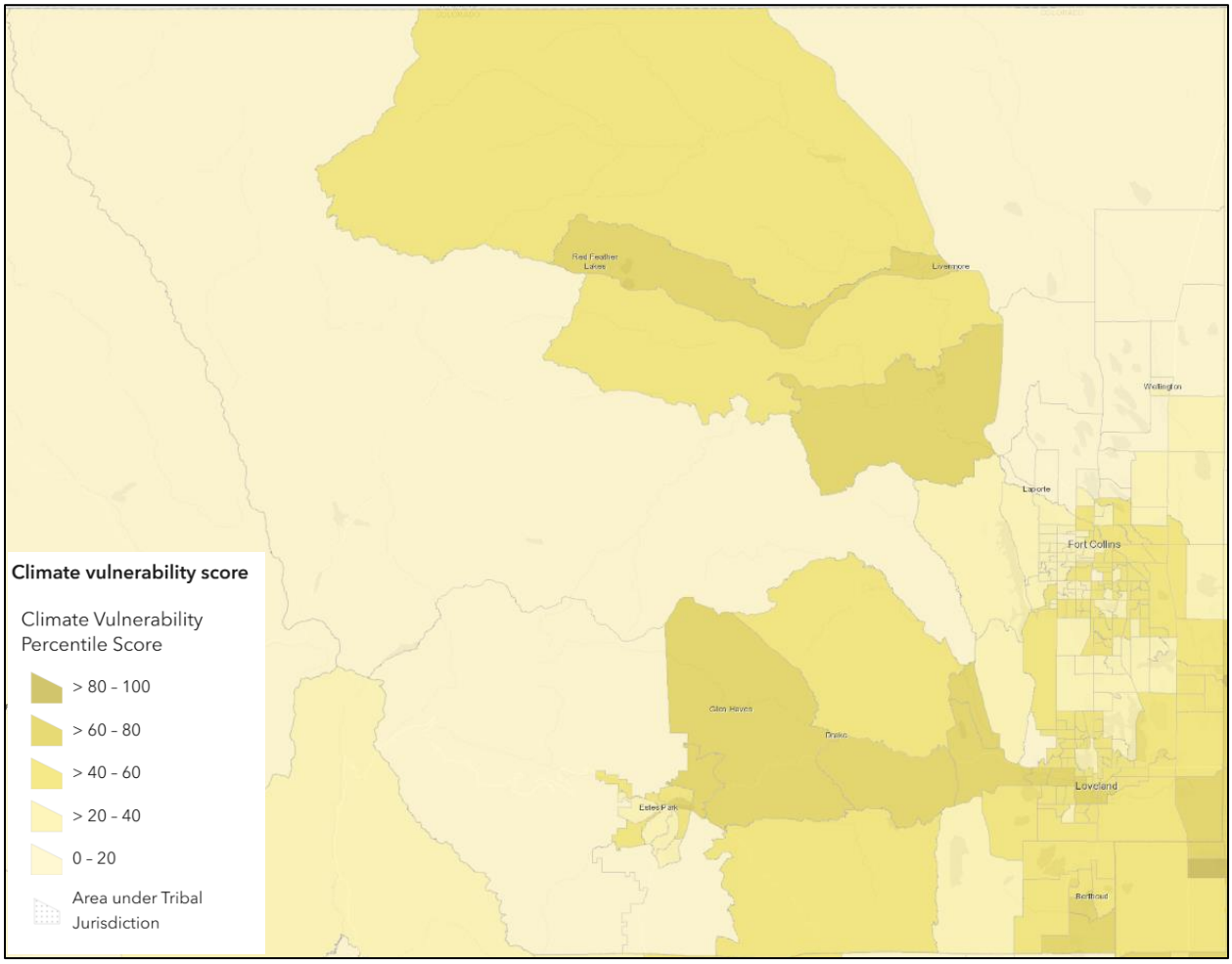
Map 4.11. Linguistically isolated population above 20% Definition of Disproportionately Impacted Communities in Larimer County map (census block group 080690028053)



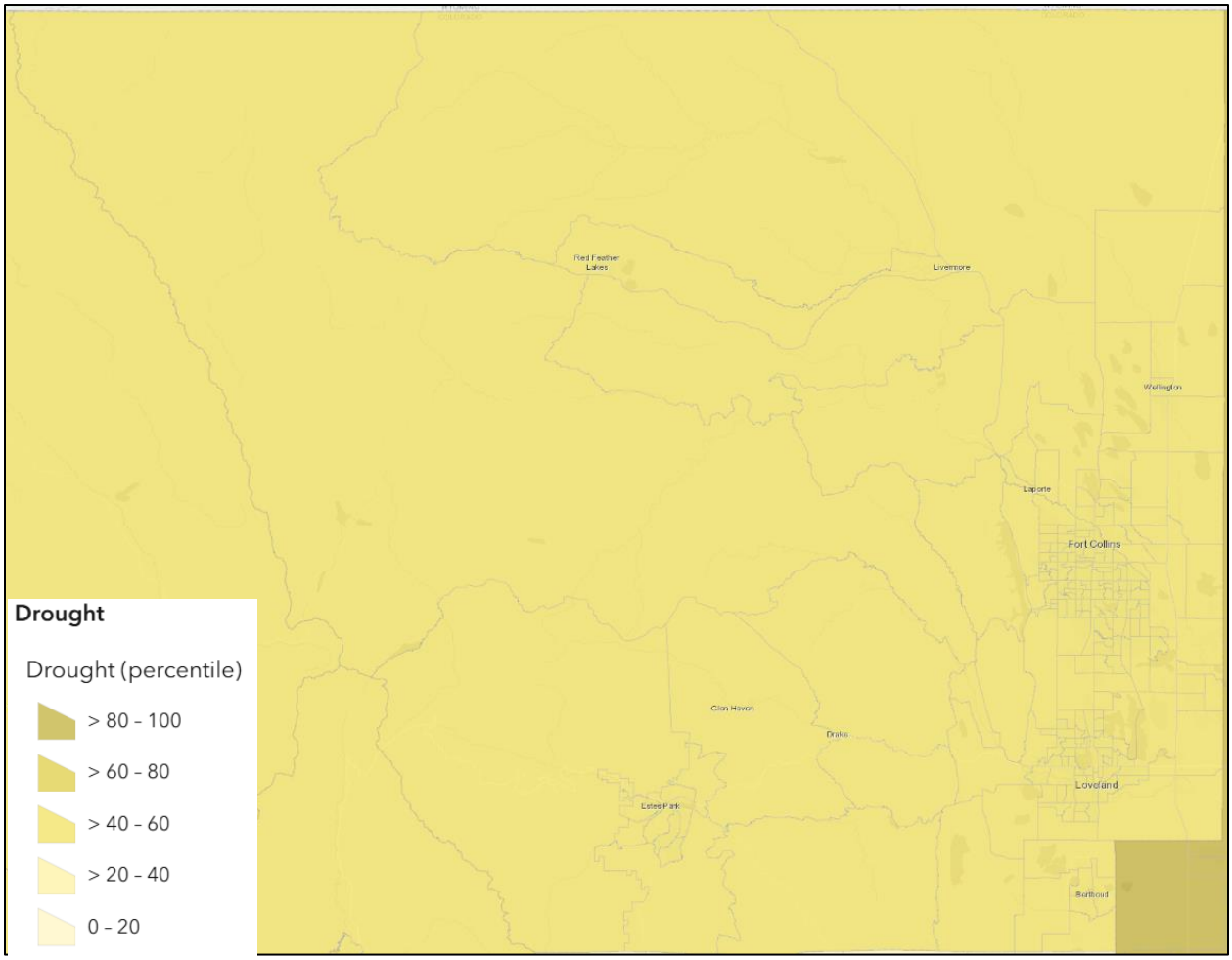
Map 4.12. Census Block Groups within a Justice 40 (Climate and Economic Justice Screening Tool) census tract defined Disadvantaged Communities in Larimer County



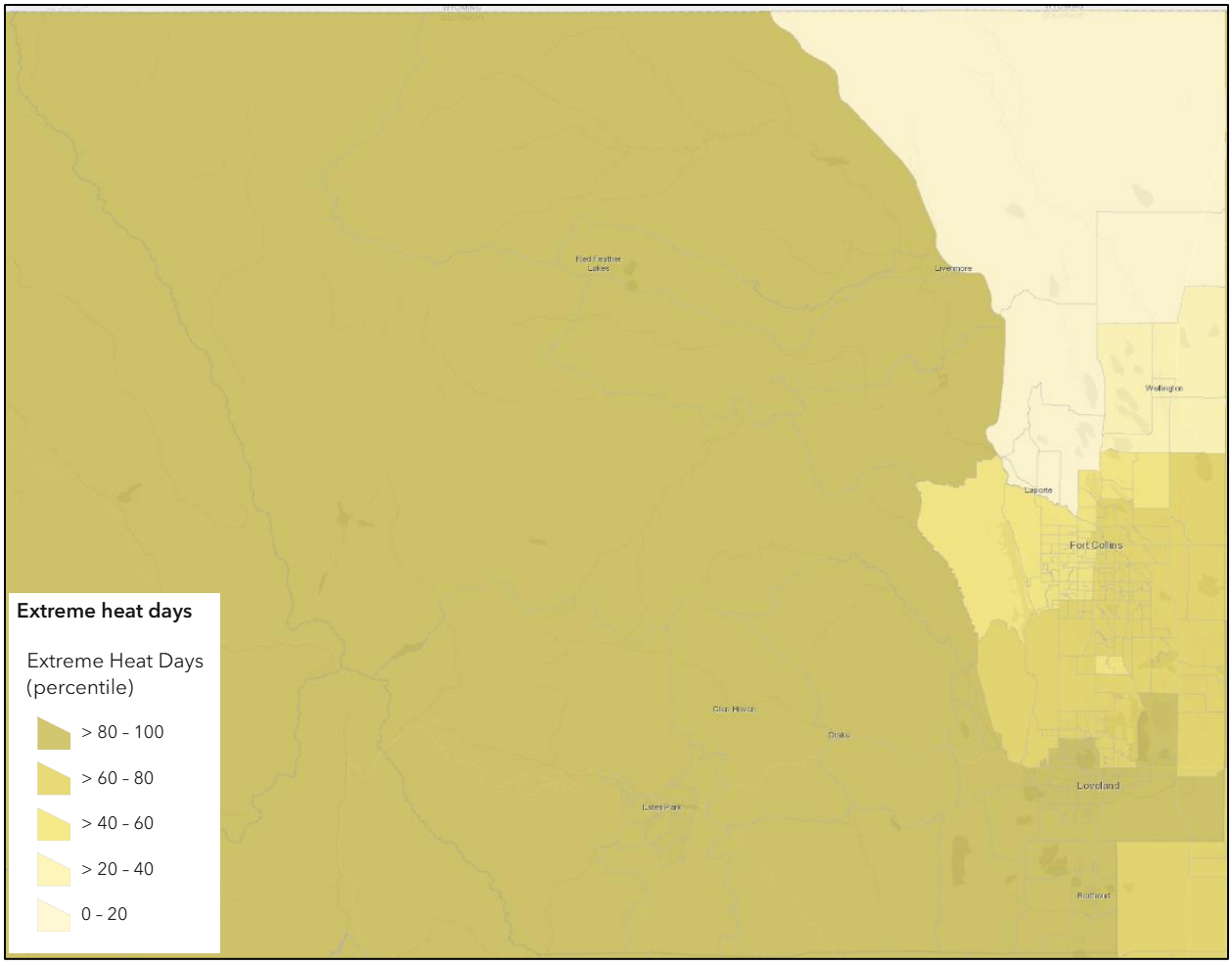
Map 4.13. Climate Vulnerability Score (that combines drought, extreme heat days, floodplains, and wildfire risk) based on CO EnviroScreen 2.0 based in Census Block Groups



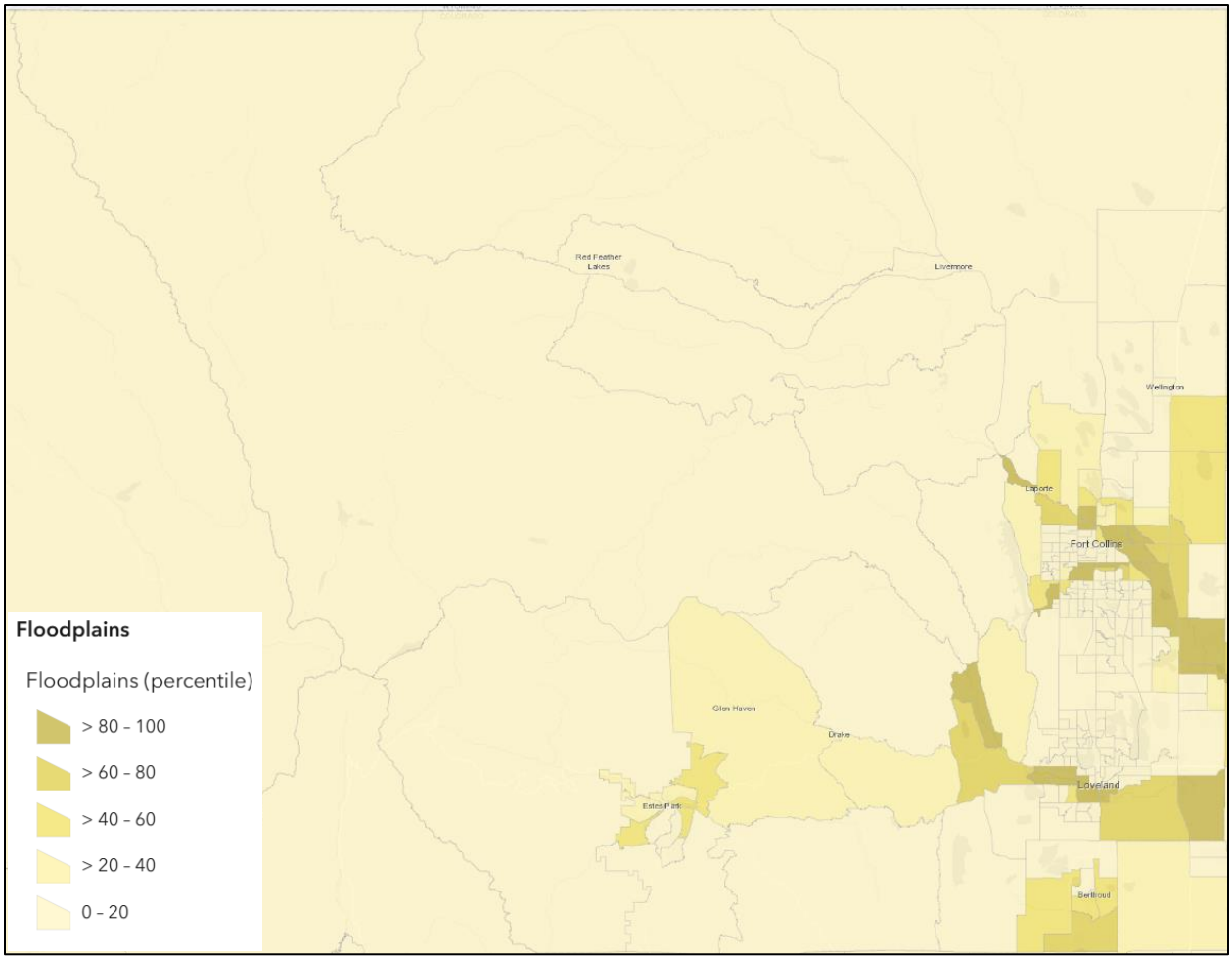
Map 4.14. Drought percentile based on CO EnviroScreen 2.0 based in Census Block Groups



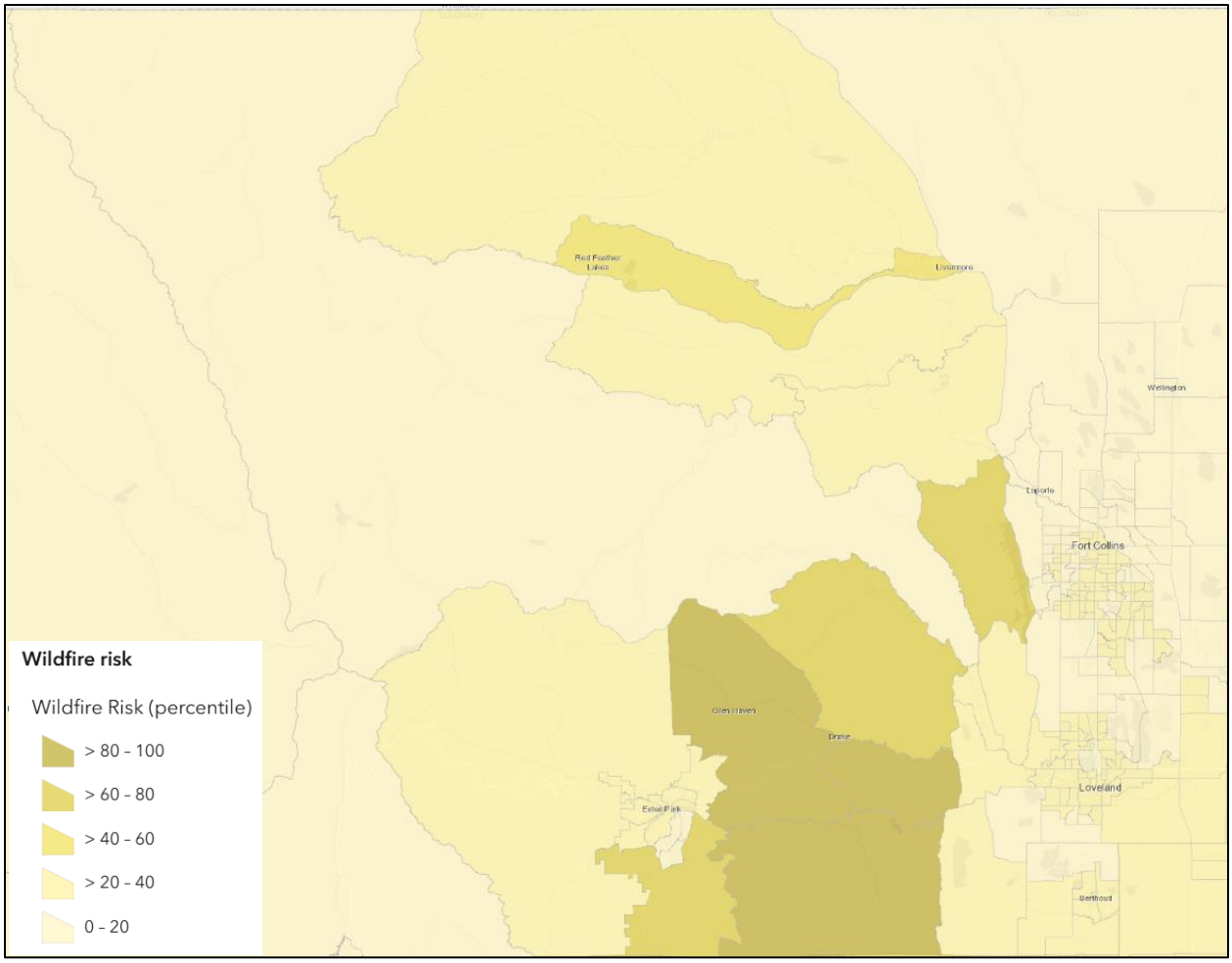
Map 4.15. Extreme heat days percentile based on CO EnviroScreen 2.0 based in Census Block Groups



Map 4.16. Floodplains percentile based on CO EnviroScreen 2.0 based in Census Block Groups



Map 4.17. Wildfire risk percentile based on CO EnviroScreen 2.0 based in Census Block Groups



4.5.5. Geographic Patterns of Disproportionate Impact

Analysis reveals several distinct patterns of environmental justice concern:

1. **High-Impact Areas**
    - Two census block groups exceed the 80th percentile threshold for CO EnviroScreen 2.0 scores
    - These areas warrant priority attention in climate strategy implementation
    - Located primarily in urbanized areas with higher population density
2. **Multiple Burden Communities** The analysis identified several areas facing multiple environmental justice challenges:
    - Overlap between environmental hazards and socioeconomic stressors
    - Concentrations of vulnerable populations
    - Limited access to resources and opportunities
3. **Geographic Distribution of Climate Risks** Climate vulnerabilities show distinct spatial patterns:
    - Urban heat island effects in developed areas
    - Flood risk in certain low-lying neighborhoods
    - Air quality concerns near major transportation corridors

For detailed information about CO EnviroScreen 2.0 list of environmental hazards, socioeconomic stressors, and their interactions, see Appendix 10.7.

4.5.6. Implications for Climate Strategies

The spatial analysis of climate actions reveals several key patterns in how environmental justice concerns intersect with proposed interventions. These patterns can inform the prioritization and implementation of climate strategies. For example, the analysis highlights the need for:

- Prioritizing high-impact areas: Census block groups 080690013042 and 080690020071, with high CO EnviroScreen 2.0 scores and multiple vulnerability factors, should be prioritized for multi-strategy implementation.
- Tailoring strategies to urban vs. rural needs: Urban areas, with higher concentrations of high-impact census block groups, may benefit from strategies focused on public transportation, energy efficiency, and 15-minute communities. Rural areas, with distinct vulnerability patterns related to transportation access and energy burden, may require modified approaches.
- Coordinating implementation: Transportation-related strategies (public transit, active transport, electric mobility) and energy-focused interventions (efficiency, renewables, building standards) share several priority areas, presenting an opportunity for coordinated implementation.

- Phased implementation: To avoid overwhelming communities, implement interventions in a phased manner, allowing time for adaptation and feedback.
- Resource efficiency: Cluster geographically related interventions to maximize resource utilization.

Table 4.4. provides detailed implementation recommendations for each climate action across specific census block groups, including the population affected and key considerations for each area.

4.5.7 Geographic Implementation Framework

To ensure effective implementation of climate strategies across identified priority areas, each action should be tailored to specific geographic contexts:

Priority Zone Implementation

- High-Impact Areas (EnviroScreen Score >80)
    - Census Block Groups 080690013042 and 080690020071
    - Combined population: 3,858 residents
    - Implementation Priority: Immediate (0-6 months)
    - Key Actions:
        - Launch targeted energy efficiency programs
        - Prioritize transit route expansion
        - Begin resilience hub development
- Multiple Burden Communities
    - Areas meeting multiple DIC criteria
    - Implementation Priority: Near-term (6-12 months)
    - Key Actions:
        - Implement fare equity programs
        - Develop anti-displacement measures
        - Launch multilingual outreach

Geographic Implementation Matrix

Each climate strategy should be implemented according to the following location-specific guidelines:

- Public Transportation
    - High-Impact Areas:
        - Immediate route expansion
        - Enhanced service frequency
        - Multilingual wayfinding systems
    - Secondary Priority Areas:
        - Phased service expansion
        - Community shuttle pilots
        - Connection improvements
- Energy Efficiency
    - High-Impact Areas:

    - Direct outreach campaigns
    - Enhanced incentive levels
    - Priority weatherization
- Secondary Priority Areas:
    - Standard program offerings
    - General marketing
    - Regular processing

This framework ensures that implementation priorities align with identified geographic needs while maximizing equity outcomes

Table 4.4. Detailed Climate Strategy Geographic Analysis

Climate Strategy	Priority Areas (Census Block Groups)	Environmental Justice Considerations	Population Affected	Geographic Implementation Recommendations
Public Transportation (Rank 1)	080690017063, 080690017064, 080690019011, 080690019012, 080690020071	High environmental exposure scores High Traffic Proximity and Volume scores Elevated Fine Particle Pollution levels High Pollution and Climate Burden scores	4,877 residents	Prioritize route expansion in high-exposure areas Focus on connecting residential zones to essential services Enhance service frequency in high-density areas Implement multilingual wayfinding systems Ensure ADA accessibility throughout
Energy Efficiency (Rank 2)	080690005051, 080690010031, 080690011061, 080690011111, 080690011112, 080690013041, 080690013042, 080690013052, 080690016011, 080690017063, 080690017065, 080690017073, 080690017151, 080690019023, 080690020052, 080690020071, 080690020083, 080690028031	High Health and Social Factors scores High Housing Cost Burden percentages Elevated Environmental Effects scores High Demographics Percentile scores Above average Climate Vulnerability scores	24,886 residents	Target weatherization in highest-need areas Prioritize multi-family housing improvements Focus on elderly and health-vulnerable populations Implement enhanced incentives in low-income areas Provide multilingual program materials

15-Minute Communities (Rank 3)	080690013042, 080690020071, 080690013041, 080690019023	High CO EnviroScreen 2.0 Percentile scores Elevated Health and Social Factors scores High Demographics Percentile scores Above average Environmental Exposures scores	6,436 residents	Prioritize development in service deserts Focus on connecting existing community assets Ensure affordable housing preservation Create multilingual community hubs Implement anti-displacement measures
Active Transportation (Rank 4)	080690017063, 080690017064, 080690019011, 080690020071	High Environmental Exposures scores Elevated Traffic Proximity scores High Air Toxics Emissions percentiles Above average Fine Particle Pollution levels	3,583 residents	Develop protected infrastructure in high-traffic areas Connect to transit nodes and essential services Prioritize safety improvements Ensure universal design principles Create multilingual safety education
Renewable Energy (Rank 5)	080690013042, 080690020071, 080690013041	High Climate Vulnerability scores High Environmental Effects scores Elevated Health and Social Factors scores High CO EnviroScreen 2.0 Percentile scores	5,087 residents	Site community solar in accessible locations Target battery storage in vulnerable areas Provide enhanced incentives Focus on resilience hubs Ensure equitable program access
Building Standards (Rank 6)	080690013042, 080690020071, 080690020083	High Housing Cost Burden percentages Elevated Health and Social Factors scores High Climate Vulnerability scores Above average Environmental Effects scores	5,984 residents	Phase implementation based on vulnerability Provide technical assistance Create cost-mitigation programs Ensure landlord compliance Develop multilingual resources
Electric Mobility (Rank 7)	080690017063, 080690017064, 080690020071	High Traffic Proximity and Volume scores Elevated Air Toxics Emissions levels High Environmental Exposures scores Above average Pollution Burden scores	2,622 residents	Site charging in underserved areas Prioritize multi-family housing locations Focus on shared mobility solutions Implement equitable access programs Create multilingual education materials

4.5.8. Geographic Priority Areas

1. **Highest Priority** (CO EnviroScreen 2.0 Score >80)
    - Census Block Groups 080690013042 and 080690020071
    - Combined population: 3,858 residents
    - Focus: Comprehensive multi-strategy implementation
2. **High Priority** (Multiple DIC Criteria)
    - Areas identified in Maps 4.2-4.7
    - Focus: Targeted strategy implementation based on specific vulnerabilities

The geographic analysis identified two census block groups with particularly high environmental burden scores, highlighting priority zones for climate action implementation. The geographic distribution of environmental burdens demonstrates the need for targeted, location-specific approaches within each climate strategy to ensure equitable outcomes across the county.

5. Co-Benefits and Risks

HIGHLIGHTS

- This section analyzes the potential co-benefits and risks of implementing the seven climate strategies.
- It considers how these co-benefits and risks may affect different communities in Larimer County.
- Environmental co-benefits include air quality improvements, ecosystem protection, and resource conservation.
- Social and economic impacts include job creation, enhanced community connectivity, and potential disruptions.
- Health implications include reduced respiratory illness, increased physical activity, and improved mental health.
- The section also assesses potential risks, including implementation, economic, social, technical, and political factors.

This section analyzes potential co-benefits and risks associated with implementing the seven climate strategies, providing a comprehensive understanding of potential positive and negative impacts. The analysis explicitly considers how these co-benefits and risks may disproportionately affect different equity-priority communities in Larimer County.

5.1. Environmental Co-Benefits

Strong environmental co-benefits were identified across strategies, including:

- **Air Quality Improvements:** Significant reductions in criteria pollutants would particularly benefit communities located near major roadways and industrial areas, which often have higher concentrations of low-income residents and people of color (Anderson et al., 2018; Mueller et al., 2017). Decreased ground-level ozone formation and reduced particulate matter emissions would also improve respiratory health.
- **Ecosystem Protection:** Reduced habitat fragmentation, improved water quality, and enhanced urban green space would benefit both urban and rural communities, enhancing quality of life and providing recreational opportunities.
- **Resource Conservation:** Decreased energy consumption, improved water use efficiency, and reduced material waste would benefit all communities, particularly those with high energy burdens or limited access to resources (Eskander & Fankhauser, 2020).

5.2. Social and Economic Impacts

Each strategy demonstrated distinct social and economic implications:

- **Positive Impacts:** Job creation in clean energy and transportation sectors would provide economic opportunities in disadvantaged communities with higher unemployment rates. Enhanced community connectivity, improved access to services and opportunities, and

reduced household transportation and energy costs would benefit low-income households and communities with limited mobility options.

- **Potential Challenges:** Short-term disruption during implementation could disproportionately affect communities with limited alternative transportation options. Transition costs for businesses and households may be challenging for low-income residents and small businesses. The need for workforce retraining requires accessible and affordable training programs for workers in transitioning industries. Potential housing market effects from 15-minute communities and other strategies could lead to displacement if not managed proactively.

5.3. Health Implications

Analysis revealed significant health co-benefits:

- **Physical Health:** Reduced respiratory illness would particularly benefit children and the elderly, who are more vulnerable to air pollution. Increased physical activity from active transportation would improve overall health and reduce chronic disease rates (Haines et al., 2006; Campbell-Lendrum et al., 2007). Better access to healthcare due to improved transportation and 15-minute communities would benefit communities with limited healthcare access.
- **Mental Health:** Reduced stress from improved mobility, enhanced community connection, and greater access to green spaces would benefit communities with limited access to parks and recreational opportunities.
- **Environmental Health:** Decreased exposure to pollutants, improved indoor air quality, and reduced urban heat island effects would benefit communities located near pollution sources or in areas with higher heat vulnerability.

Table 5.1. Strategy Co-Benefits Assessment

Strategy	Environmental	Social	Economic	Health
Public Transportation	Very High	High	High	High
Energy Efficiency	High	Moderate	Very High	High
15-Minute Communities	High	Very High	High	Very High
Renewable Energy	Very High	Moderate	High	Moderate

5.4. Risk Assessment

This section assesses potential risks associated with implementing the seven climate strategies. Understanding these risks is crucial for proactive mitigation planning, resource allocation, and ensuring equitable outcomes (Krieg & Faber, 2004; Luyten et al., 2023). The analysis considers various risk dimensions, including implementation, financial, technical, political, and social factors, to provide a comprehensive understanding of potential challenges.

Risk Categories

The risk assessment considers the following dimensions:

- **Implementation Risks:** Challenges related to project coordination, resource availability, technical complexity, and adherence to timelines.
- **Economic Risks:** Potential cost burdens, market transition effects, business adaptation needs, and investment requirements.
- **Social Risks:** Potential community disruption, equity concerns, access disparities, and cultural considerations.
- **Technical Risks:** Technology dependencies, infrastructure limitations, and potential technical challenges.
- **Political Risks:** Policy and regulatory barriers, political will, and potential conflicts with existing policies.

Risk Level

For each climate action, risks are evaluated across the following categories:

- **High Risk:** Requires immediate attention and proactive mitigation strategies. May significantly impact project success or equity outcomes if not addressed effectively.
- **Medium Risk:** Requires careful monitoring and planning. May pose challenges to implementation or equity goals if not managed proactively.
- **Low Risk:** Requires less immediate attention but should be monitored. Unlikely to significantly impact project success or equity outcomes.

Table 5.2. Risk Assessment by Climate Action

Climate Action	Risk Category	Risk Level	Description
Public Transportation	Implementation	High	Complex coordination requirements across multiple jurisdictions and agencies.
Public Transportation	Economic	Medium	Potential funding shortfalls for expanding service and maintaining affordability.
Energy Efficiency	Implementation	Medium	Difficulty reaching and engaging low-income and minority communities.
Energy Efficiency	Economic	Medium	Upfront costs for households and potential split incentives in rental properties.

15-Minute Communities	Implementation	High	Securing community buy-in and managing potential displacement pressures.
15-Minute Communities	Economic	High	Significant financial resources needed for infrastructure development and land acquisition.
Active Transportation	Implementation	Medium	Public engagement and ensuring equitable distribution of infrastructure.
Active Transportation	Economic	Medium	Funding availability and competition with other transportation priorities.
Renewable Energy	Technical	Medium	Grid integration challenges and potential impacts on energy affordability.
Renewable Energy	Political	Medium	Policy and regulatory barriers, community opposition to project siting.
Building Standards	Implementation	Medium	Ensuring compliance and providing support for low-income property owners.
Building Standards	Economic	Medium	Increased upfront costs for new construction and potential impacts on housing affordability.
Electric Mobility	Technical	Medium	Charging infrastructure accessibility and technology adoption barriers.
Electric Mobility	Social	Low	Community adaptation to new transportation options and potential for inequitable access.

How to Use the Risk Assessment

This risk assessment highlights potential challenges to implementing climate strategies. Strategies with "High" risk levels require more attention and proactive mitigation planning. The assessment should inform decision-making, resource allocation, and community engagement efforts. High-risk factors should be addressed with targeted strategies during project planning and implementation.

6. Recommendations

HIGHLIGHTS

- This section provides detailed recommendations for implementing the seven climate strategies.
- It aims to maximize benefits for vulnerable populations while mitigating potential negative impacts.
- Recommendations are linked to the EJIA findings, addressing equity concerns, mitigating risks, and prioritizing actions.
- The section includes strategy-specific recommendations, geographic equity implementation recommendations, and cross-cutting recommendations.
- It emphasizes the importance of community engagement and incorporating community feedback throughout implementation.

6.1 Overview

Based on the comprehensive analysis of seven climate strategies and their potential impacts on environmental justice in Larimer County, this section presents detailed recommendations for implementation. The recommendations are structured to maximize benefits for vulnerable populations while mitigating potential negative impacts identified in the EJIA.

Connecting Recommendations to EJIA Findings

Throughout this section, recommendations will explicitly link to the EJIA findings in the following ways:

- Addressing Equity Concerns: Each set of recommendations will specifically address the equity concerns raised in the analysis, such as access disparities, affordability challenges, and potential displacement risks.
- Mitigating Risks: Recommendations will incorporate strategies to mitigate the identified risks for each climate action, drawing on the risk assessment in Section 5.
- Prioritizing Actions: Recommendations will prioritize actions that have the greatest potential to benefit equity-priority communities and address their most pressing needs.
- Community Input: Recommendations will emphasize the importance of ongoing community engagement and incorporating community feedback throughout implementation.

6.2 Strategy-Specific Recommendations

6.2.1. Public Transportation (Rank: 1)

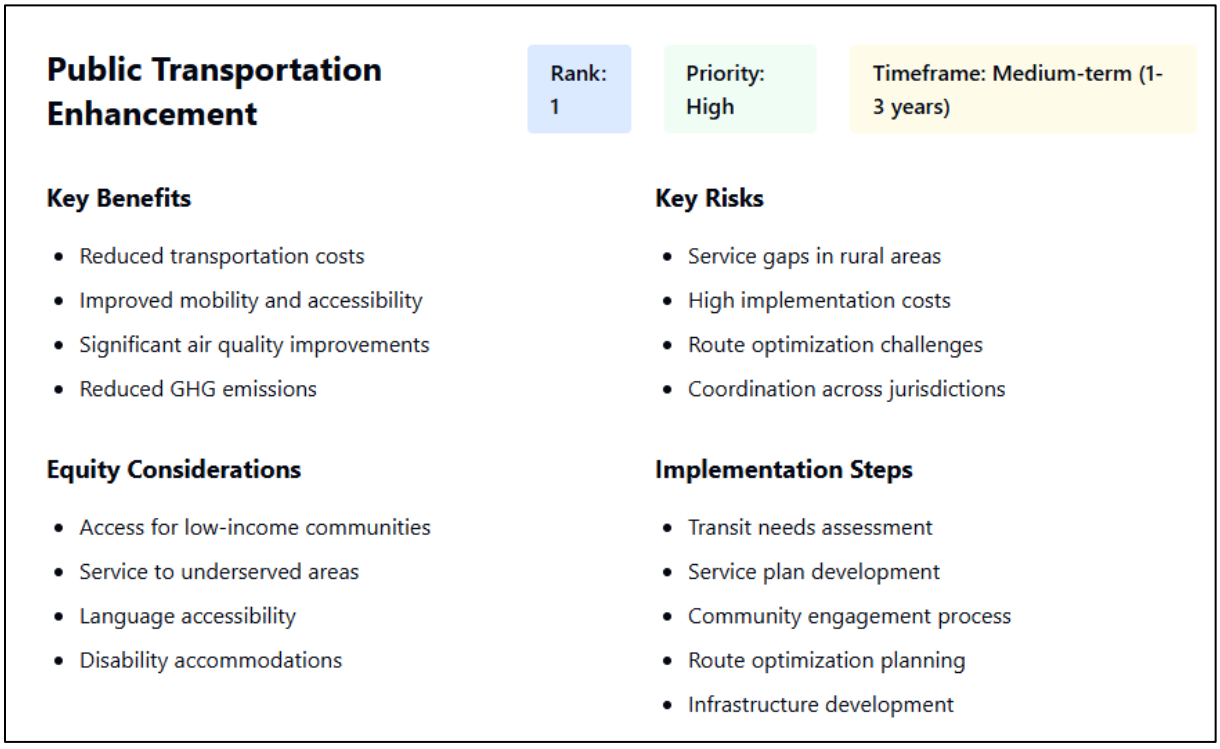
The public transportation strategy emerged as the top performer in the EJIA analysis, demonstrating exceptional potential to advance environmental justice while achieving significant climate benefits.

This strategy's strong equity scores (4.8) and high benefit potential (4.6) make it a clear priority for implementation.

Key recommendations for the public transportation strategy include:

- Conduct a comprehensive transit needs assessment focusing on the unique mobility needs of low-income, minority, rural, and linguistically isolated communities. Use this assessment to inform the development of an equity-focused service plan that maximizes accessibility and affordability.
- Establish a community advisory board to provide ongoing guidance on service expansion, fare structures, and accessibility improvements. Ensure diverse representation from historically marginalized groups on this board.
- Expand service coverage to underserved areas, particularly rural communities and neighborhoods with high concentrations of low-income residents and people of color. Implement fare equity programs to ensure financial accessibility.
- Enhance paratransit services and build partnerships with social service providers to improve mobility options for seniors, people with disabilities, and other vulnerable populations.
- Leverage transit improvements as a catalyst for broader community development, creating job opportunities and economic empowerment in the neighborhoods that receive enhanced service.

Figure 6.1. Public Transportation (Rank 1) Recommendation Summary Card



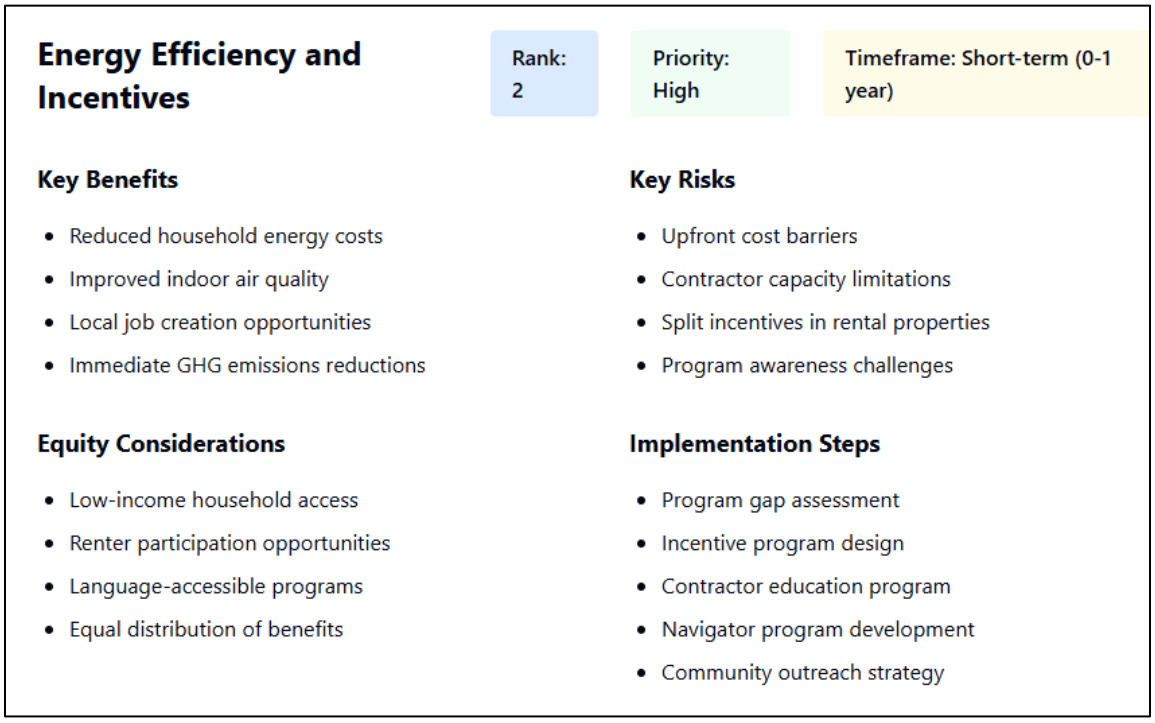
6.2.2. Energy Efficiency (Rank: 2)

The energy efficiency strategy also ranked highly in the EJIA analysis, demonstrating a strong balance of equity (4.5), benefits (4.4), and manageable risk factors (2.9). This strategy presents significant opportunities to reduce energy costs and improve indoor air quality for historically marginalized communities.

Key recommendations for the energy efficiency strategy include:

- Launch a comprehensive "Energy Navigator" technical assistance program to provide low-income households, small businesses, and multifamily properties with the resources and support needed to reduce energy use and upgrade to efficient technologies.
- Conduct a gap assessment of existing energy efficiency programs to identify underserved populations and opportunities for improved coordination across utility, government, and community-based initiatives. Use the findings to inform the development of targeted, equity-centered programs.
- Develop innovative financing mechanisms, such as on-bill financing and low-interest loans, to help overcome the upfront cost barriers that disproportionately affect low-income and minority communities.
- Partner with affordable housing providers, community organizations, and workforce development agencies to ensure energy efficiency programs are accessible, culturally responsive, and create local job opportunities.
- Expand multilingual outreach, education, and service delivery to improve participation from linguistically isolated households and businesses.

Figure 6.2. Energy Efficiency (Rank 2) Recommendation Summary Card



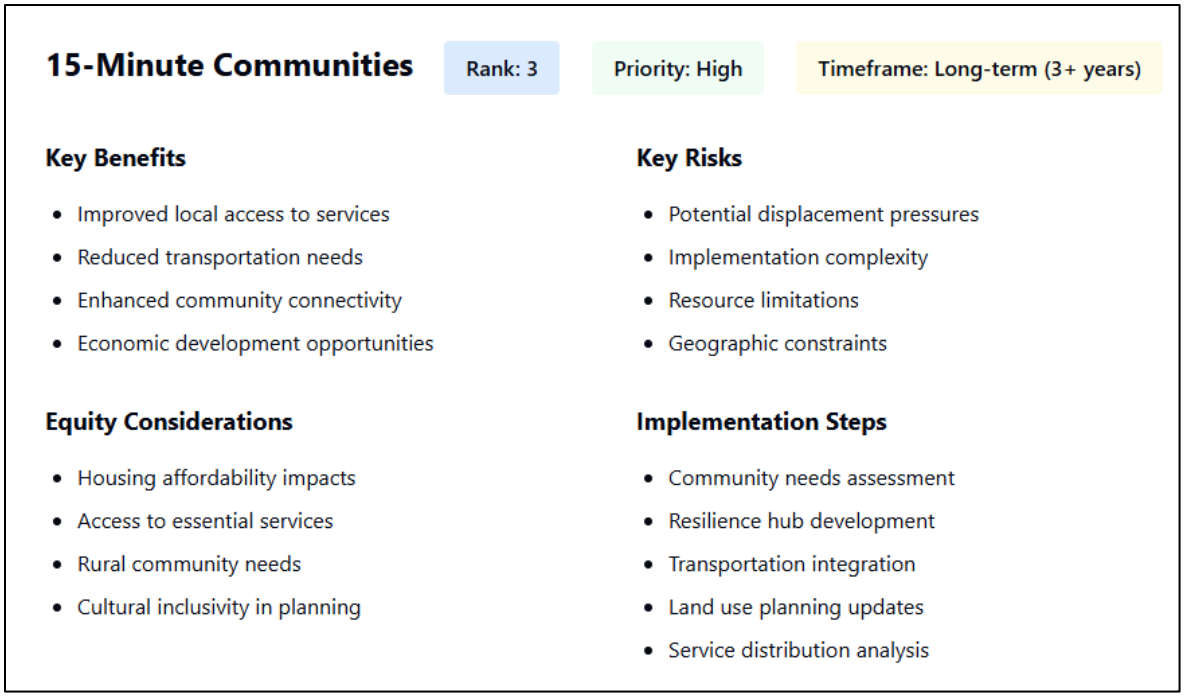
6.2.3. 15-Minute Communities (Rank: 3)

The 15-minute communities strategy received strong scores for both equity (4.4) and benefits (4.4), reflecting its potential to improve access to essential services and enhance community resilience. However, the strategy also faces moderate implementation risks (3.0) that must be carefully managed.

Key recommendations for the 15-minute communities strategy include:

- Assess potential locations for resilience hubs in collaboration with equity-priority communities, ensuring these hubs are strategically placed to serve the most vulnerable populations, including low-income residents, communities of color, and linguistically isolated groups.
- Design resilience hubs as multi-use community centers that address a range of needs, such as food access, energy security, healthcare, and emergency preparedness. Integrate these hubs with the 15-minute community transportation network to improve overall accessibility.
- Develop resilience hub governance structures and programming with direct input from the communities they are intended to serve. Ensure representation from marginalized groups in decision-making processes.
- Leverage the 15-minute community model to improve access to healthcare facilities, grocery stores, and other essential services, with a particular focus on serving elderly residents, people with disabilities, and families with young children.
- Use the 15-minute community planning process as an opportunity to address historic inequities in infrastructure investment and community development, actively engaging with communities of color and other underserved populations.

Figure 6.3. 15-Minutes Communities (Rank 3) Recommendation Summary Card



6.2.4. Active Transportation (Rank: 4)

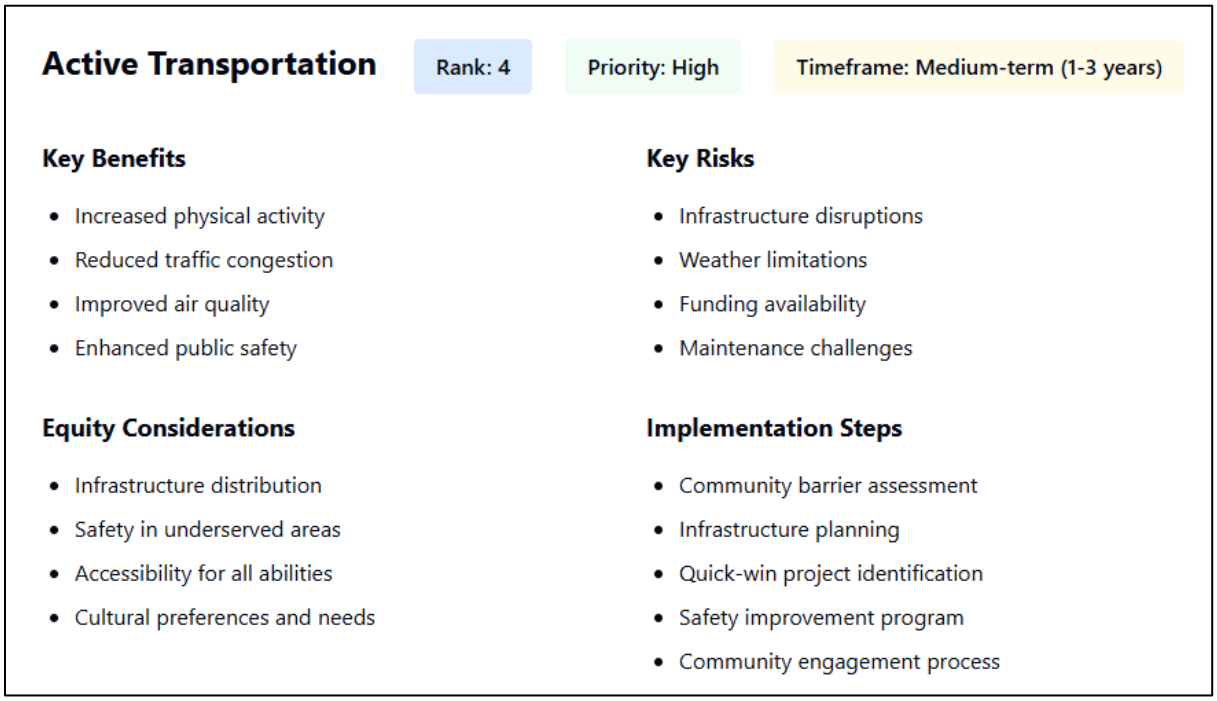
The active transportation strategy received strong scores for both equity (4.3) and benefits (4.2), highlighting its potential to improve mobility, safety, and environmental outcomes. However, the strategy also faces moderate implementation risks (3.1) that must be carefully navigated.

Key recommendations for the active transportation strategy include:

- Update the county's transportation master plan to prioritize active transportation improvements in low-income neighborhoods, communities of color, and other underserved areas. Ensure these improvements are coordinated with the NFRMPO Active Transportation Plan.
- Identify "quick win" active transportation projects that can be rapidly deployed to demonstrate immediate benefits and build community momentum. Prioritize these projects in historically marginalized communities.
- Develop comprehensive metrics to track progress in expanding the active transportation network, with a focus on measuring equity indicators such as geographic distribution, accessibility for people with disabilities, and usage patterns across different demographic groups.

- Engage diverse community stakeholders, including youth, seniors, and people with disabilities, in the active transportation planning process to ensure the network meets the unique needs of all users.
- Collaborate with public health agencies to assess the community health impacts of active transportation improvements, using this data to guide project prioritization and design.

Figure 6.4. Active Transport (Rank 4) Recommendation Summary Card



6.2.5. Renewable Energy (Rank: 5)

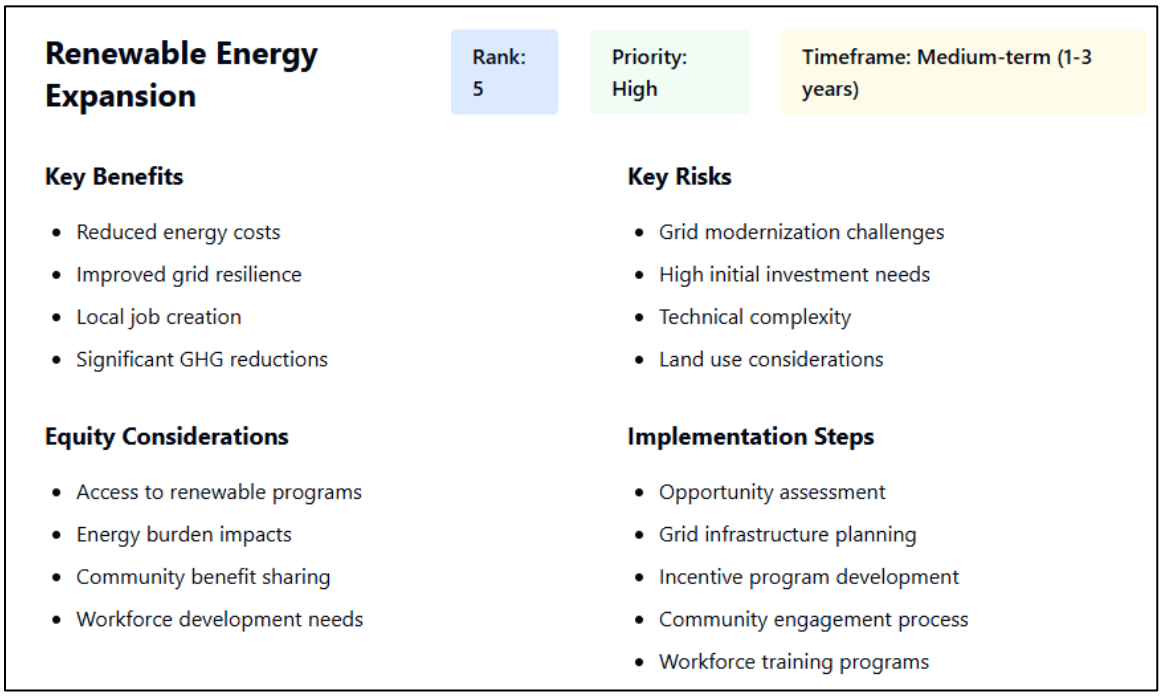
The renewable energy strategy received strong benefit scores (4.5) but faced moderately higher implementation risks (3.2) compared to some of the other top-ranked strategies. Careful planning and community engagement will be critical to ensure this strategy advances environmental justice.

Key recommendations for the renewable energy strategy include:

- Conduct a comprehensive assessment of renewable energy and energy storage opportunities across Larimer County, with a specific focus on identifying cost-effective solutions for low-income communities and communities of color. Ensure this analysis involves extensive community engagement and input.
- Prioritize the development of community-owned renewable energy projects, particularly in historically underserved areas, to maximize the economic and social benefits of the clean energy transition.
- Improve grid reliability and resilience in equity-priority communities, ensuring that critical infrastructure upgrades do not disproportionately burden low-income residents or contribute to gentrification and displacement.

- Develop targeted incentive programs and financing mechanisms to support renewable energy adoption in affordable housing, rental properties, and other underserved market segments.
- Implement comprehensive community outreach and education campaigns to raise awareness about renewable energy options and ensure equitable access to the associated benefits, particularly for linguistically isolated and low-income households.

Figure 6.5. Renewable Energy (Rank 5) Recommendation Summary Card



6.2.6. Building Standards (Rank: 6)

The building standards strategy received solid scores for both equity (4.1) and benefits (4.0), but faces higher implementation risks (3.3) that must be carefully addressed. This strategy presents opportunities to improve energy efficiency and resilience, while also mitigating potential adverse impacts on affordable housing.

Key recommendations for the building standards strategy include:

- Engage a diverse group of stakeholders, including affordable housing advocates, energy efficiency experts, and representatives from low-income and minority communities, to develop consensus on the goals and language for updated building codes.
- Ensure that code changes do not disproportionately burden low-income property owners or renters, and include provisions to protect against unintended consequences like increased housing costs or displacement.
- Provide technical assistance, training, and financial incentives to support low-income households and affordable housing providers in meeting new energy efficiency and resilience requirements.

- Develop multilingual educational materials and outreach programs to improve awareness and understanding of the building code updates among linguistically isolated communities.
- Monitor the equity impacts of the building code changes over time, making adjustments as needed to ensure they do not exacerbate existing disparities in housing quality, energy burden, or community resilience.

Figure 6.6. Building Energy Standards (Rank 6) Recommendation Summary Card

Building Energy Standards

Rank: 6 | Priority: Medium | Timeframe: Long-term (2-5 years)

Key Benefits

- Long-term energy savings
- Enhanced building resilience
- Market transformation
- Consistent building performance

Key Risks

- Development cost increases
- Housing affordability impacts
- Implementation complexity
- Industry adaptation challenges

Equity Considerations

- Housing cost impacts
- Renter protection needs
- Small business support
- Workforce development

Implementation Steps

- Stakeholder engagement process
- Code development and updates
- Industry training programs
- Compliance support systems
- Technical assistance program

6.2.7. Electric Mobility (Rank: 7)

The electric mobility strategy received the lowest overall ranking in the EJIA analysis, primarily due to lower equity scores (3.9) and higher implementation risks (3.4). However, this strategy still presents opportunities to improve transportation access and reduce emissions in historically disadvantaged communities.

Key recommendations for the electric mobility strategy include:

- Develop an equity-centered electric vehicle charging station (EVCS) plan that prioritizes the deployment of charging infrastructure in low-income neighborhoods, communities of color, and other underserved areas. Ensure the plan addresses the unique needs of renters, multifamily housing residents, and people with disabilities.
- Implement targeted outreach, education, and financial incentive programs to promote electric vehicle and e-bike adoption among low-income households, small businesses, and minority-owned enterprises. Partner with community organizations to deliver these programs in a culturally responsive manner.

- Create job training and workforce development programs to prepare local residents, including those from disadvantaged communities, for careers in the electric mobility sector, such as charging station installation and maintenance.
- Collaborate with major employers and transportation network companies to develop equitable electric mobility programs that improve access to jobs and services for underserved populations.
- Ensure all-electric mobility initiatives, including infrastructure, vehicles, and services, are designed with universal accessibility in mind to accommodate the needs of people with disabilities.

Figure 6.7. Electric Mobility (Rank 7) Recommendation Summary Card

Electric Mobility | Rank: 7 | Priority: Medium | Timeframe: Long-term (2-5 years)

Key Benefits

- Reduced transportation emissions
- Lower operating costs
- Improved air quality
- Enhanced transportation options

Key Risks

- High upfront vehicle costs
- Infrastructure needs
- Grid capacity challenges
- Technology adoption barriers

Equity Considerations

- Income-based accessibility
- Charging infrastructure distribution
- Rural community access
- Worker transition support

Implementation Steps

- Infrastructure assessment
- Incentive program development
- Workforce training programs
- Community outreach campaign
- Policy framework updates

6.3 Geographic Equity Implementation Recommendations

To effectively integrate the geographical analysis and its results into the recommendations section of the Environmental Justice Impact Assessment (EJIA), consider the following:

1. Prioritize High-Impact Areas: Based on the geographic analysis, prioritize the implementation of interventions in census block groups with high CES scores and multiple vulnerability factors. Specifically, prioritize these areas:

- Census Block Group 080690013042:
  - CES Score: 81.43
  - Population: 2,118 residents

    - Key Characteristics: High pollution burden, very high health vulnerability, moderate climate vulnerability.

- Census Block Group 080690020071:
    - CES Score: 80.42
    - Population: 1,740 residents
    - Key Characteristics: Very high pollution burden, high health vulnerability, high climate vulnerability.

These areas should be prioritized for comprehensive multi-strategy implementation, addressing their unique vulnerabilities and needs.

2. Tailor Strategies to Urban vs. Rural Needs: The geographic analysis reveals distinct environmental justice patterns in urban and rural areas. Tailor the implementation of climate strategies to address these specific needs:

- Urban Areas: Focus on strategies that improve public transportation, enhance energy efficiency, and promote 15-minute communities.
- Rural Areas: Modify implementation approaches to address challenges related to transportation access and energy burden. Consider strategies that expand public transportation coverage, improve energy efficiency in geographically dispersed housing, and promote community-scale renewable energy projects.

3. Coordinate Implementation: Leverage geographic overlap to coordinate the implementation of related strategies.

- Transportation-Related Interventions: Coordinate the implementation of public transportation, active transportation, and electric mobility strategies to maximize their combined impact.
- Energy-Focused Interventions: Coordinate the implementation of energy efficiency, renewable energy, and building standards strategies to address energy burden and promote clean energy adoption.

4. Phased Implementation: Implement interventions in a phased manner to avoid overwhelming communities and allow time for adaptation and feedback. Prioritize interventions based on the urgency of needs and the availability of resources.

5. Resource Efficiency: Cluster geographically related interventions to maximize resource utilization and minimize implementation costs.

By incorporating these geographically informed recommendations, the EJIA can promote equitable climate mitigation strategies that address the unique needs of different communities in Larimer County.

6.4 Cross-Cutting Recommendations

To ensure that equity remains central to the process, these cross-cutting recommendations have been integrated into the implementation tables (Tables 6.1-6.4) in the following ways:

- Equity Integration: Equity considerations are embedded throughout the tables, including specific equity-focused actions in Table 6.1, identification of resources needed for equitable implementation in Table 6.2, detailed equity tracking mechanisms in Table 6.3, and inclusion of equity-related risks and mitigation strategies in Table 6.4.
- Community Engagement: The tables emphasize ongoing community involvement, including early stakeholder engagement in planning phases (Table 6.1), resource allocation for community participation (Table 6.2), metrics tracking community engagement levels (Table 6.3), and risk mitigation strategies involving community input (Table 6.4).
- Capacity Building: Each table addresses capacity building needs, such as phased implementation to build capacity over time (Table 6.1), identification of specific resource needs for training and development (Table 6.2), metrics tracking workforce development (Table 6.3), and strategies to address capacity-related risks (Table 6.4).
- Multi-stakeholder Coordination: The tables highlight coordination needs, including clear definitions of lead and supporting roles (Table 6.1), identification of shared resource opportunities (Table 6.2), collaborative data collection methods (Table 6.3), and joint risk management responsibilities (Table 6.4).
- Sustainable Funding: Financial sustainability is addressed through the identification of phased funding needs by timeline (Table 6.1), diverse funding sources and strategies (Table 6.2), financial impact metrics (Table 6.3), and financial risk management approaches (Table 6.4).

The cross-cutting recommendations and implementation tables work together to provide a comprehensive framework for the successful implementation of all climate mitigation actions while ensuring equity remains central to the process.

6.5. Contingency Planning and Alternative Approaches

Each priority action requires backup plans to ensure continued progress toward environmental justice goals:

Public Transportation:

Primary Plan: Full-service expansion in identified DI communities.

Contingencies:

- Funding Shortfall: Implement micro-transit in highest-need areas

- Infrastructure Delays: Establish immediate shuttle services

- Low Ridership: Adjust routes based on community feedback

Energy Efficiency:

Primary Plan: Comprehensive home upgrade program

Contingencies:

- Resource Constraints: Focus on quick-win improvements
- Contractor Shortage: Develop resident training programs
- Low Participation: Enhance incentives and outreach

15-Minute Communities:

Primary Plan: Full infrastructure development

Contingencies:

- Land Availability Issues: Focus on service coordination
- Development Delays: Implement temporary service hubs
- Cost Escalation: Phase improvements over longer period

Alternative Implementation Pathways:

1. Accelerated Timeline
   - Requirements: Additional funding, staff capacity
   - Trigger: New funding sources or urgent community needs
2. Phased Approach
   - Requirements: Prioritization framework, community buy-in
   - Trigger: Resource constraints or implementation challenges
3. Pilot-First Strategy
   - Requirements: Test sites, evaluation metrics
   - Trigger: High uncertainty about effectiveness

Modification Triggers:

- Equity Metrics: Adjust if disparities increase
- Cost Thresholds: Modify if exceeding budgets by 20%

- Timeline Delays: Revise if milestones are missed by 3+ months

- Community Feedback: Change if satisfaction is below 70%

Table 6.1. Suggested Priority Actions by Timeline

Purpose: Guide the sequencing and coordination of actions across all climate strategies, identifying key milestones and responsible parties.

Timeline	Climate Action	Priority Actions	Action Teams
Immediate (0-6 months)	Public Transportation	• Conduct transit needs assessment • Develop equity-focused service plan • Establish community advisory board	Regional Mobility Team
	Energy Efficiency	• Launch Navigator technical assistance program • Conduct gap assessment of existing programs • Develop contractor training framework	Energy Efficiency and Electrification Team
	15-Minute Communities	• Identify potential resilience hub locations • Assess healthcare facility access • Begin community engagement process	Disaster Mitigation and Adaptation Team
Short-term (6-18 months)	Renewable Energy	• Assess renewable energy opportunities • Develop grid modernization plan • Create incentive structures	Grid Resilience and Renewables Team
	Active Transportation	• Update transportation master plan • Identify "quick win" projects • Develop metrics tracking system	Regional Mobility Team
	Building Standards	• Review existing building codes • Establish stakeholder meetings • Develop consensus on goals	Energy Code Team
	Electric Mobility	• Implement EVCS plan • Develop community outreach plan • Create equity-centered programs	Energy Efficiency and Electrification Team

Timeline	Climate Action	Priority Actions	Action Teams
Medium-term (18-36 months)	Public Transportation	• Expand service to underserved areas • Implement fare equity programs • Enhance paratransit services	Regional Mobility Team
	Energy Efficiency	• Scale up successful pilot programs • Implement targeted incentives • Expand multilingual services	Energy Efficiency and Electrification Team
	15-Minute Communities	• Develop resilience hubs • Enhance transit-healthcare connections • Implement food access programs	Disaster Mitigation and Adaptation Team
Long-term (3+ years)	Building Standards	• Implement updated codes • Launch compliance support systems • Monitor equity impacts	Energy Code Team

Table 6.2. Resource Requirements by Action

Purpose: Define specific resources needed for the successful implementation of each climate action, including funding sources and strategies to address gaps.

Climate Action	Required Resources	Potential Funding Sources	Resource Gaps	Strategy to Address
Public Transportation	• Transit vehicles • Operating staff • Route planning software • Multilingual materials	• Federal Transit Grants • State Transportation Funds • Local Sales Tax • MMOF Funds	• Rural service capacity • Multilingual staff • Maintenance facilities	• Regional partnerships • Language access grants • Infrastructure bonds
Energy Efficiency	• Technical experts • Program staff • Outreach materials • Monitoring systems	• Utility Program Funds • Federal Energy Grants • State Efficiency Funds	• Contractor capacity • Rural program delivery • Income-qualified support	• Workforce development • Mobile service units • Partnership programs

Climate Action	Required Resources	Potential Funding Sources	Resource Gaps	Strategy to Address
		• ARPA Funding		
15-Minute Communities	• Planning expertise • Community liaisons • Assessment tools • Infrastructure funds	• HUD Grants • CDBG Funds • State Planning Grants • Local Tax Revenue	• Land acquisition • Technical analysis • Community engagement	• Public-private partnerships • University collaborations • Community land trusts
Renewable Energy	• Technical expertise • Grid infrastructure • Planning tools • Installation capacity	• Federal Energy Grants • Utility Programs • State Energy Funds • Private Investment	• Grid modernization • Storage systems • Technical staff	• Utility partnerships • Training programs • Phased implementation
Active Transportation	• Design expertise • Construction crews • Safety equipment • Planning tools	• Transportation Grants • Local Tax Revenue • State Safety Funds • Federal Programs	• Construction capacity • Winter maintenance • Design expertise	• Contractor training • Equipment sharing • Regional coordination
Building Standards	• Code expertise • Training materials • Enforcement staff • Education resources	• Permit Fees • State Grants • Federal Funding • Industry Support	• Technical expertise • Training capacity • Enforcement staff	• Industry partnerships • Regional sharing • Online training

Climate Action	Required Resources	Potential Funding Sources	Resource Gaps	Strategy to Address
Electric Mobility	• Charging infrastructure • Technical staff • Planning tools • Education materials	• Federal EV Grants • State Programs • Utility Funding • Local Tax Revenue	• Installation capacity • Grid upgrades • Technical expertise	• Utility partnerships • Phased rollout • Training programs

Table 6.3. Equity Metrics by Strategy

Purpose: The following equity metrics have been designed to track both immediate implementation outcomes and long-term progress in improving CO EnviroScreen 2.0 indicators. Each metric connects to specific CO EnviroScreen 2.0 components, allowing us to measure how climate actions affect environmental justice outcomes over time.

Climate Action	Equity Metrics	Data Sources	Collection Method	Reporting Frequency
Public Transportation	• % population within 1/4 mile of service • Income distribution of riders • Service frequency in equity areas • Language accessibility score • ADA compliance rate	• Ridership surveys • Census data • GIS analysis • Service records	• Automated passenger counts • Annual surveys • GIS mapping • Compliance audits	• Monthly service metrics • Quarterly equity reports • Annual comprehensive review
Energy Efficiency	• % low-income households served • Geographic distribution of programs • Energy burden reduction	• Program data • Utility records • Census data • Participant surveys	• Program tracking • Energy audits • Participant feedback • Cost monitoring	• Monthly program metrics • Quarterly assessments • Annual impact review

Climate Action	Equity Metrics	Data Sources	Collection Method	Reporting Frequency
	• Multilingual program access • Renter participation rates			
15-Minute Communities	• Access to essential services • Healthcare facility proximity • Food access improvements • Community participation rates • Housing affordability metrics	• GIS analysis • Community surveys • Health data • Housing data	• Spatial analysis • Community feedback • Health assessments • Housing studies	• Quarterly access reports • Semi-annual reviews • Annual assessments
Renewable Energy	• Distribution of installations • Program participation equity • Cost burden impacts • Community benefit sharing • Job creation metrics	• Installation data • Program records • Employment data • Cost analyses	• Project tracking • Participant surveys • Economic analysis • Employment monitoring	• Monthly installation reports • Quarterly equity reviews • Annual impact assessment
Active Transportation	• Infrastructure distribution • Usage patterns by demographics • Safety improvements • Access to key destinations	• Infrastructure maps • Usage counts • Safety data • Community input	• GIS mapping • User surveys • Safety monitoring • Community feedback	• Monthly safety reports • Quarterly usage analysis • Annual equity assessment

Climate Action	Equity Metrics	Data Sources	Collection Method	Reporting Frequency
	• Community engagement levels			
Building Standards	• Cost impacts by income level • Renter protections • Code compliance equity • Technical assistance reach • Language accessibility	• Building permits • Compliance data • Program records • Cost studies	• Permit tracking • Cost monitoring • Program evaluation • Community feedback	• Monthly compliance reports • Quarterly cost analysis • Annual impact review
Electric Mobility	• Charging station distribution • Program participation equity • Access to incentives • Infrastructure proximity • Community awareness levels	• Installation data • Usage patterns • Program records • Community surveys	• Location tracking • Usage monitoring • Program evaluation • Public surveys	• Monthly usage reports • Quarterly equity analysis • Annual program review

Table 6.4. Risk Management Framework

Purpose: Identify and manage potential risks to ensure successful and equitable implementation.

Climate Action	Identified Risks	Early Warning Signs	Mitigation Strategies	Action Teams
Public Transportation	• Service inequities • Cost barriers • Access limitations • Language barriers	• Low ridership in certain areas • Cost complaints • Missed	• Route optimization • Sliding scale fares • Service expansion • Language services	• Regional Mobility Team

Climate Action	Identified Risks	Early Warning Signs	Mitigation Strategies	Action Teams
	• Diesel particulate matter (PM) • Noise •Fine particle pollution (PM2.5) •Traffic proximity and volume	connections • Service gaps		
Energy Efficiency	• Cost barriers • Contractor capacity • Split incentives • Program awareness	• Low participation rates • Contractor shortages • Renter exclusion • Limited outreach	• Income-based assistance • Workforce development • Renter programs • Enhanced outreach	Energy Efficiency and Electrification Team
15-Minute Communities	• Displacement pressure • Service gaps • Implementation delays • Resource limitations •Floodplains •Extreme heat days •Noise	• Rising housing costs • Access inequities • Project delays • Budget constraints	• Anti-displacement measures • Gap analysis • Phased implementation • Resource sharing	Regional Mobility Team
Renewable Energy	• Cost barriers • Technical challenges • Grid capacity • Community opposition •Wildfire risk	• Low adoption rates • Technical failures • Grid constraints • Public concerns	• Financial incentives • Technical support • Grid upgrades • Community engagement	Grid Resilience and Renewables Team

Climate Action	Identified Risks	Early Warning Signs	Mitigation Strategies	Action Teams
Active Transportation	• Safety concerns • Weather limitations • Maintenance issues • Usage barriers • Noise •Fine particle pollution (PM2.5) •Extreme heat days	• Safety incidents • Weather damage • Poor conditions • Low usage	• Safety improvements • Weather protection • Maintenance plans • Usage promotion	Regional Mobility Team
Building Standards	• Cost impacts • Compliance challenges • Technical barriers • Resource constraints	• Cost increases • Low compliance • Technical issues • Resource shortages	• Cost assistance • Technical support • Training programs • Resource sharing	Energy Code Team
Electric Mobility	• Infrastructure gaps • Cost barriers • Technical issues • Adoption resistance	• Coverage gaps • Low adoption • Technical failures • Public concerns	• Infrastructure planning • Financial incentives • Technical support • Public education	Regional Mobility Team Energy Efficiency and Electrification Team

7. Monitoring and Evaluation

HIGHLIGHTS

- This section outlines a framework for monitoring the implementation and effectiveness of the climate mitigation strategies.
- It provides tables with key performance indicators (KPIs), data collection methods, and responsible parties for each climate action.
- The framework emphasizes tracking equity outcomes, including data disaggregation, community feedback, and geographic equity monitoring.
- It also highlights the importance of adaptive management to adjust strategies based on equity impacts and community feedback.

To effectively monitor and evaluate climate mitigation strategies, it is essential to establish a clear framework for tracking progress, measuring outcomes, and ensuring accountability (Harris-Roxas et al., 2012; Luyten et al., 2023). The following section includes tables that provide a detailed overview of the key performance indicators (KPIs), data collection methods, responsible parties, and other relevant information for each climate action. These tables are designed to guide CSFR action teams in implementing a robust monitoring and evaluation (M&E) strategy that aligns with the goals and objectives of each action while promoting environmental justice and equity.

7.1 Tracking Equity Outcomes

The M&E framework specifically track equity outcomes in the following ways:

- Data Disaggregation: All data collected through the M&E process will be disaggregated by demographics, including income, race/ethnicity, age, disability status, and geographic location. This will allow for an analysis of equity impacts and identification of any disparities in outcomes.
- Community Feedback: Community feedback will be actively collected and incorporated into the M&E process. This will include surveys, focus groups, public forums, and other methods to ensure diverse voices are heard and that community perspectives inform program adjustments.
- Geographic Equity Monitoring: The M&E framework will specifically track equity outcomes across different geographic areas, with a particular focus on census block groups identified as Disproportionately Impacted Communities. The geographic analysis identified 59 census block groups meeting the definition of Disproportionately Impacted Communities, representing 78,653 residents (22% of the county population). These communities are distributed across the county, with higher concentrations found in urban areas, particularly in parts of Fort Collins and Loveland. Two areas, census block groups 080690013042 and 080690020071, showed particularly high environmental burden scores (>80th percentile on Colorado EnviroScreen 2.0), highlighting them as priority zones for climate action implementation. These areas should be a top priority for M&E.

- Adaptive Management: The M&E framework will inform an adaptive management approach, allowing the County to adjust its strategies and implementation plans based on the identified equity impacts and community feedback. This iterative process will ensure that equity remains central to the implementation of climate mitigation strategies.

7.2 Key Performance Indicators (KPIs)

KPIs are quantifiable metrics used to assess the progress and success of the climate mitigation strategies. KPIs should be aligned with the goals and objectives of each strategy, with a focus on measuring both environmental outcomes and equity impacts.

7.2.1. Public Transportation Enhancement - Monitoring and Evaluation

This table outlines the KPIs, data collection methods, and other relevant information for monitoring and evaluating the Public Transportation Enhancement strategy. The KPIs are focused on measuring ridership, service coverage, accessibility, and affordability, with a particular emphasis on tracking equity outcomes for underserved communities. The data collection methods include passenger surveys, automated data collection, GIS analysis, and community feedback. The table also identifies the responsible parties within the Regional Mobility Team and other relevant stakeholders who will be involved in the M&E process.

Table 7.1. Public Transportation Key Performance Indicators (Regional Mobility Team)

KPI	Definition and Measurement	Specific Data Sources	Collection Frequency	Other Relevant Information
Ridership	Average daily ridership per route, disaggregated by demographics (income, race/ethnicity)	Passenger surveys, automated passenger counters, ridership data per route	Monthly	Baseline ridership, target ridership increase by route and demographic group
Service coverage	Geographic area covered by public transportation, frequency of service in underserved areas (defined by census block group)	GIS analysis of routes and underserved areas, service records, community feedback	Quarterly	Target expansion of service area, target increase in frequency, community input on service gaps
Accessibility	Number and percentage of accessible vehicles and stops, feedback on accessibility	Compliance audits, focus groups with people with disabilities, accessibility surveys	Bi-annual	ADA compliance, target improvement in accessibility measures, accessible vehicle availability

	from people with disabilities			
Affordability	Average fare as a percentage of household income, disaggregated by income level, ridership data for low-income fare programs	Fare analysis, household income data, ridership surveys, community feedback	Annual	Target reduction in fare burden for low-income riders, ridership targets for low-income fare programs, community input on fare affordability
Community Satisfaction	Community feedback on overall satisfaction with public transportation services, disaggregated by demographics	Community surveys, public forums, focus groups, online feedback mechanisms	Bi-annual	Satisfaction benchmarks, target improvement in satisfaction levels, community input on service quality

7.2.2. Energy Efficiency - Monitoring and Evaluation

This table outlines the KPIs, data collection methods, and other relevant information for monitoring and evaluating the Energy Efficiency strategy. It focuses on energy consumption reduction, cost savings, program participation, and community health improvements, with an emphasis on equity for underserved communities. Data collection involves smart meter readings, energy audits, health surveys, and community feedback.

Table7.2. Energy Efficiency Key Performance Indicators (Energy Efficiency and Electrification Team)

KPI	Definition and Measurement	Specific Data Sources	Collection Frequency	Other Relevant Information
Energy Consumption	Total energy consumption reduction (kWh) in residential and commercial sectors, disaggregated by	Smart meter data, energy audits, utility billing records	Quarterly	Baseline consumption, target reduction by sector and demographic group

	building type and demographics			
Cost Savings	Total cost savings ($) for households and businesses, disaggregated by income level and business size	Utility bill analysis, customer surveys, program tracking systems	Annual	Baseline energy burden, target reduction in energy burden by income level, cost-effectiveness of programs
Program Participation	Number of participants in energy efficiency programs, disaggregated by demographics (income, race/ethnicity, housing type)	Program records, community outreach metrics, customer relationship management (CRM) data	Quarterly	Target participation rates for underserved populations, barriers to participation, program accessibility
Health Indicators	Changes in community health metrics related to energy efficiency (e.g., asthma rates, respiratory hospitalizations), disaggregated by demographics and geographic areas	Public health data, household health surveys, environmental monitoring data	Annual	Baseline health indicators, target improvement in health outcomes, correlation with energy efficiency measures
Community Feedback	Community satisfaction with energy efficiency programs and services, disaggregated by demographics and geographic areas	Community satisfaction surveys, public forums, focus groups, online feedback platforms	Bi-annual	Satisfaction benchmarks, target improvement in satisfaction levels, community input on program design and delivery

7.2.3. 15-Minute Communities - Monitoring and Evaluation

This table details the monitoring and evaluation framework for the 15-Minute Communities strategy, focusing on local access, housing affordability, community participation, resilience hub

usage, and community health. It tracks travel time, housing costs, participation rates, hub usage, and health indicators, emphasizing equity across demographics and neighborhoods. Data is gathered through GIS analysis, surveys, hub tracking, and health data. Responsible parties include Planning, Housing, Emergency Management, and Public Health.

Table 7.3. 15-Minute Communities Key Performance Indicators (Regional Mobility Team & Disaster Mitigation and Adaptation Team)

KPI	Definition and Measurement	Specific Data Sources	Collection Frequency	Other Relevant Information
Local Access	Average travel time to essential services (grocery stores, healthcare, parks) for residents in different neighborhoods, disaggregated by demographics (income, age, disability)	GIS analysis, travel time surveys, community feedback	Annual	Baseline travel times, target reduction in travel times, equity analysis by demographics and neighborhood
Housing Affordability	Median home prices and rental costs in different neighborhoods, disaggregated by housing type and size	Housing market data, real estate records, rental listings	Quarterly	Baseline affordability, target affordability range, displacement risk assessment
Community Participation	Number and diversity of residents participating in community planning and engagement activities related to 15-Minute Communities	Meeting attendance records, survey responses, community feedback	Bi-annual	Target participation rates for different demographics, representation of diverse voices in planning
Resilience Hub Usage	Number of residents using resilience hubs and types of services accessed, disaggregated by demographics	Hub activity tracking, service utilization records, community feedback	Quarterly	Target usage rates, service accessibility, community needs assessment
Community Health	Changes in community health indicators (physical activity, chronic disease rates,	Public health data, community health surveys,	Annual	Baseline health indicators, target improvement in health outcomes,

	mental health) for residents in different neighborhoods	environmental monitoring		correlation with 15-Minute Communities implementation

7.2.4.Active Transportation - Monitoring and Evaluation

This table outlines the framework for monitoring and evaluating the Active Transportation strategy. It emphasizes usage rates, safety, accessibility, and community health, with a focus on equity across demographics and locations. Data collection methods include automated counters, surveys, crash reports, and health data. Responsible parties involve Transportation, Public Works, and Public Health.

Table 7.4. Active Transportation Key Performance Indicators (Regional Mobility Team & Disaster Mitigation and Adaptation Team)

KPI	Definition and Measurement	Specific Data Sources	Collection Frequency	Other Relevant Information
Usage Rates	Number of people using active transportation infrastructure (trails, bike lanes, sidewalks), disaggregated by mode, demographics, and location	Automated counters, user surveys, intercept surveys	Monthly	Baseline usage, target increase in usage, equity analysis by demographics and location
Safety Incidents	Number of crashes and near-misses involving active transportation users, disaggregated by mode, demographics, and location	Crash reports, safety audits, community feedback	Quarterly	Baseline safety data, target reduction in incidents, identification of high-risk locations
Accessibility	Number and percentage of accessible active transportation infrastructure (e.g., curb ramps, accessible crossings), feedback from people with disabilities	Accessibility audits, focus groups with people with disabilities, community feedback	Bi-annual	Baseline accessibility, target improvement in accessibility, universal design standards
Community Health	Changes in community health indicators (physical activity,	Public health data, community health surveys,	Annual	Baseline health indicators, target improvement in

	chronic disease rates, air quality) for residents in different neighborhoods	environmental monitoring		health outcomes, correlation with active transportation usage
Community Feedback	Community satisfaction with active transportation infrastructure and safety, disaggregated by demographics and geographic areas	Community satisfaction surveys, public forums, focus groups, online feedback platforms	Bi-annual	Satisfaction benchmarks, target improvement in satisfaction levels, community input on infrastructure design and safety

7.2.5 Renewable Energy Expansion - Monitoring and Evaluation

This table outlines the KPIs, data collection methods, and responsible parties for monitoring and evaluating the Renewable Energy Expansion strategy. It focuses on renewable energy adoption, grid capacity, community benefit sharing, and job creation, with an emphasis on equity and community feedback. Data collection involves installation records, grid system data, project records, and employment data.

Table 7.5. Renewable Energy Key Performance Indicators (Grid Resilience and Renewables Team)

KPI	Definition and Measurement	Specific Data Sources	Collection Frequency	Other Relevant Information
Renewable Energy Adoption	Total renewable energy capacity installed (MW), disaggregated by technology type, customer type (residential, commercial, industrial), and demographics	Installation records, utility interconnection data, market research	Quarterly	Baseline capacity, target capacity additions, equity analysis by customer type and demographics
Grid Capacity	Assessment of grid capacity to accommodate renewable energy integration, including transmission and distribution infrastructure	Grid system data, technical analysis, utility planning documents	Annual	Grid modernization progress, integration challenges, investment needs

Community Benefit Sharing	Number and type of community-owned renewable energy projects, economic benefits to communities (jobs, revenue)	Project records, community surveys, economic impact analysis	Bi-annual	Target number of community projects, local ownership models, and economic benefits to underserved communities
Job Creation	Number of jobs created in the renewable energy sector, disaggregated by job type, skill level, and demographics	Employment data, workforce surveys, industry reports	Annual	Baseline employment, target job creation, job quality, and accessibility for underserved communities
Community Feedback	Community satisfaction with renewable energy development and its impacts, disaggregated by demographics and geographic areas	Community satisfaction surveys, public forums, focus groups, online feedback platforms	Bi-annual	Satisfaction benchmarks, target improvement in satisfaction levels, community input on project siting and benefits

7.2.6. Building Standards - Monitoring and Evaluation

This table outlines the monitoring and evaluation framework for the Building Standards strategy, focusing on code compliance, cost-effectiveness, energy performance, and technical assistance. It tracks compliance rates, costs, energy use intensity (EUI), and assistance program usage, emphasizing equity and community feedback. Data is gathered through building permits, inspections, cost studies, energy audits, and program records. Responsible parties include Building, Sustainability, and Housing.

Table 7.6. Building Standards Key Performance Indicators (Energy Code Team)

KPI	Definition and Measurement	Specific Data Sources	Collection Frequency	Other Relevant Information
Code Compliance	Number and percentage of new construction and renovations that meet the updated building energy codes	Building permits, inspection records, compliance audits	Monthly	Baseline compliance, target compliance rates, identification of persistent non-compliance

Cost-Effectiveness	Cost of compliance with the updated codes for different building types and sizes, disaggregated by income level and housing type	Building permit data, cost studies, market analysis	Annual	Baseline construction costs, target cost range, affordability analysis for different housing types
Energy Performance	Average energy use intensity (EUI) for new construction and renovations, disaggregated by building type and size	Building energy audits, energy modeling simulations	Annual	Baseline energy performance, target EUI reduction, comparison with previous code cycles
Technical Assistance	Number of property owners and builders accessing technical assistance programs related to the updated codes, disaggregated by demographics	Program records, outreach metrics, customer satisfaction surveys	Quarterly	Target outreach and assistance levels, program effectiveness, accessibility for underserved communities
Community Feedback	Community satisfaction with the updated building standards and their impacts, disaggregated by demographics and housing type	Community satisfaction surveys, public forums, focus groups, online feedback platforms	Bi-annual	Satisfaction benchmarks, target improvement in satisfaction levels, community input on code implementation and impacts

7.2.7. Electric Mobility - Monitoring and Evaluation

This table outlines the KPIs, data collection methods, and responsible parties for monitoring and evaluating the Electric Mobility strategy. It focuses on EV adoption rates, charging infrastructure, community awareness, workforce development, and community feedback. Data collection involves sales and registration data, GIS analysis, surveys, and training records.

Table 7.7. Electric Mobility Key Performance Indicators (Energy Efficiency and Electrification Team & Regional Mobility Team)

KPI	Definition and Measurement	Specific Data Sources	Collection Frequency	Other Relevant Information

EV Adoption Rates	Number of electric vehicles (EVs) and electric bikes (e-bikes) sold and registered in the County, disaggregated by vehicle type, demographics, and geographic areas	Sales data, vehicle registration records, market research	Quarterly	Baseline adoption, target adoption rates, equity analysis by demographics and location
Charging Infrastructure	Number and distribution of EV charging stations, disaggregated by charging level, location type (public, workplace, residential), and accessibility	GIS analysis, charging station usage data, infrastructure surveys	Quarterly	Baseline infrastructure, target charging station deployment, accessibility for different vehicle types and users
Community Awareness	Community knowledge and understanding of electric mobility options, benefits, and incentives	Public opinion surveys, outreach metrics, social media engagement	Bi-annual	Baseline awareness, target awareness levels, effectiveness of education campaigns
Workforce Development	Number of people trained and employed in the electric mobility sector (e.g., EV technicians, charging station installers), disaggregated by demographics	Training records, employment data, industry partnerships	Annual	Baseline workforce, target job creation, job quality and accessibility for underserved communities

Community Feedback	Community satisfaction with electric mobility infrastructure, programs, and their impacts, disaggregated by demographics and geographic areas	Community satisfaction surveys, public forums, focus groups, online feedback platforms	Bi-annual	Satisfaction benchmarks, target improvement in satisfaction levels, community input on infrastructure deployment and programs

8. Conclusion

This Environmental Justice Impact Assessment (EJIA) analyzed the Climate Smart Future Ready climate mitigation strategies with the highest potential to impact greenhouse gas emission reductions, highlighting their potential impacts on equity-priority communities. The assessment identified key opportunities to advance environmental justice and climate action goals simultaneously. By prioritizing strategies with strong equity considerations, CSFR Action Teams can ensure that its climate mitigation efforts benefit all communities, particularly those that have been historically marginalized and overburdened.

The EJIA process has underscored the importance of integrating equity into all aspects of climate action planning, from community engagement to implementation and monitoring. CSFR Action Teams can create a more just and sustainable future for all its residents by centering the needs and voices of vulnerable communities.

The geographic analysis has further emphasized the importance of prioritizing equity in Larimer County's climate mitigation efforts. By identifying specific areas with high environmental burdens and concentrations of vulnerable populations, this analysis has provided valuable insights for ensuring that climate action strategies are implemented in a just and equitable manner. The findings highlight the need for targeted interventions and place-specific approaches to address the unique challenges faced by different communities. By incorporating these considerations into the implementation and monitoring of climate mitigation strategies, CSFR Action Teams can ensure that all residents benefit from a just and sustainable transition to a clean energy future.

9. References

- Adger, W. N. (2001). Scales of governance and environmental justice for adaptation and mitigation of climate change. *Journal of International development*, *13*(7), 921-931.
- Aldy, J. E., Krupnick, A. J., Newell, R. G., Parry, I. W. H., & Pizer, W. A. (2010). Designing climate mitigation policy. *Journal of Economic Literature*, *48*(4), 903-934.
- Anderson, C. M., Kissel, K. A., Field, C. B., & Mach, K. J. (2018). Climate change mitigation, air pollution, and environmental justice in California. *Environmental science & technology*, *52*(18), 10829-10838.
- Bakkensen, L. A., Ma, L., Muehlenbachs, L., & Benitez, L. (2024). Cumulative impacts in environmental justice: Insights from economics and policy. *Regional Science and Urban Economics*, *107*, 103993.
- Blue, G., Bronson, K., & Lajoie-O'Malley, A. (2021). Beyond distribution and participation: A scoping review to advance a comprehensive environmental justice framework for impact assessment. *Environmental Impact Assessment Review*, *90*, 106607.
- Brechin, S., & Lee, S. (Eds.). (2010). Routledge Handbook of Climate Change and Society (1st ed.). Routledge..
- Bullard, R. D. (2005). *The Quest for Environmental Justice: Human Rights and the Politics of Pollution*. Sierra Club Books.
- Campbell-Lendrum, D. H., Woodruff, R., Prüss-Üstün, A., Corvalán, C. F., & World Health Organization. (2007). *Climate change: quantifying the health impact at national and local levels*. World Health Organization.
- Chakraborty, J. (2006). Evaluating the environmental justice impacts of transportation improvement projects in the US. *Transportation Research Part D: Transport and Environment*, *11*(5), 315-323.
- Colorado Department of Public Health and Environment. (2024). Colorado EnviroScreen 2.0.
- Eskander, S. M., & Fankhauser, S. (2020). Reduction in greenhouse gas emissions from national climate legislation. *Nature Climate Change*, *10*(8), 750-756.
- Fung, A. (2006). Varieties of participation in complex governance. *Public Administration Review*, 66(s1), 66-75.
- Gee, G. C., & Payne-Sturges, D. C. (2004). Environmental health disparities: A framework integrating psychosocial and environmental concepts. *Environmental Health Perspectives*, 112(17), 1645-1653.
- Haines, A., Kovats, R. S., Campbell-Lendrum, D., & Corvalán, C. (2006). Climate change and human health: impacts, vulnerability, and mitigation. *The Lancet*, *367*(9528), 2101-2109.
- Harris-Roxas, B., Viliani, F., Bond, A., Cave, B., Divall, M., Furu, P., ... & Winkler, M. (2012). Health impact assessment: the state of the art. *Impact assessment and project appraisal*, *30*(1), 43-52.
- Hoppe, J., Hinder, B., Rafaty, R., Patt, A., & Grubb, M. (2023). Three decades of climate mitigation policy: what has it delivered?. *Annual Review of Environment and Resources*, *48*(1), 615-650.
- Intergovernmental Panel on Climate Change (IPCC). (2022). Climate Change 2022: Impacts, Adaptation, and Vulnerability. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change.

- Israel, B. A., Schulz, A. J., Parker, E. A., & Becker, A. B. (1998). Review of community-based research: Assessing partnership approaches to improve public health. *Annual Review of Public Health*, 19(1), 173-202.
- Kemm, J. (2001). Health impact assessment: a tool for healthy public policy. *Health promotion international*, *16*(1), 79-85.
- Krieg, E. J., & Faber, D. R. (2004). Not so black and white: environmental justice and cumulative impact assessments. *Environmental impact assessment review*, *24*(7-8), 667-694.
- Levy BS, Patz JA. Climate Change, Human Rights, and Social Justice. Ann Glob Health. 2015 May-Jun;81(3):310-22.
- Luyten, A., Winkler, M. S., Ammann, P., & Dietler, D. (2023). Health impact studies of climate change adaptation and mitigation measures–A scoping review. *The Journal of Climate Change and Health*, *9*, 100186.
- Mitigation, C. C. (2011). IPCC special report on renewable energy sources and climate change mitigation. *Renewable Energy*, *20*(11).
- Mohai, P., Pellow, D., & Roberts, J. T. (2009). Environmental justice. *Annual review of environment and resources*, *34*(1), 405-430.
- Mueller N, Rojas-Rueda D, Basagaña X, Cirach M, Cole-Hunter T, Dadvand P, Donaire-Gonzalez D, Foraster M, Gascon M, Martinez D, Tonne C, Triguero-Mas M, Valentín A, Nieuwenhuijsen M. Health impacts related to urban and transport planning: A burden of disease assessment. Environ Int. 2017 Oct;107:243-257.
- Mueller, N., Rojas-Rueda, D., Cole-Hunter, T., De Nazelle, A., Dons, E., Gerike, R., ... & Nieuwenhuijsen, M. (2015). Health impact assessment of active transportation: a systematic review. *Preventive medicine*, *76*, 103-114.
- Nieuwenhuijsen MJ, Khreis H, Verlinghieri E, Mueller N, Rojas-Rueda D. Participatory quantitative health impact assessment of urban and transport planning in cities: A review and research needs. Environ Int. 2017 Jun;103:61-72.
- Perrotta K. Climate change, population health and health equity: Public health strategies and five local climate solutions that produce health and health equity benefits. Canadian Public Health Association (CPHA), Canadian Health Association for Sustainability and Equity (CHASE), Ontario Public Health Association (OPHA). November 2023
- Pucher, J., & Buehler, R. (2008). Making cycling irresistible: Lessons from the Netherlands, Denmark, and Germany. *Transport Reviews*, 28(4), 495-528.
- Romanello M, Walawender M, Hsu SC, Moskeland A, Palmeiro-Silva Y, Scamman D, Ali Z, Ameli N, Angelova D, Ayeb-Karlsson S, Basart S, Beagley J, Beggs PJ, Blanco-Villafuerte L, Cai W, Callaghan M, Campbell-Lendrum D, Chambers JD, Chicmana-Zapata V, Chu L, Cross TJ, van Daalen KR, Dalin C, Dasandi N, Dasgupta S, Davies M, Dubrow R, Eckelman MJ, Ford JD, Freyberg C, Gasparyan O, Gordon-Strachan G, Grubb M, Gunther SH, Hamilton I, Hang Y, Hänninen R, Hartinger S, He K, Heidecke J, Hess JJ, Jamart L, Jankin S, Jatkar H, Jay O, Kelman I, Kennard H, Kiesewetter G, Kinney P, Kniveton D, Kouznetsov R, Lampard P, Lee JKW, Lemke B, Li B, Liu Y, Liu Z, Llabrés-Brustenga A, Lott M, Lowe R, Martinez-Urtaza J, Maslin M, McAllister L, McMichael C, Mi Z, Milner J, Minor K, Minx J, Mohajeri N, Momen NC, Moradi-Lakeh M, Morrisey K, Munzert S, Murray KA, Obradovich N, O'Hare MB, Oliveira C, Oreszczyn T, Otto M, Owfi F, Pearman OL, Pega F, Perishing AJ, Pinho-Gomes AC,

Ponmattam J, Rabbaniha M, Rickman J, Robinson E, Rocklöv J, Rojas-Rueda D, Salas RN, Semenza JC, Sherman JD, Shumake-Guillemot J, Singh P, Sjödin H, Slater J, Sofiev M, Sorensen C, Springmann M, Stalhandske Z, Stowell JD, Tabatabaei M, Taylor J, Tong D, Tonne C, Treskova M, Trinanes JA, Uppstu A, Wagner F, Warnecke L, Whitcombe H, Xian P, Zavaleta-Cortijo C, Zhang C, Zhang R, Zhang S, Zhang Y, Zhu Q, Gong P, Montgomery H, Costello A. The 2024 report of the Lancet Countdown on health and climate change: facing record-breaking threats from delayed action. Lancet. 2024 Nov 9;404(10465):1847-1896.

- Rojas-Rueda D, Morales-Zamora E. Equitable Urban Planning: Harnessing the Power of Comprehensive Plans. Curr Environ Health Rep. 2023 Jun;10(2):125-136.
- Rojas-Rueda D, Nieuwenhuijsen MJ, Khreis H, Frumkin H. Autonomous Vehicles and Public Health. Annu Rev Public Health. 2020 Apr 2;41:329-345.
- Rojas-Rueda D, Norberciak M, Morales-Zamora E. Advancing Health Equity through 15-min Cities and Chrono-urbanism. J Urban Health. 2024 Jun;101(3):483-496.
- Roux J, Rojas-Rueda D. Colorado Burden of Disease, Injuries and Risk Factors, 1990-2019: A Sub-Analysis of the Global Burden of Disease Study. Int J Environ Res Public Health. 2021 Dec 28;19(1):288.
- Schlosberg, D. (2007). *Defining Environmental Justice: Theories, Movements, and Nature*. Oxford University Press.
- Schlosberg, D., & Collins, L. B. (2014). From environmental to climate justice: climate change and the discourse of environmental justice. *Wiley Interdisciplinary Reviews: Climate Change*, *5*(3), 359-374.
- Sexton, K., & Linder, S. H. (2010). The role of cumulative risk assessment in decisions about environmental justice. *International journal of environmental research and public health*, *7*(11), 4037-4049.
- Walker, G. (2010). Environmental justice, impact assessment and the politics of knowledge: The implications of assessing the social distribution of environmental outcomes. *Environmental impact assessment review*, *30*(5), 312-318.
- Whitmee S, Green R, Belesova K, Hassan S, Cuevas S, Murage P, Picetti R, Clercq-Roques R, Murray K, Falconer J, Anton B, Reynolds T, Sharma Waddington H, Hughes RC, Spadaro J, Aguilar Jaber A, Saheb Y, Campbell-Lendrum D, Cortés-Puch M, Ebi K, Huxley R, Mazzucato M, Oni T, de Paula N, Peng G, Revi A, Rockström J, Srivastava L, Whitmarsh L, Zougmoré R, Phumaphi J, Clark H, Haines A. Pathways to a healthy net-zero future: report of the Lancet Pathfinder Commission. Lancet. 2024 Jan 6;403(10421):67-110. doi: 10.1016/S0140-6736(23)02466-2. Epub 2023 Nov 20.

10. Appendix

10.1. Office of Sustainability and Climate Coordination Checklist (example)

Purpose:

- Provides structured quarterly accountability for each action team
- Ensure consistent implementation across all strategies
- Creates documentation trail for monitoring and evaluation
- Facilitates regular reporting to stakeholders

Usage Instructions:

Quarterly Implementation Process:

1. Initial Setup (Start of Quarter)
    - Action team head assigns responsible staff
    - Project manager reviews priority actions
    - Team establishes quarterly targets
    - Resource requirements are confirmed
2. Regular Monitoring (Throughout Quarter)
    - Weekly team check-ins on progress
    - Bi-weekly updates to checklist
    - Monthly review of potential issues
    - Documentation of modifications
3. End of Quarter Review
    - Complete all checklist items
    - Document uncompleted tasks
    - Provide justification for delays
    - Plan adjustments for next quarter
4. Reporting Requirements
    - Submit completed checklist to Sustainability Office
    - Present summary at cross-action team meeting
    - Share relevant updates with the community advisory board

- Document lessons learned

10.2. Office of Sustainability and Climate Coordination Checklist (example)

Category	Task
Strategy	[Strategy Name]
Action Team	[Action Team Name]
Quarter/Year	[Q#/YYYY]
Target Geography	Census Block Groups: _____ Priority Areas (High Impact):_____ Secondary Areas:_____
Priority Actions	☐ Action 1 [Due Date]
	☐ Action 2 [Due Date]
	☐ Action 3 [Due Date]
Resources Required	☐ Budget Allocated
	☐ Staff Assigned
	☐ Equipment/Materials
	☐ External Partners
Community Engagement	☐ Advisory Board Meeting
	☐ Public Comments Period
	☐ Stakeholder Updates
	☐ Feedback Collection
Risk Management	☐ Risk Assessment Complete
	☐ Mitigation Plans in Place
	☐ Contingencies Reviewed
	☐ Emergency Contacts Updated
Progress Metrics	☐ Baseline Data Collected
	☐ KPIs Tracked

Category	Task
	☐ Outcomes Documented
	☐ Adjustments Noted
Sign-offs	☐ Action Team Head
	☐ Project Manager
	☐ Community Liaison
	☐ Environmental Justice Lead

10.3. Strategy Modification Triggers (example)

Purpose:

- Establishes clear thresholds for strategy adjustments
- Ensures timely response to implementation challenges
- Maintains focus on equity outcomes
- Provides objective criteria for modifications

10.4. Strategy Modification Trigger Points

Strategy Component	Trigger Metric	Threshold (TBD)	Required Action
Service Coverage	% Population	<X %	Route Analysis
Energy Savings	kWh Reduction	<X %	Program Review
Housing Costs	% Income	>X %	Policy Review
Air Quality	PM2.5 Levels	>X μg/m^3	Traffic Study
Participation	Response Rate	<X %	Outreach Plan

10.5. Disproportionately impacted communities in Larimer County - State definition (census block group)

Census Block Group GEOID	November 2024 disproportionately impacted community Type	Low Income >40%	Low Income (%)	People of Color >40%	People of Color (%)	Linguistically Isolated >20%	Linguistic Isolation (%)	Housing Cost Burdened >50%	Housing Cost Burdened (%)	CO EnviroScreen 2.0, Percentile above 80	CO EnviroScreen 2.0 Percentile Score	Justice40 (Climate and Economic Justice Screening Tool) definition of DIC	Disproportionately impacted community (DIC) definitions agreed Count	Population Estimate (ACS 5 year 2018-2022)
080690001001	More than one category	1	57.55%	0	19.66%	0	0.00%	1	81.31%	0	68.2449	0	2	702
080690002011	More than one category	1	74.92%	0	16.32%	0	4.34%	1	58.03%	0	51.6609	0	2	1618
080690004011	Low-income population above 40%	1	40.70%	0	34.10%	0	7.86%	0	37.84%	0	53.1482	0	1	909
080690004021	Low-income population above 40%	1	46.08%	0	13.45%	0	0.00%	0	48.83%	0	36.7873	0	1	1799
080690005032	More than one category	1	87.02%	0	35.82%	0	3.56%	1	65.05%	0	59.5935	0	2	2973
080690005033	Low-income population above 40%	1	90.11%	0	21.71%	0	2.07%	0	45.67%	0	55.4041	0	1	2616
080690005041	More than one category	1	64.52%	0	22.89%	0	0.00%	1	70.21%	0	55.2801	0	2	1599
080690005042	More than one category	1	58.70%	0	17.60%	0	5.07%	1	64.36%	0	45.5379	0	2	1443
080690005051	More than one category	1	58.04%	0	29.51%	0	0.00%	1	52.90%	0	62.3699	0	2	1847
080690005052	Low-income population above 40%	1	42.86%	0	27.93%	0	0.00%	0	40.32%	0	41.1006	0	1	1504
080690005062	More than one category	1	51.32%	0	10.34%	0	0.00%	1	53.69%	0	41.4229	0	2	725
080690006003	More than one category	1	92.12%	0	31.66%	0	2.91%	1	60.11%	0	52.0327	0	2	2107
080690006004	More than one category	1	57.39%	0	23.22%	0	1.19%	1	86.90%	0	40.3818	0	2	1111
080690009014	Low-income population above 40%	1	44.17%	0	16.08%	0	0.00%	0	40.19%	0	61.2048	0	1	2594
080690009021	More than one category	1	41.99%	0	5.94%	0	0.00%	1	50.75%	0	41.7204	0	2	774
080690010031	Low-income population above 40%	1	41.30%	0	26.45%	0	0.00%	0	47.27%	0	75.1363	0	1	983

0806900 10035	Low-income population above 40%	1	41.41%	0	27.71 %	0	3.52%	0	37.02%	0	69.1869	0	1	1833
0806900 10073	Housing cost-burdened population above 50%	0	39.45%	0	20.73 %	0	7.69%	1	57.03%	0	52.9003	0	1	545
0806900 10082	More than one category	1	44.24%	0	27.67 %	0	0.00%	1	50.11%	0	67.9722	0	2	694
0806900 11041	Low-income population above 40%	1	43.61%	0	3.15%	0	0.00%	0	37.00%	0	37.0848	0	1	571
0806900 11044	Low-income population above 40%	1	54.78%	0	16.31 %	0	0.00%	0	48.71%	0	46.1081	0	1	1539
0806900 11071	Housing cost-burdened population above 50%	0	37.29%	0	25.21 %	0	0.00%	1	52.45%	0	46.4799	0	1	1805
0806900 11072	Housing cost-burdened population above 50%	0	36.38%	0	10.27 %	0	0.00%	1	50.84%	0	36.7625	0	1	896
0806900 11073	More than one category	1	48.67%	0	11.88 %	0	0.00%	1	61.64%	0	48.3887	0	2	943
0806900 11094	People of color population above 40%	0	25.40%	1	46.11 %	0	1.95%	0	29.26%	0	48.5374	0	1	1425
0806900 11102	More than one category	1	56.55%	0	23.50 %	0	5.13%	1	57.57%	0	59.2464	0	2	1894
0806900 11103	More than one category	1	67.76%	0	26.99 %	0	2.25%	1	76.97%	0	53.5201	0	2	915
0806900 11112	More than one category	1	68.04%	0	16.66 %	0	0.00%	1	69.57%	0	69.7819	0	2	1711
0806900 11123	More than one category	1	41.56%	1	43.59 %	0	0.00%	0	44.19%	0	61.527	0	2	835
0806900 11124	People of color population above 40%	0	27.03%	1	47.18 %	0	0.00%	0	14.02%	0	54.0654	0	1	1047
0806900 13041	More than one category	1	48.52%	1	83.40 %	0	17.89%	0	21.57%	0	78.2102	1	3	1229
0806900 13042	More than one category	1	51.18%	1	51.94 %	0	0.00%	0	28.18%	1	81.4328	1	4	2118
0806900 13051	More than one category	1	46.45%	0	20.84 %	0	0.00%	1	57.46%	0	61.8989	0	2	2327
0806900 13052	More than one category	1	56.78%	1	44.65 %	0	6.10%	0	49.15%	0	72.9053	0	2	916
0806900 13062	More than one category	1	80.05%	0	36.16 %	0	2.55%	1	76.55%	0	69.8066	0	2	1684
0806900 16011	People of color population above 40%	0	25.12%	1	59.36 %	0	0.00%	0	18.80%	0	73.0788	0	1	1218
0806900 16021	Housing cost-burdened population above 50%	0	35.16%	0	9.83%	0	0.00%	1	61.86%	0	40.828	0	1	529

08069001602 2	People of color population above 40%	0	2.93%	1	45.43 %	0	0.00%	0	23.89%	0	24.0952	0	1	1400
08069001603 3	People of color population above 40%	0	23.93%	1	57.63 %	0	2.43%	0	20.49%	0	55.7015	0	1	2018
08069001605 1	More than one category	1	100.00 %	0	34.45 %	0	0.00%	1	100.00%	0	52.1071	0	2	833
08069001605 4	People of color population above 40%	0	22.13%	1	48.06 %	0	6.71%	0	28.89%	0	25.5578	0	1	2295
08069001706 3	Housing cost-burdened population above 50%	0	7.41%	0	35.42 %	0	0.00%	1	56.35%	0	75.1611	0	1	432
08069001706 4	Low-income population above 40%	1	45.33%	0	11.33 %	0	0.00%	0	43.20%	0	71.0709	0	1	450
08069001707 1	People of color population above 40%	0	21.93%	1	43.24 %	0	0.00%	0	31.72%	0	60.8329	0	1	451
08069001707 3	Low-income population above 40%	1	50.93%	0	27.72 %	0	0.00%	0	35.20%	0	69.9554	0	1	754
08069001711 3	People of color population above 40%	0	5.39%	1	41.32 %	0	0.00%	0	23.26%	0	66.1378	0	1	1578
08069001713 2	Low-income population above 40%	1	52.18%	0	1.76%	0	0.00%	0	34.76%	0	31.7303	0	1	1192
08069001715 1	Low-income population above 40%	1	54.26%	0	39.12 %	0	16.01%	0	39.53%	0	73.0045	0	1	2715
08069001804 1	Low-income population above 40%	1	58.45%	0	29.23 %	0	0.00%	0	33.33%	0	58.9489	0	1	763
08069001902 3	More than one category	0	31.36%	1	41.44 %	0	16.31%	1	58.51%	0	71.4179	0	2	1349
08069002005 2	Housing cost-burdened population above 50%	0	33.49%	0	21.38 %	0	0.00%	1	51.24%	0	55.4784	0	1	2409
08069002007 1	More than one category	1	45.23%	0	32.59 %	0	5.19%	1	58.18%	1	80.4165	0	3	1740
08069002503 3	Housing cost-burdened population above 50%	0	34.46%	0	13.15 %	0	4.49%	1	50.94%	0	9.8909	0	1	502
08069002508 3	Low-income population above 40%	1	42.69%	0	32.07 %	0	0.00%	0	41.08%	0	30.6644	0	1	1743
08069002803 1	More than one category	1	40.69%	1	45.52 %	0	0.00%	0	0.00%	0	18.3193	1	3	145
08069002804 1	Housing cost-burdened	0	4.95%	0	20.83 %	0	0.00%	1	52.51%	0	19.8562	0	1	1474

	population above 50%													
08069002804 2	Low-income population above 40%	1	47.71%	0	11.46 %	0	8.60%	0	23.98%	0	24.0456	0	1	960
08069002805 1	Low-income population above 40%	1	51.86%	0	20.83 %	0	0.00%	0	49.03%	0	20.352	0	1	653
08069002805 3	Linguistically isolated population above 20%	0	14.65%	0	38.95 %	1	26.67%	0	16.97%	0	20.9222	0	1	819

10.6. Sensitivity Analysis Approach

Objectives

The sensitivity analysis evaluates how variations in the weighting of Equity, Benefits, and Risks influence the rankings of strategies. This ensures the robustness of recommendations and highlights the resilience of strategies under varying assumptions.

Single-Dimensional Sensitivity Analysis

Objective:

Evaluate how changes in the weight of one dimension affect the rankings of strategies.

Steps:

1. **Adjust the Weight of One Dimension**:
    - Increase and decrease the weight of one dimension (e.g., Benefits) by ±10%:
        - For wb, increase to 0.385 (+10%) or decrease to 0.315 (-10%).
    - Adjust the remaining two weights proportionally to maintain their sum with the adjusted weight equal to 1. For example:
        - If wb = 0.385w_b :

          then wr = we = (1−0.385) / 2 = 0.3075
        - If wb=0.315w_b :

          then wr = we = (1−0.315)/2 = 0.3425

          wb: The adjusted weight for Benefits.

          wr and **we**: The remaining weights for Risks and Equity, calculated proportionally to ensure the total of all weights equals 1.
2. **Recalculate Scores**:
    - Apply the adjusted weights in the Final Score formula for each strategy.
3. **Record Rankings**:
    - Note changes in rankings after each adjustment.

Table 2.2. Examples of Adjusted Weights.

Scenario	wb	wr	we
Increase Benefits	0.33	0.335	0.335
Decrease Benefits	0.27	0.365	0.365

Scenario	wb	wr	we
Increase Risks	0.335	0.275	0.39
Decrease Risks	0.365	0.225	0.41
Increase Equity	0.335	0.335	0.33
Decrease Equity	0.365	0.365	0.27

4. **Interpret Results**:
    - Identify strategies sensitive to changes in the adjusted dimension.
    - Determine which dimension has the greatest standalone influence.

Multi-Dimensional Sensitivity Analysis

Objective:

Simultaneously adjust the weights of two dimensions to test interactions and their combined effect on rankings.

Steps:

1. **Select Dimensions for Adjustment**:
    - Choose two dimensions (e.g., Benefits and Risks).
2. **Define Adjustments**:
    - Vary both dimensions by ±10% and proportionally adjust the third dimension to maintain a total sum of 1. For example:
        - Increase wb and decrease wr by 10% each.
        - Decrease wb and increase we by 10% each.
3. **Calculate Adjusted Weights**:
    - For example:

      If wb = 0.385 and wr=0.225:
      we = 1−(0.385+0.225)=0.39

      If wb=0.315 and wr=0.275:
      we=1−(0.315+0.275)=0.41
4. **Recompute Scores**:
    - Apply the adjusted weights to compute new Final Scores for each strategy.
5. **Record Rankings**:

- Note rankings for each adjustment combination.

Table 2.3. Examples of Adjusted Weights.

Scenario	wb	wr	we
Increase Benefits, Decrease Risks	0.33	0.225	0.445
Decrease Benefits, Increase Equity	0.27	0.275	0.455
Increase Risks, Decrease Equity	0.335	0.275	0.39
Decrease Risks, Increase Equity	0.335	0.225	0.445

6. **Interpret Results**:
    - Analyze how rankings change due to interactions between dimensions.
    - Identify strategies that are resilient to joint adjustments and those that are sensitive to trade-offs.

Monte Carlo Sensitivity Analysis

Purpose:

The Monte Carlo simulation tests the robustness of strategy rankings by introducing probabilistic variations to the weights for Benefits, Risks, and Equity. This approach provides insights into how rankings might change under uncertainty in weight assignments.

Steps in the Monte Carlo Analysis:

1. **Define Weight Ranges**:
    - Allow weights for each dimension to vary randomly within ±10% of their baseline values:
        - Benefits (wb):0.27 to 0.33
        - Risks (wr): 0.225 to 0.275
        - Equity (we): 0.405 to 0.495
2. **Generate Random Weights**:
    - For each simulation, randomly sample a value for wb, wr, and we from their respective ranges.
    - Normalize the sampled weights to ensure their sum equals 1.
3. **Recalculate Scores**:

Final Score = (Benefit Score × wb) + ((5 - Risk Score) × wr) + (Equity Score × we)

This formula is applied iteratively with randomly generated weights for wb, wr, and we within their defined ranges (e.g., ±10%) during the Monte Carlo simulations.

4. **Rank Strategies**:
    - Sort the strategies based on their recalculated scores for each simulation.
5. **Repeat Simulations**:
    - Conduct 1,000 simulations to capture a broad range of possible outcomes.
6. **Analyze Rankings**:
    - Count how often each strategy appears in each rank position across all simulations.
    - Summarize the frequency of each strategy's rank to assess its robustness.

Benefits of Monte Carlo Analysis:

- **Probabilistic Insights**:
    - Provides a range of possible outcomes instead of relying on a single set of weights.
- **Resilience Testing**:
    - Identifies strategies that are consistently ranked high or low, regardless of weight variability.
- **Sensitivity Patterns**:
    - Highlights which strategies are most sensitive to changes in weight assignments

10.7. Colorado EnviroScreen Categories of Environmental Hazards and Socioeconomic Stressors

The Colorado EnviroScreen 2.0 tool evaluates environmental burdens and socioeconomic stressors through several key categories of indicators:

Category	Indicator	Description	Data source
Environmental exposures	Ozone	Air pollutant that harms respiratory health, cardiovascular system, and plant life.	2021 Community Multiscale Air Quality model data.
Environmental exposures	Air toxics emissions	Measures of toxic air pollutants contributing to health risks.	Air Pollutant Emission Notices, 2019-2023, Colorado Air Pollution Control Division.
Environmental exposures	Diesel particulate matter (PM)	Particulate emissions from diesel engines are harmful to respiratory and cardiovascular systems.	Via U.S. Environmental Protection Agency (EPA) EJScreen, July 2024 update; EPA Hazardous Air Pollutants, 2020.
Environmental exposures	Drinking water regulations	Monitors violations of drinking water safety standards.	CDPHE Water Quality Control Division's safe water information finder tool, 2013-2023.
Environmental exposures	Lead exposure Risk	Indicates population exposure to lead, especially in housing.	American Community Survey, 2018-2022, Table B25034 (Year structure built).
Environmental exposures	Noise	Exposure to harmful noise levels.	National Park Service, 2013-2015 dataset.
Environmental exposures	Other air pollutants	Concentrations of pollutants other than ozone or particulate matter.	Air Pollutant Emission Notices, 2019-2023, Colorado Air Pollution Control Division.
Environmental exposures	Fine particle pollution (PM2.5)	Measures of fine particulate matter linked to respiratory and cardiovascular problems.	2021 Community Multiscale Air Quality model data.

Category	Indicator	Description	Data source
Environmental exposures	Traffic proximity and volume	Measure of population exposure to traffic-related pollution.	Via EPA EJScreen, July 2024 update; U.S. Department of Transportation, 2020.
Environmental Effects	Impaired streams and rivers	Water bodies impaired by pollutants.	CDPHE, Water Quality Control Division, 2000 - 2023
Environmental effects	Proximity to hazardous waste sites	Indicates how close communities are to hazardous waste facilities.	Via EPA EJScreen, July 2024 update; EPA RCRAInfo database, 2024.
Environmental effects	Proximity to mining locations	Indicates population proximity to mining areas and associated risks.	Colorado Division of Reclamation, Mining, and Safety.
Environmental effects	Proximity to national priorities List sites	Identifies proximity to federally recognized hazardous waste sites (Superfund).	Via EPA EJScreen, July 2024 update; EPA Superfund National Priorities List boundaries, 2024.
Environmental effects	Proximity to oil and gas	Proximity to oil and gas extraction sites associated with air and water pollution.	Energy and Carbon Management Commission.
Environmental effects	Proximity to risk management plan sites	Proximity to facilities regulated for accidental chemical releases under the Clean Air Act.	Via EPA EJScreen, July 2024 update; EPA Risk Management Plan database, 2024.
Environmental effects	Wastewater discharge indicator	Represents exposure to wastewater discharges containing pollutants.	Via EPA EJScreen, July 2024 update; EPA Risk-Screening Environmental Indicators, 2021.
Climate vulnerability	Drought	Measures prolonged dry periods impacting water resources.	U.S. Drought Monitor, 2019–2023.
Climate vulnerability	Extreme heat days	Monitors days with extreme heat that affect health, especially vulnerable populations.	Centers for Disease Control and Prevention Environmental Public Health Tracking, 2020–2023.

Category	Indicator	Description	Data source
Climate vulnerability	Floodplains	Identifies areas at risk for flooding.	Federal Emergency Management Agency.
Climate vulnerability	Wildfire risk	Measures risk from wildfire exposure.	U.S. Forest Service, 2023.
Sensitive populations	Asthma hospitalization rate	The rate of hospitalizations due to asthma.	Colorado Hospital Association
Sensitive populations	Cancer prevalence	Prevalence of cancer in the population.	Centers for Disease Control PLACES, 2024 release.
Sensitive populations	Diabetes prevalence	Prevalence of diabetes in the population.	Centers for Disease Control PLACES, 2024 release.
Sensitive populations	Heart disease prevalence	Prevalence of heart disease in the population.	Centers for Disease Control PLACES, 2024 release.
Sensitive populations	Mental health indicator	Measures poor mental health prevalence in the population.	Centers for Disease Control PLACES, 2024 release.
Sensitive populations	Cancer mortality data	Tracks mortality from cancer.	CDPHE, 2018–2022.
Sensitive populations	Diabetes mortality data	Tracks mortality from diabetes.	CDPHE, 2018–2022.
Sensitive populations	Heart disease mortality data	Tracks mortality from heart disease.	CDPHE, 2018–2022.
Sensitive populations	Life expectancy	Tracks average life expectancy.	Centers for Disease Control, 2010-2015.
Sensitive populations	Low birth weight	Tracks percentage of low birth weight in newborns.	CDPHE, 2018–2022.
Sensitive populations	Population over 64	The population count of those over 64 years old.	American Community Survey, 2018–2022.
Demographics	Population under five	The population count of those under five years old.	American Community Survey, 2018–2022.

Category	Indicator	Description	Data source
Demographics	Housing cost-burdened	Percentage of households spending more than 30% of their income on housing.	American Community Survey, 2018–2022.
Demographics	Percent disability	Percentage of the population with a disability.	American Community Survey, 2018–2022.
Demographics	Percent less than high school education	Percentage of population with less than a high school education.	American Community Survey, 2018–2022.
Demographics	Percent linguistic isolation	Percentage of population where no adults speak English fluently.	American Community Survey, 2018–2022.
Demographics	Percent low income	Percentage of the population earning less than 200% of the federal poverty level.	American Community Survey, 2018–2022.
Demographics	Percent people of color	Percentage of non-white populations.	American Community Survey, 2018–2022.

10.8. Community Engagement Report (Emily Morales Zamora, Emoza Community Planning)

Executive Summary

The Larimer County Climate Smart Future Ready (CSFR) Plan includes dynamic initiatives aimed at safeguarding public health, preserving natural resources, and fostering economic and community-wide resilience. To ensure that the CSFR Plan benefits those who need it most, Larimer County's Sustainability Office worked with consultants to undertake an Environmental Justice Impact Assessment (EJIA). This assessment evaluates the potential effects of the Plan's seven core climate mitigation actions, to understand their impact on diverse community segments—especially vulnerable populations and historically underrepresented groups.

The engagement process reached nearly 400 community members through online polls, tabling events, and workshops. While overall participation was largest by English-speakers (82%), Spanish-speakers made the majority of the workshops (53%). The multilingual, multi-method approach used in this EJIA revealed important insights about community priorities, concerns, and opportunities for ensuring equitable implementation of climate initiatives.

Key findings indicate that while there is broad support for climate mitigation efforts, there are significant variations in how different community segments perceive both benefits and challenges. Spanish-speaking participants consistently emphasized economic considerations and community disruption concerns, while English-speaking participants focused more on environmental impacts and infrastructure challenges. These differences highlight the critical importance of developing nuanced, culturally-sensitive approaches to climate action implementation.

The assessment also revealed geographic disparities in both participation and priorities, with distinct concerns emerging from Fort Collins, Loveland, and Estes Park communities. These variations underscore the need for locally-tailored approaches within the broader county-wide action.

This summary provides structured documentation of community feedback to inform the broader EJIA process.

Key Findings:

- High prioritization of public transportation improvements and energy-saving initiatives across communities
- Notable differences in perceived benefits between language groups
- Geographic variations in participation and concerns
- Clear need for targeted support for vulnerable populations

1. Introduction

This community engagement summary complements Larimer County's Environmental Justice Impact Assessment (EJIA) by integrating community perspectives on the seven climate mitigation actions outlined in the **Climate Smart Future Ready (CSFR) Plan** (see Table 1). This effort aimed to deepen understanding of how the actions can be refined to minimize potential negative impacts while maximizing benefits for all residents, with a particular focus on the county's most vulnerable populations.

1.1 Community Engagement Purpose

The engagement process was designed to:

- Gather community perspectives on seven climate mitigation actions
- Document perceived benefits and concerns associated with each action
- Identify potential implementation challenges
- Collect suggestions for action improvements

2. Methodology

2.1 Engagement Timeline

Two months, from September and October of 2024.

2.2 Turning Complex Concepts into "Energy Solutions"

To make the complex topic of climate mitigation actions more relatable and engaging for the public, we rebranded them as "Energy Solutions" throughout all communication and engagement efforts. Additionally, the original seven actions were adapted into a more accessible format, ensuring clarity and inclusivity for all community members.

The following table illustrates how the original and the modified version of the actions, aka, Energy Solutions:

Table 1. Original Actions vs Accessible Actions Used Throughout the Outreach Process

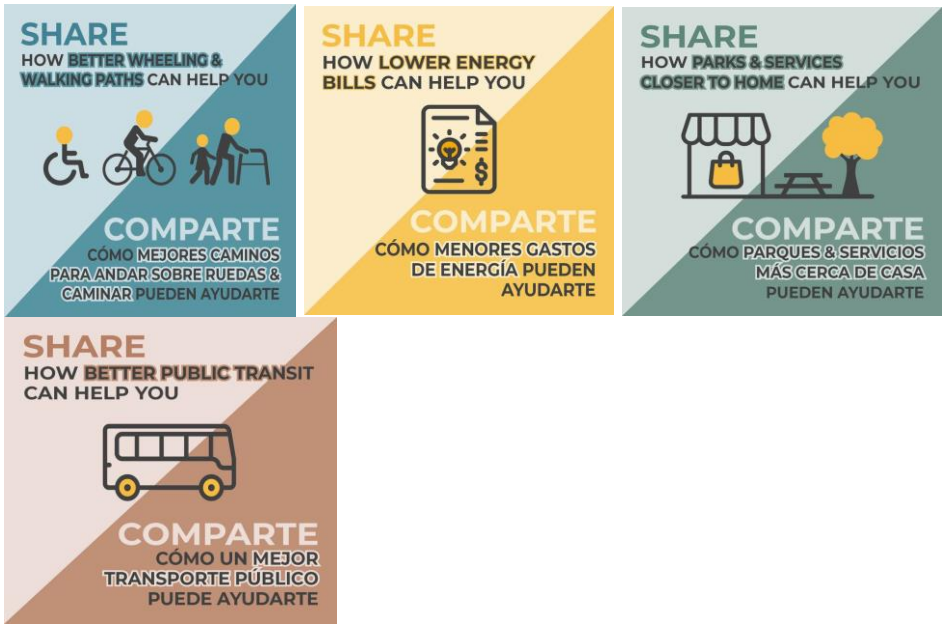
Area	Original Action	Accessible Action English (ENG) Spanish (SPA)
1. Building Energy Efficiency Standards	Update building codes to encourage energy efficiency, indoor air quality and healthy home standards	**(ENG)** Make rules so buildings use less energy **(SPA)** Establecer reglas para que los edificios utilicen menos energía
2. Home Energy Conservation Program	Provide education, training, and incentives that reduce the upfront cost for property owners who weatherize and electrify their businesses and homes	**(ENG)** Give people resources to use less energy at home and at work **(SPA)** Dar recursos para usar menos energía en los hogares y trabajos
3. Renewable Energy Expansion	Support renewable energy installations and electric grid expansion to accommodate building and transportation electrification	**(ENG)** Develop more solar and wind energy **(SPA)** Desarrollar más energía solar y de viento

4. Electric Mobility Infrastructure	Enhance infrastructure for electric mobility options including cars, scooters and e-bikes	**(ENG)** Increase electric mobility **(SPA)** Ampliar la movilidad eléctrica
5. Public Transportation Enhancement	Enhance and expand regional transportation	**(ENG)** Improve public transportation **(SPA)** Mejorar el transporte público
6. Active Transportation Infrastructure	Improve maintenance, connectivity, safety, and accessibility of existing and new biking and walking infrastructure	**(ENG)** Better walking and wheeling paths **(SPA)** Mejores calles para caminar y andar sobre ruedas
7. 15-Minute Communities Initiative	Align regional transportation plans to work toward 15-minute communities	**(ENG)** Bring stores and parks closer to home **(SPA)** Acercar las tiendas y los parques a los hogares

2.3 Broadening the Reach

The project team developed a comprehensive **Media Kit** featuring printed and digital communication materials (press release, digital poster, and social media images and content). These resources were distributed to local organizations, including Climate Smart Future Ready Champions, Community Partners, Advisory Boards, and municipalities across the area. To amplify outreach, the team collaborated with Larimer County's communication department to share information through the County's website, newsletter, and social media channels.

Figure 1: Bilingual Social Media Post Images (accompanying content was also included in the Media Kit)



In addition to leveraging institutional networks, the team worked closely with embedded community organizations such as libraries, schools, and grassroots groups serving Hispanic residents, low-income households, seniors, immigrants, and other historically underrepresented populations. Outreach efforts were further enhanced by distributing posters in Fort Collins,

Loveland, Estes Park, and the Poudre Canyon, ensuring visibility in key locations throughout the County.

2.4 Engagement Approaches & Locations

The community engagement process employed three distinct methods to ensure comprehensive feedback. All activities were offered in a bilingual format.

Table 2. Engagement Approaches Format and Focus

Online Poll	Tabling Events	Workshop Sessions
• **Format**: 5-minute digital survey (platform SurveyMonkey) • **Focus on action prioritization and benefits assessment**	• **Format**: Direct community interaction at public locations (Fort Collins BIPOC Market, Fort Collins Farmer's Market, Family Night at Loveland's Peakview Academy at Conrad Ball, and Estes Park Elk Festival) • **Focus on action prioritization activity and encouraging people to complete quick poll and/or register for a workshop**	• **Format**: Facilitated discussion sessions at three* in person in Fort Collins, Loveland, and Estes, and two online via Zoom • **Focus on in-depth discussion of benefits, concerns, and opportunities**

**The location for the three in person workshops was selected using the Colorado EnviroScreen Tool to identify areas with higher concentrations of disproportionately impacted communities, such as low-income households, linguistically isolated populations, mobile home residents, and historically underrepresented groups. These communities often face overlapping environmental and socioeconomic challenges, contributing to health and resilience disparities.*

2.5 Data Collection Methods

Quantitative data included action preference rankings and geographic distribution (i.e., participants' zip code). **Qualitative data**, on the other hand, included feedback on concerns and benefits, implementation suggestions, and community context.

3. Results

3.1 Overall Participation Summary

Almost 400 community members participated across three distinct engagement methods, providing valuable insights into community perspectives on the proposed climate mitigation actions. While this number is not representative of the County's entire population, the outreach effort focused on reaching historically underrepresented communities (like non-English speakers and mobile home residents) to better understand their specific concerns and priorities.

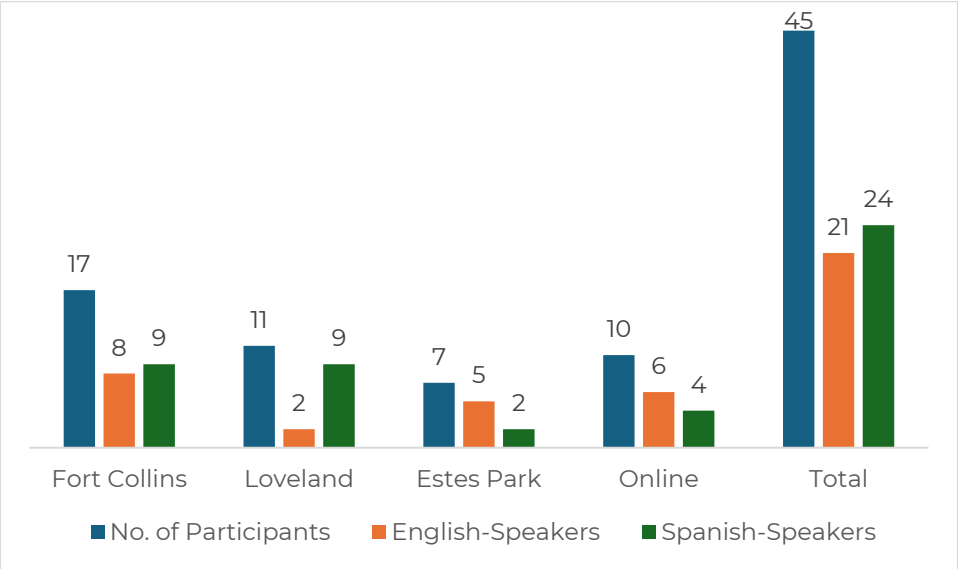
Figure 2: Overall Participation Summary by Language Group

The **online poll** emerged as the most widely accessed engagement method, drawing 230 participants and accounting for 56% of total participation. This digital format proved particularly effective in reaching English-speaking residents, with 80% of participants completing the poll in English. While Spanish-speaking participation in the online poll was lower, at 20% participation rate, this established a baseline for digital engagement with the Spanish-speaking community that can inform future outreach efforts.

Tabling events engaged 104 participants across various locations in the county. While bilingual information and staff was available at the tabling events, the feedback received were all in English.

The **workshops**, while reaching a smaller total number of participants (45), provided the most in-depth engagement opportunities. These sessions were conducted across three key locations in the county, with participation varying significantly by location: **Fort Collins** attracted the largest crowd, with 17 participants engaging in discussions about action implementation and community impacts. The **Loveland** session drew 11 participants and the **Estes Park** session had 7 participants. While the latter two drew a smaller crowd, the intimate group sizes facilitated more detailed discussions and allowed for thorough exploration of local concerns and opportunities. In addition to the in-person workshops, there were also two online sessions that drew 10 participants. The table below summarizes the workshop participation by language group.

Figure 3: Workshop Participation Overview by Language



The language distribution in workshops revealed interesting patterns that merit consideration for future engagement efforts. **Among workshop participants, 47% engaged in English and 53% in Spanish, representing a more balanced ratio than seen in other engagement methods.** This suggests that the workshop format, when properly designed and communicated, can effectively engage Spanish-speaking community members in policy discussions.

3.2 Action Prioritization Analysis

3.2.1 Combined Events Ranking by Language Group

The combined rankings of polls, workshops, and tabling events revealed clear patterns in how different language groups prioritized and perceived the actions.

The *Improve Public Transportation* action emerged as a leading choice, though with notable variations between language groups. English-speaking participants consistently ranked *Improve Public Transportation* as their top priority, while Spanish-speaking participants placed it third in their overall rankings. This variation highlights the importance of considering different community perspectives in action implementation.

The *Give People Resources to Use Less Energy at Home and at Work* action demonstrated strong support across both language groups, ranking second in combined results. This said, while English-speaking participants valued its environmental benefits, Spanish-speaking participants emphasized its potential for reducing household costs.

Develop More Solar and Wind Power also garnered strong support across the board. Yet, as with the above-mentioned two actions, benefits and concerns varied between language groups. English-speaking participants emphasized the environmental benefits, such as cleaner energy sources and reduced reliance on fossil fuels, while Spanish-speaking participants highlighted the potential for job creation and cost savings through renewable energy adoption.

Table 3. Combined Ranking (Polls, Workshops & Tabling *Events*) Summary Table

Climate Mitigation Action	Polls, Workshops & Tabling Events (ENG & SPA)	Combined ENG Rank	Combined SPA Rank
Improve public transportation	1	1	3
Give people resources to use less energy at home and at work	2	2	1
Develop more solar and wind power	3	3	2
Better walking and wheeling paths	4	4	4
Bring stores and parks closer to homes	5	5	5
Make rules so buildings use less energy	6	6	6
Increase electric mobility	7	7	7

3.2.2 Workshops and Tabling Events Ranking by Language Group

The combined results from workshops and tabling events revealed interesting contrasts with the poll findings. While *Improve Public Transportation* maintained a high priority overall, the in-person engagement formats revealed stronger support for *Better Walking and Wheeling Paths* among

Spanish-speaking participants than was evident in the poll responses. Similar contrasts were revealed on all but two actions (highlighted in the table below). This difference highlights the value of employing multiple engagement methods to capture a fuller spectrum of community priorities.

Table 4. Workshops and Tabling Events Ranking Summary Table

Climate Mitigation Action	Workshop/Tabling Events Rank (ENG & SPA)	English Rank	Spanish Rank
Improve public transportation	1	1	5
Give people resources to use less energy at home/work	2	2	2
Develop more solar and wind power	3	3	3
Better walking and wheeling paths	4	4	1
Bring stores and parks closer to homes	5	5	4
Make rules so buildings use less energy	6	6	7
Increase electric mobility	7	7	6

3.2.3 Polls Ranking by Language Group

Poll results revealed strong alignment in some areas and notable differences in others regarding the prioritization of actions. English- and Spanish-speaking respondents both ranked *Improve Public Transportation* among their top priorities, with it earning the highest combined rank. However, energy-related actions showed variations in prioritization across language groups.

Spanish-speaking respondents ranked *Give People Resources to Use Less Energy at Home or Work* as their top priority, emphasizing the economic benefits of lower energy costs and potential job creation. In contrast, English-speaking participants ranked this action second, citing its environmental benefits, such as reduced emissions and cleaner air.

Develop More Solar and Wind Power also demonstrated differing levels of importance, ranking second for Spanish speakers but fourth for English speakers. Similarly, *Make Rules So Buildings Use Less Energy* was ranked third by English speakers but fourth by Spanish speakers.

Transportation-related actions, such as *Increase Electric Mobility* and *Better Walking and Wheeling Paths*, consistently received lower rankings across both groups, indicating a lower perceived urgency for these initiatives compared to other actions.

These variations underscore the importance of tailoring communication and implementation strategies to address the diverse priorities and concerns of each group. Spanish-speaking respondents tended to prioritize economic and accessibility factors, while English-speaking participants leaned more toward environmental and infrastructure considerations.

Table 5. Poll Ranking Summary Table

Climate Mitigation Action	Poll Rank (Eng. & Spa.)	English Rank	Spanish Rank
Improve Public Transportation	1	1	3
Give people resources to use less energy at home/work	2	2	1

Develop More Solar and Wind Power	3	4	2
Make rules so buildings use less energy	4	3	4
Bring stores and parks closer to homes	5	5	5
Increase Electric Mobility	6	6	6
Better walking and wheeling paths	7	7	7

An analysis of the poll rankings reveals three key patterns:

First, actions that offered immediate household-level benefits, such as *Give People Resources to Use Less Energy at Home/Work*, garnered strong support across all community segments. The high ranking of this particular action appears linked to its potential for delivering tangible benefits while addressing both environmental and economic concerns.

Second, infrastructure-focused actions showed the greatest variation in support between language groups. While English-speaking participants strongly favored *Improve Public Transportation*, Spanish-speaking participants placed higher priority on *Better Walking and Wheeling Paths*. This variation likely reflects different patterns of infrastructure use and access among community segments.

Third, both groups consistently ranked *Increase Electric Mobility* lower in their priorities, though for different reasons revealed through workshop discussions. English-speaking participants often cited concerns about implementation costs, while Spanish-speaking participants expressed concerns about accessibility and practical utility for their communities.

3.4 Benefits and Concerns Analysis

The in-depth workshop sessions revealed a landscape of perceived benefits and concerns across different community segments. These perceptions were notably influenced by participants' lived experiences and community needs.

3.4.1 Contrasting Perceptions by Language Group

English-speaking participants consistently emphasized environmental benefits, with particular focus on air quality improvements and creation of healthier living environments. This group frequently connected individual actions to broader environmental goals, demonstrating strong interest in long-term environmental impacts. Their concerns often centered on implementation challenges, particularly regarding infrastructure costs and potential environmental disruption during construction phases.

Spanish-speaking participants, while also valuing environmental benefits, placed greater emphasis on immediate community impacts. Economic considerations featured prominently in their feedback, with particular attention to household cost savings and job creation opportunities. Their concerns frequently focused on community disruption and financial accessibility, highlighting the need for careful consideration of equity in action implementation.

Table 6: Perceived Concerns and Opportunities by Language Group

Language	Key Concerns	Key Opportunities

English	Wildlife impact, cost of adoption	Education and training (for businesses, trades people, households, etc.)
Spanish	Community disruptions, financial barriers	Accessibility improvements

3.4.2 Shared Perceptions by Language Group

Workshop discussions did reveal several shared priorities across all community segments. The desire for clear, accessible communication about program opportunities and implementation timelines emerged as a consistent theme across all locations and language groups. **Participants emphasized the importance of maintaining community input channels throughout the implementation process, not just during planning phases.**

Economic accessibility concerned all groups, though manifesting differently across language groups. While English-speaking participants often focused on overall program costs and tax implications, Spanish-speaking participants emphasized the need for household-level financial support and program accessibility for renters and low-income residents.

Infrastructure improvement timing and coordination emerged as a shared priority, with participants across all groups emphasizing the need for careful phasing of improvements to minimize community disruption while maximizing benefits.

3.4.3 Perceptions Influenced by Local Context

The geographic distribution of workshops across Fort Collins, Loveland, and Estes Park revealed how the local context influences community benefits and concerns. Each community presented distinct perspectives shaped by their unique context, such as infrastructure, topography, demography, and seasonality, among other.

Fort Collins participants, representing the largest urban area in the county, brought forward sophisticated discussions about equity and system-wide implementation. Their feedback frequently addressed the interconnected nature of the proposed actions, particularly emphasizing the relationship between transportation improvements and energy efficiency initiatives. Workshop discussions in Fort Collins demonstrated strong interest in educational programs (for businesses, trades people, households, etc.) about renewable energy, suggesting a community ready to engage with more technical aspects of climate mitigation.

Loveland's engagement revealed particular concern about the practical implications of infrastructure development. Participants frequently discussed the potential disruption of construction activities and emphasized the need for careful planning to maintain community access during implementation. However, these concerns were balanced by strong interest in leveraging existing local programs and community networks to support new initiatives. Some novel ideas suggested by the Loveland community was to consider collaborating with small businesses and community-based organizations to support with the management and distribution and of incentives.

The Estes Park sessions, provided crucial insight into the unique challenges faced by smaller, rural communities within the county. Participants emphasized the need for solutions that would work within the constraints of their tourism-based economy, seasonal population fluctuations, and

rural-based nature. Their feedback highlighted the importance of ensuring climate mitigation actions are adaptable to different community contexts.

Table 7: Concerns and Opportunities by Community Group

Community	Key Concerns	Key Opportunities
Fort Collins	Cost of adoption, equity	Education/training (for businesses, trades people, households, etc.)
Loveland	Infrastructure disruptions	Leverage existing programs and community-based organizations
Estes Park	Local context (rural/seasons)	Community-owned renewable energy provision

4. Implementation Insights

The community engagement process yielded various insights regarding implementation considerations.

4.1 Prioritize Equity in Action Implementation

The relationship between environmental benefits and economic impacts emerged as a central concern across all community segments. While there was broad support for environmental improvements, participants consistently emphasized the need to ensure these improvements don't create undue economic burdens on vulnerable communities.

Access to benefits emerged as a complex issue extending beyond simple program availability. Participants highlighted various barriers to participation, from language and cultural considerations to practical constraints like work schedules and transportation access. These insights suggest the need for a comprehensive approach to accessibility in action implementation.

Community cohesion featured prominently in discussions, with participants emphasizing the importance of maintaining and strengthening existing community networks through the implementation process. This was particularly evident in Spanish-speaking communities, where social networks play a crucial role in information sharing and program participation.

4.2 Tailor Actions to Community Priorities

The high prioritization of the ***Improve Public Transportation*** action across most community segments suggests strong support for expanding transit access. However, the varying concerns between language groups highlight the need for careful attention to how these improvements are implemented to ensure they serve all community members effectively.

Two other actions, ***1) Give People Resources to Use Less Energy at Home and at Work and 2) Develop More Solar and Wind Power,*** also garnered strong support largely due to their perceived dual benefits of environmental improvement and cost savings. The consistent ranking of these actions among top priorities suggests they might serve as effective early implementation targets to build community support for broader climate initiatives.

The varying perspectives on the ***Better Walking and Wheeling Paths*** action between language groups provides important insight for implementation planning. While English-speaking participants

often focused on recreational benefits, Spanish-speaking participants emphasized practical transportation needs, suggesting the need for a balanced approach in infrastructure development.

4.3 Maintain Cross-Cultural Communication

Throughout the engagement process, the importance of culturally appropriate communication emerged as a crucial factor for successful action implementation. Workshop discussions particularly highlighted how different communities access and process information about environmental initiatives. For example, **Spanish-speaking participants frequently emphasized the value of direct community outreach through trusted local organizations, while English-speaking participants often preferred digital communication channels and formal public meetings.**

The varying preferences in communication channels and styles suggest the need for a multi-faceted approach to community engagement during implementation. Future engagement efforts should consider maintaining multiple parallel communication streams to ensure all community segments can effectively participate in ongoing discussions and decision-making processes.

4.4 Strengthen Local Collaboration and Networks

The engagement process highlighted the critical importance of fostering collaboration between county and city departments and community-based organizations. These **partnerships not only establish and strengthen networks but also create a foundation that extends beyond individual initiatives, supporting long-term goals like emergency response planning and community resilience.**

This need was particularly evident in Estes Park, where grassroots networks appeared less developed compared to Fort Collins and Loveland. For example, Fort Collins benefits from a highly active WhatsApp group with over 600 members dedicated to community events, while Loveland has smaller but impactful efforts, such as the informal ambassadors program organized by the Hispanic Services Librarian. Strengthening or building similar networks in areas like Estes Park could enhance not only community engagement efforts but also equity and preparedness for emergencies.

4.5 Enhance Economic Accessibility and Support Mechanisms

Economic considerations featured prominently in discussions across all community segments, though with varying emphases. The engagement process revealed three key areas requiring careful consideration during implementation:

First, the need for tiered financial assistance programs or flexible support systems emerged as a consistent theme. Participants across all workshops emphasized that one-size-fits-all financial assistance programs often fail to address the diverse economic circumstances within communities. Spanish-speaking participants particularly emphasized the importance of ensuring programs remain accessible to residents who might lack traditional documentation or credit access.

Second, discussions highlighted the importance of considering both direct and indirect costs to community members. While direct costs such as program participation fees or equipment purchases were frequently mentioned, participants also emphasized indirect costs such as time taken off work for home improvements or transportation changes during area infrastructure updates.

Third, community input revealed strong interest in innovative financing mechanisms. Workshop participants, particularly in Fort Collins and Loveland, suggested exploring community-based funding models and cooperative purchasing programs to make participation more accessible to a broader range of residents.

4.6 Adapt Implementation to Local Contexts

The varying geographic contexts across Larimer County necessitate careful consideration of how each action might be adapted to different community settings. The engagement process revealed several key considerations:

In more urbanized areas like Fort Collins, participants emphasized the interconnected nature of the proposed actions, particularly regarding transportation, land use, and energy infrastructure. The feedback suggested that implementation planning should consider how different actions might be coordinated to maximize efficiency and minimize community disruption.

Loveland participants highlighted the importance of maintaining business access during infrastructure improvements, suggesting the need for careful construction phasing and clear communication about temporary changes to transportation routes or access points.

In Estes Park, the seasonal nature of the tourist economy emerged as a crucial consideration for implementation timing. Participants suggested focusing major infrastructure work during shoulder seasons to minimize impact on both local businesses and visitor access. Additionally, participants suggested exploring alternative approaches for the more distant and mountainous areas to ensure they too receive adequate infrastructure and connections to services and jobs.

5. Conclusions and Next Steps

This community engagement process has provided rich insight into how different segments of the Larimer County community view and prioritize proposed climate mitigation actions. The findings highlight both areas of broad consensus as well as important variations in community needs and preferences that should inform the broader Environmental Justice Impact Assessment.

The engagement results suggest several key considerations moving forward:

First, the need for ongoing, inclusive dialogue throughout the implementation process. The varying perspectives and priorities revealed through this engagement highlight the importance of maintaining open channels for community input as actions are refined and implemented.

Second, the importance of flexible, adaptable implementation approaches that can accommodate different community contexts while maintaining consistent progress toward climate goals. The geographic and demographic variations in community priorities suggest the need for implementation plans that can be tailored to local conditions while advancing county-wide objectives.

Third, the critical role of economic accessibility in ensuring equitable action implementation. The consistent emphasis on economic considerations across all community segments underscores the need for careful attention to how implementation costs and benefits are distributed across the community.

These findings provide a foundation for incorporating community perspectives into the broader Environmental Justice Impact Assessment, ensuring that final action recommendations reflect both environmental goals and community needs.

COLORADO STATE UNIVERSITY

CLIMATE SMART
FUTURE Ready