Crested Butte Action Analysis: Technical Summary

Building Decarbonization (B)

Actions the Town can take to reduce the impact of municipal buildings and those belonging to residents and businesses in Crested Butte. A summary of the expected impact, cost effectiveness, and time commitment for each action are shown in the table below. Calculation inputs and assumptions can be found in the following sections.

Strategy	Action	Scope of Impact	2030 Carbon Reduction ($MTCO_2e$)	Cumulative Cost (2025 – 2030)	Cost Effectiveness ($/MTCO_2e$)	2025-2030 Average Annual Town Staff Time (FTE)
B1: Enable climate-friendly future development	A. Incorporate climate considerations into zoning code	Community-wide	n/a - enabling	n/a – included in Community Plan	n/a	n/a
B1: Enable climate-friendly future development	B. Enable climate-friendly construction and development through flexible design guidelines and a review of permitting processes	Community-wide	n/a - enabling	n/a – included in Historic Preservation Plan	n/a	n/a
B2: Accelerate efficiency improvements and electrification in existing residential buildings	A. Require an energy assessment for residential Level 1, 2, and 3 remodels	Community-wide	n/a - enabling	$4,300 - $6,500	n/a	<0.1
B2: Accelerate efficiency improvements and electrification in existing residential buildings	B. Require an energy assessment for vacation rental units	Community-wide	n/a - enabling	$10,800 - $16,200	n/a	0.1 - 0.2
B2: Accelerate efficiency improvements and electrification in existing residential buildings	C. Provide Town-funded energy efficiency and electrification incentives for all residential buildings	Community-wide	1,163	$89,500 - $95,000	$77 - $82	0.08 - 0.1
B3: Accelerate efficiency improvements and electrification in existing commercial buildings	A. Require an energy assessment for commercial Level 1, 2, and 3 remodels	Community-wide	n/a - enabling	$4,300 - $6,500	n/a	<0.1

B3: Accelerate efficiency improvements and electrification in existing commercial buildings	B. Provide Town-funded energy efficiency and electrification incentives for all commercial buildings	Community-wide	661	$68,300 - $69,500	$103 - $105	0.08 - 0.1
B3: Accelerate efficiency improvements and electrification in existing commercial buildings	C. Require energy use disclosure and benchmarking for commercial buildings	Community-wide	5	$8,600 - $13,000	$1,813 - $2,741	0.83 - 1.24
B4: Close the gap on new construction electrification and efficiency	A. Require all-electric commercial kitchen equipment for new construction	Community-wide	19	$10,900 - $16,300	$587 - $878	<0.1
BD-5: Lead the way with efficiency improvements and electrification of Town buildings	A. Develop a municipal building energy efficiency and renewable energy plan and perform updated audits of all municipal facilities	Town Operations	n/a - enabling	$55,600 - $68,000	n/a	<0.1
B5: Lead the way with efficiency improvements and electrification of Town buildings	B. Implement electrification and efficiency improvements identified in energy efficiency and renewable energy plan	Town Operations	49	$20,800 - $31,100	$426 - $636	0.2 - 0.4
B5: Lead the way with efficiency improvements and electrification of Town buildings	C. Monitor Town facilities' energy use and include within an annual sustainability report	Town Operations	16	$0 - $0	$0 - $0	<0.1
	Community Total	Community-wide	1,847	$196,700 - $223,000	$106 - $121	1.2 - 1.8
	Town Total	Town Operations	65	$76,400 - $99,100	$1,173 - $1,521	0.2 - 0.4
	Sector Total	All	1,912	$273,100 - $322,100	$143 - $168	1.4 - 2.2

Strategy B1: Enable climate-friendly future development

A. Incorporate climate considerations into zoning code

Adjust the current zoning code to incorporate climate considerations, for example in decisions about maximum or minimum density.

2030 Carbon Reduction (MTCO2e)	Cumulative Cost (2025 – 2030)	Cost Effectiveness ($/MTCO2e)	Average Annual Town Staff Time (FTE)
n/a - enabling	n/a – included elsewhere	n/a	<0.1

2025 - 2030 targets to achieve savings

n/a

GHG Calculations

No emissions savings are calculated for this action as it is not directly influencing GHG emissions. This change, however, will impact future community growth and emissions.

Cost Calculations

An update to Crested Butte's zoning code has been identified as an action for the Community Plan. This update has been budgeted for elsewhere and therefore no cost has been calculated to incorporate climate-friendly considerations as part of the Climate Action Plan.

B. Enable climate-friendly construction and development through flexible design guidelines and a review of permitting processes

Adjust the current historical buildings requirements, downtown design standards, and other code to allow building upgrades needed to improve efficiency and implement beneficial electrification actions.

2030 Carbon Reduction (MTCO2e)	Cumulative Cost (2025 – 2030)	Cost Effectiveness ($/MTCO2e)	Average Annual Town Staff Time (FTE)
n/a	n/a	n/a	n/a

2025 - 2030 targets to achieve savings

n/a

GHG Calculations

No emissions savings are calculated for this action as it is not directly influencing GHG emissions. However, this change is important for allowing building upgrades that will impact emissions as modeled below.

Cost Calculations

An update to Crested Butte's design standards and guidelines has been identified as an action in the Historic Preservation and Community Plans. This update has been budgeted for elsewhere and therefore no cost has been calculated to incorporate climate-friendly design and permitting considerations as part of the Climate Action Plan.

Strategy B2: Accelerate efficiency improvements and electrification in existing residential buildings

A. Require an energy assessment for residential Level 1, 2, and 3 remodels

Change building and/or energy code requirements to include electrification and energy efficiency requirements to help improve performance of existing residential buildings. Under the new code, all level 3 remodel permits will require electrification in disturbed areas and all permits will require an energy audit to be completed and some measures to be implemented during the remodel.

2030 Carbon Reduction (MTCO2e)	Cumulative Cost (2025 – 2030)	Cost Effectiveness* ($/MTCO2e)	Average Annual Town Staff Time (FTE)
n/a - enabling	$4,300 - $6,500	n/a	<0.1

2025-2030 targets needed to achieve savings

- 100% of applicable permits receive an energy assessment

GHG Calculations

- No GHG savings are anticipated. This action is anticipated to enable GHG savings in other actions

Cost Calculations

- The calculations for this action incorporate costs associated with:
  - Gathering stakeholder input to inform code changes
  - Development and delivery of trainings to support code implementation
  - Outreach to inform the community about the changes

B. Require an energy assessment for vacation rental units

Require an energy assessment for all vacation rental units as part of the business license renewal process.

2030 Carbon Reduction (MTCO2e)	Cumulative Cost (2025 – 2030)	Cost Effectiveness* ($/MTCO2e)	Average Annual Town Staff Time (FTE)
n/a - enabling	$10,800 - $16,200	n/a	0.1 - 0.2

2025-2030 targets needed to achieve savings

- 100% (191) vacation rental units with an energy assessment by 2030

GHG Calculations

- No GHG savings are anticipated. This action is anticipated to enable GHG savings in other actions

Cost Calculations

- The calculations for this action incorporate costs associated with:
  - Gathering stakeholder input to inform code changes
  - Development and delivery of trainings to support code implementation
  - Outreach to inform the community about the changes
- Higher costs for initial outreach and engagement are estimated since this is a regulation that is not seen in peer communities, although it is similar to Boulder's SmartRegs program (City of Boulder, 2024) with a more focused scope but a faster roll out
- Ongoing costs for this regulation are also high due to level of effort needed to confirm compliance that largely falls outside of existing Town workflows

C. Provide Town-funded energy efficiency and electrification incentives for all residential buildings

Create a Town-funded energy efficiency and electrification incentive program for all residential properties.

2030 Carbon Reduction (MTCO2e)	Cumulative Cost (2025 – 2030)	Cost Effectiveness* ($/MTCO2e)	Average Annual Town Staff Time (FTE)
1,163	$89,500 - $95,000	$77 - $82	0.08 - 0.1

2025-2030 targets needed to achieve savings:

- 87 residential homes converted to all electric
- 447 homes implementing energy efficiency actions
- 191 vacation rental properties implementing efficiency improvements
- Achieve 10% annual adoption by the residential sector for efficiency or electrification upgrades
- Achieve a 10% improvement in average HERS score of homes after energy efficiency upgrades

GHG Calculations

- The GHG impact of this action is based on 10% of residential properties upgrading annually, where approximately 12% of upgrades electrify their residence with associated energy efficiency gain and 88% perform energy efficiency improvements not tied to electrification
- While a net decrease in natural gas use is anticipated, a net increase in electricity use is expected as a result of residential electrification and efficiency measures in 2030

Cost Calculations

- The cost calculations for this action assume a match of GCEA's custom incentives at $0.15 per kWh and $4 per Dth. Estimated total incentives of $46,900 between 2025 and 2030 for energy efficiency improvements through this program assuming a utility incentive match program design based on energy savings

Strategy B3: Accelerate efficiency improvements and electrification in existing commercial buildings

A. Require an energy assessment for commercial Level 1, 2, and 3 remodels

Change building and/or energy code requirements to include electrification and energy efficiency requirements to help improve performance of existing commercial buildings at time of building improvements. Under the new code, all level 3 remodel permits will require electrification in disturbed areas and all permits will require an energy audit to be completed and some measures to be implemented during the remodel.

2030 Carbon Reduction (MTCO2e)	Cumulative Cost (2025 – 2030)	Cost Effectiveness* ($/MTCO2e)	Average Annual Town Staff Time (FTE)
n/a - enabling	$4,300 - $6,500	n/a	<0.1

2025-2030 targets needed to achieve savings

- 100% of applicable permits receive an energy assessment

GHG Calculations

- No GHG savings are anticipated. This action is anticipated to enable GHG savings in other actions

Cost Calculations

- The calculations for this action incorporate costs associated with:
  - Gathering stakeholder input to inform code changes
  - Development and delivery of trainings to support code implementation
  - Outreach to inform the community about the changes

B. Provide Town-funded energy efficiency and electrification incentives for all commercial buildings

Create a Town-funded energy efficiency and electrification incentive program for businesses

2030 Carbon Reduction (MTCO2e)	Cumulative Cost (2025 – 2030)	Cost Effectiveness* ($/MTCO2e)	Average Annual Town Staff Time (FTE)
661	$68,300 - $69,500	$103 - $105	0.08 - 0.1

2025-2030 targets needed to achieve savings:

- 16 commercial properties converted to all electric
- 43 commercial properties implemented energy efficiency measures
- Achieve a 10% improvement in average EUI for renovated properties equivalent to 97.5 kBtu/sq. ft., down from 114.7 kBtu/sq. ft. current average through energy efficiency measures

GHG Calculations

- The GHG impact of this action is based significant outreach & engagement to help businesses reduce energy use. This analysis assumes a 21% annual adoption in energy efficiency and electrification upgrades in the commercial sector, based on 106 business licenses in the town. Of the upgrades, this analysis assumes approximately 15% of upgrades electrify the commercial property with associated energy efficiency impact, while 85% perform energy efficiency upgrades to the property unrelated to electrification
- While a net decrease in natural gas use is anticipated, a net increase in electricity use is expected as a result of commercial electrification and efficiency measures in 2030

Cost Calculations

The cost calculations for this action assume a match of GCEA's custom incentives at $0.15 per kWh and $4 per Dth. Estimated total incentives of $62,900 between 2025 and 2030 for energy efficiency improvements through this program assuming a utility incentive match program design based on energy savings

C. Require energy use disclosure and benchmarking for commercial buildings

Require annual energy disclosures and benchmarking for commercial buildings over a certain size to disclose energy use and compare against other similar businesses to encourage energy efficiency actions beyond energy disclosures (for large buildings) required by the state.

2030 Carbon Reduction (MTCO2e)	Cumulative Cost (2025 – 2030)	Cost Effectiveness* ($/MTCO2e)	Average Annual Town Staff Time (FTE)
5	$8,600 - $13,000	$1,813 - $2,741	0.8 - 1.2

2025-2030 targets needed to achieve savings

- Benchmarking of commercial properties accounting for 25% of total community commercial energy use
- Reporting businesses improve energy efficiency by 2.4% from baseline

GHG Calculations

- Assumes that a benchmarking program would apply to the largest commercial properties equivalent to 25% of commercial business energy use in Crested Butte
- For those commercial properties that benchmark, a 2.4% energy savings from energy use is achieved by benchmarking, consistent with findings from other commercial benchmarking programs

Cost Calculations

- The calculations for this action incorporate costs associated with:
    - Gathering stakeholder input to inform regulation changes
    - Development and delivery of trainings to support implementation
    - Outreach to inform the community about the changes

Strategy B4: Close the gap on new construction electrification and efficiency

A. Require all-electric commercial kitchen equipment for new construction

Update existing new construction building code to require electrification of commercial kitchen equipment for new construction, the only electrification measure not currently required by existing building code.

2030 Carbon Reduction (MTCO2e)	Cumulative Cost (2025 – 2030)	Cost Effectiveness ($/MTCO2e)	Average Annual Town Staff Time (FTE)
19	$10,900 - $16,300	$587 - $878	<0.1

2025-2030 targets to achieve savings

- 2-3 new commercial kitchens transitioned to all electric

GHG Calculations

- The GHG impact of this action is calculated based on this historical average number of commercial new construction permits and a target for 2-3 new commercial kitchens being transitioned from natural gas to electric cooking equipment by 2030

Cost Calculations

- The calculations for this action incorporate estimated costs associated with:
  - Gathering stakeholder input to inform code changes
  - Development and delivery of trainings to support code implementation
  - Outreach to inform the community about the changes
- Since this is a code requirement that is not common in peer communities and has received some pushback from community members, higher levels of engagement are expected to be required to build community understanding and compliance

B. Estimate and track building materials used in construction

Leverage a 2025 building code update to establish methods for tracking building materials used in new construction.

2030 Carbon Reduction (MTCO2e)	Cumulative Cost (2025 – 2030)	Cost Effectiveness ($/MTCO2e)	Average Annual Town Staff Time (FTE)
n/a - enabling	Not calculated	n/a	Not calculated

2025-2030 targets to achieve savings

- Tracking process established

GHG Calculations

- No direct emissions impact from this action

Cost Calculations

- No cost was calculated for this action

Strategy B5: Lead the way with efficiency improvements and electrification of Town buildings

A. Develop a municipal building energy efficiency and renewable energy plan and perform updated audits of all municipal facilities

Use existing municipal building energy efficiency audits to inform the development of an energy efficiency and renewable energy plan. Complete updated ASHRAE level II audits on all Town buildings to understand energy efficiency, renewable energy, and electrification opportunities and update the plan to reflect new opportunities.

2030 Carbon Reduction (MTCO2e)	Cumulative Cost (2025 – 2030)	Cost Effectiveness ($/MTCO2e)	Average Annual Town Staff Time (FTE)
n/a	$55,600 - $68,000	n/a	<0.1

2025-2030 targets to achieve savings

n/a

GHG Calculations

No emissions savings are calculated for this action as it is not directly influencing GHG emissions. Developing the energy efficiency and renewable energy plan, and performing updated audits of municipal facilities are, however, important to inform upgrades modeled in action BD-5 B.

Cost Calculations

The cost calculation for this action includes the estimated cost of an updated energy audit for all Town of Crested Butte facilities (123,591 square feet at an estimated average of $0.50 per square foot (Pacific Northwest National Labratory, 2011).

B. Implement electrification and efficiency improvements identified in energy efficiency and renewable energy plan

Based on the Facilities Energy Efficiency and Renewable Energy plan, develop upgrade budgets for priority energy efficiency and electrification improvements to be included in the annual budgeting process and install upgrades annually.

2030 Carbon Reduction (MTCO2e)	Cumulative Cost (2025 – 2030)	Cost Effectiveness* ($/MTCO2e)	Average Annual Town Staff Time (FTE)
49	$20,800 - $31,100	$426 - $636	0.2 - 0.4

2025-2030 targets needed to achieve savings

- 1 Town facility is upgraded each year to include either energy efficiency or full building electrification (3 energy efficiency upgrades and 3 properties electrified between 2025 and 2030)

GHG Calculations

- Town upgrades alternate between implementing energy efficiency upgrades or fully electrifying natural gas space heating, water heating, and cooking end uses with its one annual upgrade.
- It is assumed a 50% likelihood that either energy efficiency (a 10% reduction in energy use is assumed) or full electrification with estimated savings associated with those improvements occurs for one property annually.
- Town facility electricity use is expected to see a net increase as a result of energy efficiency and building electrification measures.

Cost Calculations

- The cost calculations for this action assume an average 20-year payback for electrification and energy efficiency work and are based on estimated energy savings.
- Note that the costs shown are incremental investments above and beyond typical equipment replacement costs.

C. Monitor Town facilities' energy use and include within an annual sustainability report

Energy benchmarking for all Town facilities along with energy use disclosure in an annual sustainability report.

2030 Carbon Reduction (MTCO2e)	Cumulative Cost (2025 – 2030)	Cost Effectiveness* ($/MTCO2e)	Average Annual Town Staff Time (FTE)
16	$0	$0	<0.1

2025-2030 targets needed to achieve savings

- 100% Town facility energy use benchmarked by 2030

GHG Calculations

- All municipal energy use is subject to a benchmarking program.
- A 2.4% energy savings from municipal energy use is achieved by benchmarking, consistent with findings from other commercial benchmarking programs.

Cost Calculations

- Includes upfront costs to get the Town set up in ENERGY STAR Portfolio Manager and enter all the baseline data for the buildings gathered for this plan.
- Ongoing costs include time to gather and input data as well as time to identify the cause of any data oddities and determine solutions.
- Savings are assumed to arise from equipment setting or other no-cost adjustments. Equipment replacement needs that may be identified through this process are not included here.

Renewable Energy Supply (R)

Actions that increase the amount of renewable energy used by municipal buildings, residents, and businesses in Crested Butte. A summary of the expected impact, cost effectiveness, and time commitment for each action are shown in the table below. Calculation inputs and assumptions can be found in the following sections.

Strategy	Action	Scope of Impact	2030 Carbon Reduction ($MTCO_2e$)	Cumulative Cost (2025 – 2030)	Cost Effectiveness ($/MTCO_2e$)	2025-2030 Average Annual Town Staff Time (FTE)
R1: Maximize new local renewable energy generation	A. Coordinate a group buy and provide educational resources to increase voluntary adoption of local renewable energy generation	Community-wide	78	$15,000 - $45,000	$193 - $580	0.2 - 0.5
R1: Maximize new local renewable energy generation	B. Partner with GCEA to support the installation of local renewable generation up to allowable caps	Community-wide	16	$7,500 - $22,500	$477 - $1,431	0.1 - 0.3
R1: Maximize new local renewable energy generation	C. Expand the Renewable Energy Mitigation Program (REMP) to require renewable energy generation or fee-in-lieu for buildings over a certain size	Community-wide	22	$3,200 - $4,900	$143 - $219	<0.1
R2: Push to accelerate widespread grid decarbonization	A. Advocate for increased renewable energy generation at the local, state, and federal levels	Community-wide	n/a	$13,500 - $16,500	n/a	0.1 - 0.2
R3: Install renewable energy to serve Town facilities	A. Install renewable energy generation to meet Town energy needs	Town Operations	247	$2.6M - $3.2M	$10,503 - $12,837	<0.1
	Community-Wide Total	Community-wide	116	$25,700 - $72,400	$222 - $626	0.4 - 0.8
	Town Operations Total	Town Operations	247	$2.6M - $3.2M	$10,503 - $12,837	<0.1
	Total	All	362	$2.6M - $3.3M	$7,260 – $8,986	0.5 – 1.0

Strategy R1: Maximize new local renewable energy generation

A. Coordinate a group buy and provide educational resources to increase voluntary adoption of local renewable energy generation

This action focuses on increasing voluntary adoption of local renewable energy through coordinating a group buy to bring down the cost of on-site installation to individual households and businesses through collective purchasing power. Pairing with educational resources will help to raise awareness of existing incentives and rebates available to support local renewable energy generation. Significant incentives already exist to support local renewable energy and studies have shown that additional local incentives may have limited impact on adoption, hence the focus on coordination and education (Matisoff & Johnson, 2017) (van Valkengoed & Werff, 2022).

2030 Carbon Reduction (MTCO2e)	Cumulative Cost (2025 – 2030)	Cost Effectiveness* ($/MTCO2e)	Average Annual Town Staff Time (FTE)
78	$15,000 - $45,000	$193 - $580	0.2 - 0.5

2025-2030 targets needed to achieve savings:

- 3 business and 3 residential solar arrays installed annually (triple the historical rate of installs)

GHG Calculations

- Total installed solar capacity 419 kW installed between 2025-2030 based on average system sizes of 5 kW per residential system and 23 kW per commercial system installed
- Installed solar capacity offsets grid supplied electricity with the emissions factor forecasted in the ABAU

Cost Calculations

- The calculations for this action incorporate costs associated with:
    - Education and outreach associated with coordinating and administering a group buy
    - Education and outreach related to existing incentives for local renewable energy generation
- Moderate level of effort estimated. There are well established group buy programs, but a significant amount of community outreach is still needed

B. Partner with GCEA to support the installation of local renewable generation up to allowable caps

Work with GCEA to maximize local clean electricity generation within existing TriState generation caps to achieve a total of 6MW installed by 2030.

2030 Carbon Reduction (MTCO2e)	Cumulative Cost (2025 – 2030)	Cost Effectiveness* ($/MTCO2e)	Average Annual Town Staff Time (FTE)
16	$7,500 - $22,500	$477 - $1,431	0.1 - 0.3

2025-2030 targets needed to achieve savings:

- Achieve 6MW total installed local generation by 2030
- New 0.8MW solar array installed by 2030, with RECs attributed to local businesses or residents

GHG Calculations

- Installed renewable energy reduces the emissions factor for grid supplied electricity by 1.4%. in 2030

Cost Calculations

- Ongoing costs for outreach and engagement activities including printing materials, meeting venue and/or food costs, as well as any travel costs
- Staff time to attend meetings, gather information/data, and coordinate implementation of actions

C. Expand the Renewable Energy Mitigation Program (REMP) to require renewable energy generation or fee-in-lieu for buildings over a certain size

Evaluate the existing REMP program and add a requirement for on-site renewable energy generation or payment of a fee-in-lieu for all newly constructed buildings over a certain size.

2030 Carbon Reduction (MTCO2e)	Cumulative Cost (2025 – 2030)	Cost Effectiveness* ($/MTCO2e)	Average Annual Town Staff Time (FTE)
22	$3,200 - $4,900	$143 - $219	<0.1

2025-2030 targets needed to achieve savings:

- 2 business and 17 residential solar arrays installed between 2025-2030

GHG Calculations

- Total installed solar capacity 120 kW installed between 2025-2030 based on average system sizes of 5 kW per residential system and 23 kW per commercial system installed
- Based on total generated power from installed solar offsetting grid electricity delivered at the emissions factor outlined in the ABAU

Cost Calculations

- The calculations for this action incorporate costs associated with:
    - Gathering stakeholder input to inform policy adoption
    - Development and delivery of trainings to support implementation
    - Outreach to inform the community about the new requirements
- Moderate level of effort needed to pass this ordinance as there are similar ordinances in peer communities, but the ordinance can be complex to implement

Strategy R2: Push to accelerate widespread grid decarbonization

A. Advocate for increased renewable energy generation at the local, state, and federal levels

Continue to advocate for increased local and utility renewable generation with GCEA and Tri-State, including a greater percentage of renewable energy supply and/or increased allowances for local generation.

2030 Carbon Reduction (MTCO2e)	Cumulative Cost (2025 – 2030)	Cost Effectiveness* ($/MTCO2e)	Average Annual Town Staff Time (FTE)
0	$13,500 - $16,500	n/a	0.1 – 0.2

2025-2030 targets needed to achieve savings:

n/a

GHG Calculations

- This is an enabling action to pursue the potential for additional renewable energy in the Town electricity mix. No savings expected by 2030, rather a strategy to enable future electricity generation GHG emissions reductions.

Cost Calculations

The cost calculations for this action assume ongoing engagement with GCEA and TriState as well as continued participation in Colorado Communities for Climate Action (CC4CA) and engagement at the state and federal level.

Strategy R3: Install renewable energy to serve Town facilities

A. Install renewable energy generation to meet Town energy needs

Meet 100% of Town electricity needs through on-site solar.

2030 Carbon Reduction (MTCO2e)	Cumulative Cost (2025 – 2030)	Cost Effectiveness* ($/MTCO2e)	Average Annual Town Staff Time (FTE)
247	$2.6M - $3.2M	$10,503 - $12,837	<0.1

2025-2030 targets needed to achieve savings:

- Total installed capacity of 1,600 kW by 2030

GHG Calculations

- Installed on-site solar covers all Town electricity needs in 2030
- Based on total generated power from installed solar offsetting grid electricity delivered at the emissions factor outlined in the ABAU

Cost Calculations

- Estimated cost of $1.80 per watt installed from NREL 2024 commercial rooftop solar installation cost estimates (National Renewable Energy Laboratory, 2024), which includes materials and soft costs for installation

Waste and Materials Management (W)

Actions that increase the diversion rate and reduce the amount of waste sent to landfill in Crested Butte.

The impact of waste actions is calculated as a cumulative impact downstream landfill waste emissions. As the upstream emissions from the manufacturing of materials is not accounted for in the Town's baseline inventory, the upstream impacts are not estimated here. Additionally, granular waste data by sector was not available during the inventory development and thus the emissions impact of waste actions on downstream disposal is calculated at the community scale.

A summary of the expected cumulative impact, cost effectiveness, and time commitment for waste actions is shown in the table below. Calculation inputs and assumptions can be found in the following sections.

Strategy	Action	Scope of Impact	2030 Carbon Reduction ($MTCO_2e$)	Cumulative Cost (2025 – 2030)	Cost Effectiveness ($/MTCO_2e$)	2025-2030 Average Annual Town Staff Time (FTE)
W1: Increase diversion from landfill and encourage sustainable consumption	A. Require adequate space for trash, recycling, and composting containers and pickup in new development	Community-wide	Not calculated for individual actions	$2,200 - $3,200	Not calculated for individual actions	<0.1
W1: Increase diversion from landfill and encourage sustainable consumption	B. Facilitate the development of new waste diversion infrastructure	Community-wide	Not calculated for individual actions	No cost calculated for this action	Not calculated for individual actions	No time allocated for this action
W1: Increase diversion from landfill and encourage sustainable consumption	C. Incentivize waste reduction and diversion for residents and businesses	Community-wide	Not calculated for individual actions	$29,500 - $44,500	Not calculated for individual actions	0.1 - 0.3
W1: Increase diversion from landfill and encourage sustainable consumption	D. Ban certain materials from landfill and enforce requirements for construction and demolition materials recycling	Community-wide	Not calculated for individual actions	$44,600 - $50,000	Not calculated for individual actions	0.6

W1: Increase diversion from landfill and encourage sustainable consumption	E. Adopt a pay-as-you-throw ordinance to disincentivize waste generation	Community-wide	Not calculated for individual actions	$2,200 - $3,200	Not calculated for individual actions	<0.1
W1: Increase diversion from landfill and encourage sustainable consumption	F. Develop incentives and programs to encourage waste reduction and diversion by Town employees	Town Operations	Not calculated for individual actions	$1,800 - $2,700	Not calculated for individual actions	<0.1
W1: Increase diversion from landfill and encourage sustainable consumption	G. Develop and implement a Town Environmental Purchasing Policy	Town Operations	Not calculated for individual actions	$6,100 – $7,400	Not calculated for individual actions	<0.1
	Total	All	116	$86,400 - $111,000	$742 - $953	0.8 – 1.0

Strategy W1: Increase diversion from landfill and encourage sustainable consumption

2025-2030 targets needed to achieve savings:

- Increase diversion rate to 53%

GHG Calculations

- Reduce landfilled waste by 224 tons from ABAU

A. Require adequate space for trash, recycling, and composting containers and pickup in new development

Require adequate space for collection of trash, recycling, and composting in new development that is easily accessible to building residents.

Cost Calculations

- Cost calculations for this action include stakeholder engagement and outreach associated with code amendment.
- Low outreach and engagement costs are expected for this action since many similar ordinances have been passed in local jurisdictions and aligns with requirements for LEED, so developers should be familiar.

B. Facilitate the development of new waste diversion infrastructure

Cost Calculations

- The scope of this action is still to be determined, ranging from removing barriers and facilitating the development of new waste diversion infrastructure to incentives or grants for infrastructure. No cost has currently been estimated for this action.

C. Incentivize waste reduction and diversion for residents and businesses

Encourage sustainable materials or low waste events through Town-funded incentives, education, and outreach.

Cost Calculations

- Cost calculations for this action include:
    - A Town-funded waste reduction grant of about $4,400 per year, based on a similar program implemented in Steamboat Springs, Colorado at $2.70 per person (City of Steamboat Springs, 2024)
    - Outreach and education
- High time commitments from Town staff to develop and administer the program due to the potential scope of this incentive.

D. Ban certain materials from landfill and enforce requirements for construction and demolition materials recycling

Require sustainable materials to be used in new construction projects, ban some materials from landfill, and/or require deconstruction.

Cost Calculations

- The calculations for this action incorporate costs associated with:
    - Gathering stakeholder input to inform policy adoption
    - Development and delivery of trainings to support implementation
    - Outreach to inform the community about the new requirements
- High level of cost and time commitment for engagement given the complexity of this regulation. Deconstruction regulations are also rate and infrastructure needed to be successful may not already exist.
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E. Adopt a save-as-you-through ordinance to disincentivize waste generation

Partner with Waste Management to develop and enforce a save-as-you-throw ordinance with higher trash rates for larger containers or quantities of waste to disincentivize waste generation and encourage recycling and composting by residents and businesses.

Cost Calculations

- The calculations for this action incorporate costs associated with:
    - Gathering stakeholder input to inform policy adoption
    - Development and delivery of trainings to support implementation
    - Outreach to inform the community about the new requirements.
- Low level of effort estimated since this is a common approach to trash service.

F. Develop incentives and programs to encourage waste reduction and diversion by Town employees

Develop programs and incentives such as re-use libraries or interdepartmental competitions to reduce waste generation and increase diversion by Town employees.

Cost Calculations

- Cost calculations for this action include incentives and time commitment proportional to the Town waste incentive program.

G. Develop and implement a Town Environmental Purchasing Policy

Develop an Environmental Purchasing Policy that specifies sustainable purchasing criteria for Town operations such as minimum recycled percentages for paper goods or construction materials, guidelines around reuse, and/or disposal requirements.

Cost Calculations

- Assume 5% additional cost for purchasing Environmentally friendly products for office supplies, cleaning supplies, and tools and equipment from the 2024 Town budget (Town of Crested Butte, 2023)
- Hours estimate for Town staff to develop and pass the policy as well as time annually to adjust and update as needed.
    - Low level of effort estimated since there are many examples and templates available.

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