



GREENHOUSE GAS REDUCTION TOOLKIT

How to Take Action in Your Community



TABLE OF CONTENTS

Introduction to the Greenhouse Gas Reduction Toolkit	3
High-Impact Sectors	3
How To Use the Toolkit	4
Toolkit Process	5
Key Recommendations for Community Leaders	5
Toolkit Key & Definitions	6
Energy Supply	7
Residential Energy	14
Commercial Energy	21
Vehicles & Transportation	30
Waste & Landfill	40
Aviation & Airport	49
Appendix: Notable climate change info	56
Acknowledgments	58

INTRODUCTION TO THE GREENHOUSE GAS REDUCTION TOOLKIT

The Greenhouse Gas Reduction Toolkit (Toolkit) is designed to support cities, counties, and regions as they work to advance their emissions reduction programs. It identifies best-practices, strategies and actions that reduce greenhouse gas (GHG) emissions while enhancing quality of life and helping create thriving communities.

The menu of over 250 actions from six emission sectors reflect input from a diverse group of experts. The actions are adaptable to fit the unique needs of communities and vary in terms of carbon reduction potential, feasibility, cost, associated co-benefits and more.

HIGH-IMPACT SECTORS

The Toolkit provides readers with ideas to reduce emissions stemming from the six GHG sectors common to most Colorado communities¹:

Full descriptions of these sectors are provided in their respective chapters.



ENERGY SUPPLY

How electricity powering the community is generated



RESIDENTIAL ENERGY

How energy is used in residential buildings



COMMERCIAL ENERGY

How energy is used in commercial buildings



VEHICLES & TRANSPORTATION

The on-road movement of people, goods and services in private, transit and fleet vehicles



WASTE & LANDFILL

The solid waste generated by the community and how it is transported to the landfill



AVIATION & AIRPORT

Aircraft operations as well as energy use and transportation directly attributable to airport operations and passengers

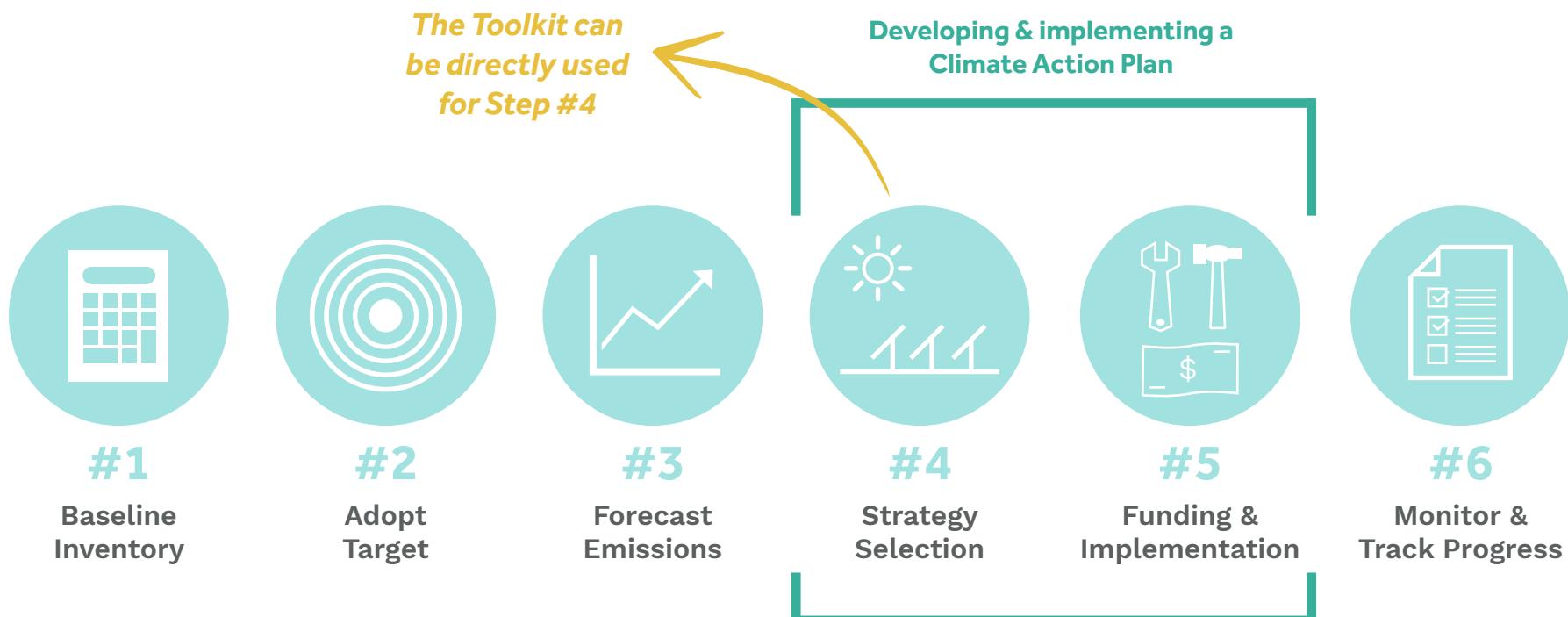
¹ These sectors also align with national and international best practices. Both the *US Community Protocol* and the *Global Protocol for Communities* suggest tracking and mitigating emissions associated with these activities.

HOW TO USE THE TOOLKIT

Fundamentally, the Toolkit is a shortcut and resource communities can use to develop climate action plans that fit their unique conditions. By listing potential actions in addition to defining the associated GHG reduction potential and co-benefits of each one, the priorities that are most important to a given community are identifiable.

The most effective way to use the Toolkit is to identify actions for implementation during the “strategy selection” phase of the climate action planning process². Once actions have been selected, communities can get into the detailed deliberation necessary to move selected actions towards implementation. The Toolkit itself is a type of workbook and provides the user with space to take notes and brainstorm key considerations like implementation timeframe and partners. Since the actions detailed throughout the document are generalized, it is likely that communities will choose to modify, customize and specify Toolkit language into their own.

As actions are identified and moved towards implementation, a wide variety of considerations will likely be evaluated. Among these, it is especially beneficial to compare preferred climate actions with other strategic planning documents to identify complementary priorities. It is also especially helpful to consider opportunities for regional collaboration, given that efforts at the multijurisdictional scale can lead to efficiencies and greater impact.



² Detailed information and resources for completing each of these steps is available at <http://www.coolcalifornia.org/local-government/toolkit> and <http://icleiusa.org/programs/emissions-management/5-milestones>.

Page 4 figure is based on the Climate Action Resource Guide graphic on CoolCalifornia.org from the California Air Resources Board, <http://www.coolcalifornia.org/local-government/toolkit>.

TOOLKIT PROCESS

The Toolkit emerged as a by-product of the City of Aspen's most recent climate action planning (CAP) process. During 2016 and 2017, Aspen convened experts under the auspices of an official Advisory Committee (AC) to develop a robust strategy aimed at achieving its long-term GHG reduction goals (30% below 2004 levels by 2020 and 80% below 2004 levels by 2050). This AC is comprised mostly of leadership-level staff, specialists, and elected officials or board members³.

The deliberative, yearlong process of GHG analysis, stakeholder meetings, and community surveys, led the leadership team to the realization that the refined yet comprehensive list of 250+ actions was far beyond the scope of a 3-5 year CAP. Further, the group realized that the list of actions could be relevant to other communities. Not wanting to limit the accessibility and impact of this impressive body of work, compiling the Toolkit became the solution to provide Aspen and others with an immediate-, mid- and long-term planning resource.

KEY RECOMMENDATIONS FOR COMMUNITY LEADERS

As community members convene to determine which actions to prioritize and refine for implementation, it is important that leaders create a supportive culture and provide resources for success. These recommendations for decision-makers will help ensure success of the overall climate planning and implementation process:

1. **Secure and prioritize the necessary organizational capacity.** This could involve assigning existing staff, hiring new staff, convening advisory commissions or otherwise.
2. Ensure that **stakeholders from all relevant sectors** are included in selecting Toolkit actions for the community's plan.
3. **Identify champions** to guide implementation when the plan is finalized.
4. **Identify and allocate funds** for plan development and implementation. This could include using existing funds, securing a new funding mechanism, or incremental multi-year budgeting. Funding is needed for projects, infrastructure, outreach, and staff capacity.
5. **Develop technical capacity** to do the work and an understanding of the linkages between climate and other local priorities. Joining the Compact of Colorado Communities⁴ provides training for all levels of staff from specialists to senior leadership.
6. **Engage in state policy discussions.** Often, local priorities can be bolstered by enabling legislation at the state level. Groups such as Colorado Communities for Climate Action⁵ enable municipalities to collectively represent their interests at the state capital.
7. **Collaborate across jurisdictional boundaries.** Regional collaboration in all sectors enhances efficiency and magnifies impact.
8. **Track performance, celebrate successes, and adjust course** when necessary. By measuring progress, building off what works, reevaluating when necessary, trying new things and maintaining a long-term commitment, communities are more likely to be successful in achieving their climate-related goals.

³ List of Advisory Committee members provided in the Acknowledgments section of this document.

⁴ <http://www.compactofcoloradocommunities.org/>

⁵ <http://cc4ca.org/>

GHG REDUCTION TOOLKIT: Key & Definitions

In addition to presenting a wide range of options for reducing GHG emissions in each sector, the Toolkit presents a 'GHG reduction potential' ranking and a list of potential co-benefits of each 'Objective' and 'Action'. The schematic below explains the elements of the tables throughout the rest of the document.

OBJECTIVE:

The broad and big picture things that need to happen to make significant progress in reducing community-wide and regional GHG emissions.

ACTION:

The programs, policies and steps that help achieve each Objective.

CO-BENEFITS:

Co-benefits are the additional positive benefits related to the reduction of greenhouse gases. Nearly all of the Objectives and Actions in this toolkit have co-benefits that achieve at least one of these measures:

Objective co-benefits:

The primary co-benefits of accomplishing the Objective.

Action co-benefits:

The specific co-benefits of implementing the Action.

 Promotes Equity

 Fosters Economic Sustainability

 Improves Local Environmental Quality

 Enhances Public Health & Safety

 Builds Resilience

OBJECTIVE	GHG REDUCTION POTENTIAL	CO-BENEFITS	TIMEFRAME	PARTNERS
Mandate decarbonization of energy supply				
ACTIONS Establish a collective of local governments, large consumers and utilities to drive regional clean energy transition				

GHG REDUCTION POTENTIAL (BLUE):

GHG reduction potential for each **Objective** represents how much it could reduce GHG emissions in the context of the sector it is a part of if fully and successfully implemented. Reduction potential was quantified using a proprietary model and simplified to a scale of 1 to 4 for presentation in the Toolkit:



Marginal



Small



Medium



Large

GHG REDUCTION POTENTIAL (GREEN):

GHG reduction potential for each **Action** represents how much it could reduce GHG emissions in the context of the Objective it is a part of. Reduction potential was approximated and is presented using a 1 to 4 scale:



Marginal



Small



Medium



Large

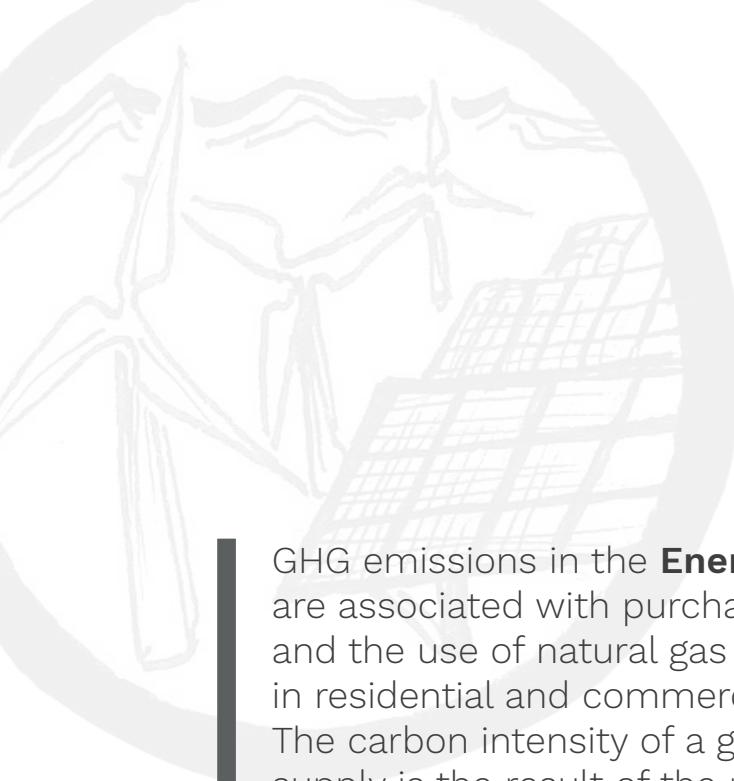
TIMEFRAME:

Defines whether the action is happening now or whether it should happen in the near, mid- or long-term future.

PARTNERS:

Describes which individuals, groups or organizations are leading and collaborating on implementation.

These columns have been left blank and are to be filled out by Toolkit users to help choose Actions for prioritization and implementation.



GHG emissions in the **Energy Supply** sector are associated with purchased electricity and the use of natural gas and propane in residential and commercial buildings. The carbon intensity of a given electricity supply is the result of the resources used to generate the power; fossil resources are significantly more carbon intensive than renewable energy sources. Opportunities to reduce emissions in this sector range from fuel switching to decentralizing production. The co-benefits of successfully reducing Energy Supply sector GHGs include widespread improvements to environmental quality and the unleashing of wealth creation and employment opportunities.

GHG REDUCTION TOOLKIT:

Energy Supply

GHG REDUCTION TOOLKIT: Energy Supply

OBJECTIVE	GHG REDUCTION POTENTIAL	CO-BENEFITS	TIMEFRAME	PARTNERS
Mandate decarbonization of energy supply		Primary Co-Benefits: 		
ACTIONS				
Participate in regional collaborative of governments, businesses, and utilities to drive clean energy transition				
Establish regional market-based mechanism favoring low-carbon energy (e.g., a price on carbon or a carbon tax and fee)				
Pursue retirement, conversion or sale of fossil-fuel plants serving area				
Remove barriers to local renewable energy generation				
Establish a local renewable energy generation target				
Communicate to utilities the importance of reducing the carbon content of electricity				
Enable consumers to purchase and produce renewable energy		Primary Co-Benefits: 		
ACTIONS				
Install renewable systems on municipal facilities				

Level of Potential GHG Reduction

Promotes Equity

Fosters Economic Sustainability

Improves Local Environmental Quality

Enhances Public Health & Safety

Builds Resilience

GHG REDUCTION TOOLKIT: Energy Supply

OBJECTIVE	GHG REDUCTION POTENTIAL	CO-BENEFITS	TIMEFRAME	PARTNERS
(Cont.) Enable consumers to purchase and produce renewable energy				
ACTIONS				
Expand municipal renewable energy power purchasing when on-site renewables are unsuitable				
Pilot microgrid infrastructure to create districts that produce the same amount of energy they consume				
Enable consumers to participate in wholesale clean power market (e.g., feed-in tariffs, net metering)				
Promote access to rooftop solar for homes and businesses through code and utility policy				
Assist large entities in implementing clean energy purchasing (e.g., virtual PPAs)				
Use Property Assessed Clean Energy (PACE) and other financing mechanisms to fund renewable installations				
Address the soft costs of solar energy installations such as permitting and interconnection fees				
Change land use codes to encourage regional solar development				

Level of Potential GHG Reduction

Promotes Equity

Fosters Economic Sustainability

Improves Local Environmental Quality

Enhances Public Health & Safety

Builds Resilience

GHG REDUCTION TOOLKIT: Energy Supply

OBJECTIVE	GHG REDUCTION POTENTIAL	CO-BENEFITS	TIMEFRAME	PARTNERS
Reduce the cost of renewable energy		Primary Co-Benefits: = \$		
ACTIONS				
Expand Advanced Metering Infrastructure (AMI)		= \$		
Facilitate solar PV and/or solar thermal bulk purchase program		= \$		
Provide funding and incentives for residential and commercial solar projects		= \$		
Expand solar programs for low-income households (e.g., GRID Alternatives)		= \$		
Streamline and incentivize rooftop solar installation process (e.g., sales tax legislation)		= \$		
Incentivize local utility owned and operated renewable capacity		\$		
Incentivize community solar		= \$		

Level of Potential GHG Reduction

Promotes Equity

Fosters Economic Sustainability

Improves Local Environmental Quality

Enhances Public Health & Safety

Builds Resilience

GHG REDUCTION TOOLKIT: Energy Supply

OBJECTIVE	GHG REDUCTION POTENTIAL	CO-BENEFITS	TIMEFRAME	PARTNERS
Invest in renewable generation at the community and utility scales		Primary Co-Benefits: 		
ACTIONS				
Develop goal to self-generate a given percentage of government, public, and nonprofit buildings' energy needs and install corresponding renewable capacity				
Develop geothermal energy				
Develop local hydropower capacity (ideally micro, pico-hydro or run of the river)				
Site and develop utility-operated renewable capacity in local service area				
Advance regional grid flexibility to enable a predominantly renewable electricity supply				
Invest in energy storage to address the intermittency of wind and solar				
Install methane digesters				
Encourage customers of electric cooperatives to vote in board elections				

Level of Potential GHG Reduction

Promotes Equity

Fosters Economic Sustainability

Improves Local Environmental Quality

Enhances Public Health & Safety

Builds Resilience

GHG REDUCTION TOOLKIT: Energy Supply

OBJECTIVE	GHG REDUCTION POTENTIAL	CO-BENEFITS	TIMEFRAME	PARTNERS
Support relevant federal and state policies through active legislative and regulatory engagement		Primary Co-Benefits: = \$ ❄️ + ∞		
ACTIONS				
Promote and share success of local climate initiatives as local narrative for broader climate action				
Cultivate elected officials as local champions for state and federal climate and energy policy				
Track state and federal climate and energy policy and engage when appropriate				
Advocate for grid modernization and flexibility policies				
Support continuation and strengthening of Colorado's Renewable Energy Standard				
Support State Energy Office				
Become a member of Colorado Communities for Climate Action to support state climate/energy policies				

Level of Potential GHG Reduction

Promotes Equity

Fosters Economic Sustainability

Improves Local Environmental Quality

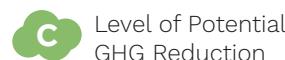
Enhances Public Health & Safety

Builds Resilience

GHG REDUCTION TOOLKIT: Energy Supply

OBJECTIVE	GHG REDUCTION POTENTIAL	CO-BENEFITS	TIMEFRAME	PARTNERS
(Cont.) Support relevant federal and state policies through active legislative and regulatory engagement				
ACTIONS				
Join coalition of communities advocating for federal climate/energy policies (e.g., Mountain Pact)				
Support state or national price on carbon				
Help defend the Clean Air Act and continued EPA regulation of CO ₂ as a pollutant				

Notes:



Level of Potential
GHG Reduction



Promotes Equity



Fosters Economic
Sustainability



Improves Local
Environmental Quality



Enhances Public
Health & Safety



Builds Resilience



GHG REDUCTION TOOLKIT:

Residential Energy

GHG emissions in the **Residential Energy** sector are associated with the use of electricity, natural gas and propane in ownership and rental units. These units vary widely in age, quality, size and occupancy, and include single-family homes, multifamily properties, mobile homes and residences in mixed use buildings. Residential units are typically served by both electric and natural gas utilities, and opportunities to reduce GHG emissions are tied to decarbonizing the supply of energy flowing to the unit and consuming less of it. The co-benefits of successfully reducing Residential Energy sector GHGs include direct consumer savings and improved dwelling comfort and safety.

GHG REDUCTION TOOLKIT: Residential Energy

OBJECTIVE	GHG REDUCTION POTENTIAL	CO-BENEFITS	TIMEFRAME	PARTNERS
Increase the efficiency of natural gas space and water heating, and convert to electric		Primary Co-Benefits: 		
ACTIONS				
Convert natural gas heating system to electric or renewable energy				
Convert natural gas water heating systems to electric or renewable energy				
Heat buildings with geothermal heat pumps, air source heat pumps, or other heat exchange technology				
Integrate space and water heating equipment standards into building codes				
Promote energy efficiency improvements such as adding insulation and pipe wrap to water heaters				
Offer technical assistance to determine natural gas heating alternatives				
Encourage integration with air conditioning systems if future AC need is anticipated (e.g., dual ground/air-source heat pumps)				

 Level of Potential GHG Reduction

 Promotes Equity

 Fosters Economic Sustainability

 Improves Local Environmental Quality

 Enhances Public Health & Safety

 Builds Resilience

GHG REDUCTION TOOLKIT: Residential Energy

OBJECTIVE	GHG REDUCTION POTENTIAL	CO-BENEFITS	TIMEFRAME	PARTNERS
Mandate no- to low-carbon standards for new construction and major remodels		Primary Co-Benefits: 		
ACTIONS				
Incentivize above-code buildings				
Adopt the latest energy codes with specific local requirements to exceed minimum standards				
Adopt net zero (or similar) building and energy conservation codes				
Require net zero (or near net zero) for all new development				
Require net zero (or near net zero) for houses over a certain square footage				
Strengthen building codes and standards to move toward net zero energy				
Conduct community trainings on updated code requirements				

 Level of Potential GHG Reduction

 Promotes Equity

 Fosters Economic Sustainability

 Improves Local Environmental Quality

 Enhances Public Health & Safety

 Builds Resilience

GHG REDUCTION TOOLKIT: Residential Energy

OBJECTIVE	GHG REDUCTION POTENTIAL	CO-BENEFITS	TIMEFRAME	PARTNERS
Improve the energy efficiency performance of existing buildings		Primary Co-Benefits: = \$ ❄️ + ∞		
ACTIONS				
Retrofit buildings to meet current building codes		= \$ ❄️ + ∞		
Provide incentives for energy efficiency retrofits (e.g., tax abatement, rebates, etc.)		= \$ ❄️ + ∞		
Enact ordinances to drive and support deep energy retrofits and align regionally		○ \$ ❄️ ○ ∞		
Facilitate education and accreditation for contractors, architects and property managers		= ○ ○ ○ ∞		
Require and incentivize measurement and verification (to gauge efficacy of energy efficiency programs)		= \$ ❄️ + ∞		
Mandate sleep mode technology for second homes when unoccupied		○ ○ ❄️ ○ ∞		
Encourage adoption of building automation systems		○ ○ ❄️ + ○		
Conduct energy efficiency challenges and provide incentives to drive energy retrofits		○ \$ ○ ○ ∞		
Expand number of cool roofs (white coating on rooftops) to reduce cooling needs		= \$ ❄️ ○ ∞		
Expand number of green roofs (covered in soil and vegetation) to reduce heating and cooling needs		○ \$ ❄️ ○ ∞		
 Level of Potential  Promotes Equity  Fosters Economic Sustainability  Improves Local Environmental Quality  Enhances Public Health & Safety  Builds Resilience				

GHG REDUCTION TOOLKIT: Residential Energy

OBJECTIVE	GHG REDUCTION POTENTIAL	CO-BENEFITS	TIMEFRAME	PARTNERS
(Cont.) Improve the energy efficiency performance of existing buildings				
ACTIONS				
Facilitate peer-to-peer information sharing among building owners				
Improve access to Property Assessed Clean Energy (PACE) and other specialized financing mechanisms				
Provide regulatory and zoning relief for projects that meet verifiable high energy standards (e.g., LEED, Net Zero Energy Building, etc.)				
Provide energy consulting services				
Support low-income households with energy upgrades and onsite renewable energy (e.g., Colorado's Affordable Residential Energy program, GRID Alternatives)				
Reduce energy consumption in rentals, apartments and multifamily buildings				
ACTIONS				
Encourage and incentivize energy efficiency retrofits in rental housing				
Partner with seasonal housing providers to deploy large-scale energy efficiency retrofits				
Level of Potential GHG Reduction	Promotes Equity	Fosters Economic Sustainability	Improves Local Environmental Quality	Enhances Public Health & Safety
				Builds Resilience

GHG REDUCTION TOOLKIT: Residential Energy

OBJECTIVE	GHG REDUCTION POTENTIAL	CO-BENEFITS	TIMEFRAME	PARTNERS
(Cont.) Reduce energy consumption in rentals, apartments and multifamily buildings				
ACTIONS				
Partner with utilities to improve tenants' access to energy-usage data				
Implement mandatory, phased energy efficiency upgrades for rental units (e.g., SmartRegs in Boulder)				
Support building automation to optimize efficiency and effectiveness				
Deploy a targeted outreach strategy to engage renters				
Adopt building energy reporting and disclosure ordinances				
Require energy performance disclosure at point of lease or sale				
Implement sub-metering for multifamily buildings for more granular building energy data				
Promote energy efficiency opportunities through outreach, workshops, and neighborhood challenges				
Pilot green leasing strategies to address the landlord and tenant split incentive				

Level of Potential GHG Reduction

Promotes Equity

Fosters Economic Sustainability

Improves Local Environmental Quality

Enhances Public Health & Safety

Builds Resilience

GHG REDUCTION TOOLKIT: Residential Energy

OBJECTIVE	GHG REDUCTION POTENTIAL	CO-BENEFITS	TIMEFRAME	PARTNERS
Anticipate and mitigate likely expansion of air conditioning use		Primary Co-Benefits: 		
ACTIONS				
Avoid or delay the need for air conditioning through building design and management				
Require high efficiency air conditioning systems as AC use becomes more prevalent				
Coordinate with efforts to adopt high efficiency electric heating systems (e.g., dual ground/air-source heat pumps)				

Notes:

Level of Potential GHG Reduction

Promotes Equity

Fosters Economic Sustainability

Improves Local Environmental Quality

Enhances Public Health & Safety

Builds Resilience



GHG emissions in the **Commercial Energy** sector are associated with the use of electricity, natural gas and propane in owner-occupied and tenant-occupied businesses in single occupancy and mixed-use buildings. These properties vary widely in age, quality, size, occupancy and use. All are typically served by both electric and natural gas utilities. Opportunities to reduce GHG emissions are tied to decarbonizing the supply of energy flowing to commercial properties and consuming less energy in them. The co-benefits of successfully reducing Commercial Energy sector GHGs include direct financial savings for businesses and enhancing the health, safety and comfort of the built environment.

GHG REDUCTION TOOLKIT:

Commercial Energy

GHG REDUCTION TOOLKIT: Commercial Energy

OBJECTIVE	GHG REDUCTION POTENTIAL	CO-BENEFITS	TIMEFRAME	PARTNERS
Promote building energy benchmarking and reporting		Primary Co-Benefits: 		
ACTIONS				
Create commercial energy benchmarking and disclosure ordinance				
Leverage the business license renewal process as a way to increase benchmarking participation and performance				
Facilitate submetering for more granular building energy data and improve building owners' access to utility data				
Provide technical support to help building owners begin benchmarking				
Increase the efficiency of natural gas heating systems and appliances				
ACTIONS				
Expand participation in voluntary incentive programs for upgrading old or inefficient equipment				
Identify opportunities for and implement district heating projects				

 Level of Potential

 Promotes Equity

 Fosters Economic Sustainability

 Improves Local Environmental Quality

 Enhances Public Health & Safety

 Builds Resilience

GHG REDUCTION TOOLKIT: Commercial Energy

OBJECTIVE	GHG REDUCTION POTENTIAL	CO-BENEFITS	TIMEFRAME	PARTNERS
Replace NG heating and appliances with electric and/or renewable systems		Primary Co-Benefits: 		
ACTIONS				
Eliminate natural gas connections for all new commercial developments				
Integrate geothermal heat or ground heat to offset natural gas use				
Promote solar thermal for water heating				
Provide rebates and incentives to replace old or inefficient boilers with electric				
Encourage integration with air conditioning systems if future AC need is anticipated (e.g., dual ground/air-source heat pumps)				
Enhance energy and resource efficiency in new commercial developments		Primary Co-Benefits: 		
ACTIONS				
Strengthen building codes to promote energy and resource efficiency in new commercial developments				
Provide above-code incentives for new commercial developments				

Level of Potential GHG Reduction

Promotes Equity

Fosters Economic Sustainability

Improves Local Environmental Quality

Enhances Public Health & Safety

Builds Resilience

GHG REDUCTION TOOLKIT: Commercial Energy

OBJECTIVE	GHG REDUCTION POTENTIAL	CO-BENEFITS	TIMEFRAME	PARTNERS
(Cont.) Enhance energy and resource efficiency in new commercial developments				
ACTIONS				
Require new buildings achieve LEED standards, mandating that criteria focus on energy efficiency				
Require new buildings meet net zero energy building (NZEB) standards				
Use land use planning to encourage density in development				
Allow an outcome-based compliance path (target) to promote build/design flexibility				
Coordinate regional alignment of building energy codes and beyond code preferences				
Bring all buildings up to current building codes or retrofit a majority of existing buildings				
ACTIONS				
Require or incentivize remodels to meet current energy code				
Require commercial lighting retrofits in existing buildings				

 Level of Potential GHG Reduction

 Promotes Equity

 Fosters Economic Sustainability

 Improves Local Environmental Quality

 Enhances Public Health & Safety

 Builds Resilience

GHG REDUCTION TOOLKIT: Commercial Energy

OBJECTIVE	GHG REDUCTION POTENTIAL	CO-BENEFITS	TIMEFRAME	PARTNERS
(Cont.) Bring all buildings up to current building codes or retrofit a majority of existing buildings				
ACTIONS				
Require or incentivize refrigeration upgrades				
Ban or disincentivize open doors while heating or cooling is happening				
Conduct energy assessments				
Provide energy efficiency and renewable energy incentives for large consumers				
Develop programs targeting specific commercial users (e.g., small lodges, restaurants, etc.)				
Require deep energy retrofits at designated points, such as time of sale or major renovation				
Establish incremental timeline to require that all commercial buildings meet current building energy codes				
Develop and implement program for energy efficiency and renewable energy in historical buildings				

 Level of Potential GHG Reduction

 Promotes Equity

 Fosters Economic Sustainability

 Improves Local Environmental Quality

 Enhances Public Health & Safety

 Builds Resilience

GHG REDUCTION TOOLKIT: Commercial Energy

OBJECTIVE	GHG REDUCTION POTENTIAL	CO-BENEFITS	TIMEFRAME	PARTNERS
Model best practices through energy retrofitting of government buildings and properties		Primary Co-Benefits: 		
ACTIONS				
Implement energy efficiency measures on government buildings, offices and facilities				
Improve energy efficiency in affordable housing units and complexes				
Require green capital needs assessment for renovation projects financed by local government				
Train building operators and facility managers in energy efficiency best practices				
Ensure new government buildings achieve high performance green building standards (e.g., NEZB, LEED, etc.)				
Identify opportunities for and implement district heating in new construction, remodels and campuses				
Improve education and infrastructure; optimize utility rates				
ACTIONS				
Integrate carbon sequestration practices and infrastructure into built environment				
 Level of Potential  Promotes Equity	 Fosters Economic Sustainability	 Improves Local Environmental Quality	 Enhances Public Health & Safety	 Builds Resilience

GHG REDUCTION TOOLKIT: Commercial Energy

OBJECTIVE	GHG REDUCTION POTENTIAL	CO-BENEFITS	TIMEFRAME	PARTNERS
(Cont.) Improve education and infrastructure; optimize utility rates				
ACTIONS				
Provide contractor education programs on green building and energy efficiency upgrades				
Require certification of building operators				
Redesign utility rates to incentivize and balance current and future priorities (e.g., electric vehicles, fuel switching, time of use, peak shaving, energy efficiency, demand side management)				
Establish a green business certification program to recognize buildings that achieve energy efficiency and sustainability thresholds				
Create green business corridors				
Require higher energy efficiency standards for major appliances				
Optimize water distribution system to make it as efficient as possible				
Increase public works oversight in construction to prevent continual reconstruction due to poor initial construction quality				

 Level of Potential GHG Reduction

 Promotes Equity

 Fosters Economic Sustainability

 Improves Local Environmental Quality

 Enhances Public Health & Safety

 Builds Resilience

GHG REDUCTION TOOLKIT: Commercial Energy

OBJECTIVE	GHG REDUCTION POTENTIAL	CO-BENEFITS	TIMEFRAME	PARTNERS
(Cont.) Improve education and infrastructure; optimize utility rates				
ACTIONS				
Promote optimal thermostat settings to couple comfort with efficiency				
Expand messaging and communication on energy programs				
Anticipate and mitigate likely expansion of air conditioning use in buildings				
ACTIONS				
Avoid or delay the need for air conditioning through building design and management				
Require high efficiency air conditioning systems as AC use becomes more prevalent				
Coordinate with efforts to adopt high efficiency electric heating systems (e.g., dual ground/air-source heat pumps)				

 Level of Potential GHG Reduction

 Promotes Equity

 Fosters Economic Sustainability

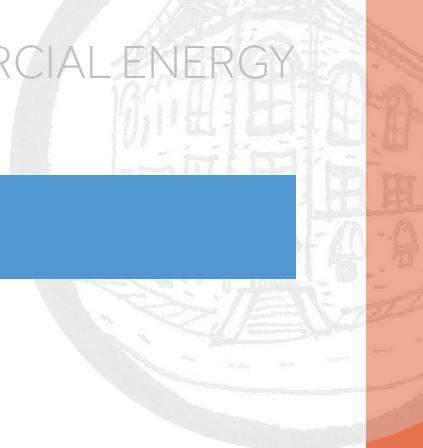
 Improves Local Environmental Quality

 Enhances Public Health & Safety

 Builds Resilience

GHG REDUCTION TOOLKIT: Commercial Energy

Notes:



Level of Potential GHG Reduction



Promotes Equity



Fosters Economic Sustainability



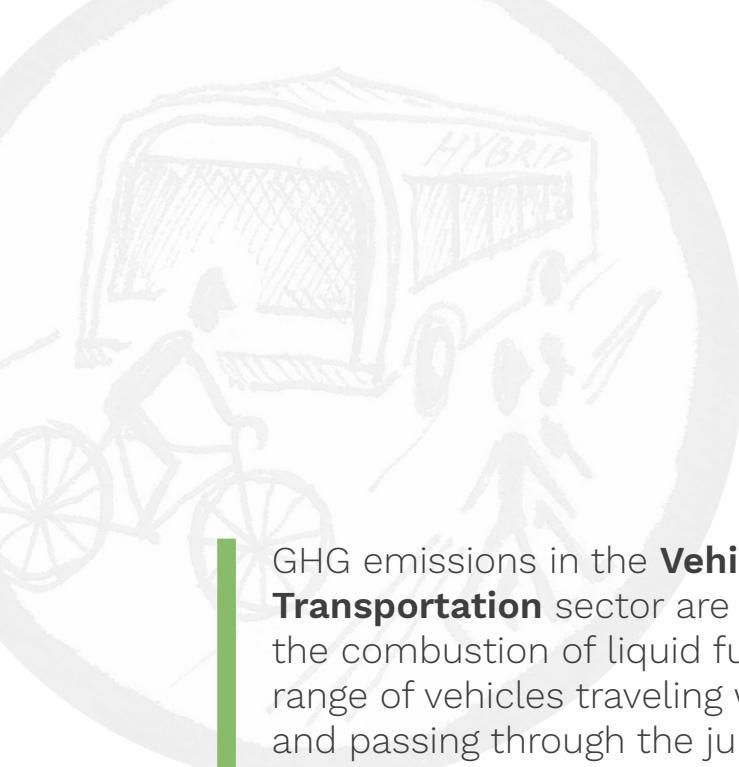
Improves Local Environmental Quality



Enhances Public Health & Safety



Builds Resilience



GHG emissions in the **Vehicles and Transportation** sector are associated with the combustion of liquid fuels in the wide range of vehicles traveling within, to, from, and passing through the jurisdiction. Types of vehicles include but are not limited to personal vehicles, light trucks, transit buses, commercial transport vehicles, heavy duty vehicles, and motorcycles. Opportunities to reduce emissions in this sector are diverse, and include shifting transportation modes away from single occupancy vehicle use and transitioning personal and commercial vehicle fleets to low or zero-emission options like electric vehicles. The co-benefits of successfully reducing Transportation sector GHGs include reduced congestion and improved air quality.

GHG REDUCTION TOOLKIT:

Vehicles & Transportation

GHG REDUCTION TOOLKIT: Vehicles & Transportation

OBJECTIVE	GHG REDUCTION POTENTIAL	CO-BENEFITS	TIMEFRAME	PARTNERS
Reduce VMT by promoting alternatives to single-occupancy vehicles		Primary Co-Benefits: 		
ACTIONS				
Encourage employers to subsidize bus passes for employees				
Create funding mechanism for free regional bus ridership				
Promote and incentivize carpooling				
Strengthen enforcement of high occupancy vehicle (HOV) and transit lanes				
Boost public transit reliability				
Promote teleworking as an alternative to commuting				
Make transit more convenient, affordable and fun than driving (e.g., optimized schedules, dedicated bus lanes, comfortable seats, free wi-fi, etc.)				
Increase the number and quality of safe routes and transit options to schools				

Level of Potential GHG Reduction

Promotes Equity

Fosters Economic Sustainability

Improves Local Environmental Quality

Enhances Public Health & Safety

Builds Resilience

GHG REDUCTION TOOLKIT: Vehicles & Transportation

OBJECTIVE	GHG REDUCTION POTENTIAL	CO-BENEFITS	TIMEFRAME	PARTNERS
(Cont.) Reduce VMT by promoting alternatives to single-occupancy vehicles				
ACTIONS				
Evaluate high-speed rail to optimize transit coverage and efficiency				
Enable growth of on-demand mobility services (i.e., ride-sharing, e-hailing, bike-sharing, car-sharing etc.)				
Place 'air pollution disclosure' labels on gas pumps (similar to Surgeon General's warning on cigarettes)				
Enhance first and last mile connectivity to transit				
ACTIONS				
Expand feeder transit network to primary bus stops (e.g., circulators, 'mobility as a service')				
Expand bike share network to better connect neighborhoods and work centers to public transit				
Expand rideshare network to better connect people traveling to similar destinations				

 Level of Potential GHG Reduction

 Promotes Equity

 Fosters Economic Sustainability

 Improves Local Environmental Quality

 Enhances Public Health & Safety

 Builds Resilience

GHG REDUCTION TOOLKIT: Vehicles & Transportation

OBJECTIVE	GHG REDUCTION POTENTIAL	CO-BENEFITS	TIMEFRAME	PARTNERS
(Cont.) Enhance first and last mile connectivity to transit				
ACTIONS				
Promote zero-emission and driverless technologies for expanded mobility services				
Expand bicycle network to better connect neighborhoods and work centers to public transit				
Expand pedestrian infrastructure to better connect neighborhoods and work centers to public transit				
Promote adoption of alternate fuel vehicles for individuals and fleets <div style="display: flex; justify-content: space-between; align-items: center;"> <div style="flex: 1;"> </div> <div> Primary Co-Benefits: </div> </div>				
ACTIONS				
Provide free parking for zero-emissions vehicles in areas that typically charge parking fees				
Increase the proportion of EVs in fleets (e.g., car share, municipal, rental cars, hotel shuttles, etc.)				
Create EV charging hubs for taxis or other fleets				
Increase EV charging stations in visible, accessible locations				
Level of Potential GHG Reduction	Promotes Equity	Fosters Economic Sustainability	Improves Local Environmental Quality	Enhances Public Health & Safety
				Builds Resilience

GHG REDUCTION TOOLKIT: Vehicles & Transportation

OBJECTIVE	GHG REDUCTION POTENTIAL	CO-BENEFITS	TIMEFRAME	PARTNERS
(Cont.) Promote adoption of alternate fuel vehicles for individuals and fleets				
ACTIONS				
Encourage off-peak EV charging through electricity rate structure				
Require EV charging stations (or EV readiness) in all new commercial developments				
Require EV charging stations (or EV readiness) in all new multifamily developments				
Require all new single-family construction to be EV ready				
Provide incentives to tie PV (and storage battery) installation to EV purchases				
Provide free public EV charging stations				
Support the full spectrum of low emission vehicle technologies, in addition to EVs				
Convert transit and government fleets to low-carbon fuel vehicles (e.g., electric buses)				
Provide financial incentives to convert fleets to low-carbon fuel vehicles				
Make transportation fuels at landfill using methane capture				

Level of Potential GHG Reduction

Promotes Equity

Fosters Economic Sustainability

Improves Local Environmental Quality

Enhances Public Health & Safety

Builds Resilience

GHG REDUCTION TOOLKIT: Vehicles & Transportation

OBJECTIVE	GHG REDUCTION POTENTIAL	CO-BENEFITS	TIMEFRAME	PARTNERS
(Cont.) Promote the adoption of alternate fuel vehicles for individuals and fleets				
ACTIONS				
Deploy public outreach campaign and give the public opportunities to drive an EV				
Facilitate EV bulk purchase program				
Redesign urban form and population density to reduce vehicle use <div style="display: flex; justify-content: space-between; align-items: center;"> Primary Co-Benefits: </div>				
ACTIONS				
Use zoning and transit-oriented development to site new development near jobs and transit				
Enable a greater percentage of the workforce to live near work and transit				
Improve winter bike and pedestrian options				
Improve and expand pedestrian infrastructure (e.g., pedestrian malls, fast walk signals, sidewalks)				
Create or expand no car zones				

 Level of Potential GHG Reduction

 Promotes Equity

 Fosters Economic Sustainability

 Improves Local Environmental Quality

 Enhances Public Health & Safety

 Builds Resilience

GHG REDUCTION TOOLKIT: Vehicles & Transportation

OBJECTIVE	GHG REDUCTION POTENTIAL	CO-BENEFITS	TIMEFRAME	PARTNERS
(Cont.) Redesign urban form and population density to reduce vehicle use				
ACTIONS				
Improve and expand bicycle infrastructure (e.g., well-placed bike lanes, find solutions for conflict/hazard areas, etc.)				
Build bike racks in strategic locations; consider covered or winter bike racks				
Support local food production and sale at scale				
Change codes to include EV service equipment installations as acceptable transportation demand management (TDM) option				
Limit parking and drop-off permits at schools				
Eliminate minimum parking requirements for development; instead, require transit and mobility services				
Support relevant federal, state and local policy through active legislative and regulatory engagement				
ACTIONS				
Support local, state and federal incentives, policies and programs to grow EV adoption and infrastructure		Primary Co-Benefits: 		

Level of Potential GHG Reduction

Promotes Equity

Fosters Economic Sustainability

Improves Local Environmental Quality

Enhances Public Health & Safety

Builds Resilience

GHG REDUCTION TOOLKIT: Vehicles & Transportation

OBJECTIVE	GHG REDUCTION POTENTIAL	CO-BENEFITS	TIMEFRAME	PARTNERS
(Cont.) Support relevant federal, state and local policy through active legislative and regulatory engagement				
ACTIONS				
Actively support Colorado transit grants				
Support EPA greenhouse gas emissions standards and fuel efficiency standards for medium- and heavy-duty engines and vehicles				
Promote state fuel economy standards, such as California's standards				
Advocate for a strengthening of the CAFE standards (the national fuel economy targets)				
Promote new mobility technologies and business models <div style="display: flex; justify-content: space-between;"> <div style="flex: 1;"> </div> <div style="flex: 1;"> Primary Co-Benefits: </div> </div>				
ACTIONS				
Integrate a multi-modal mobility system at the regional or state scale				
Pilot on-demand bus and/or van share				
Implement peak demand service for strategic transit routes				

Level of Potential GHG Reduction

Promotes Equity

Fosters Economic Sustainability

Improves Local Environmental Quality

Enhances Public Health & Safety

Builds Resilience

GHG REDUCTION TOOLKIT: Vehicles & Transportation

OBJECTIVE	GHG REDUCTION POTENTIAL	CO-BENEFITS	TIMEFRAME	PARTNERS
(Cont.) Promote new mobility technologies and business models				
ACTIONS				
Address regulatory barriers to shared-use mobility and driverless vehicles				
Support on-demand parking apps to reduce vehicle circulation and congestion				
Deploy real-time public transit data to provide up-to-the-minute information (e.g., bus arrival information, parking availability, etc.)				
Increase the cost of using fossil-fuel vehicles <div style="display: flex; justify-content: space-between;"> Primary Co-Benefits: </div>				
ACTIONS				
Establish CO ₂ fees on fossil-fuel vehicles at purchase or registration				
Establish congestion fees on fossil-fuel vehicles in designated areas or for driving during high-use times				
Tax gasoline sales locally or regionally				

 Level of Potential GHG Reduction

 Promotes Equity

 Fosters Economic Sustainability

 Improves Local Environmental Quality

 Enhances Public Health & Safety

 Builds Resilience

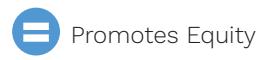
GHG REDUCTION TOOLKIT: Vehicles & Transportation

OBJECTIVE	GHG REDUCTION POTENTIAL	CO-BENEFITS	TIMEFRAME	PARTNERS
Increase the cost of driving in certain places		Primary Co-Benefits:		
ACTIONS				
Institute new parking pricing models (e.g., performance-based parking, off-street parking tax, dynamic pricing, etc.)				
Establish regional road pricing (e.g., toll roads, dynamic pricing)				

Notes:



Level of Potential
GHG Reduction



Promotes Equity



Fosters Economic
Sustainability



Improves Local
Environmental Quality



Enhances Public
Health & Safety



Builds Resilience



GHG emissions in the **Waste and Landfill** sector come from waste generated within the jurisdiction, then transported to, and processed at the landfill. Organic components within the waste stream generate methane as they decompose. Organic components vary but predominantly include food waste and construction and demolition (C&D) waste. Heavy duty vehicles hauling waste to the landfill and processing it on site consume liquid fuels. Opportunities to reduce emissions in this sector include diverting or salvaging organic components of the waste stream and increasing the efficiency of hauling and processing. The co-benefits of successfully reducing Landfill sector GHGs include extending the life of local landfills and improving local environmental quality.

GHG REDUCTION TOOLKIT:

Waste & Landfill

GHG REDUCTION TOOLKIT: Waste & Landfill

OBJECTIVE	GHG REDUCTION POTENTIAL	CO-BENEFITS	TIMEFRAME	PARTNERS
Increase rates of and participation in composting and recycling		Primary Co-Benefits: 		
ACTIONS				
Require composting through codes or regulations				
Create convenient, accessible neighborhood compost drop-off locations				
Equip an entity like the landfill with resources to turn organic waste into a safe and usable compost product				
Make finished compost product accessible to gardeners and landscapers				
Require waste haulers to offer compost pickup				
Require waste haulers to offer recycling pickup				
Run ongoing public education campaigns to promote composting				
Ensure buildings have adequate space for composting and recycling collection and storage (e.g., equal space ordinance)				
Create (or strengthen, if existing) yard waste composting ordinances				

 Level of Potential GHG Reduction

 Promotes Equity

 Fosters Economic Sustainability

 Improves Local Environmental Quality

 Enhances Public Health & Safety

 Builds Resilience

GHG REDUCTION TOOLKIT: Waste & Landfill

OBJECTIVE	GHG REDUCTION POTENTIAL	CO-BENEFITS	TIMEFRAME	PARTNERS
(Cont.) Increase rates of and participation in composting and recycling				
ACTIONS				
Create (or enforce, if existing) ban on burying yard waste in landfill				
Create composting program and infrastructure for multifamily complexes				
Supply local food waste to agricultural operations (e.g., animal feed)				
Provide resources and support for property managers to increase recycling and composting				
Charge more for trash service and reduce trash pickup days				
Implement a single-stream recycling policy				
Expand public recycling and composting infrastructure				
Expand businesses' participation in compost collection services				

 Level of Potential GHG Reduction

 Promotes Equity

 Fosters Economic Sustainability

 Improves Local Environmental Quality

 Enhances Public Health & Safety

 Builds Resilience

GHG REDUCTION TOOLKIT: Waste & Landfill

OBJECTIVE	GHG REDUCTION POTENTIAL	CO-BENEFITS	TIMEFRAME	PARTNERS
Maximize diversion of construction and demolition (C&D) waste		Primary Co-Benefits: 		
ACTIONS				
Create a system for moving C&D waste to markets				
Make demolition more expensive than deconstruction				
Mandate deconstruction				
Update building codes to ensure deconstruction of buildings is prioritized over demolition				
Charge a lot more for C&D loads				
Adopt and enforce C&D waste ordinance				
Create a salvage yard for deconstructed building materials				
Establish reuse center for building materials				
Facilitate markets for resale businesses to pre-resell materials				

Level of Potential GHG Reduction

Promotes Equity

Fosters Economic Sustainability

Improves Local Environmental Quality

Enhances Public Health & Safety

Builds Resilience

GHG REDUCTION TOOLKIT: Waste & Landfill

OBJECTIVE	GHG REDUCTION POTENTIAL	CO-BENEFITS	TIMEFRAME	PARTNERS
(Cont.) Maximize diversion of construction and demolition (C&D) waste				
ACTIONS				
Offer incentives to encourage reuse of existing structures				
Introduce onboard technology to sort C&D waste at landfill				
Provide technical support to contractors to reduce C&D waste				
Increase community compliance with waste diversion ordinances				
ACTIONS				
Impose tickets and fines for not recycling or for contaminating recycling loads				
Provide consistent education across relevant target audiences				
Create and enforce zero-waste event requirements				
Require recycling and compost bins at public events				
Align city, county and regional waste policies and codes				

 Level of Potential GHG Reduction

 Promotes Equity

 Fosters Economic Sustainability

 Improves Local Environmental Quality

 Enhances Public Health & Safety

 Builds Resilience

GHG REDUCTION TOOLKIT: Waste & Landfill

OBJECTIVE	GHG REDUCTION POTENTIAL	CO-BENEFITS	TIMEFRAME	PARTNERS
(Cont.) Increase community compliance with waste diversion ordinances				
ACTIONS				
Perform compliance spot-checks (similar to health code inspections at restaurants)				
Host community-wide waste collection events to support proper disposal of hard-to-recycle items (e.g., electronics, tires, batteries, etc.)				
Consume fewer products and resources <div style="display: flex; justify-content: space-between; align-items: center;">  Primary Co-Benefits:  </div>				
ACTIONS				
Conduct “buy local” and “consume local” campaigns				
Promote reusable mugs and water bottles				
Develop and adopt local Styrofoam ban				
Tax or ban plastic water bottles				
Develop programs to reduce use of plastic foodservice packaging				
Incentivize the use of reusable containers over disposable				
 Level of Potential	 Promotes Equity	 Fosters Economic Sustainability	 Improves Local Environmental Quality	 Enhances Public Health & Safety
				 Builds Resilience

GHG REDUCTION TOOLKIT: Waste & Landfill

OBJECTIVE	GHG REDUCTION POTENTIAL	CO-BENEFITS	TIMEFRAME	PARTNERS
(Cont.) Consume fewer products and resources				
ACTIONS				
Promote government and corporate purchasing policies favoring low waste				
Redesign organizational purchasing rules to favor sustainable consumption				
Require improved materials management by businesses and government				
Increase oversight by public works departments to reduce the need to reconstruct poorly built projects				
Support food waste reduction programs				
Change state regulations to allow food rescue (e.g., food pantry)				
Facilitate donation of excess or unused food (e.g., Uber-style app to connect restaurants and private chefs to organizations that feed the hungry)				
Require use of recycled asphalt in streets				
Ban plastic bags				

Level of Potential GHG Reduction

Promotes Equity

Fosters Economic Sustainability

Improves Local Environmental Quality

Enhances Public Health & Safety

Builds Resilience

GHG REDUCTION TOOLKIT: Waste & Landfill

OBJECTIVE	GHG REDUCTION POTENTIAL	CO-BENEFITS	TIMEFRAME	PARTNERS
(Cont.) Consume fewer products and resources				
ACTIONS				
Impose fees on paper bags				
Promote thrift stores, reuse programs, fix-it clinics and community share programs				
Increase the cost of waste disposal for MSW and C&D				
ACTIONS				
Implement tiered 'Pay As You Throw' rates to all jurisdictions served by a particular landfill				
Expand and improve existing waste hauling practices				
ACTIONS				
Combine yard waste and food waste for pickup service				
Re-route haulers to increase operating efficiency				
Require haulers use cleaner vehicles				

 Level of Potential GHG Reduction

 Promotes Equity

 Fosters Economic Sustainability

 Improves Local Environmental Quality

 Enhances Public Health & Safety

 Builds Resilience

GHG REDUCTION TOOLKIT: Waste & Landfill

OBJECTIVE	GHG REDUCTION POTENTIAL	CO-BENEFITS	TIMEFRAME	PARTNERS
Pilot new technologies		Primary Co-Benefits: 		
ACTIONS				
Develop waste-to-energy technologies at regional landfills				
Pilot small-scale anaerobic digestion facilities for organic waste				
Assess feasibility of FastOx Gasification (waste becomes energy via hydrogen, syngas)				
Combine small-scale plasma gasification with district heating				

Notes:

 Level of Potential GHG Reduction

 Promotes Equity

 Fosters Economic Sustainability

 Improves Local Environmental Quality

 Enhances Public Health & Safety

 Builds Resilience



GHG emissions in the **Aviation and Airport** sector are associated with aircraft operations, airport ground support equipment, on road vehicle use and energy consumed in airport buildings. Aircraft operations include landings and takeoffs. Opportunities to reduce emissions in this sector include increasing the operating efficiency of aircraft, electrifying ground support equipment and ground access vehicles and maximizing the energy efficiency and production of airport buildings. The co-benefits of successfully reducing Airport sector GHGs include improvements to both public health and environmental quality.

GHG REDUCTION TOOLKIT:

Aviation & Airport

GHG REDUCTION TOOLKIT: Aviation & Airport

OBJECTIVE	GHG REDUCTION POTENTIAL	CO-BENEFITS	TIMEFRAME	PARTNERS
Reduce airport-controlled GHGs		Primary Co-Benefits:		
ACTIONS				
Require EVs and/or cleaner fuels for ground support vehicles and ground support equipment (GSE)				
Build onsite PV or PV canopies to power EV service vehicles and EV GSE				
Install alternative fueling sources (would need to be regionally based) at airports to enable airlines to convert ground support equipment to cleaner, lower emission vehicles				
Maximize the energy efficiency and energy performance of airport buildings				
Integrate ground heat or geothermal heating into existing buildings and facilities				
Replace airfield lighting with LED lighting				
Increase the efficiency of the airport curbside to reduce vehicle trip lengths and idling				
Prohibit vehicle idling in pickup/drop-off and waiting zones				
Install ground power and preconditioned air systems at gates to reduce the use of the auxiliary power units on aircraft				

Level of Potential GHG Reduction

Promotes Equity

Fosters Economic Sustainability

Improves Local Environmental Quality

Enhances Public Health & Safety

Builds Resilience

GHG REDUCTION TOOLKIT: Aviation & Airport

OBJECTIVE	GHG REDUCTION POTENTIAL	CO-BENEFITS	TIMEFRAME	PARTNERS
(Cont.) Reduce airport-controlled GHGs				
ACTIONS				
Optimize waste diversion practices and rates at airport facilities and terminal				
Require taxi and airport shuttles to meet a clean-fuels or MPGe standard for onsite agreements				
Reduce aircraft- and aviation-related GHGs				
ACTIONS Primary Co-Benefits:				
Modernize Air Traffic Control System (NextGen – FAA controlled)				
Encourage continuous descent approaches (CDAs) if possible				
Financially incentivize the use of more efficient aircraft serving airport (e.g., through takeoff/ landing fees)				
Incentivize the use of aviation biofuels in aircraft servicing local airport (would require local supply, regional approach or partnership with DIA)				

Level of Potential GHG Reduction

Promotes Equity

Fosters Economic Sustainability

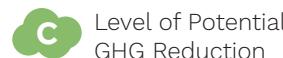
Improves Local Environmental Quality

Enhances Public Health & Safety

Builds Resilience

GHG REDUCTION TOOLKIT: Aviation & Airport

OBJECTIVE	GHG REDUCTION POTENTIAL	CO-BENEFITS	TIMEFRAME	PARTNERS
(Cont.) Reduce aircraft- and aviation-related GHGs				
ACTIONS				
Offer targeted offsets through partnerships with industry leaders and airlines serving local airport				
Encourage and support Bustang to DIA				
Reduce the need for air travel via state/regional high-speed rail				
Pressure local airlines to implement their aspirational International GHG goals				
ACTIONS				
Inform airlines of local GHG reduction targets, and provide operational incentives connected with facilitating attainment				
Educate passengers about 'greener' flying and becoming consumer advocates via airline promotional material				
Encourage airlines to continue developing improved Engine and Airframe Technology				



Level of Potential
GHG Reduction



Promotes Equity



Fosters Economic
Sustainability



Improves Local
Environmental Quality



Enhances Public
Health & Safety



Builds Resilience

GHG REDUCTION TOOLKIT: Aviation & Airport

OBJECTIVE	GHG REDUCTION POTENTIAL	CO-BENEFITS	TIMEFRAME	PARTNERS
If a new terminal is developed, ensure that it represents the pinnacle of energy efficiency and sustainability		Primary Co-Benefits: 		
ACTIONS				
Require any new terminal or airport building to be net-zero				
Mandate 'zero construction waste' and 'sustainable construction' plans for any new terminal or airport facilities				
Integrate ground heat or geothermal heating into new buildings and facilities				
Plan for and install PV at airport and adjacent areas (e.g., PV parking canopies)				
Ensure terminal encourages next-generation mobility by providing EV and 'mobility as a service' infrastructure				
Encourage passengers to use transit and mobility services to access airport				
ACTIONS				
Deploy combined marketing outreach with chamber and lodges regarding transit and mobility options				
Provide luggage delivery to hotels or residences so passengers can use the transit and mobility options of their choice				
 Level of Potential GHG Reduction	 Promotes Equity	 Fosters Economic Sustainability	 Improves Local Environmental Quality	 Enhances Public Health & Safety
				 Builds Resilience

GHG REDUCTION TOOLKIT: Aviation & Airport

OBJECTIVE	GHG REDUCTION POTENTIAL	CO-BENEFITS	TIMEFRAME	PARTNERS
(Cont.) Encourage passengers to use transit and mobility services to access airport				
ACTIONS				
Require rental car companies to have EV options (and require that EVs are a certain percentage of rental fleet); also require an MPGe standard for rental car fleet				
Partner with airport rental car companies to include info card about local mobility options (including option of zero-emissions rental cars)				
Provide a dedicated ground transit route with local service into terminal drop-off				
Establish an easy-to-use link from terminal to transit				
Create a luxury bus system to carry people and luggage to and from airport to their accommodations				
Install signage and wayfinding from terminal to existing transit				
Install light rail from airport to city				
Provide appropriate amount of remote airport parking (including at Park and Rides)				

 Level of Potential GHG Reduction

 Promotes Equity

 Fosters Economic Sustainability

 Improves Local Environmental Quality

 Enhances Public Health & Safety

 Builds Resilience

GHG REDUCTION TOOLKIT: Aviation & Airport

OBJECTIVE	GHG REDUCTION POTENTIAL	CO-BENEFITS	TIMEFRAME	PARTNERS
Support relevant federal and state policies through active legislative and regulatory engagement		Primary Co-Benefits: 		
ACTIONS				
Push for federal air quality standards to reduce GHGs associated with jet fuel				
Establish an active local government voice in federal aviation policy				
Encourage or facilitate the adoption of 'sustainable aviation fuels,' such as biofuels				
Support federal carbon tax that includes aircraft operations				

Notes:

 Level of Potential GHG Reduction

 Promotes Equity

 Fosters Economic Sustainability

 Improves Local Environmental Quality

 Enhances Public Health & Safety

 Builds Resilience

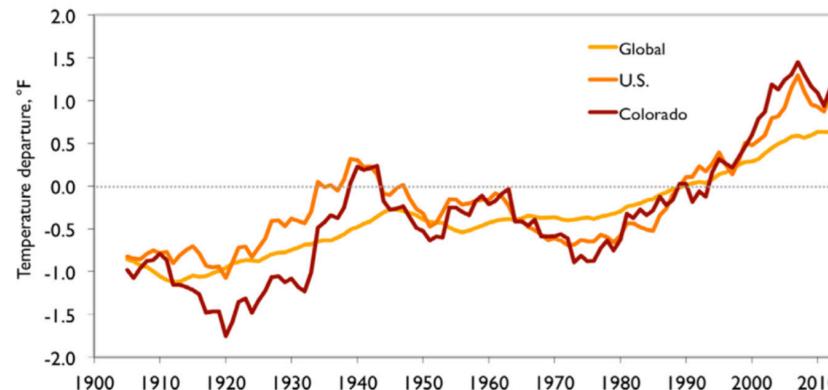
APPENDIX: Notable climate change info for your CAP

While questions remain about the exact specifics of future climate conditions, the basic facts of climate science and solutions are well understood, and more relevant and accessible to local communities than they ever have been. The following insights have been compiled to provide Toolkit users with accessible climate change information that can be drawn for use in their own climate action plans.

Our climate is changing, and more rapidly than at any point on recordⁱ.

- “Every single year since 1977 has been warmer than the 20th century average, with 16 of the 17 warmest years on record occurring since 2001, and 2016 being the warmest year on recorded history.”ⁱⁱ
- Global temperatures have risen by 1.5°F since 1880ⁱⁱⁱ and national temperatures have increased 2°F since 1978^{iv}.
- In Colorado, average temperatures have risen by 2.5°F since the 1950s^v.
- In Western Colorado, there are 23 fewer frost free than there were before the 1980s and annual snowfall has declined by 10 inches^{vi}.

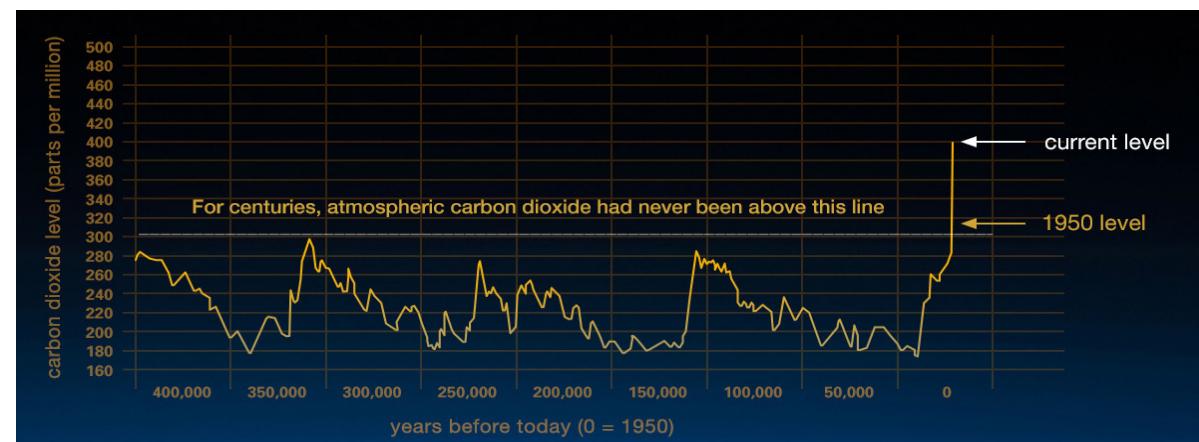
Figure 1. Observational record of annual mean temperature: Global, U.S. and Colorado (Aspen Global Change Institute^v)



Human activity is driving most of this change.

- 97% of climate scientists agree that the warming over the past century is due to human activity. Most leading scientific organizations worldwide have issued public statements affirming this^{vii}.
- Atmospheric concentrations of CO₂ have risen 40% since the industrial revolution^{viii}.

Figure 2. Evidence that atmospheric CO₂ has increased since the Industrial Revolution (NASA^{vii})



APPENDIX: Notable climate change info for your CAP

The severity of future climate change is directly linked to GHG emissions.

- GHG emissions are the single most significant factor in determining the amount of future global temperature change^{ix}.
- Currently, the world is on a high emissions trajectory. Unless GHG emissions are mitigated, this could lead to a 9.7°F increase in Western Colorado by 2100^x.
- The best available science indicates that the world, Colorado and communities should reduce GHG emissions 45% below 2005 levels by 2030 and 90% below 2005 levels by 2050, to limit warming to 1.5 to 2°C above preindustrial levels^{xi}.

We know how to solve it.

- Robust and effective climate solutions are developed and ready for implementation at the international, national, state and local level^{xii}.

Acting now is less expensive than inaction and can create healthy, thriving communities.

- Dramatically reducing GHG emissions is much less expensive than the anticipated costs of dealing with the impacts of unchecked climate change^{xiii xiv}.
- Effectively addressing climate change at the scale necessary to solve the problem could be the largest wealth creation opportunity of our time^{xv}.
- In communities, climate action typically creates numerous co-benefits such as increased resilience and economic activity, healthier citizens and improved environmental quality. This Toolkit defines some of the co-benefits that are associated with various actions.
- Climate action is frequently complementary to existing priorities for communities and regions.

Local action matters.

- While future climate will be determined by global GHG emissions, the cumulative impact of local action is significant and meaningful.
- 78% of energy globally is consumed in cities^{xvi}. Collectively, local action can significantly accelerate a transition away from fossil fuels.
- Local governments in the US currently have some of the most ambitious climate action commitments. More than 350 US mayors have signed a pledge to uphold the Paris Climate Agreement through local action and necessary policy at the state, federal and international levels^{xvii}.

ⁱ American Meteorological Society, 2017. State of the Climate in 2016, <https://www.ametsoc.org/ams/index.cfm/publications/bulletin-of-the-american-meteorological-society-bams/state-of-the-climate/>.

ⁱⁱ NASA, 2017. Release 17-006. <https://www.nasa.gov/press-release/nasa-noaa-data-show-2016-warmest-year-on-record-globally>.

Quotation from Union of Concerned Scientists: http://www.ucsusa.org/global_warming/science_and_impacts/science/human-contribution-to-gw-faq.html#.WdvDKmhSzU.

ⁱⁱⁱ IPCC, 2013. Summary for Policymakers. In: Climate Change 2013: The Physical Science Basis. Contribution 12 of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change.

^{iv} Aspen Global Change Institute, 2014. Climate Change and Aspen 2014, p. 28.

^v Aspen Global Change Institute, 2014. Climate Change and Aspen 2014, p. 29.

^{vi} Ibid p. 14.

^{vii} NASA, 2017. Climate change: How do we know? <https://climate.nasa.gov/evidence/>.

^{viii} NOAA, 2014. Global Warming FAQ. <https://www.climate.gov/news-features/understanding-climate/global-warming-frequently-asked-questions#hide7>.

^{ix} Aspen Global Change Institute, 2014. Climate Change and Aspen 2014, p. 43.

^x Ibid p. 44.

^{xi} Western Resource Advocates, 2017. Colorado's Climate Blueprint. <https://westernresourceadvocates.org/publications/colorados-climate-blueprint/>.

^{xii} Hawken, P., 2017. Drawdown: The Most Comprehensive Plan Ever Proposed to Reverse Global Warming. <http://www.drawdown.org/>.

^{xiii} Universal Ecological Fund, 2017. The Economic Case for Climate Action in the US. <https://feu-us.org/case-for-climate-action-us2/>.

^{xiv} American Security Project. <http://www.americansecurityproject.org/resources/pnpl/Colorado%20FINAL.pdf>.

^{xv} Shah, J., 2013. Creating Climate Wealth: Unlocking the Impact Economy.

^{xvi} CDP Cities, 2015. Report infographic.

^{xvii} <https://www.wearestillin.com/cities-counties/initiatives/>.

ACKNOWLEDGMENTS

The GHG Reduction Toolkit was prepared by the City of Aspen and the Community Office for Resource Efficiency (CORE) with extensive direction from expert stakeholders representing all GHG emission sectors. It would not be possible without the expertise, time, and dedication of this Advisory Committee. We would like to express our thanks to the following individuals and the organizations they represent for developing and refining this comprehensive menu of actions for reducing greenhouse gas emissions at the community and regional scales.

Advisory Committee (AC):

Person	Title	Organization
Adam McCurdy	Forest Programs Director	Aspen Center for Environmental Studies
Ashley Perl	Director of Canary Initiative	City of Aspen
Auden Schendler	Vice President of Sustainability	Aspen Skiing Company
Bert Myrin	Council Member	City of Aspen
Chris Hildred	Power Supply & Special Projects Supervisor	Holy Cross Energy
Chris Lane	Chief Executive Officer	Aspen Center for Environmental Studies
Chris Menges	Data Research and Project Planner	City of Aspen
Cindy Houben	Director of Community Development	Pitkin County
Claire Sacco	Member Services Coordinator	Aspen Chamber Resort Association
Clem Kopf	Board Member	Holy Cross Energy
David Hornbacher	Director of Utilities and Environmental Initiatives	City of Aspen
Ellen Sassano	Long Range Planner	Pitkin County
Jack Johnson	Executive Director	Aspen Zero Impact
Jamie Mandel	Prinicipal	Rocky Mountain Institute
Jamie Werner	Forest Programs Director (former)	Aspen Center for Environmental Studies
Jane Wilch	Climate Outreach Coordinator	City of Aspen
Jannette Whitcomb	Sr. Environmental Health Specialist – Air Quality	City of Aspen
Jed Miller	Operations Foreman	Pitkin County Landfill
Jen Wolchansky	Project Manager	Mead & Hunt
Jesse Morris	Principal	Rocky Mountain Institute
Jessica Garrow	Community Development Director	City of Aspen
John Katzenberger	Executive Director	Aspen Global Change Institute
John Kinney	Director of Aviation	Aspen/Pitkin County Airport
John Krueger	Director of Transportation	City of Aspen
Kate Andrus	Project Manager, Aviation Services	Mead & Hunt
Laura Armstrong	Climate and Sustainability Programs Associate	City of Aspen
Liz Chapman	Sr. Environmental Health Specialist – Waste	City of Aspen
Mary Vigilante	President	Synergy Consultants LLC

ACKNOWLEDGMENTS

(Cont.) Advisory Committee (AC):

Person	Title	Organization
Matt Hamilton	Sustainability Director	Aspen Skiing Company
Matthew Shmigelsky	Energy Consultant	Clean Energy Economy for the Region
Michael Miracle	Director of Community Engagement	Aspen Skiing Company
Mirte Mallory	Executive Director	We-Cycle
Mona Newton	Executive Director	Community Office for Resource Efficiency
Phillip Supino	Long Range Planner	City of Aspen
Randy Ready	Assistant City Manager (former)	City of Aspen
Richard Heede	Director	Climate Accountability Institute
Robert Gardner	Board Member	Holy Cross Energy
Ruth Brown	Co-chair	Aspen Chapter, Citizens Climate Lobby
Ryk Dunkelberg	Vice President of Aviation Services	Mead & Hunt
Ryland French	Utilities Efficiency Specialist	City of Aspen
Sara Ott	Assistant City Manager	City of Aspen
Sarah Gruen	Community Sustainability Coordinator	Community Office for Resource Efficiency
Stephen Kanipe	Chief Building Official	City of Aspen
Steve Child	Commissioner	Pitkin County

Facilitation and meeting assistance:

Person	Title	Organization
CJ Oliver	Director of Environmental Health and Sustainability	City of Aspen
Julia Farwell	Sustainability Intern – Waste Reduction	City of Aspen
Larissa Read	Principal Owner	Common Ground Environmental Consulting
Missy Stults	Program Officer	Climate Resilience Fund
Mitzi Rapkin	Community Relations Director	City of Aspen

Project leads and contact information:

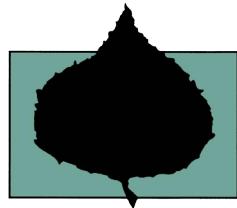
Author, Toolkit project manager: Chris Menges, Data Research and Project Planner, City of Aspen. chris.menges@cityofaspen.com

Contributing author, Toolkit community liaison: Sarah Gruen, Community Energy Coordinator, CORE. sarah@aspencore.org

Meeting facilitator: Larissa Read, Common Ground Environmental Consulting. larissa@commongroundenv.com

Graphic design and layout: Kate Lohnes and Claire Lukens, Lilja Communications. kate@lilja.com, claire@lilja.com

Cover illustration: Ellie Barber, Aspen Global Change Institute. ebarber@agci.org



THE CITY OF ASPEN



Community Office for Resource Efficiency

PARTNERS



Citizens' Climate Lobby



NOVEMBER 2017

City of Aspen

130 South Galena Street
Aspen, Colorado 81611
(970) 429-1798
Canary@CityofAspen.com
www.CityofAspen.com

The City of Aspen strives to be an environmental leader and to promote environmental stewardship throughout the Roaring Fork Valley, across the state of Colorado, and around the globe. We recognize Aspen's dependence on climate and natural resources for a thriving economy, healthy ecosystems, and exceptional quality of life. In an effort to do our part to reduce the threat of climate change, Aspen's City Council adopted the Canary Action Plan in 2007, which commits to reducing community-wide emissions 30% by 2020 and 80% by 2050, below 2004 levels.

Community Office for Resource Efficiency (CORE)

111 Airport Business Center, Suite M
Aspen, Colorado 81611
(970) 925-9775
Energy@AspenCORE.org
www.AspenCORE.org

The Community Office for Resource Efficiency (CORE) works cooperatively with businesses, individuals, utilities, and government entities to create measurable improvements in energy and water efficiency in order to benefit the environment and develop a more sustainable economy. The non-profit has been serving the Roaring Fork Valley since 1994.