TOWN OF MOUNTAIN VILLAGE
GREEN TEAM COMMITTEE MEETING
TUESDAY, NOVEMBER 19, 2019, 2:00 PM
2ND FLOOR CONFERENCE ROOM, MOUNTAIN VILLAGE TOWN HALL
455 MOUNTAIN VILLAGE BLVD, MOUNTAIN VILLAGE, COLORADO
AGENDA

Item	Time	Min	Presenter	Type	
1.	2:00		Jett		Call to Order
2.	2:00	5	Lambert	Action	Approval of the October 15, 2019 Green Team Committee Meeting Minutes
3.	2:05	20	Dohnal	Work Session	Mountain Village Community and Government Green House Gas Emissions Inventory Report Work Session
4.	2:25	40	Dohnal	Action	RFP Applicant Review and Decision
5.	3:05	5	Dohnal	Action	Select Additional Alternate Seat Member and Make Recommendation to Town Council
6.	3:10	5	Dohnal	Informational	Voluntary Single-Use Plastics Reduction Incentive Subcommittee Update
7.	3:15	5	Berry	Informational	Composting Subcommittee Update
8.	3:20	5	Jett	Informational	Items for Consideration: A. Community Clean Up Day Subcommittee Update B. Snowmelt options for Chondola walkways C. Potential 2020 Conferences D. Updates on Regulations from the State on Plastics E. San Miguel Watershed Coalition Update F. Beaver Issue G. Finn Kjome to speak about Mountain Village water H. Piece of Art- to bring awareness of the Green Team Committee I. Adopt a Highway J. 2019 Oct – Dec: 4th Quarter Green Team Quarterly Report. Present in **JAN** K. 2020 January – March: 1st Quarter Green Team Quarterly Report. Present in **APRIL** L. 2020 April – June: 2nd Quarter Green Team Quarterly Report. Present in **JULY** M. 2020 July – Sept: 3rd Quarter Green Team Quarterly Report. Present in **OCT** N. 2020 Oct – Dec: 4th Quarter Green Team Quarterly Report. Present in **JAN**
9.	3:25	5	Jett	Informational	Other Business
10	3:30		Jett		Adjourn

TOWN OF MOUNTAIN VILLAGE
MINUTES OF THE OCTOBER 15, 2019
GREEN TEAM MEETING DRAFT

The meeting of the Green Team Committee was called to order by Cath Jett on Tuesday, October 15, 2019 at 2:01 p.m. in the Mountain Village Municipal Building, 411 Mountain Village Boulevard, Mountain Village, Colorado.

Attendance:

The following Green Team Committee members were present:

Cath Jett, Chair and Mountain Village Resident
Jonathan Greenspan, Vice Chair and Mountain Village Resident (By Phone)
Jeff Proteau, Telluride Ski and Golf Company
Patrick Berry, Mountain Village Town Council
Marti Prohaska, Mountain Village Town Council
Heidi Stenhammer, Telluride Mountain Village Owner's Association
Mike Follen, At Large Member

The following were also in attendance:

Christina Lambert, Deputy Town Clerk (Staff)
Zoe Dohnal, Business Development & Sustainability Manager (Staff)
Kim Wheels. Eco Action Partners
Susan Holland

Consideration of Approval of Minutes:

September 17, 2019 Green Team Committee Meeting Minutes

On a **MOTION** by Marti Prohaska and seconded by Heidi Stenhammer, the Green Team Committee voted unanimously to approve the September 17, 2019 meeting minutes as presented.

Discussion and Committee Follow Up/Next Steps:

- Agenda Item 3A- Election of Officers:

  - **NEXT STEPS:** Discussion took place and Zoe Dohnal presented this agenda item to the committee. On a **MOTION** by Marti Prohaska and seconded by Patrick Berry, the Green Team Committee voted unanimously to appoint Cath Jett as Chair and Jonathan Greenspan as Vice Chair.

- Agenda Item 3B- Green Team Bylaws Amendment- Alternate Seat:

  - **NEXT STEPS:** Discussion took place and Zoe Dohnal presented this item to the committee. On a **MOTION** by Marti Prohaska and seconded by Mike Follen, the Green

Team Committee voted unanimously to amend the Green Team Committee Bylaws to add one alternate seat.

- Agenda Item 3C- REMP Update:

  - **NEXT STEPS:** This item was **CONTINUED** to the November Green Team meeting.

- Agenda Item 3D- Draft Mountain Village Community GHG Inventory Report:

  - **NEXT STEPS:** Discussion took place and Kim Wheels presented this item to the committee. The Green Team Committee gave input to Kim Wheels. The Green Team Committee **DIRECTED** staff to add this item to the November Green Team agenda and to allow plenty of time for discussion.

- Agenda Item 3E- Propose/Set 2020 Meeting Dates:

  - **NEXT STEPS:** Discussion took place and Christina Lambert presented this item to the committee. On a **MOTION** by Marti Prohaska and seconded by Mike Follen, the Green Team Committee voted unanimously to set the 2020 Green Team Committee Meeting dates for the 2nd Tuesday of every month. The Green Team Committee **DIRECTED** Christina Lambert to send out a calendar reminder with the future 2020 dates.

  - Approved dates:

    - **1.14.20**
    - **2.11.20**
    - **3.10.20**
    - **4.14.20**
    - **5.12.20**
    - **6.9.20**
    - **7.14.20**
    - **8.11.20**
    - **9.8.20**
    - **10.13.20**
    - **11.10.20**
    - **12.8.20**

- Agenda Item 3F- 2020 Green Team Work Plan Approval:

  - **NEXT STEPS:** Discussion took place and Cath Jett presented this item to the committee. The Green Team Committee agreed that the top 3 items to focus on are: Building Codes, Composting and Plastics. A new workplan will be developed and discussed at the December meeting. The Green Team Committee **DIRECTED** staff to reach out to

Michelle Haynes and Drew Harrington to invite them to the November Green Team meeting. Staff is to hold off on formally inviting SMPA at this time. Christina Lambert will send a calendar invite to Michelle and Drew with the meeting date and time.

- The Green Team Committee **DIRECTED** Jeff Proteau to meet with Finn Kjome to find out what he is doing regarding the Beaver issue in the Meadows. Jeff will call the EPA to investigate who the best contact is for the beaver issue.

- The Green Team Committee **REQUESTED** that the current 2020 Green Team Work Plan be saved and used as a working document.

➢ Agenda Item 3G- Voluntary Single-Use Plastics Reduction Initiative Survey Approval and Update:

- **NEXT STEPS:** Discussion took place and Zoe Dohnal presented this item to the committee. The Green Team Committee was supportive of the survey.

➢ Agenda Item 3H- Finalize and Approve RFP for GHG Emissions and Energy Use:

- **NEXT STEPS:** Discussion took place and Zoe Dohnal presented this item to the committee. On a **MOTION** by Marti Prohaska and seconded by Cath Jett, the Green Team Committee voted unanimously to approve the RFP.

- The Green Team Committee will present the Compact of Mayors commitment letter and ask for Town Council support in the November meeting.

➢ Agenda Item 3I- EAP Green Business Program:

- **NEXT STEPS:** Discussion took place and Zoe Dohnal presented this item to the committee. The Green Team Committee **DIRECTED** staff to add this item to the future items for consideration list.

➢ Agenda Item 3J- July-Sept 2019: Consideration of 3rd Quarter Green Team Committee Quarterly Report to Present to Council in October:

- **NEXT STEPS:** Discussion took place and Cath Jett presented this item to the committee. The report has already been sent to Town Council for the October 17, 2019 Town Council Meeting. The Green Team Committee is supportive of the report. On a **MOTION** by Patrick Berry and seconded by Heidi Stenhammer, the Green Team Committee voted unanimously to approve the 3rd Quarter Report.

- Agenda Item 3K- Voluntary Single-Use Plastics Reduction Incentive Subcommittee:

  - **NEXT STEPS:** Discussion took place and Zoe Dohnal presented this item to the committee. Zoe reminded the committee that creating the tool kit is critical.

  - The first Voluntary Single-Use Plastics Reduction Incentive Subcommittee meeting is scheduled on October 24, 2019 at 2 p.m. in the Town Hall conference room.

- Agenda Item 3L- Composting Subcommittee Update:

  - **NEXT STEPS:** Discussion took place and Zoe Dohnal presented this item to the committee. Zoe passed out copies of the Individual Composting Unit Application.

  - The Green Team Committee **DIRECTED** staff to add the Individual Composting Unit Application to the November Green Team agenda.

- Agenda Item 4- Items for Consideration:

  - EAP Green Business Program
  - Snowmelt options for Chondola walkways
  - Community Wide Emissions Report- October
  - EAP Green Business Program (Dohnal, 5)- October
  - Propose/Set 2020 Green Team Meeting Dates
  - Updates on Regulations from the State on Plastics
  - Potential Future Voluntary Single Use Plastics Reduction Incentive Subcommittee
  - RFP for GHG Emissions & Energy Use Discussion
  - 2020 Green Team Work Plan
  - San Miguel Watershed Coalition Update
  - Beaver Issue
  - Finn Kjome to speak to the committee about Mountain Village water
  - Piece of Art- to bring awareness of the Green Team Committee
  - Adopt a Highway
  - 2019 Oct – Dec: 4th Quarter Green Team Quarterly Report. Present in JAN
  - 2020 Jan – Mar: 1st Quarter Green Team Quarterly Report. Present in APRIL
  - 2020 April – June: 2nd Quarter Green Team Quarterly Report. Present in JULY
  - 2020 July – Sept: 3rd Quarter Green Team Quarterly Report. Present in OCT
  - 2020 Oct – Dec: 4th Quarter Green Team Quarterly Report. Present in JAN

Other Business:

There being no further business, on a **MOTION** by Patrick Berry and seconded by Marti Prohaska, the Green Team Committee voted unanimously to adjourn the meeting at 3:44 p.m.

Reminder:

The next Green Team Committee meeting will take place on Tuesday, November 19, 2019 at 2:00 p.m. in the Mountain Village Town Hall Conference Room.

Respectfully submitted,

Christina Lambert

Deputy Town Clerk
Town of Mountain Village

Notes from Eco Action Partners regarding the following 2018 TMV Community GHG Emissions Report

Explanation of the Water, Wastewater & Transportation benchmarks were covered during Q/A. As for the other benchmarks, the data is correct, within the limitations of the data available, as I will explain further. Appendices A & B also explains the methodology, data sources, and provide other helpful information.

Benchmarks based on population must be understood within the context that per census population or per visitor population are extremes on each side of the equation, with the reality somewhere in between, for both MV & Telluride. When using visitor population, the WWTP population estimate (including visitors) has been split between Telluride & MV based on the WWTP percentage split agreed upon between the towns, so ~35% of the population (incl visitors) is assigned to MV. A better way of allocating visitor population between the 2 communities has not been suggested. In the 2017 report (see attached), I provided a pretty thorough explanation in the "Per Capita & Comparison Discussion" on page 6.

Buildings: Utility data is provided directly from SMPA & BHE annually, per jurisdiction & split into commercial & residential categories. Number & size of buildings (residences & commercial) is provided annually by the SMC Assessor's office. Within the data, condos are categorized by SMC as either commercial condo or residential condo, for both Telluride & MV. I do not know the methodology or reasoning behind what is used to determine whether a condo is residential or commercial. Thus, the residential benchmark numbers are provided both per household & per square foot, and the commercial benchmark is also per square foot.

Waste data for the GHG Inventory is from EcoAction Partner's Regional Waste Diversion Study based on 2015 waste. The trash & recycling data is provided in that report per jurisdiction. The benchmark calculation is per census population.

At previous Sneffels Energy Board and EcoAP Board meetings we've discussed the value of consistent tracking of values annually and understanding what influences their change from year to year, and we've discussed the limitations of the data sets as well as trying to perform comparisons between communities. I also covered this in last years' GHG report and presentation to MV. However, per regional board direction, in the past I've avoided providing any comparisons between communities and we have focused on working together regionally toward our goals. The benchmark table provided for the 2017 report was per request from MV. I'm considering that it may be better to completely remove this table from the 2018 report, given that it is included & fully explained in the 2017 report.

Hopefully the above explanations provide further understanding of both the validity & limitations of the data & calculations. Please let me know if there are any further questions. I've reattached the 2018 draft report for your convenience. I've spoken with both Zoe & Michelle about scheduling a meeting soon to discuss the recommendations so that I can revise them & create the final report for MV.

Regarding the Gondola Transportation GHG savings calculation performed on 2010 data... I sensed an unspoken criticism during the council discussion that this calculation hasn't been updated since then. The calculation was a special request that year. During EcoAP's presentation to MV last year, council expressed interest in having it updated. Thus EcoAP proposed it in our budget request for 2019, however by the end of the budget discussions at MV council & Green Team levels, all of the special calculation line items were eliminated from the final budget approved for EcoAP by the Green Team. EcoAction Partners would be happy to update this calculation for MV during 2020, if requested & sufficient budget was provided to include this service.

Mountain Village 2018 Greenhouse Gas Inventory Report

Prepared by EcoAction Partners
for the Town of Mountain Village

November 1, 2019

Overview:
In 2018, the Town of Mountain Village contracted with EcoAction Partners to create a Mountain Village-specific Greenhouse Gas Inventory. Working from the baseline regional San Miguel and Ouray County GHG Inventory that EcoAction Partners manages and updates annually, EcoAction Partners modified the calculations to focus on Mountain Village specific data from 2017. This inventory was updated this year to create the 2018 results reported here.

History:
The regional GHG Inventory was initially developed by the University of Colorado at Denver with data collection input from EcoAction Partners. It was funded through a matching grant in which Mountain Village, Telluride, San Miguel County, Ridgway, City of Ouray and Ouray County each contributed $1000. The calculations are in accordance with ICLEI protocol established by 2010. Since then it has been updated to align with the subsequent "Global Protocol for Community-Scale Greenhouse Gas Emission Inventories".

Mountain Village adopted a goal to reduce overall GHG emissions 20% by 2020, from 2005 baseline levels, however our regional GHG and energy-use baseline began to be tracked in 2010. Thus progress toward this goal is determined based on data from 2010 forward.

Shared regional resources:
As part of the analysis, Mountain Village desired clear understanding of how GHG emissions associated with shared regional resources were allocated between jurisdictions. Thus, EcoAction Partners created a summary of how these resources have been allocated in the past and coordinated a meeting of representatives from Mountain Village, Telluride, San Miguel County, and Telluride Ski & Golf, to review and discuss allocations for each of these resources. The agreed-upon outcome for each of these are detailed in Appendix A. The resources discussed include:

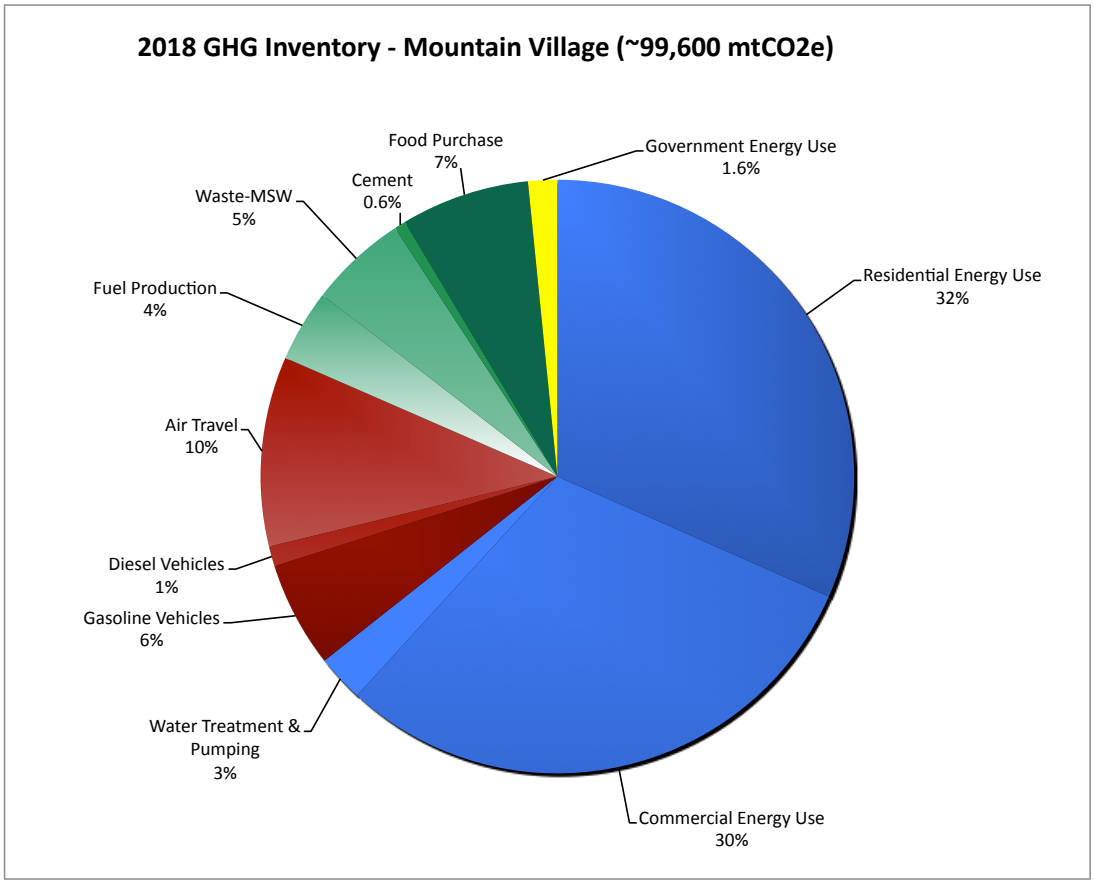
- Regional airports
- Waste Water Treatment Plant
- Gondola
- Telluride Ski and Golf's utilities including water use
- Festivals
- Transit services

2018 Mountain Village GHG Inventory Results
Mountain Village's total GHG emissions for 2018 were approximately 99,600 mtCO2e (metric tons of carbon dioxide equivalent). This is an increase of 3.75% over 2017 emissions of 96,000 mtCO2e.

Equivalencies:

- 99,600 mtCO2e is equivalent to over 108,885,000 pounds of coal burned.
- 99,600 mtCO2e is also equivalent to the energy used by 11,900 average U.S. homes in one year. (MV has 1675 residences)
- 99,600 mtCO2e is the amount of carbon that can be sequestered by over 117,000 acres of U.S. forests in a year.

The detailed pie chart below breaks those emissions down per category, explained further below the pie chart. See Appendices for more detailed explanation of allocation per jurisdiction and calculation methodologies.



- Government Energy Use – Electricity and natural gas use by Town of Mountain Village government, including building energy use, streetlights, town plaza snowmelt, and other exterior uses. Note: Gondola electricity use is 100% offset by SMPA Green Blocks, so Gondola electricity use does not contribute to GHG emissions. Gondola natural gas use does contribute toward TMV GHG emissions. Government portion of emissions increased from 2017 to 2018 (see Town of Mountain Village 2018 Government Energy Use and Greenhouse Gas Report for details).
- Residential Buildings – electricity and natural gas use for homes, including exterior lighting, snowmelt systems, and patio fireplaces. Renewable electricity associated with net-metered solar systems, SMPA solar farm purchases, and Green Blocks offsets decrease the emissions associated with residential building emissions.
- Commercial Buildings– electricity and natural gas use for commercial buildings and other use, including exterior lighting, snowmelt systems, patio fireplaces, and Mountain Village ski area operations.

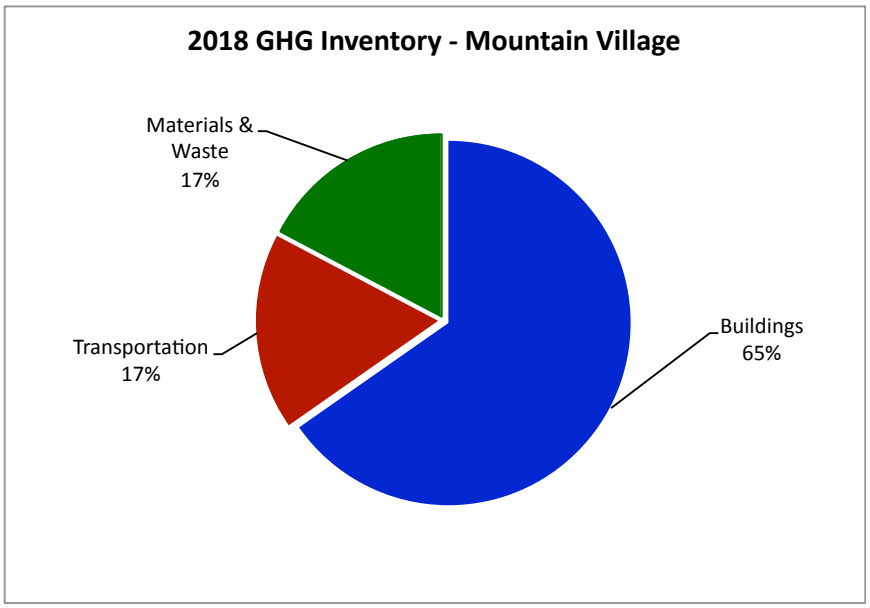
Renewable electricity associated with net-metered solar systems, SMPA solar farm purchases, and Green Blocks offsets decrease the emissions associated with commercial building emissions.

- Water Treatment & Pumping – Electricity used by Town of Mountain Village for treatment and pumping of water. Water electricity emissions increased from 2017 to 2018 (see Town of Mountain Village 2018 Government Energy Use and Greenhouse Gas Report for details on water use).
- Gasoline Vehicles – Emissions from gasoline vehicles
- Diesel Vehicles – Emissions from diesel vehicles
- Air Travel – Emissions associated with airplane fuel & enplanements at Telluride Airport & Montrose Regional Airport. (for allocations, See Appendix A)
- Fuel Production – Processing emissions associated with gasoline and diesel fuel before the fuel enters vehicles
- Waste – Emissions associated with Municipal Solid Waste taken to landfill to decompose
- Cement – Emissions associated with cement for Mountain Village, based on Colorado's total economy
- Food Purchase – Emissions calculated based on Mountain Village's total population of census and visitors

Additional Items:
These items contribute to reducing MV's GHG emissions and are incorporated into the overall total calculated value of 99,600 mtCO2e:

- Open Space Carbon Sequestration – Mountain Village's dedicated open space is a mixture of grasslands, wetlands and mixed forest. All of these areas sequester carbon and thus reduce GHG emissions by a total of approximately 312 mtCO2e, or 0.31% of MV's total GHG Inventory.
- SMPA Community Solar Farm – Mountain Village's total participation in the community solar farm is the equivalent of 170 mtCO2e, or 0.17% of MV's total GHG Inventory.
- Gondola electricity use is 100% offset with SMPA Green Blocks (~1,872,500 kWh), equivalent to 1500 mt-CO2e, or 1.5% of MV's total GHG Inventory.
- On-site Net-metered Solar PV Systems – Government, residential & commercial on-site systems produced over 115,600 kWh in 2018, reducing GHG emissions by approximately 93 mt-CO2e, or 0.09% of MV's total GHG Inventory. Electricity used while these systems were producing electricity does not get metered, so the numbers under-represent the total production of electricity by these systems.
- Gondola Transportation – Gondola use reduces vehicle transportation between Telluride and Mountain Village. In a previous study by EcoAction Partners for Mountain Village, it was estimated that gondola usage reduced GHG emissions by approximately 2,700 mt-CO2e in 2010, or 2.7% of MV's total 2017 GHG Inventory.
- Farm-to-Community Program – This program began in 2018 and offset approximately 6 mt-CO2e in it's first year. In 2019, the net total GHG emissions impact from the program is estimated to be a reduction of 16 mt-CO2e in GHG emissions. These estimates are conservative. See annual report for this program for other un-calculated benefits.

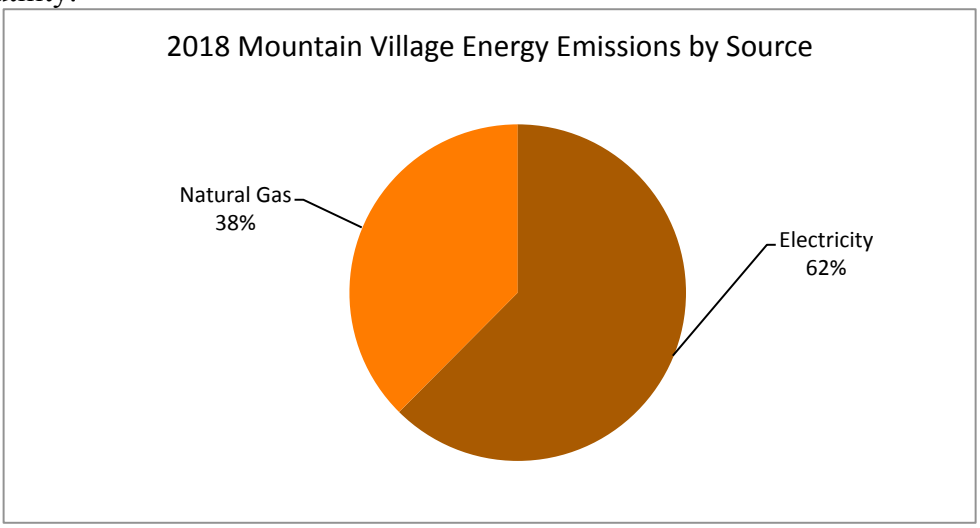
Simplified pie chart



The pie chart above simplifies the Mountain Village Inventory by showing 3 main categories:

1. Buildings – 65%
2. Transportation – 17%
3. Materials & Waste – 17%

Clearly, building energy consumption is the largest category of GHG emissions. The next pie chart shows just the Building emissions portion of the above pie chart (government, residential, & commercial combined) broken down per utility:



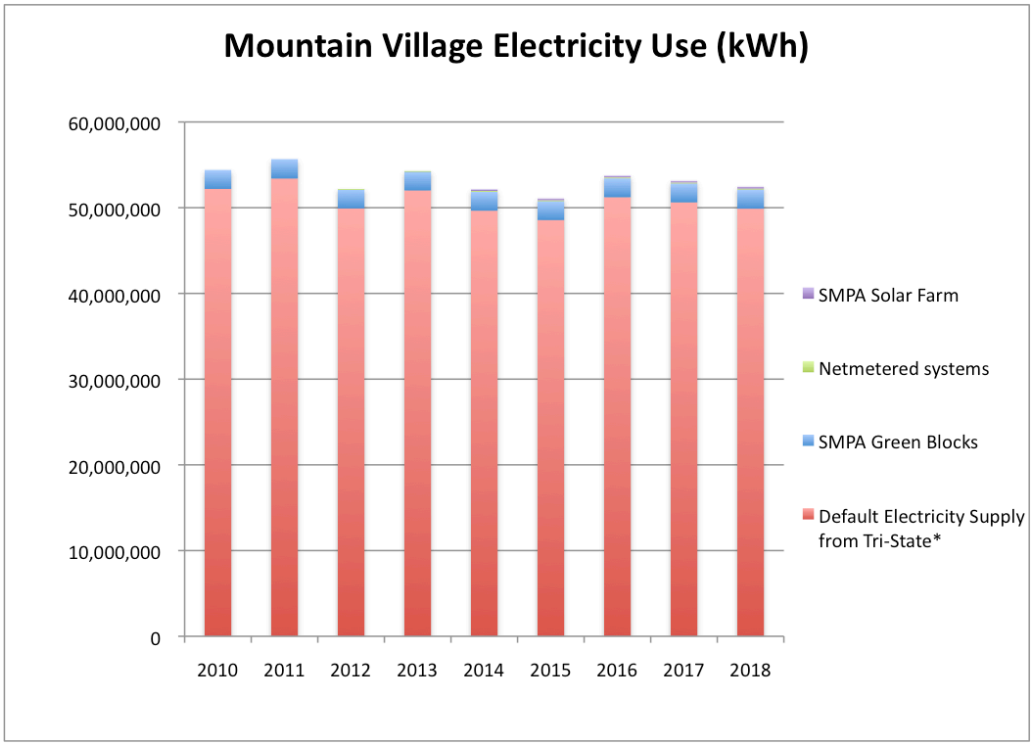
Electricity emissions are impacted by overall usage and the emissions factor, which reflects the amount of renewable energy that is part of our overall electricity mix. This value is provided to SMPA from Tri-State annually and has been steadily decreasing since 2010, from 2.12 to 1.595 lb-CO2e/kWh.

Natural gas emissions are also impacted by overall usage and the emissions factor, which is determined how the natural gas is produced. In 2010, Source Gas provided this factor at 11.88 lb-CO2e/therm. For 2017 & 2018, the natural gas emissions factor was provided by Black Hills at 11.68 lb-CO2e/therm.

Natural gas and electricity data is provided annually from the utility companies, broken down by jurisdiction. It's accurate data that is easy to track and analyze progress toward reduction goals. Mountain Village's

electricity and natural gas usage have been tracked since 2010, with analysis presented annually by EcoAction Partners to Town Council. The following graphs show electricity and natural gas use from 2010 to 2018.

Mountain Village Electricity Use:

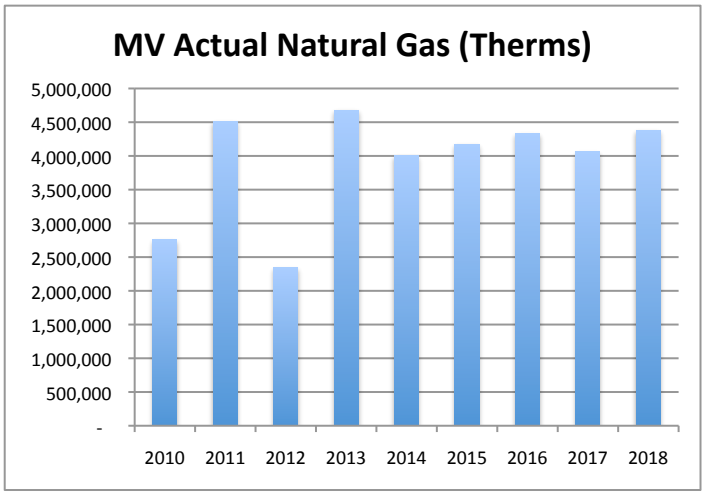


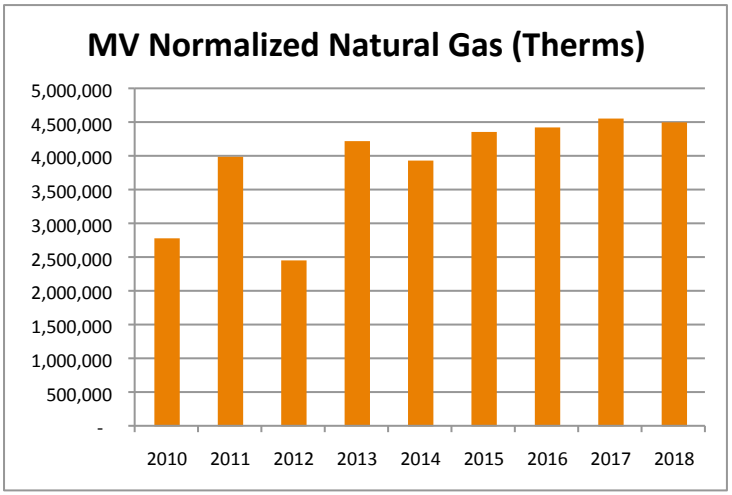
**Default Electricity Supply from Tri-State Generation & Transmission Association, Inc. - Tri-State reports that 30% of this comes from a renewable energy source.*

Electricity use associated with MV's SMPA community solar farm purchases, net-metered solar systems, and SMPA Green Blocks offsets do not contribute to MV's GHG emissions. Electricity emissions in the pie charts are associated with Mountain Village's "Default Electricity Supply from Tri-State" which is approximately 50,000,000 kilowatt-hours annually. Notable, is that overall use has decreased by 3.6% since 2010, despite an increase in people, buildings, and overall economy. Continuing to increase renewable energy in our electricity mix and decrease electricity use through conservation and efficiency will continue to reduce electricity-related emissions.

Mountain Village Electricity GHG emissions:
GHG emissions associated with the "Default Electricity" consumed is calculated using the Tri-State emissions factor for each year.
2010 – 52,191,724 kWh produced 50,300 mtCO2e
2018 – 49,885,933 kWh produced 39,300 mtCO2e
Thus, since 2010, MV has seen a 21.9% reduction in emissions from electricity use.

Mountain Village Natural Gas Use:





*In 2010, some of MV's natural gas use was assigned by Source Gas to San Miguel County, resulting in an inaccurate baseline for Mountain Village. Thus, 2011 data is used for baseline purposes.
*In 2018, Black Hills Energy updated their database to improve location accuracy of meters. As a result, some meters previously included within Mountain Village boundaries have been reallocated to San Miguel County.

Actual natural gas use is greatly influenced by temperature and snowfall from year to year, to a greater extent than electricity use. Thus actual natural gas use is reviewed with respect to these weather variations. Normalizing natural gas use is a calculation process performed to adjust for temperature variations. It does not adjust for snowfall.

In general, natural gas use has been increasing, when adjusted to account for varying winter temperatures. This increase is in line with increased building and snowmelt square footage being constructed in Mountain Village. Overall natural gas use can be reduced through efficiency and conservation measures, addressing new construction through energy efficient building codes and existing buildings through implementing Energy Conservation Measures, such as weatherization, increasing insulation, and improving tuning mechanical heating systems and controls.

Mountain Village Natural Gas GHG emissions:
To understand progress toward addressing GHG emissions, emissions associated with normalized natural gas have been used to calculate GHG emissions associated with natural gas consumption:
2011 – 4,006,797 therms produced 21,600 mtCO2e
2017 – 4,573,998 therms produced 24,400 mtCO2e
2018 – 4,502,366 therms produced 24,000 mtCO2e
Thus, an 11% increase in natural gas related emissions is seen comparing 2011 to 2017 & 2018.

Factors influencing Energy Use & GHG Emissions:
Multiple variables impact annual use of electricity and the resulting GHG Emissions. These include:

- Population – Census & Visitors
- Economy:
  - New Construction
  - Hotel Occupancy
  - Restaurants & Businesses
- Weather:
  - Winter (& Summer) Temperatures
  - Snowfall
- Emissions factors – Electricity, natural gas & other fuels

Charts tracking these variables from year-to-year follow this report, with further explanation of their influence provided in the annual GHG Inventory presentation given by EcoAction Partners.

Per Capita & Comparison Discussion:
The Mountain Village 2017 GHG Inventory report provided an extensive section covering a discussion regarding per capita analysis and comparisons to other jurisdictions' GHG Inventories. Since overall emissions and inventory results for Mountain Village have not dramatically changed between 2017 and 2018, this section was not recreated for this 2018 report. The 2017 Benchmark comparison table is included again at the end of this report for reference. The wastewater treatment plant benchmark line was revised, as it is not feasible to accurately separate wastewater gallons and visitor population values between Mountain Village and Telluride. The notes column was revised to improve clarity and address town council questions regarding the bases for the benchmark values and reasons for why Mountain Village values are higher than Telluride values.

Recommendations for GHG Emissions reductions:
It is recommended that Mountain Village adopt the new Colorado state goals for GHG emission reductions, and consider adopting a target of carbon neutrality by 2030.

The Regional Sustainability Action Plan (STRATEGY) developed in 2010 by the Sneffels Energy Board is a comprehensive document for San Miguel and Ouray Counties, and all of the jurisdictions within. The STRATEGY is a guide to multi-jurisdictional energy action planning providing a framework to facilitate streamlined, inter-entity collaboration in our region's efforts to effectively manage energy resources, reduce energy costs and meet energy, water, waste and transportation fuel reduction goals. Within it is an extensive list of region-wide and jurisdiction-specific actions for reducing GHG emissions and achieving region-wide sustainability goals. Mountain Village was represented throughout the development of this document by Bob Delves and Deanna Drew. It is available at http://www.ecoactionpartners.org/sustainability-action-plan.

This regional plan and the goals within it will be updated during 2020 by the Sneffels Energy Board. Mountain Village council & staff representatives are invited to be a part of this important discussion and planning process. Recommendations from the Green Team and Mountain Village staff will be valuable for the community-specific portion of the plan and will also contribute toward the regional planning process.

Discussions with MV staff and Green Team have resulted in the following list of ideas for MV to reduce community GHG emissions. A comprehensive plan to reduce GHG emissions would also address Transportation, Food, Waste & Consumption areas of the GHG Inventory. See the MV 2018 Town Government Energy Use & Greenhouse Gas Report for further recommendations.

Maximize partnership possibilities with other organizations

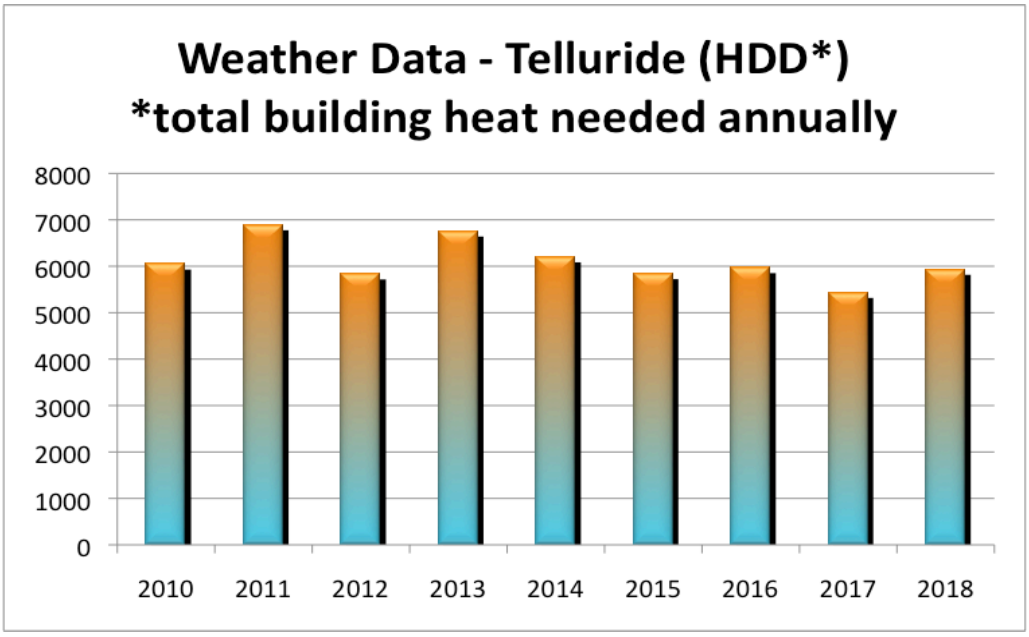
Renewable Electricity
- Collaborate with SMPA toward increasing local renewable electricity
- Support new Community Solar Farm development & include as an option for REMP
- Promote SMPA Green Blocks & efficiency programs along with MV Incentives

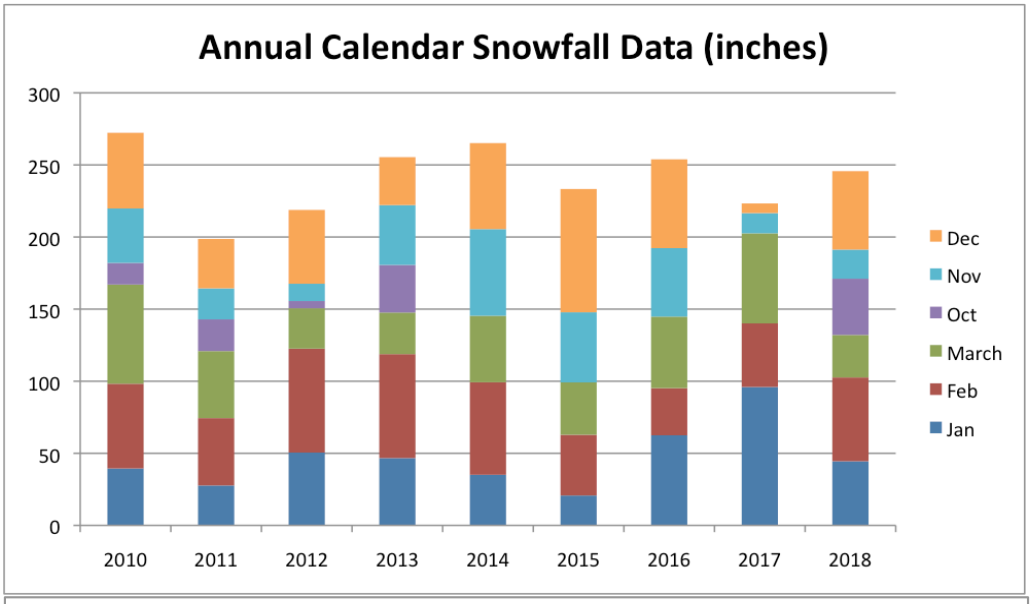
Community Programs to address existing homes & buildings
- Continue MV program development & implementation
    - Farm-to-Community Program
    - Composting Incentive Program
    - Incentivize smart controls for snowmelt systems and electric heat tape
    - Incentivize on-site renewable energy systems
    - Consider an incentive program for larger housing units / hotels to install smart energy controls

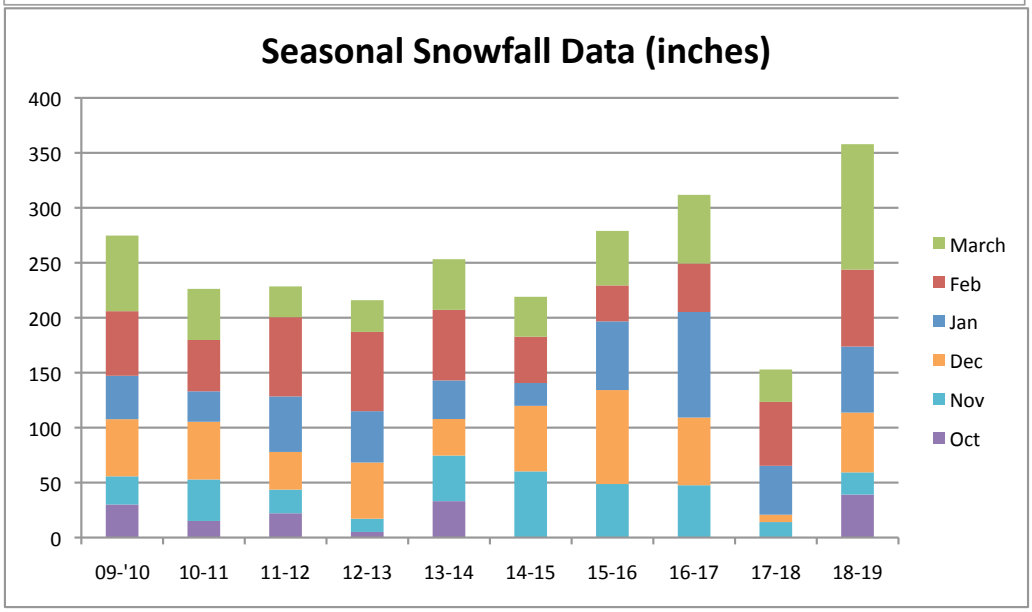
- Continued participation in EcoAction Partners' regional programs:
    - SMPA IQ Weatherization
    - Green Business Certification Program for Lodging, Restaurants, Retail, & other businesses
    - Green Property Manager Program to address part-time / unoccupied homes
    - Community Composting

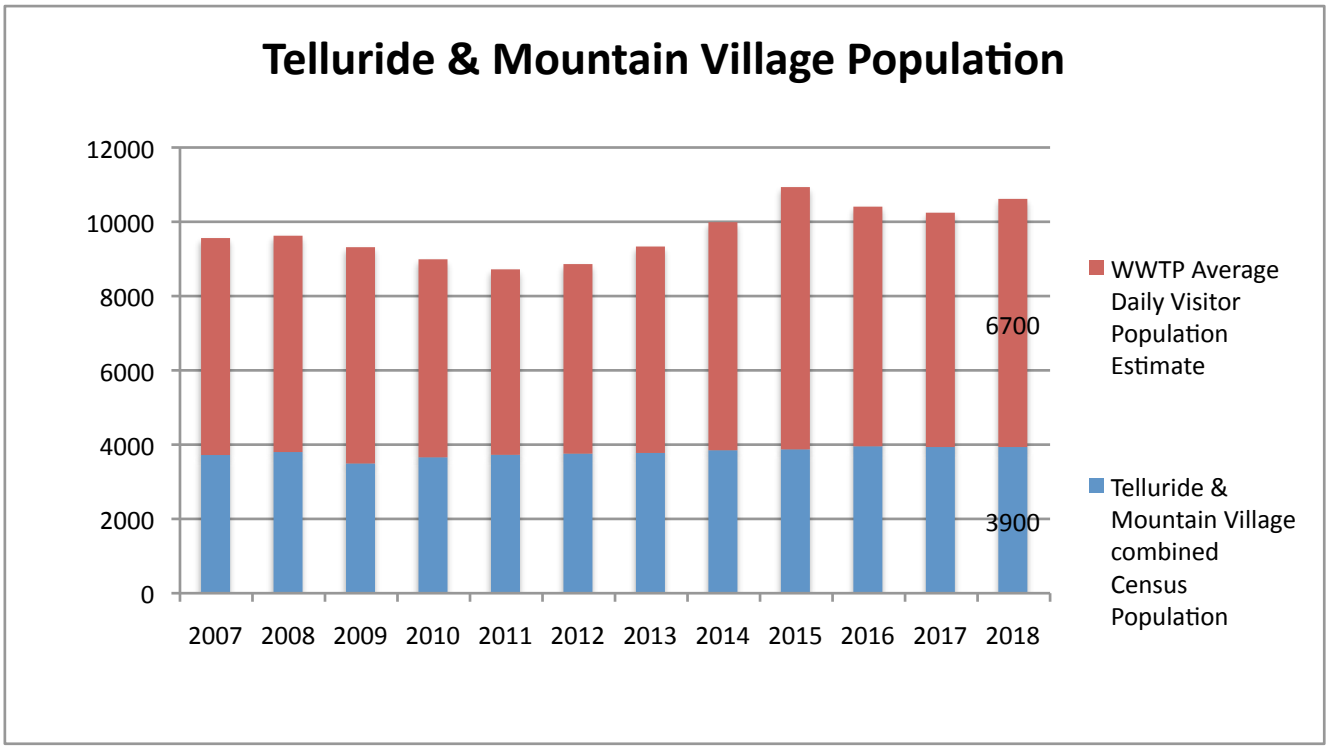
Building Energy Code Adoption:
- 2018 IECC with amendments that progress energy efficiency
- Reconsider size categories & HERS scores
- Scale toward Net Zero home as size increases
- Require house electricity offset of 100%, through Green Blocks, on-site renewable energy, or other equivalent
- Consider adding natural gas offset requirement, through Green Blocks, RECs or equivalent
- Incentivize small homes < 3000 SF & net-zero, passive home construction through financial or expedited process
- Require solar panels or solar-ready provisions on all new construction
- Require smart energy control systems on new lodging units and larger residences

Renewable Energy Mitigation Program (REMP):
- Update fees to offset carbon to match current costs & solar production values
- Eliminate or reduce free 1000 SF of snowmelt allowed
- Address outdoor fireplaces and infrared heaters
- Continue double-incentive for on-site renewable energy mitigation


Weather Data - Telluride (HDD*)
*total building heat needed annually
8000
7000
6000
5000
4000
3000
2000
1000
0
2010
2011
2012
2013
2014
2015
2016
2017
2018


Annual Calendar Snowfall Data (inches)
300
250
200
150
100
50
0
2010
2011
2012
2013
2014
2015
2016
2017
2018
Dec
Nov
Oct
March
Feb
Jan


Seasonal Snowfall Data (inches)
400
350
300
250
200
150
100
50
0
09-'10
10-11
11-12
12-13
13-14
14-15
15-16
16-17
17-18
18-19
March
Feb
Jan
Dec
Nov
Oct



Conversion Factors Used:

TriState (SMPA):	2.12 lb CO2e/kWh (pre-2012)	1.96 lbCO2d/kWh (2012)	1.93 lbCO2e/kWh (2013)
	1.99 lbCO2e/kWh (2014)	1.871 lbCO2e/kWh (2015)	1.776 lbCO2e/kWh (2016)
	1.595 lbCO2e/kWh (2017)		
Black Hills Energy:	11.68 lbCO2e/therm	**Source Gas (2010-2016):** 11.88 lbCO2e/therm	
Gasoline:	20.02 lbCO2e/gallon (tail-pipe emissions only per governmnet GHG protocol)		
Diesel:	22.44 lb CO2e/gallon (tail-pipe emissions only per governmnet GHG protocol)		

Local Benchmark Comparison from 2017:

Description of Benchmark	San Miguel County, CO (2017)	Telluride, CO (2017)	Town of Mountain Village, CO (2017)	Aspen, CO (2014)	Mountain Village & Telluride (2017)	Units of measurement	Notes
Total GHG Emissions	**244,000**	**67,500**	**96,000**	**394,391**	**163,500**	mtCO2e	
Avg. Res. electricity use	894	728	1268			kWh/household /month	
Avg. Res. Natural gas use	110	73	197			therms/household /month	including snowmelt systems
Avg. Res. Electricity (kWh/sf/yr)	4.70	5.19	5.23			KWh/sf/yr	
Avg. Res. Natural Gas/sq.ft/yr	0.28	0.30	0.36			therms/sf/yr	including snowmelt systems
Avg. Comm/ Public Buildings Energy use intensity	227	335	343			Kbtu/ft²/year	
Vehicle Miles per person per day	17.0	27.0	28.0			VMT/person/day	per census population
Water	189	168	266*			gallons/person/day	*not incl snowmaking; see water use chart in government report
Wastewater (this line revised from MV 2018 report)	118				73*	gallons/person/day	*per capita incl visitors & all emissions offset by Telluride government REC purchase
Municipal Solid Waste	6.8	10.0	18.1			lb/person/day	per census population
GHG Emissions per capita	**30.2**	**28.6***	**68.4**	**46.8**	**41.5**	Mt-CO2e/person/year	per census population; *Telluride's GHG value incorporates REC offsets
GHG Emissions per capita + visitors	**17.2**	**12.5***	**26.2**		**17.2**	Mt-CO2e/person/year	per capita incl Visitors; *Telluride's value incorporates REC offsets

Mountain Village GHG Inventory
Appendix A
San Miguel County Shared Resources Notes

SMC Shared Resources Meeting for GHG Inventories
Wednesday July 11, 10-12 at WPL Telluride Room
(Note this document was updated after the meeting with outcomes & findings)

The aim of this meeting is to reach consensus as to how the GHG emissions associated with each shared resource will be assigned between the Telluride & Mountain Village GHG Inventories. Allocations for Telluride's inventories from 2010-2017 are explained below, along with associated Mountain Village analyses. The SMC inventory includes all jurisdictions (including Telluride & MV) and thus is inclusive of these resources.

Allocation methodologies to consider for each resource:

- Location of utility meters determines how electricity and natural gas values are provided by SMPA and Black Hills Energy
- % of county population
- Is data available to parse resources between communities?
- Allocation of tourist impact to Telluride & Mountain Village versus rest of SMC or greater region?

Regionally Shared Resources

Wastewater Treatment Plant – Telluride & MV & SMC subdivisions

MV: 15% ownership, $30,000 toward solar PV system, 35% of use
Towns working toward Regional Sewer District (~5 years?)

- Electricity & natural gas: 100% to Telluride
- Biogas emissions (nitrogen & methane) from all 10,000+ visitors: 100% assigned to Telluride
- *Could allocate all of the above based on % of use. Group agreed to continue allocation to Telluride*

*WasteWater analysis charts (no impact to GHG Inventory emissions)
35% assigned to MV, 65% assigned to Telluride.
(For improved Telluride analysis – breakout of SMC subdivision population needed)

*Food GHG emissions are calculated using WWTP population accounting
35% assigned to MV
65% assigned to Telluride, minus SMC subdivision population of 1035

Gondola – eliminates vehicle traffic between MV & Telluride

100% of electricity & offset assigned to MV.
Natural gas & diesel use allocated to MV.

- TMVOA (through TMV electricity bills) purchases Green Blocks to offset electricity use by 100% (in 2017 offset was over by 30,000 kWh & adjusted by TMVOA for 2018 onward), so electricity use does not show up in GHG pie.

Telluride Ski & Golf – operations in MV, Telluride, & County land

electricity & natural gas allocated per meter location
(provided this way by SMPA & Black Hills Energy for all regional utility use)

- TSG operations include:
  - Office space & Businesses in MV core
  - The Peaks & other lodging
  - On-mountain operations
  - Conference Center
  - Telluride - Base of Gondola & Lift 7 operations
- *Could ask for TSG assistance in separating utility bills based on location of service, to reassign emissions accordingly*

Regional airports – serve region

- Telluride airport: 100% allocated to SMC, divided 50/50 between Telluride & MV
- 65% of Montrose airport to San Miguel County – group agreed to split 50/50 between Telluride & MV

Vehicle Transportation – data provided per county

Emissions assigned as % population of SMC

- Vehicle registration data & CDOT studies are basis for current Inventory
- Transit Services (some shared among jurisdictions)
- *Traffic count data for Telluride & MV would provide better data specific to community driving, but wouldn't account for distance of travel to each town*

Telluride Festivals – all 3 governments resources utilized

Electricity & water use tied to Telluride Town Park

- Located in Telluride Town Park
- Gondola used
- Camping in outlying areas, with school bus transportation
- People travel to region for festivals
- Benefits all businesses

Mountain Village Sunset Series – MV resources

- Located in Mountain Village
- Gondola used
- Regional benefit

Others – serve region, allocated by location

- Wilkinson Public Library - Telluride
- Telluride Medical Center – Telluride
- Telluride School District – Telluride
- Telluride Mountain School - SMC

Data Gaps

Trash & Recycling –

- Bruin provides data per jurisdiction. Has not provided for 2017. Telluride fined Bruin for lack of 2016 & 2017 data. Bruin data is only part of the waste picture.

- Waste Management – Private company, data not available. Could be requested through jurisdiction contracts, similar to MV's contract with Waste Management.
- 2017 Regional & SMC Inventories – data from EcoAction Partner's Regional Waste Diversion Study. 2015 data trash & recycling per jurisdiction

Transportation –

- Region 10 study data not applicable. It focuses on gaps in transit services.
- CDOT data tracks highway travel only, not all roads.
- Registered vehicles in counties relies upon average CO annual mileage.
- Off-Road vehicle use is increasing, but not accounted for.

Affordable Housing –

- Regional impacts on transit studies & transportation emissions
- GHG calculation could be done to compare impacts of reducing commute mileage for local employees

Food -

- Population-based calculation, including visitors. Telluride is based on 65% of WWTP, minus estimated SMC subdivision population served by WWTP (~1035). Mountain Village would be 35% of WWTP population.
- A food study would be helpful for more accurate food emissions & tracking reduction associated with farmers markets & programs.

Propane data –

- Estimate from 2010
- Private companies, updated data not currently available

Mountain Village GHG Inventory
Appendix B
Bases for GHG Inventory Calculations

Carbon Emissions Footprint Calculator for Cities ™

The workbook is provided to facilitate future updates to Ouray and San Miguel's Greenhouse Gas (GHG) Emissions Inventory. This inventory was completed for 2010 based on ICLEI/WRI protocols and the Demand-Centered Hybrid Life Cycle Analysis methodology (Ramaswami et al., 2008 - see Resource 3). EcoAction Partners uses the workbook to update our regional GHG Emissions Inventory annually.

General data:
Census Population – obtained annually from the Colorado DOLA website
Visitor Population
- SMC visitor values are calculated using the Telluride & Mountain Village Wastewater Treatment Plant BOD data.
- Ouray County visitor estimates are obtained from the visitor centers in Ridgway & Ouray

# of Households, SF of commercial & residential buildings – these values are not used in overall GHG emissions calculations, but are collected for other benchmarking purposes. The Ouray County & San Miguel County Assessors offices provide this data.

Energy (blue):

Residential & Commercial Building Energy Use:
Electricity
- SMPA provides data annually per community for residential, commercial & irrigation (provided in 1st quarter for previous year). Data is categorized as non-renewable sales, Green Blocks sales, SMPA community solar farm production, & net-metered system production.
- Tri-State emissions factor - provided to SMPA annually based on Tri-State's total mix of electricity sources (provided late in year for the previous year, thus GHG Inventory value is a year behind when presented to governments, but gets updated during the following year.)

Natural Gas
- Black Hills Energy Corporation (previously SourceGas) provides data annually – per community for residential, commercial & irrigation (provided in 1st quarter for previous year).
- Emissions factor – In 2010, Source Gas provided this factor and in 2017, Black Hills Energy Corporation provided the BHE value. Inventories from this transition onward utilize this Black Hills emissions factor.

Propane
- based on initial 2010 estimate from regional propane companies, who are not obligated to release information and have not provided data since.
- Emissions factor – LGOP default factor from 2010

Government Energy Use:
Government electricity & natural gas use – provided annually by governments: utility bill data, Green Blocks purchases, renewable system production, REC purchases

Water / Wastewater Treatment Electricity & Natural Gas - provided annually by governments from utility bills

Transit (red):

Vehicle Transportation:
Transportation tail-pipe emissions are calculated using total Vehicle Miles Traveled (VMT), which is derived using two different methods - vehicle registration and average daily traffic. VMT is divided by average regional vehicle fleet fuel economy to calculate fuel consumption, which is used to determine GHG emissions from surface transportation. The Colorado Department of Public Health and Environment (CDPHE) conducts on-road vehicle surveys to characterize the Colorado vehicle mix (95% gasoline, 5% diesel).

Vehicle Registration Method:
- # Vehicles registered in San Miguel & Ouray Counties updated annually
- Vehicle Miles Travelled (VMT) estimate per vehicle / year, per EPA – 12,000

Average Daily Traffic Method:
- Average Daily traffic counts of Vehicle Miles Travelled (VMT) per county per Colorado Department of Transportation (CDOT) studies (2009), based on 342 working days/year

Gasoline (95% per CDPHE)
- 20.1 average MPG per CDPHE (2010)

Diesel (5% per CDPHE)
- 6.3 average MPG per CDPHE (2010)

Airline Transport:
- Annual aircraft fuel (jet fuel and aviation gasoline) used is provided annually from the Telluride Airport and the Montrose Regional Airport (65% of passengers travel to OC & SMC).
- Emissions factors used are from the Department of Energy (DOE).
- Total number of enplanements (passengers) is also tracked to obtain emissions/person.

Emissions values for all fuels are sourced from The Carbon Registry, local government protocol, September 2008.

Materials and embodied energy (transboundary reporting):
This section will count all the GHG emissions associated with producing and transporting key materials to OC & SMC, including food, cement, and fuel. Just like electricity, these materials are produced outside the boundaries of the community but are essential to community life. WRI and ICLEI are continuously updating their guidelines on how to include these trans-boundary emissions, termed "Scope 3 Emissions."

Food:
This calculation was originally based on 2005 BLS Economic Census data for 2009$ for average annual household dollars spent on food. Recently, due to the relatively large percentage of households in the region that are not fully occupied year-round, and the annual influx of visitors that contribute to our regional food carbon footprint, all GHG Inventories (2010-2016) were converted in 2017 to use the average food carbon footprint for annual mtCO2e/person found in industry studies published online. This carbon footprint value is used with the regional visitor data (vs census) to calculate our annual food-related emissions.

Waste & Recycling: calculated using EPA WARM methodology

- We have 2 main waste haulers for the region.
- Bruin provides annually updated data for volumes of waste and recycling collected throughout the region.
- Waste Management provided total data in 2010 for collection in Montrose, Delta, San Miguel & Ouray Counties, but has not provided updated data since.
- The Sneffels Waste Diversion Planning Project was completed in December 2016 by EcoAction Partners. It includes an analysis of total volume of waste and recycling. This is the most accurate regional information currently available. Thus OC & SMC total waste data is based on this study.
- Values from the study are used with WARM* emissions data to calculate annual waste & recycling emissions.
  **Waste Reduction Model (WARM) was created by the U.S. Environmental Protection Agency (EPA) to help solid waste planners and organizations estimate greenhouse gas (GHG) emission reductions from several different waste management practices.*

Cement:

- Total cement consumed in Colorado in 2007 is multiplied by % of state census population located in OC & SMC.

Fuel Production:

- The fuel production emissions factor represents emissions from the production and shipping of fuels. Also known as Wells-to-Pumps, W2P, or WTP Emissions
- The emissions factor for Gasoline, Diesel, & Jet Fuel is multiplied by the total gallons of each fuel used in the region to obtain overall annual emissions.
- WTP Emissions values for all fuels are sourced from the 2017 GREET WTP analysis.

Water & Wastewater Treatment Emissions:
Regional governments provide annual gallons of water treated at each plant. These values are utilized with annual census & visitor data, using ICLEI Protocol for Fugitive Emissions from Wastewater equations (10.2, 10.8 and 10.10)* to calculate annual emissions associated with water and wastewater treatment.
*See ICLEI Local Government Operations Protocol v 1.0 for more information

To: Mountain Village Town Council

Date: October 9, 2019

From: Kim Wheels, EcoAction Partners

RE: Mountain Village Town Government 2018 Energy Use & Greenhouse Gas Emissions Report

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EcoAction Partners mission is to track regional GHG emissions and coordinate programs that reduce energy and waste.

EcoAction Partners has been assisting the Town of Mountain Village track and analyze annual government energy use and emissions for several years, beginning with 2016 data. EcoAction Partners is pleased to share the following report on 2018 Energy Use & GHG Emissions with the Mountain Village Town Council.

Thank you for your interest in reducing energy use, increasing renewable energy production, and greenhouse gas emissions tracking with achieving GHG emissions reductions as the overarching goal. Mountain Village is a crucial and integral partner in achieving region-wide GHG emissions reduction goals. EcoAction Partners appreciates your ongoing engagement and efforts to create a sustainable future.

***

EcoAction Partners is a sustainability organization, formed in 20009, focused on reducing Greenhouse Gas (GHG) emissions in the greater San Miguel County region by promoting energy efficiency and renewable energy projects, and tracking progress toward reduction goals. Programs are focused on energy and waste reduction, as well as other sustainable practices. EcoAction Partners is our region's resource for collecting, analyzing and reporting on greenhouse gas emissions data for government jurisdictions and the region.

MEMORANDUM **AGENDA ITEM #**

TO: **MOUNTAIN VILLAGE MAYOR AND TOWN COUNCIL**
FROM: **KIM WHEELS, ECOACTION PARTNERS**
SUBJECT: **2018 GOVERNMENT ENERGY USE AND GREENHOUSE GAS REPORT**
DATE: **SEPTEMBER 12, 2019**

BACKGROUND

In 2009 the Town of Mountain Village along with Telluride and San Miguel County adopted a resolution to achieve a 20% reduction in greenhouse gas emissions by the year 2020 from 2005 baseline levels. The current county-wide target is carbon neutrality.

The town is currently using 2010 as the baseline year for achieving this goal. All three governments are calculating GHG emissions by converting total electricity, natural gas, and fuel consumed by government operations to carbon dioxide emissions, a primary greenhouse gas, using a standardized EPA conversion. Note: this is a simplified greenhouse gas calculation and analysis.

2018 TMV GOVERNMENT ENERGY USE AND GHG EMISSIONS SUMMARY

- 2018 total government CO2 emissions were **17% higher** than 2017 levels; **1% lower than average** of previous years; and **down 14% from 2010 baseline** emission levels.
    - CO2 emissions from **natural gas were down only 3%** from 2010 baseline levels;
    - CO2 emissions from **electricity were 14% lower** than 2010 baseline levels; and
    - CO2 emissions from **fuel were down 26%** from 2010 baseline levels.

- **Natural gas** use was **38% higher in 2018 than 2017**, and was only 2% lower than the 2010 baseline. **Plaza snowmelt** accounted for much of this increase, at 44% higher than 2017. Building natural gas use was 10% higher than 2017. This translates into a 34% increase in natural gas costs over 2017.

  Note: The rise and fall of natural gas use closely correlates with weather temperatures and snowfall amounts in our region. Building natural gas use can be normalized to account for the difference in outdoor temperature between winters. **Normalized natural gas use for buildings indicate a 1% increase in 2018 over 2017 use, and a 23% decrease from 2010 usage.**

  Thus, **plaza snowmelt** accounted for the majority of the increase in 2018. Note this data is per calendar year (not ski season). The plazas with significant increases were Heritage Crossing, Lost Creek / Blue Mesa parking (where area was added to the snowmelt system since 2017), and Sunny Ridge / See Forever Plaza).

The largest increase was Heritage Crossing Plaza, where natural gas use almost doubled between 2017 & 2018, and was higher than other years since the Conference Center was added to the snowmelt system in 2014. Thus, natural gas use for this plaza was graphed monthly (see chart below) and discussed with MV staff, who reported the following:

- Maintenance staff has been struggling with the controls for the system since they were replaced in 2015. In February, March, April, and fall months of 2017, the conference center plaza was frequently plowed instead of using the snowmelt system to clear the snow. Thus, natural gas use for these months is not reflective of what would be needed, making 2018 use for those months look substantially higher. In addition, snowfall amounts for February and October through December of 2018 were relatively high (see snowfall bar charts below), which is reflected in natural gas use of the snowmelt system for these months.
- Due to dry weather conditions in Spring 2018, maintenance work on the plaza began earlier than normal (by May). Part of this work involved replacement of concrete pavers. In order to help the concrete cure during cooler temperatures, the snowmelt system was utilized to heat the concrete.
- Summertime natural gas use was also reviewed. In 2017, staff was directed to leave the plaza fire pit in place and operational all summer long, versus removing it as done in previous years. Thus, 2017 shows a steady baseline summertime use of natural gas. In 2018, the fire pit was turned off and removed in June due to fire danger from the extremely dry weather. In 2019, the fire pit was transformed into a flower planter for summer months, so once again there will be no summertime natural gas use.

- **Electricity** use in government facilities **increased 29% in 2018 from 2017** levels. Electricity associated with water supply was higher than any year on record (see water department below). Noteable electricity increases were also associated with "Street Lights" and the Gondola Parking Structure. Overall, **2018 total electricity was 14% above 2010** baseline levels.

  Note: Electricity use is also impacted by winter temperatures & snowfall, due to electric heaters, increased operation of pumps for hydronic heating systems, and other heating-related systems. Visitor numbers also influence electricity use.

  The category of **Street Lights** shows an increase in electricity of approximately 15,700 kWh. This use was analyzed monthly (see chart below) and discussed with MV staff, who determined the following:
  - When the snowmelt system at Sunset Plaza was increased in size, a heater was installed in the snowmelt system vault to control the temperature. This heater is tied into the nearby street light meter, accounting for 11,500 kWh of additional use.
  - At the North Village Center parking lot, a solar parking meter was removed from the solar grid due to not having enough power for the system. It was instead tied into the nearby street light meter and the associated photo eye for the lights was covered, in order to keep the meter working properly. Thus, until the situation was resolved,

the 4 light poles (with 8 light bulbs) were on 24/7, causing an increase in electricity use of ~2000 kWh.

Note: it is worth noting that many of the street light meters have other electricity uses tied into them, which is an important factor to consider when analyzing data.

The **Gondola Parking Structure** data shows an increase of 31,600 kWh. This data was also analyzed monthly (see chart below) and discussed with MV staff. The additional electricity use has been associated with increased use of the electric vehicle (EV) charging station installed at the garage. Staff has observed increase use of this station over the past couple of years. Unfortunately, any data collected by the EV charging station to reflect this increased use is not available because the meter was damaged during 2018/19 winter snow removal efforts on the top floor of the parking garage. A new EV charging station has since been installed on a lower level. Staff has also noticed increased use of the elevator at the parking structure, which would also contribute toward increased electricity use. Regular monitoring of daily and hourly data from SMPA's online SmartHub system could be a useful tool for staff to further track and understand electricity use at the parking structure.

- The **water department** experienced a **55% increase** in 2018 electricity use compared to 2017 usage. This results in a **74% increase** from 2010 baseline levels. This increase correlates directly with an increase in water supply, from **~221,000,000 gallons to ~324,500,000 gallons**. These values include water use for **snowmaking**, which was almost **165,000,000 gallons in 2018**; **approximately double** the snowmaking water use for 2017, a direct reflection of snowmaking continuing into 2018 over the dry 2017-2018 ski season. Water use for irrigation also increased during the dry summer of 2018.

- The **gondola** electricity use **increased about 10% from 2017 to 2018**, but remained 9% below 2010 baseline levels. Note that the additional morning and weekend run time of the gondola began in 2017, but 2017 electricity use was still less than 2016. The increased electricity use in 2018 was analyzed monthly (see chart below) and discussed with MV staff. It was determined that the higher electricity use in November is due to the use of electric heaters in the gondola terminals due to a very snowy month. The February increase is largely due to a shift in SMPA's billing cycle that increased the number of February billing days for the two largest gondola stations. Average daily electricity use at most of the stations was also noted to be higher during February, which also aligns with a higher than average snowfall that month. Additional items to note: 9 cabins were added to the main gondola line in December of 2017, and the gondola saw an increase in overall ridership by ~7% (to ~3 million) in 2018.

  TMVOA and TMV continue to partner to **offset 100% of the gondola's electricity use** through the purchase of SMPA Green Blocks, which are renewable energy credits from SMPA. Due to gondola efficiency improvements over the years, the 2,000,000 kWh allotment of Green Blocks exceeded the current gondola electricity usage for several years. TMVOA has worked with SMPA to reallocate the excess Green Blocks. Thus, other TMVOA facilities are now also offset through SMPA's green power program.

- **Village Court Apartments** (VCA) electricity use in 2018 **decreased 5.4% from 2017 levels**, and was approximately 15% below 2010 baseline levels. Heating at VCA is provided by electricity, so winter temperature differences influence total electricity use. Weatherization and refrigerator replacement was performed in 3 buildings at VCA during 2018 through the SMPA Income Qualified Weatherization Program, which is managed by EcoAction Partners and funded by Energy Outreach Colorado. The Town of Mountain Village also contributed funds for 3 of the refrigerators. These improvements contributed toward the decrease in electricity usage in 2018.

  Note: VCA is not included in overall government emissions totals.

- The **emissions factor** for our electricity from Tri-State continues its downward trend. The emissions factor for 2017 was 1.60 lbs CO2e per kilowatt hour of electricity used; down from the emissions factor of 2.2 lbs CO2e/kwh for the baseline year of 2010. According to the EPA, the national average is about 1.24 lbs CO2e/kwh, and Colorado's average is 1.91 lbs CO2e/kWh.

- **Total Fuel use** was **1% higher** in 2018 (56,797 total gallons used) than 2017 with an increase in both unleaded & diesel fuels (611 gal). This resulted in a 26% decrease in total annual fuel used compared to 2010 baseline levels. However, the cost of fuel in the U.S. significantly increased from 2017 to 2018, resulting in an **increase in fuel costs by 36% to over $140,000**.

RECOMMENDATIONS:

The following are a summary of recommendations that resulted from recent discussions by the Mountain Village Green Team, staff and EcoAction Partners.

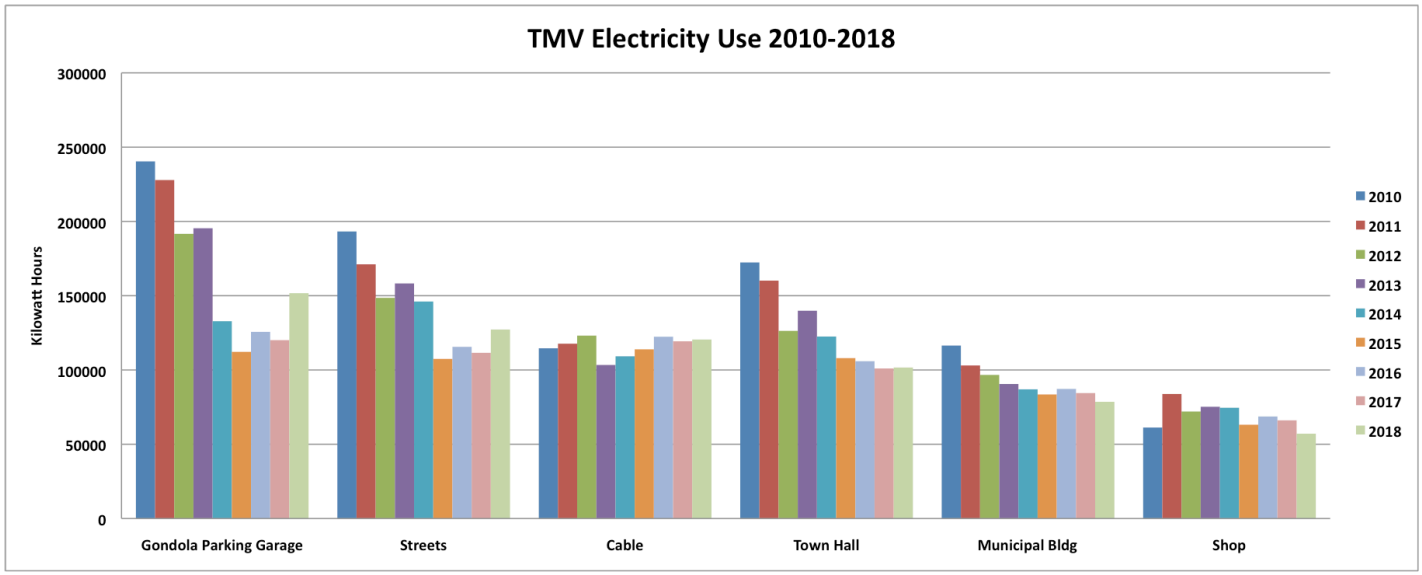
In general, the Green Team recognizes a need to develop a culture among Mountain Village staff that would engage all staff in sustainability initiatives. In order to gauge current engagement of staff, the Green Team recommends developing and sending out a survey to all staff. Following receiving and analyzing survey responses, the Green Team would provide direction and education to all staff members on MV town goals for sustainability and reducing GHG emissions. Involvement of all staff at every level in every department is critical to identifying every possible way to reduce Mountain Village's carbon footprint. EcoAction Partners has resources to contribute that utilize Community Based Social Marketing tools to build this high level of staff engagement.

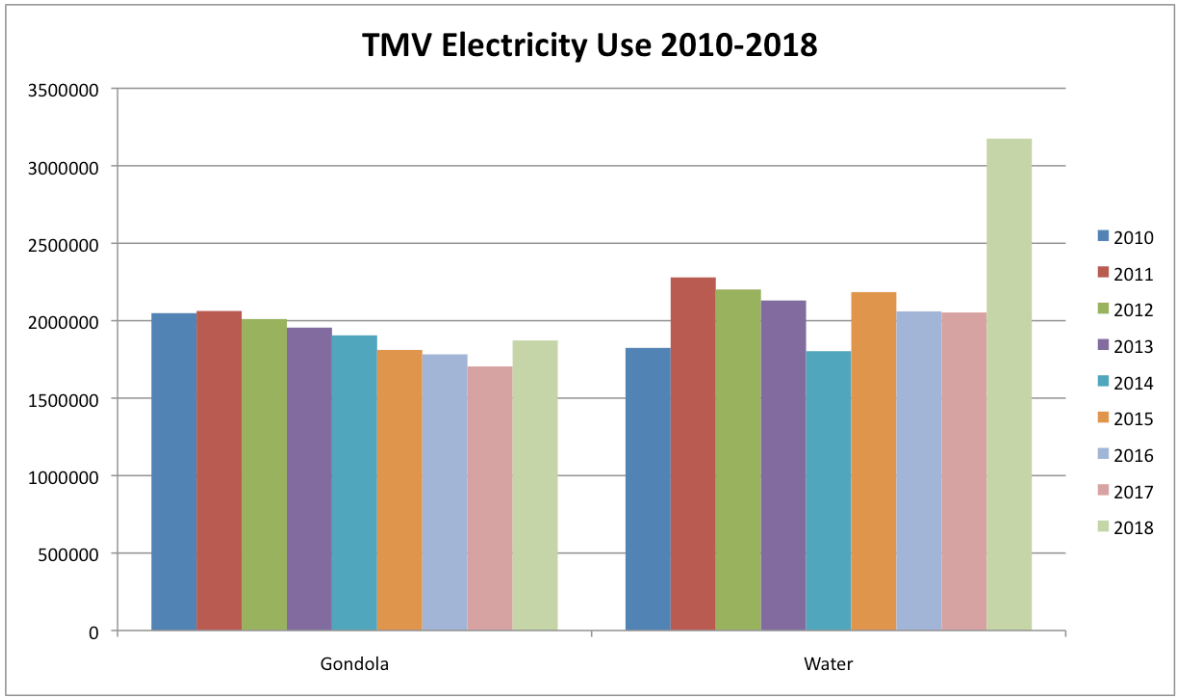
Mountain Village town staff who are responsible for managing buildings, snowmelt systems and other facilities do not currently review town energy use on a regular basis, so there is a disconnect between management of these systems and actual utility use. The number one first step in reducing energy use is regular tracking and review of utility accounts. Staff generously assisted in the analysis of energy use for specific systems to provide accurate information for this report. In

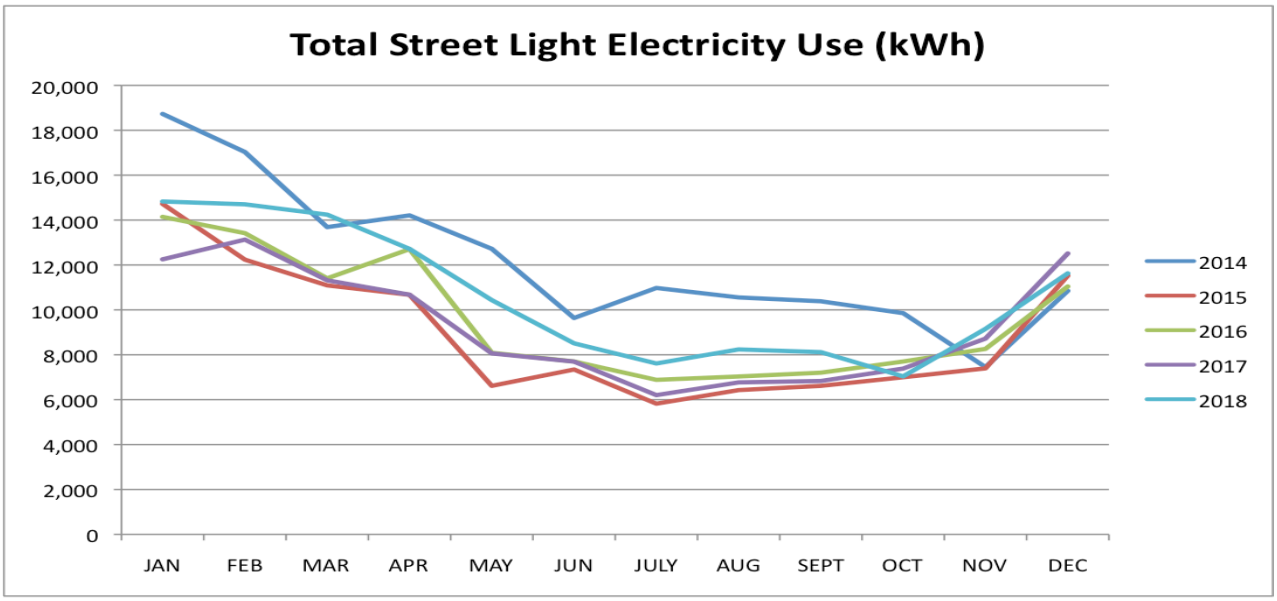
the future, it is recommended that utility usage be regularly reviewed by town staff on at least a quarterly basis, in order to identify anomalies in usage quickly and thus be able to address abnormal increases in energy use in a timely fashion. MV Town staff could also be engaged to provide and implement specific improvements to reducing energy use at MV buildings and facilities based on their knowledge and expertise of operations.

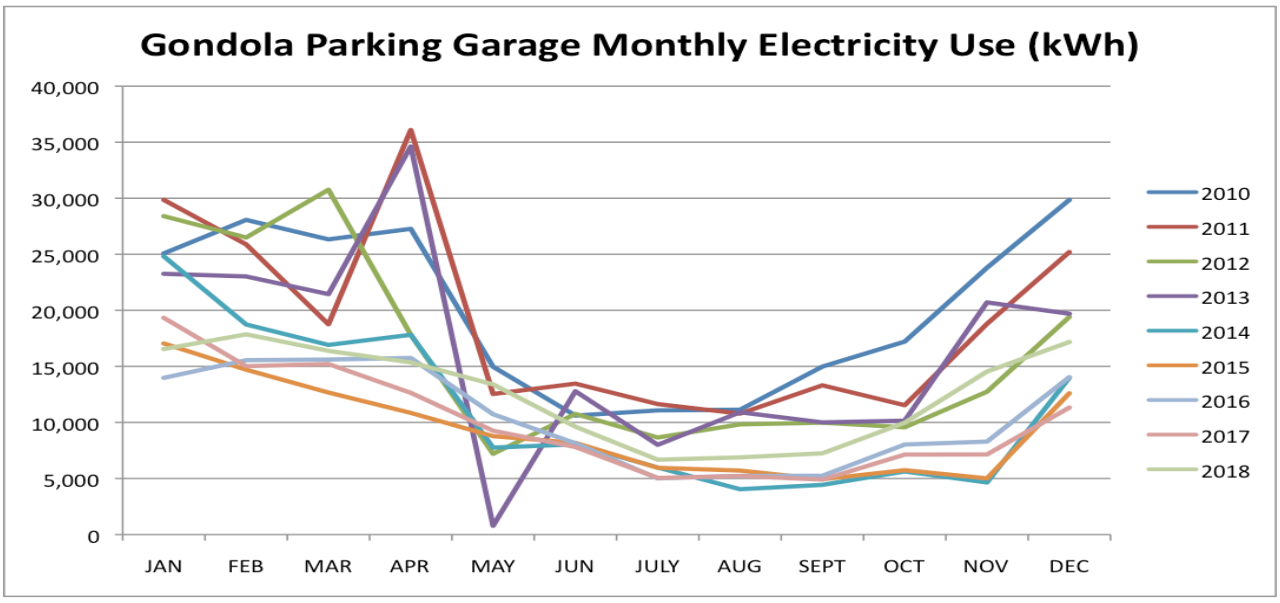
Mountain Village energy use is recorded monthly by town staff in spreadsheets and reviewed annually for GHG emissions accounting for this report, however it is not set up for monthly charting of data per account or category of usage. Electricity data per account is now available online at SMPA's SmartHub system to compare monthly, daily and hourly usage and could be accessed by staff members on a regular basis. The natural gas tracking spreadsheet could be set up for charting each account monthly as data is entered by staff, thus allowing an easy way for staff to regularly monitor natural gas use. EcoAction Partners has assisted other governments with setting up this additional spreadsheet analysis capability and could do so for Mountain Village as part of our 2020 contract for services, if desired.

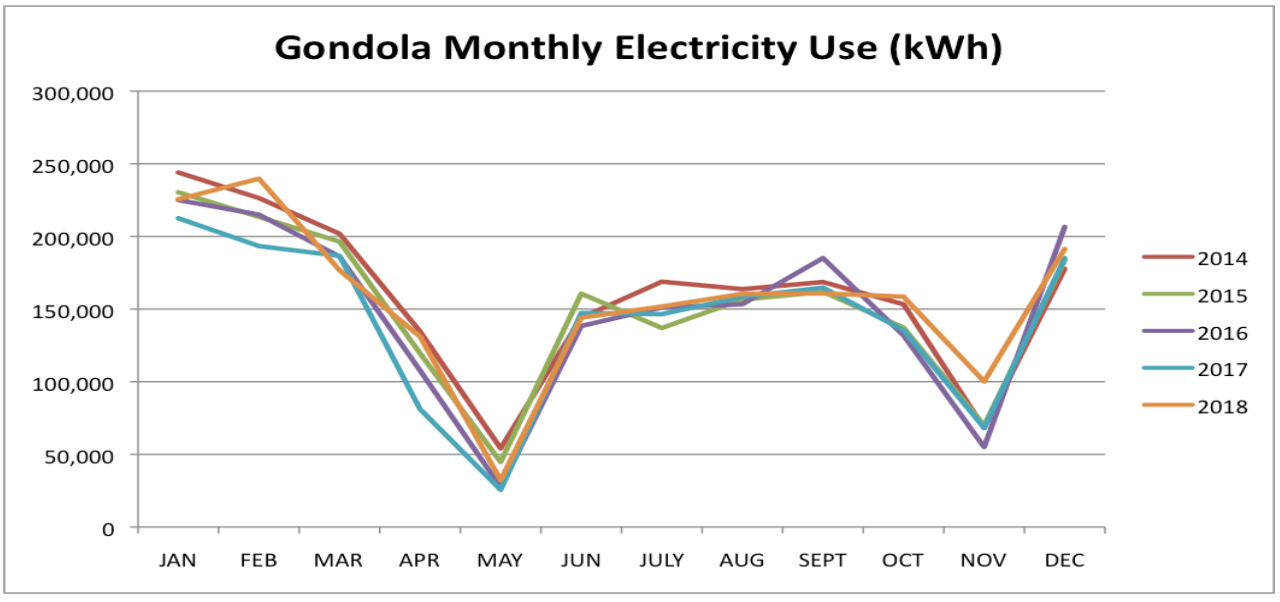
Snowmaking water and associated electricity use are currently incorporated into Mountain Village town government's utility usage. The Green Team suggests considering reallocating snowmaking usage to Telluride Ski & Golf, so that this water use and associated carbon emissions are accounted for in TSG's GHG emissions report. For the purposes of consistency, the same recommendation would be provided to the Town of Telluride for water and electricity use from Telluride that is associated with snowmaking. This change in accounting could be made retroactive through 2010 (or as far back as water records separate MV water use from snowmaking use).

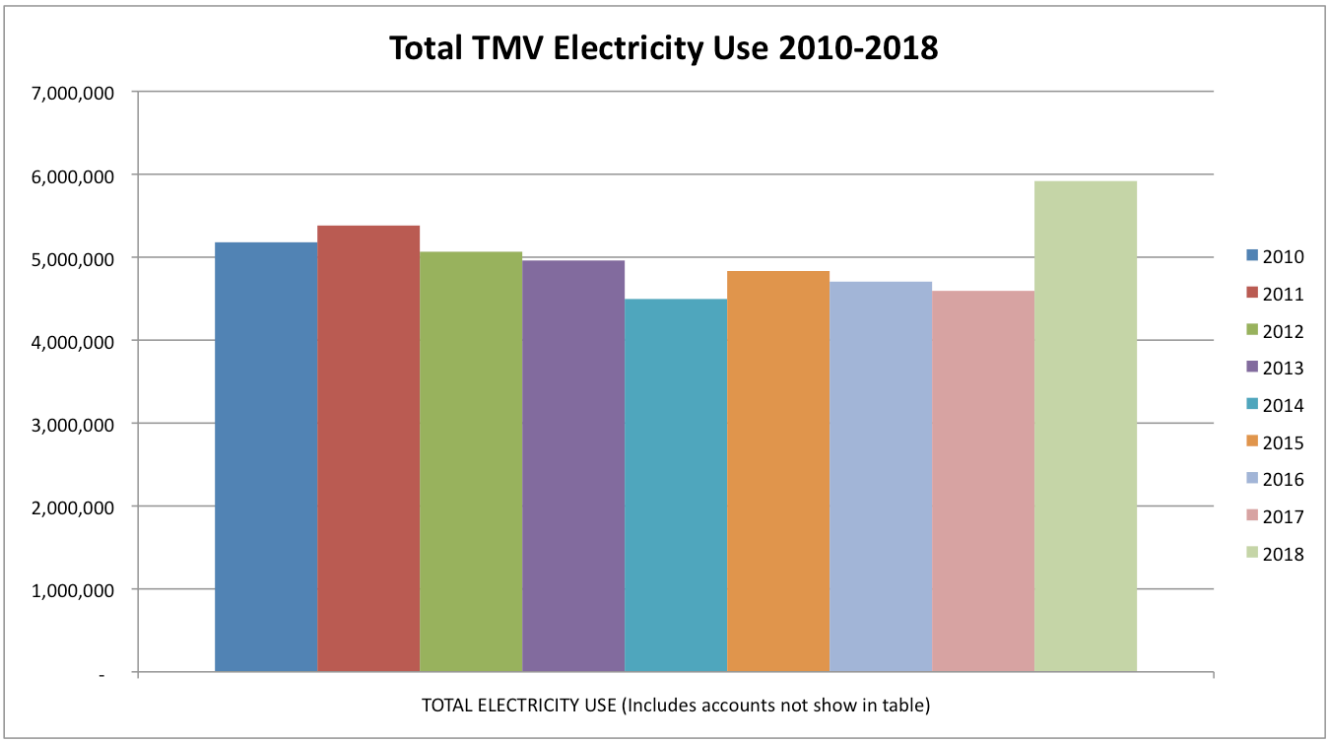

TMV Electricity Use 2010-2018
Kilowatt Hours
300000
250000
200000
150000
100000
50000
0
Gondola Parking Garage
Streets
Cable
Town Hall
Municipal Bldg
Shop
2010
2011
2012
2013
2014
2015
2016
2017
2018

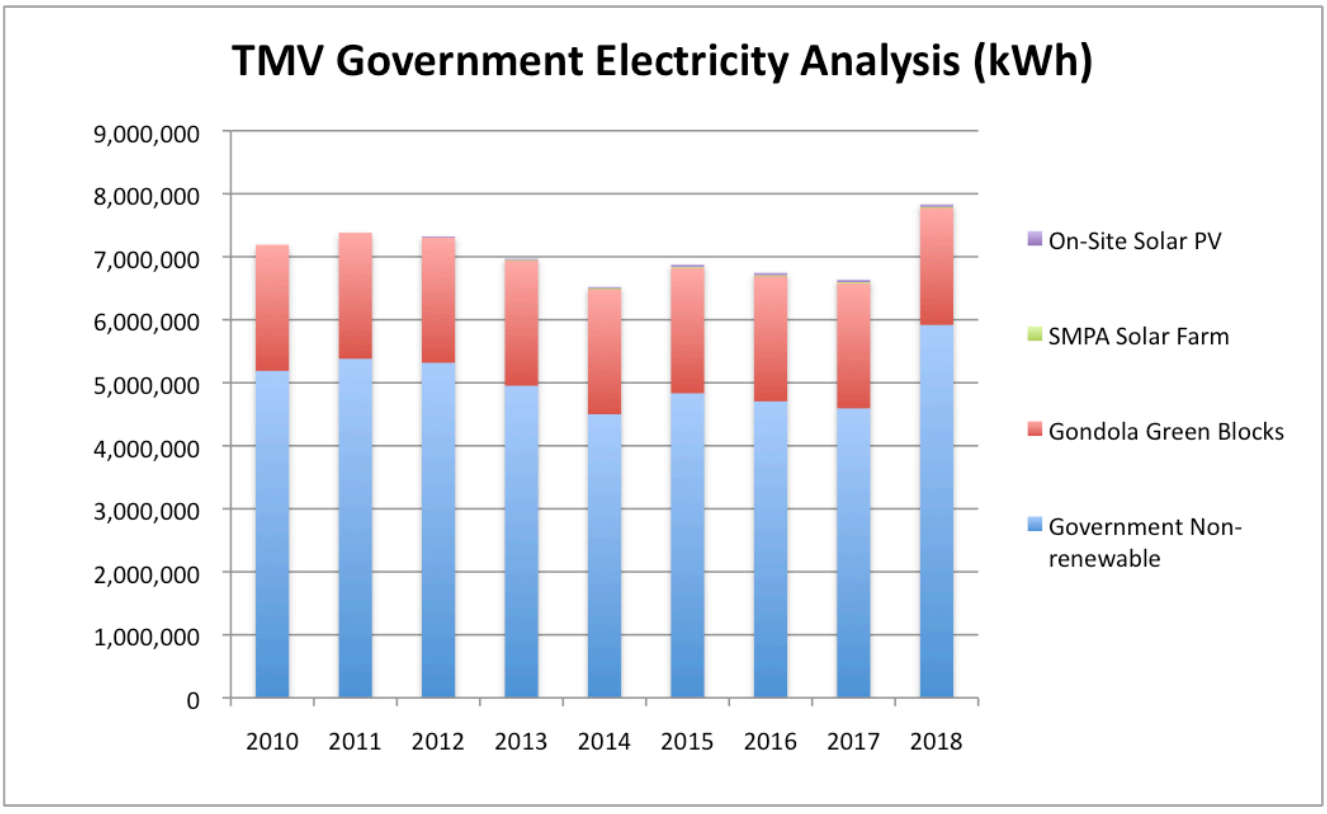

TMV Electricity Use 2010-2018
3500000
3000000
2500000
2000000
1500000
1000000
500000
0
Gondola
Water
2010
2011
2012
2013
2014
2015
2016
2017
2018

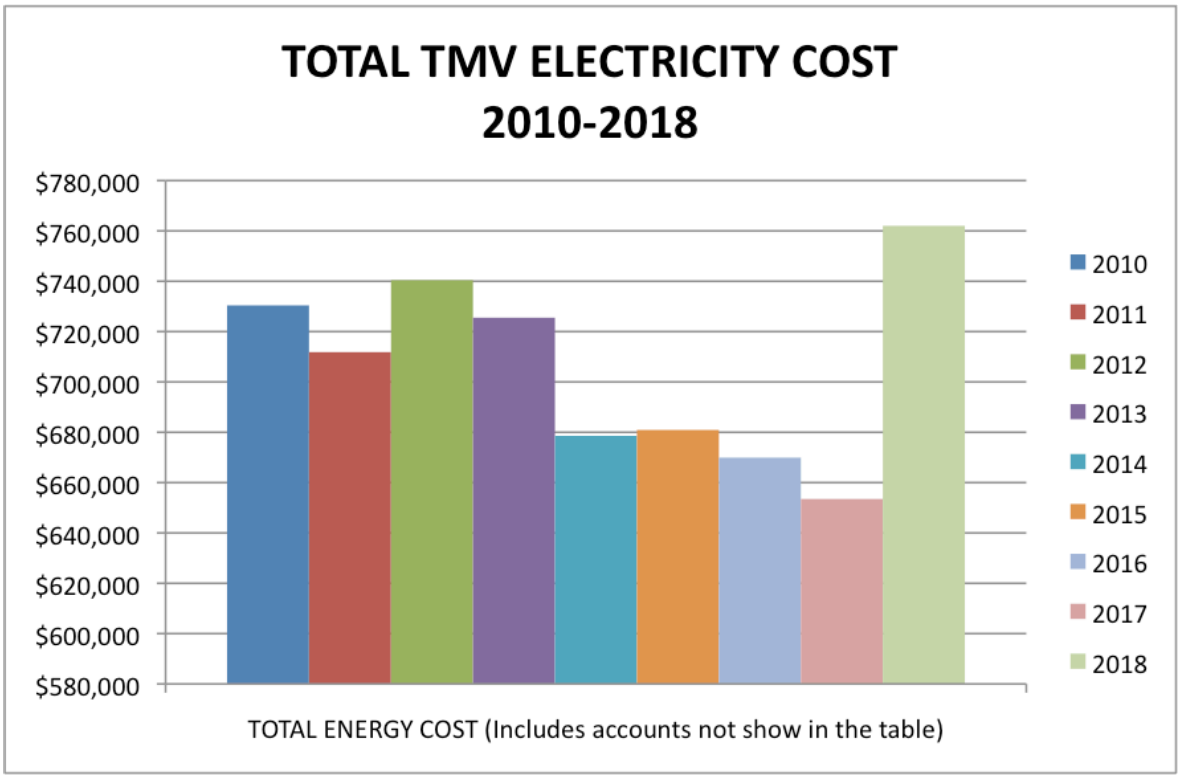

Total Street Light Electricity Use (kWh)
20,000
18,000
16,000
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
JAN
FEB
MAR
APR
MAY
JUN
JULY
AUG
SEPT
OCT
NOV
DEC
2014
2015
2016
2017
2018

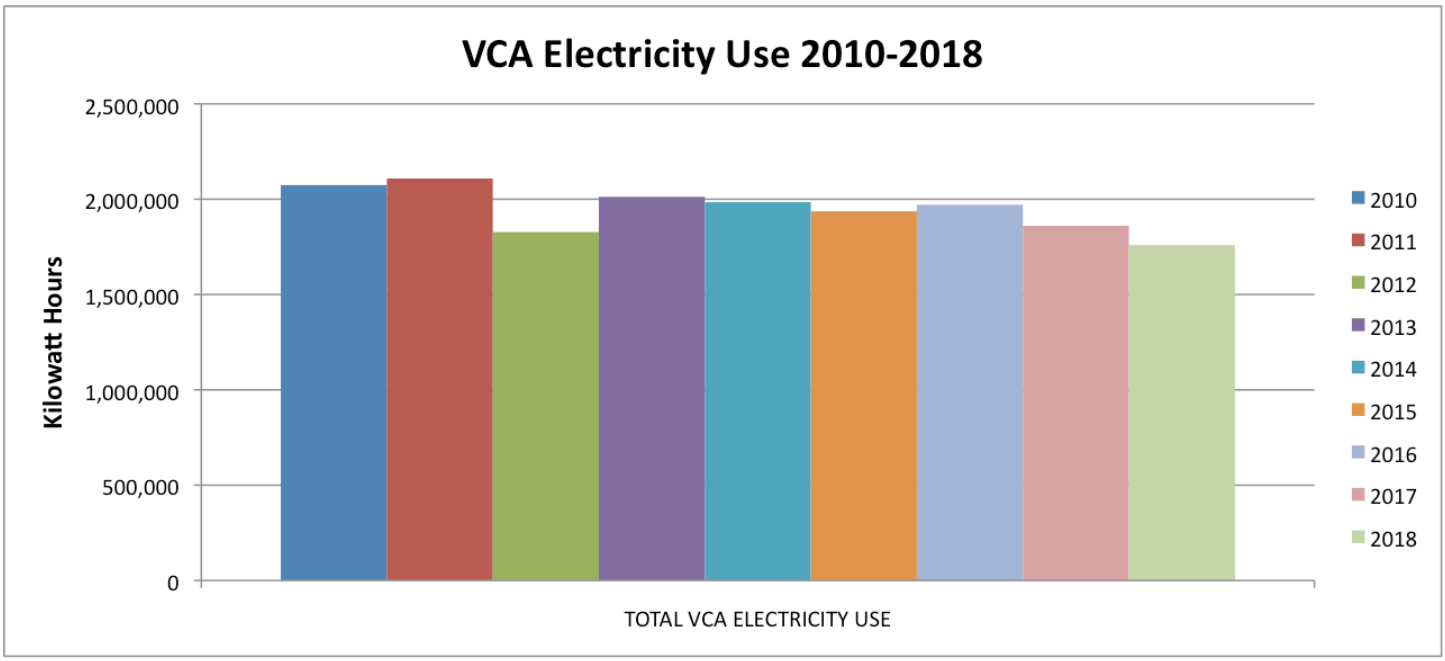

Gondola Parking Garage Monthly Electricity Use (kWh)
40,000
35,000
30,000
25,000
20,000
15,000
10,000
5,000
0
JAN
FEB
MAR
APR
MAY
JUN
JULY
AUG
SEPT
OCT
NOV
DEC
2010
2011
2012
2013
2014
2015
2016
2017
2018

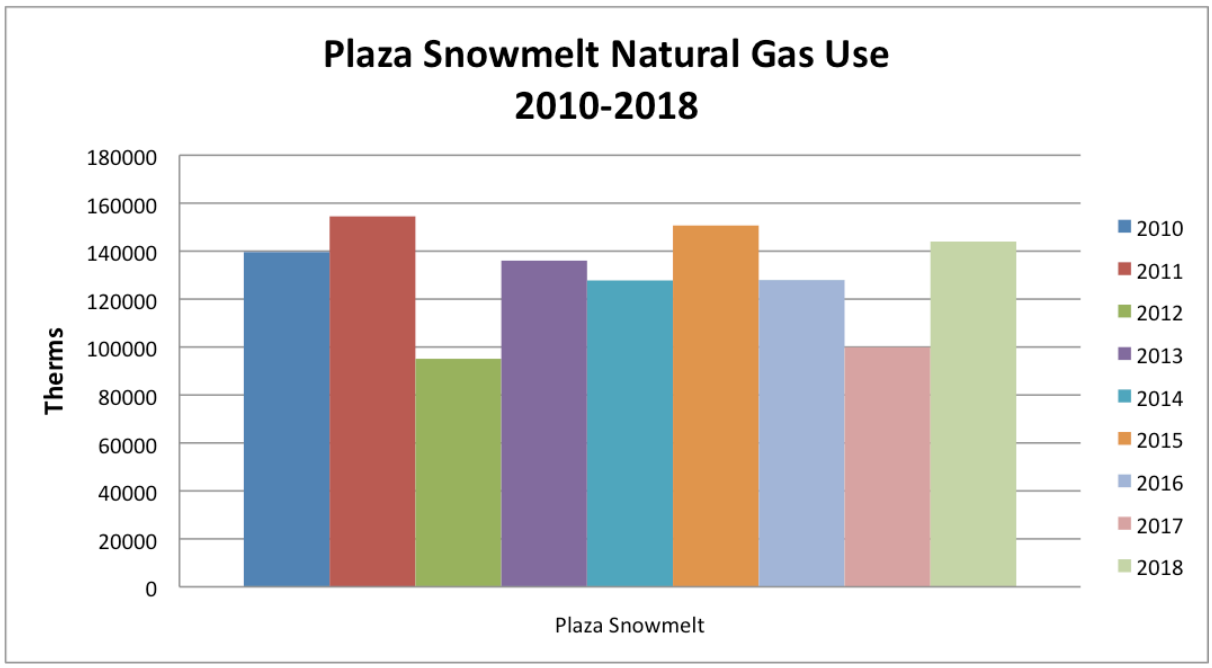

Gondola Monthly Electricity Use (kWh)
300,000
250,000
200,000
150,000
100,000
50,000
0
JAN
FEB
MAR
APR
MAY
JUN
JULY
AUG
SEPT
OCT
NOV
DEC
2014
2015
2016
2017
2018

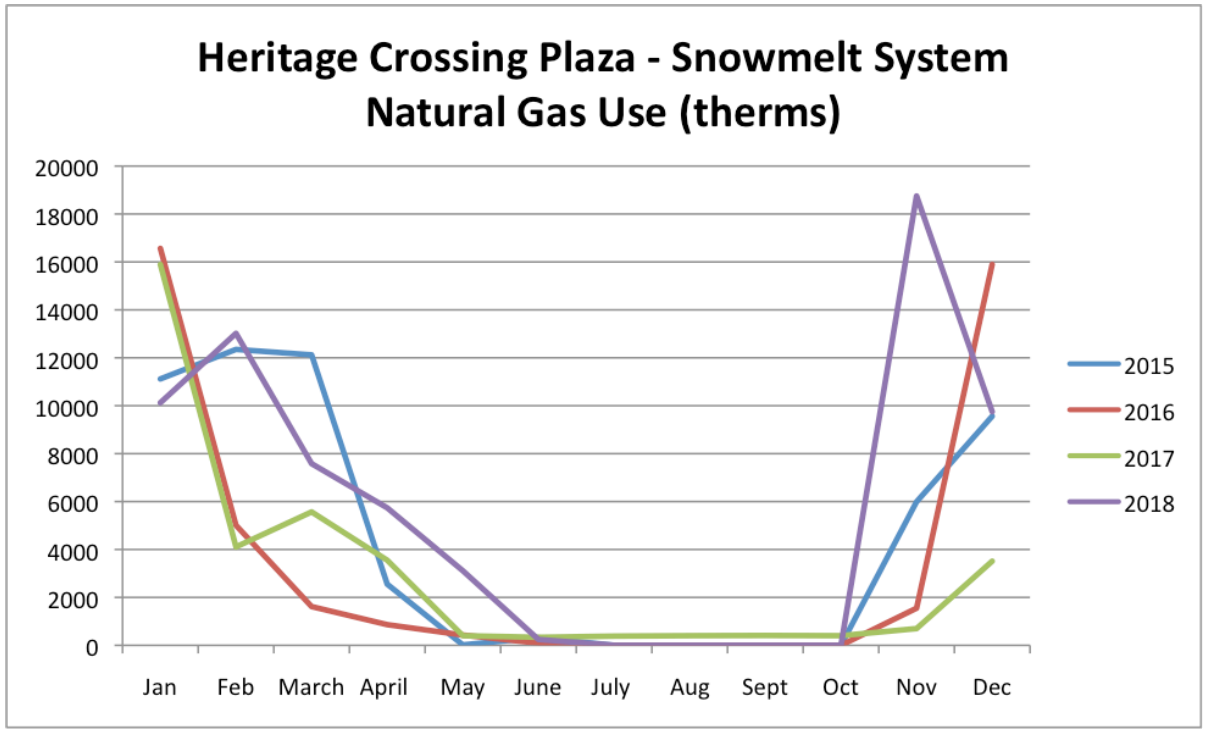

Total TMV Electricity Use 2010-2018
7,000,000
6,000,000
5,000,000
4,000,000
3,000,000
2,000,000
1,000,000
-
2010
2011
2012
2013
2014
2015
2016
2017
2018
TOTAL ELECTRICITY USE (Includes accounts not show in table)

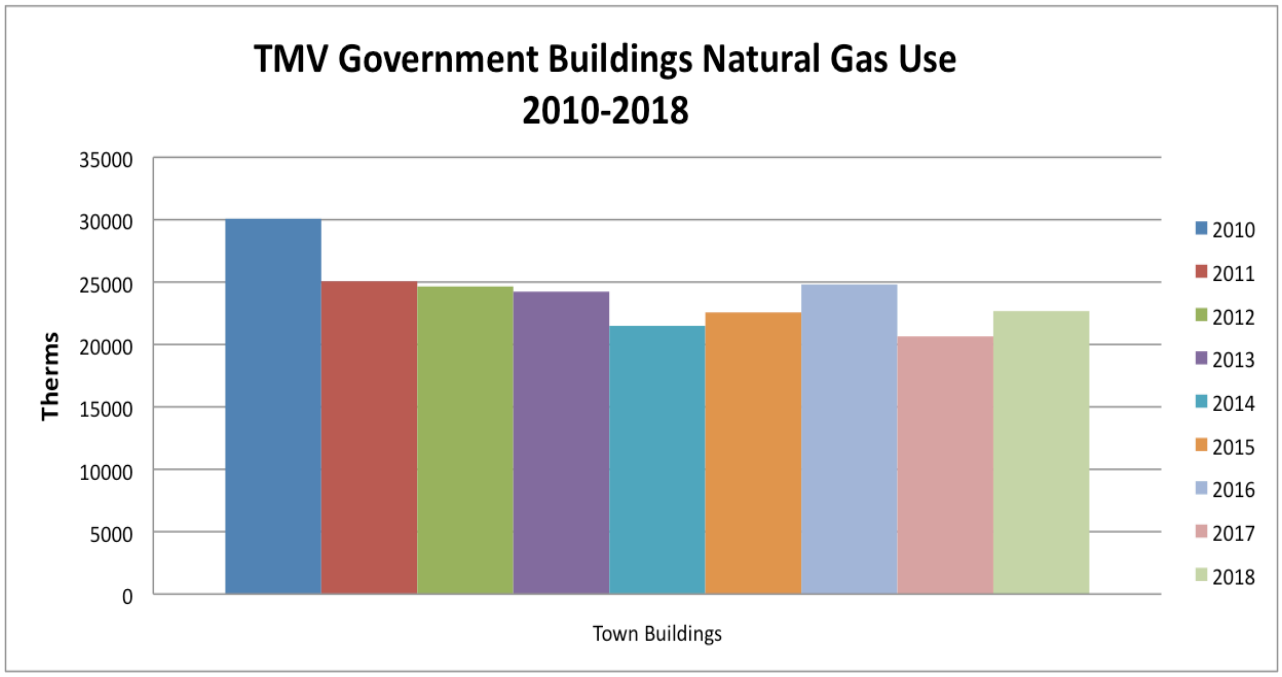

TMV Government Electricity Analysis (kWh)
9,000,000
8,000,000
7,000,000
6,000,000
5,000,000
4,000,000
3,000,000
2,000,000
1,000,000
0
2010
2011
2012
2013
2014
2015
2016
2017
2018
On-Site Solar PV
SMPA Solar Farm
Gondola Green Blocks
Government Non-renewable

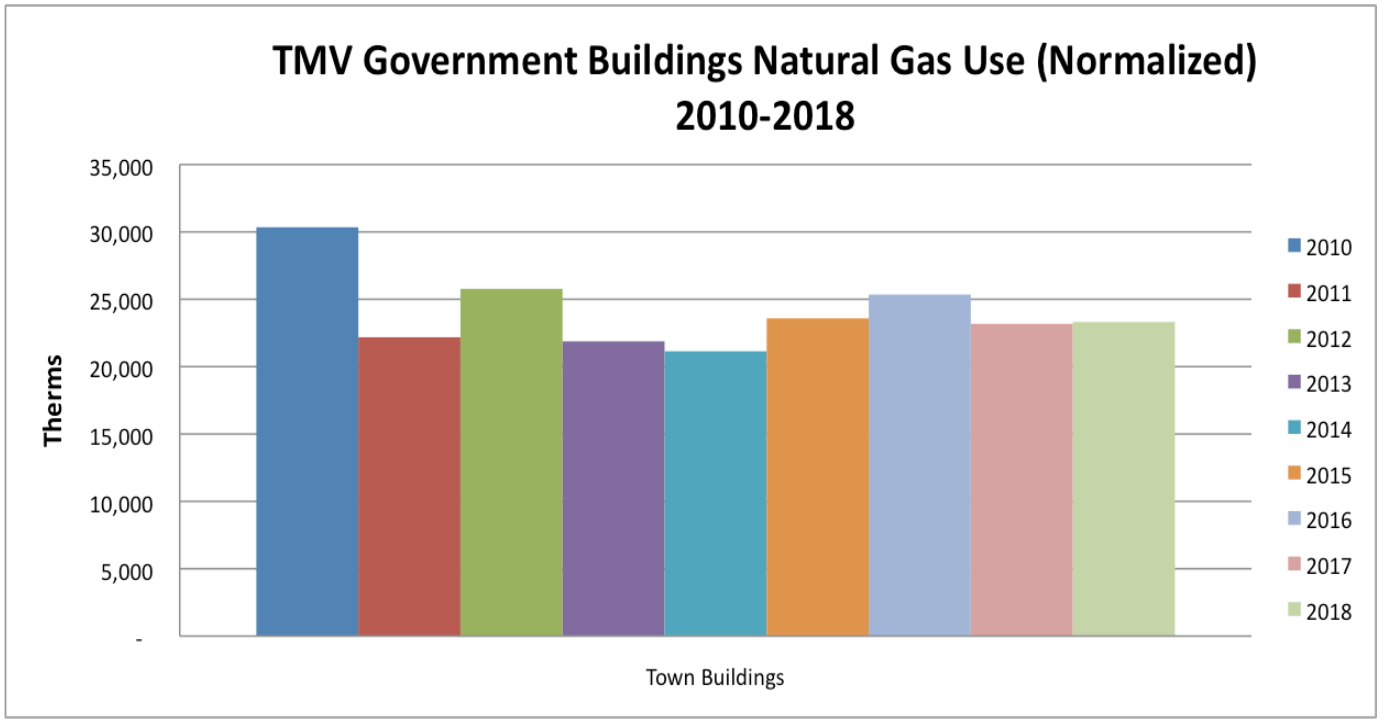

TOTAL TMV ELECTRICITY COST
2010-2018
$780,000
$760,000
$740,000
$720,000
$700,000
$680,000
$660,000
$640,000
$620,000
$600,000
$580,000
2010
2011
2012
2013
2014
2015
2016
2017
2018
TOTAL ENERGY COST (Includes accounts not show in the table)

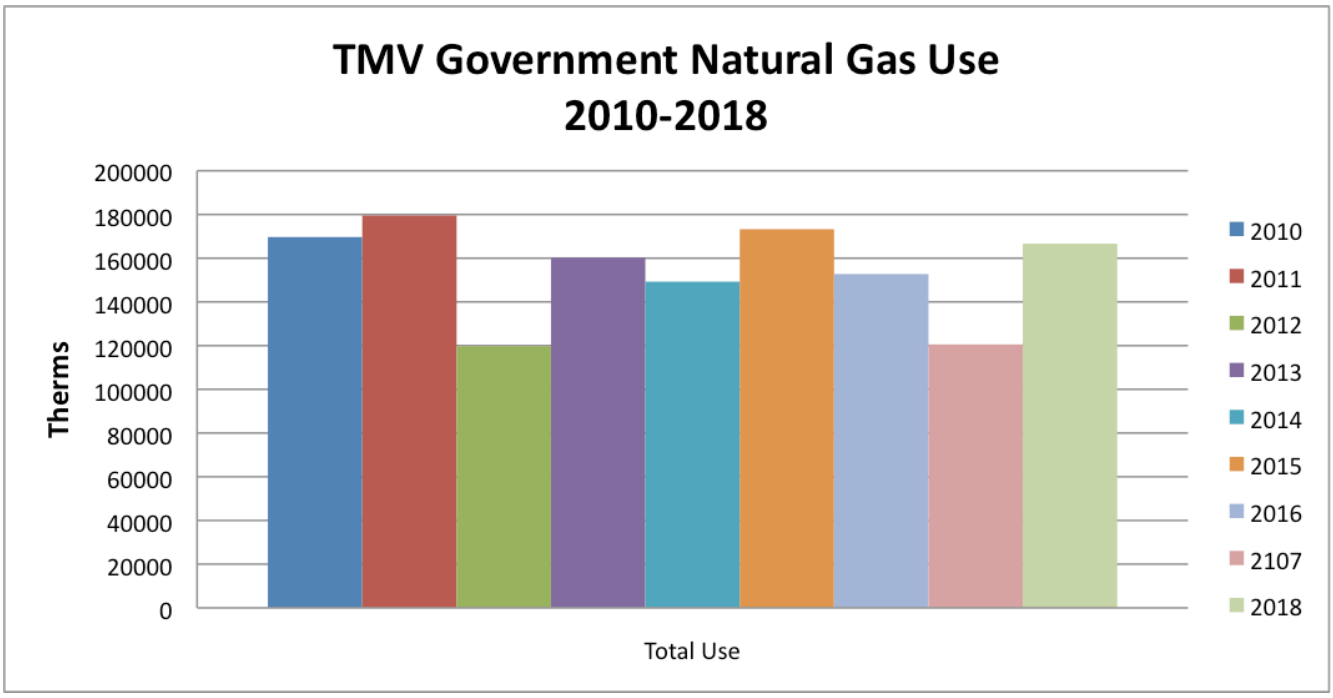

VCA Electricity Use 2010-2018
Kilowatt Hours
2,500,000
2,000,000
1,500,000
1,000,000
500,000
0
2010
2011
2012
2013
2014
2015
2016
2017
2018
TOTAL VCA ELECTRICITY USE

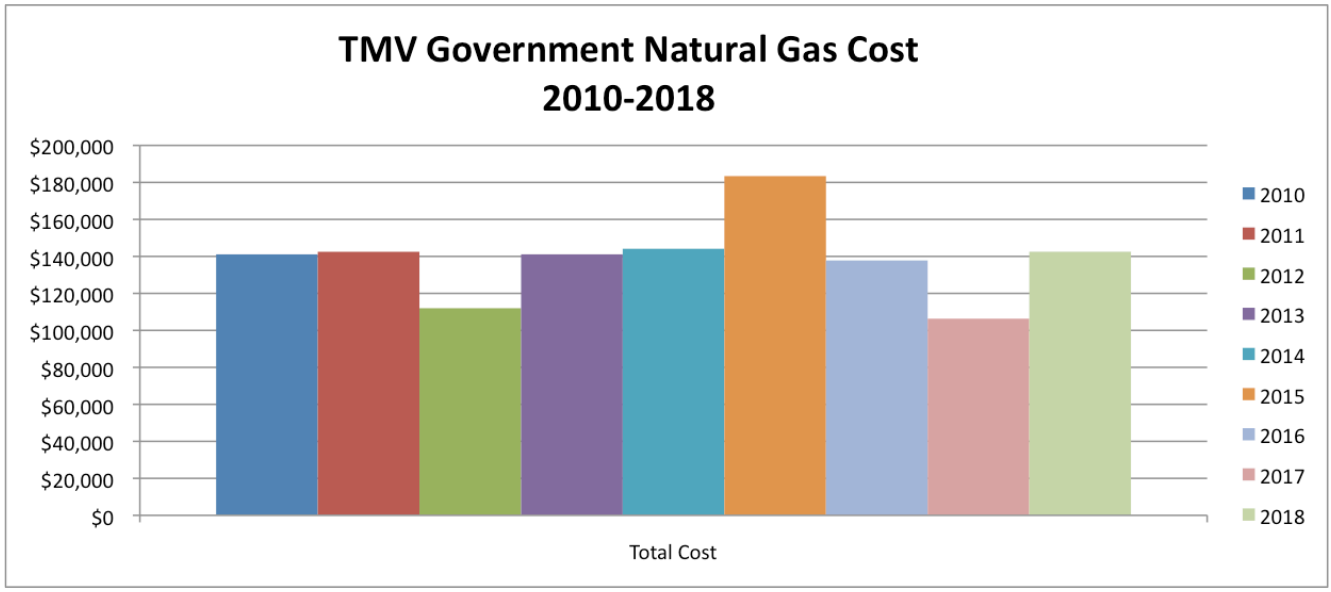

Plaza Snowmelt Natural Gas Use
2010-2018
Therms
180000
160000
140000
120000
100000
80000
60000
40000
20000
0
Plaza Snowmelt
2010
2011
2012
2013
2014
2015
2016
2017
2018

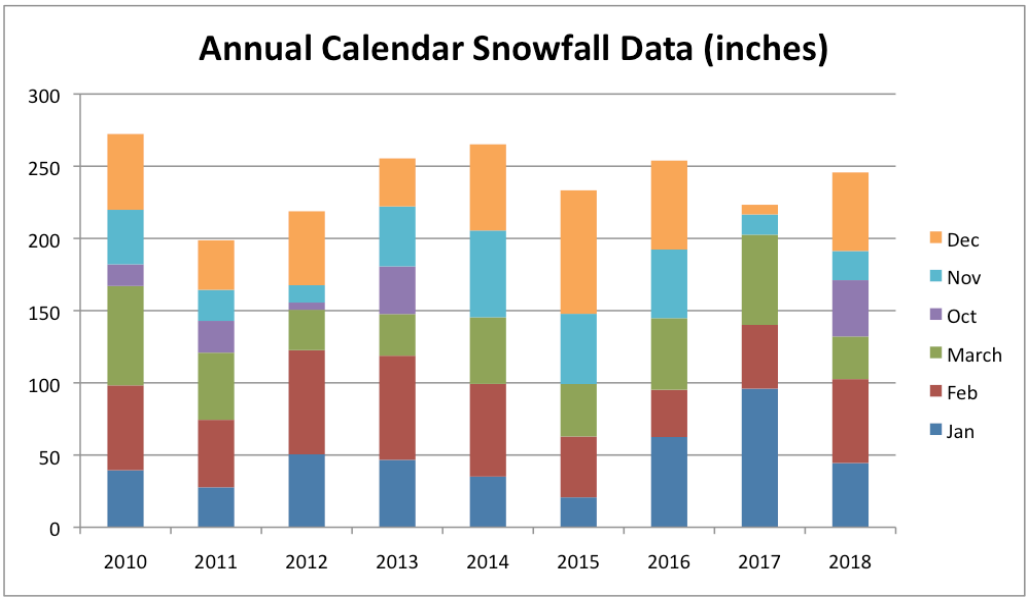

Heritage Crossing Plaza - Snowmelt System
Natural Gas Use (therms)
20000
18000
16000
14000
12000
10000
8000
6000
4000
2000
0
Jan
Feb
March
April
May
June
July
Aug
Sept
Oct
Nov
Dec
2015
2016
2017
2018

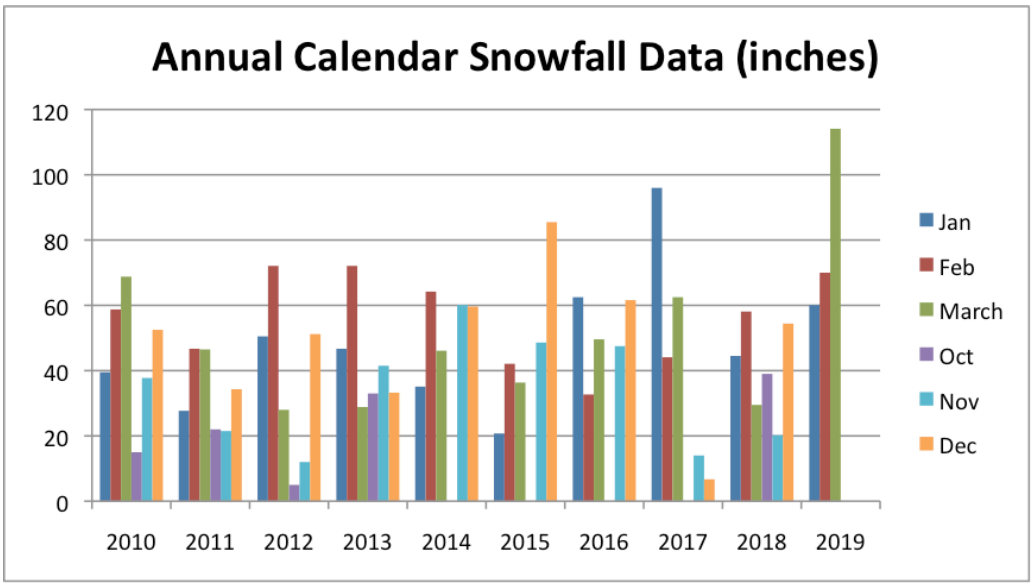

TMV Government Buildings Natural Gas Use
2010-2018
35000
30000
25000
20000
15000
10000
5000
0
Therms
Town Buildings
2010
2011
2012
2013
2014
2015
2016
2017
2018

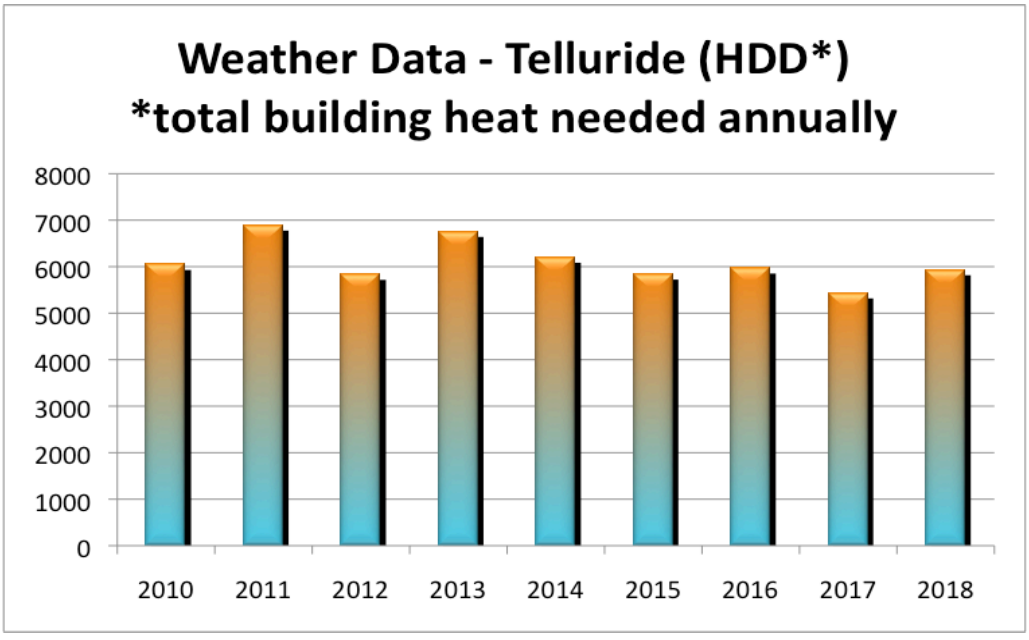

TMV Government Buildings Natural Gas Use (Normalized)
2010-2018
35,000
30,000
25,000
20,000
15,000
10,000
5,000
-
Therms
Town Buildings
2010
2011
2012
2013
2014
2015
2016
2017
2018

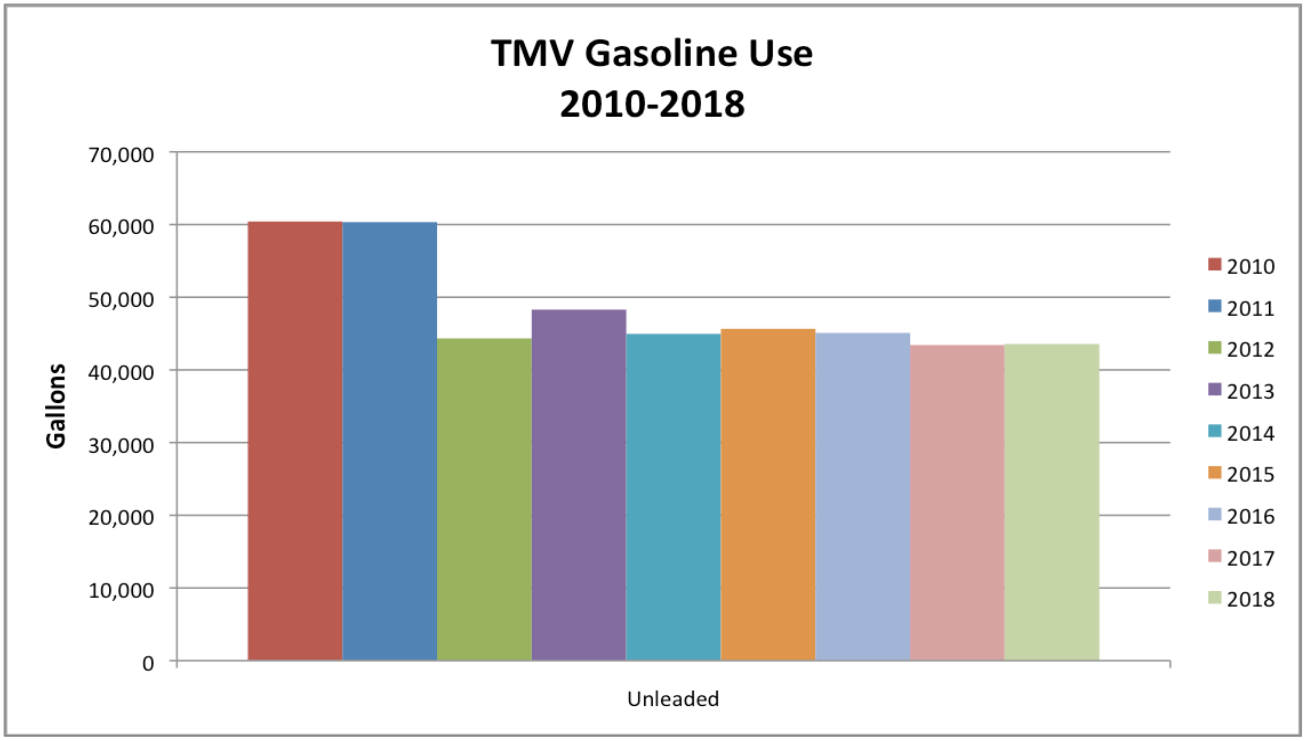

TMV Government Natural Gas Use
2010-2018
Therms
200000
180000
160000
140000
120000
100000
80000
60000
40000
20000
0
Total Use
2010
2011
2012
2013
2014
2015
2016
2107
2018

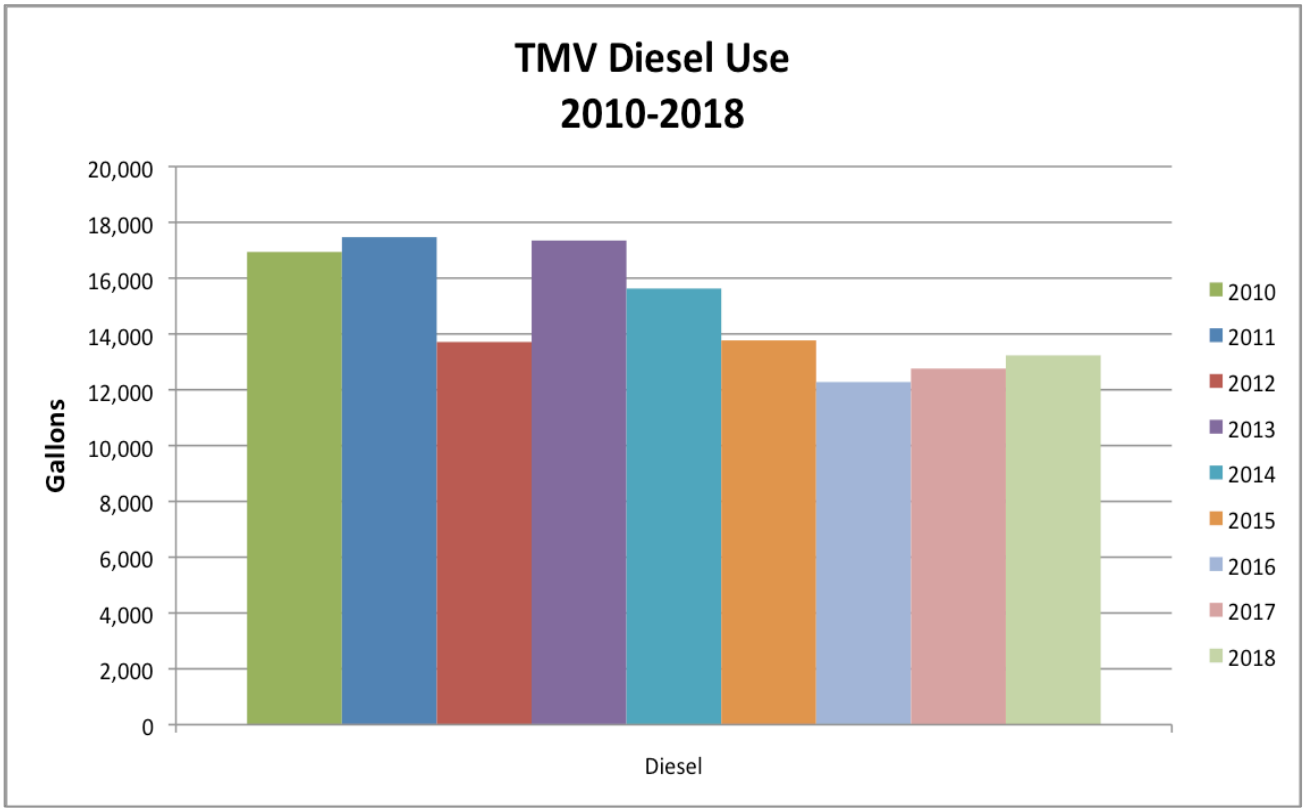

TMV Government Natural Gas Cost
2010-2018
$200,000
$180,000
$160,000
$140,000
$120,000
$100,000
$80,000
$60,000
$40,000
$20,000
$0
Total Cost
2010
2011
2012
2013
2014
2015
2016
2017
2018

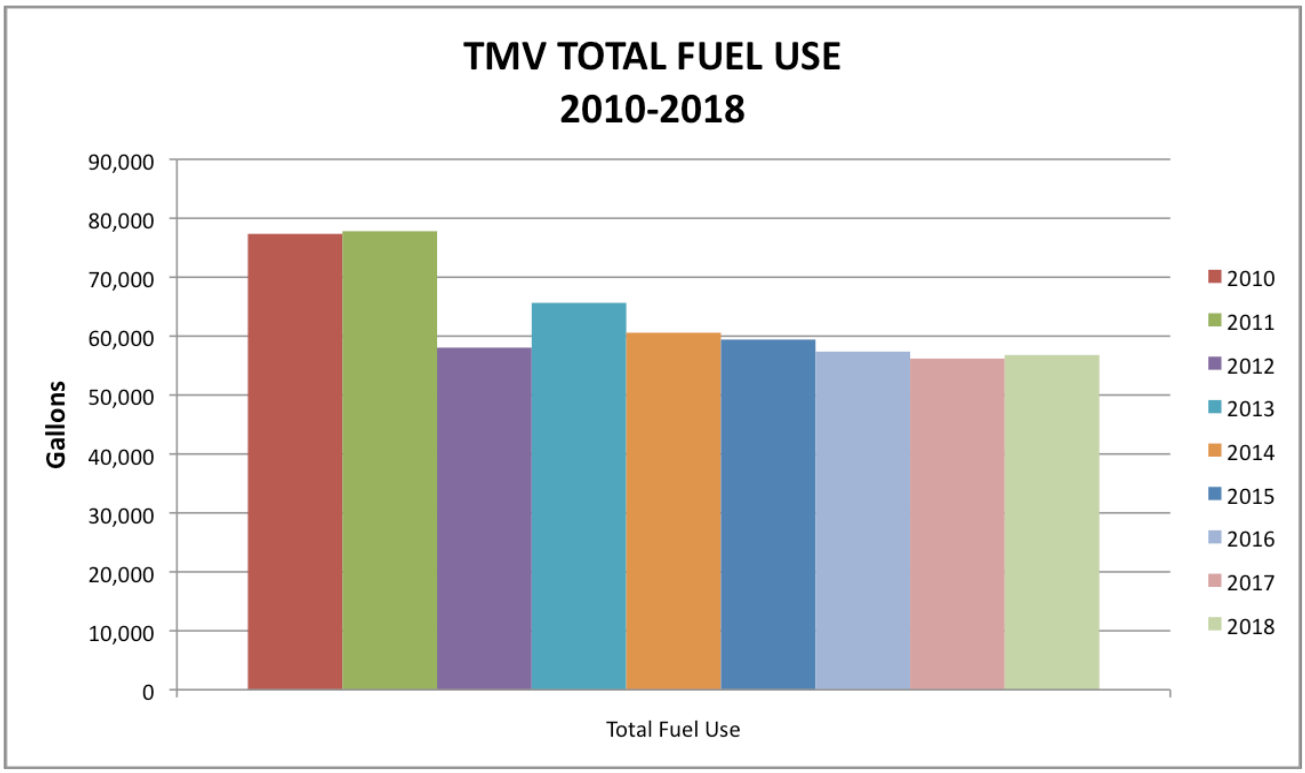

Annual Calendar Snowfall Data (inches)
300
250
200
150
100
50
0
2010
2011
2012
2013
2014
2015
2016
2017
2018
Dec
Nov
Oct
March
Feb
Jan

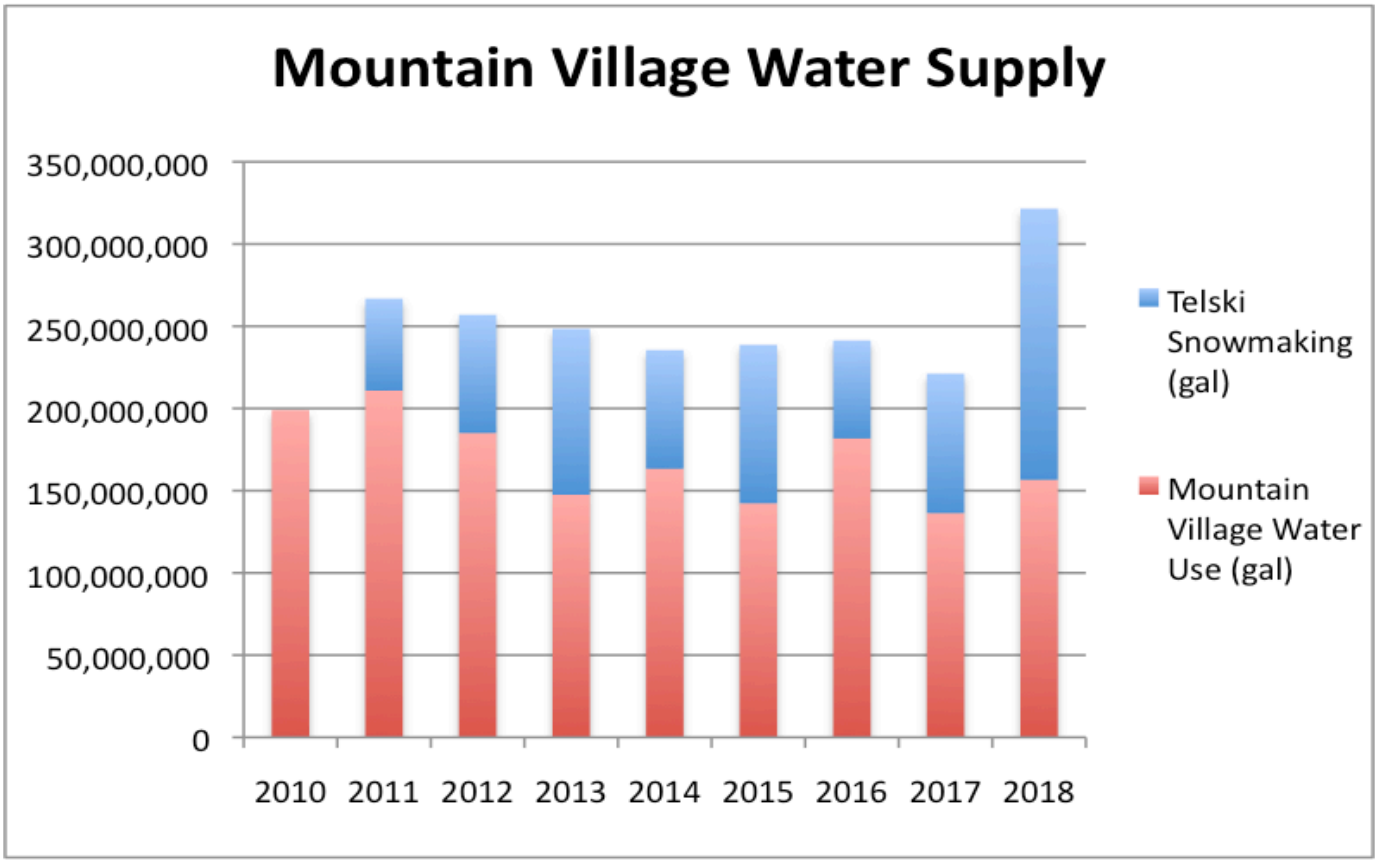

Annual Calendar Snowfall Data (inches)
120
100
80
60
40
20
0
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
Jan
Feb
March
Oct
Nov
Dec


Weather Data - Telluride (HDD*)
*total building heat needed annually
8000
7000
6000
5000
4000
3000
2000
1000
0
2010
2011
2012
2013
2014
2015
2016
2017
2018

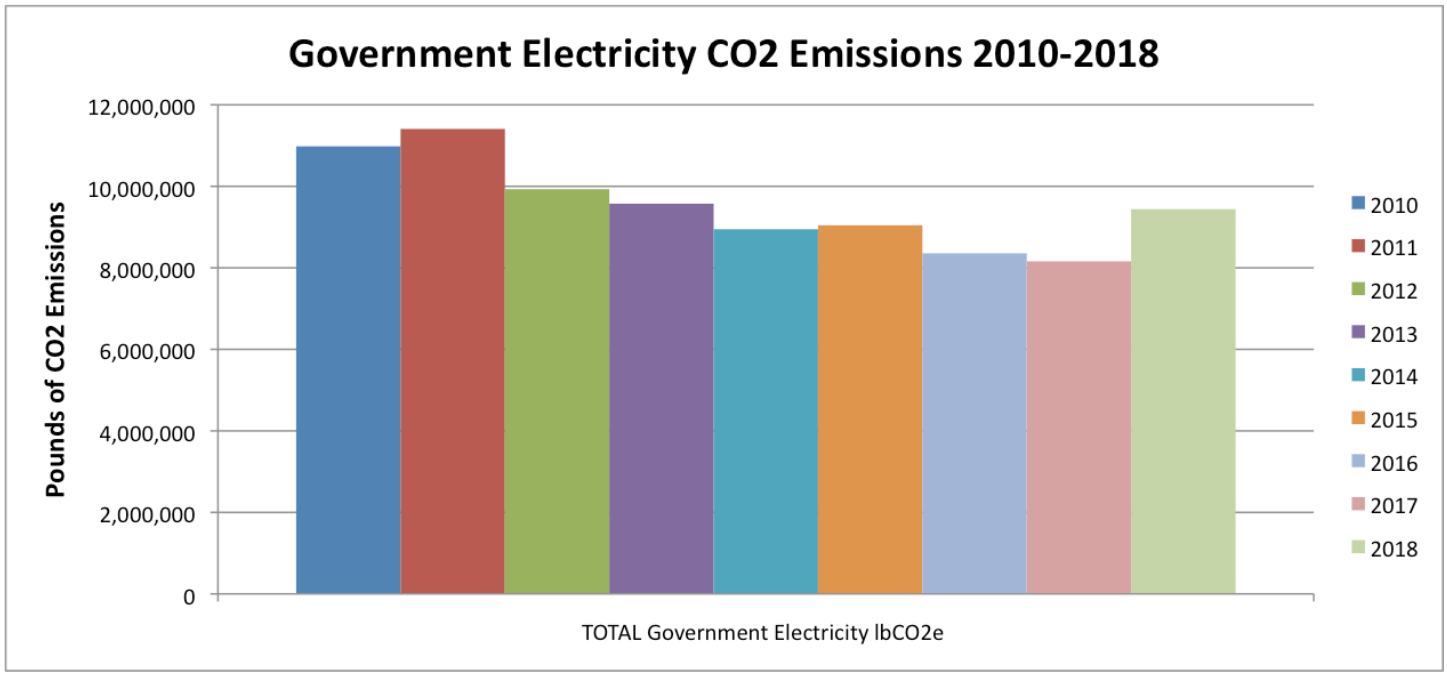

TMV Gasoline Use
2010-2018
70,000
60,000
50,000
40,000
30,000
20,000
10,000
0
Gallons
Unleaded
2010
2011
2012
2013
2014
2015
2016
2017
2018

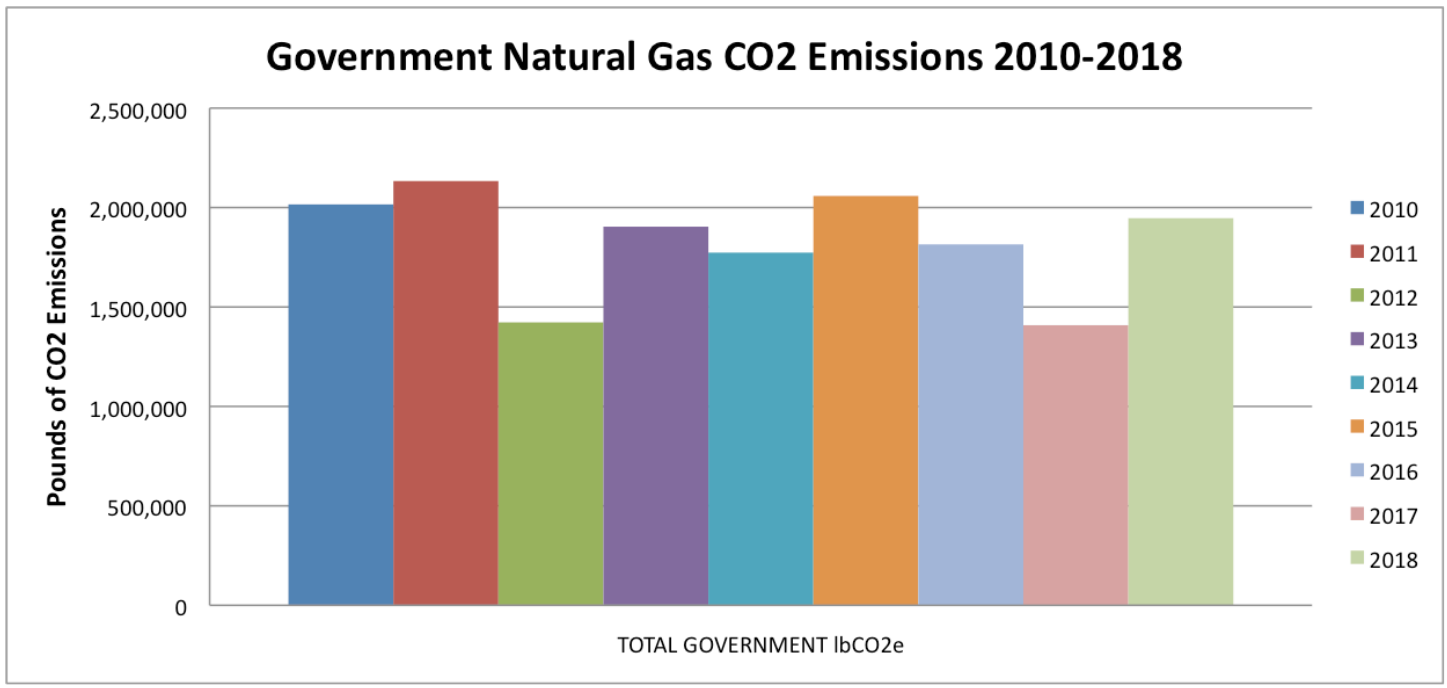

TMV Diesel Use
2010-2018
20,000
18,000
16,000
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
Gallons
Diesel
2010
2011
2012
2013
2014
2015
2016
2017
2018

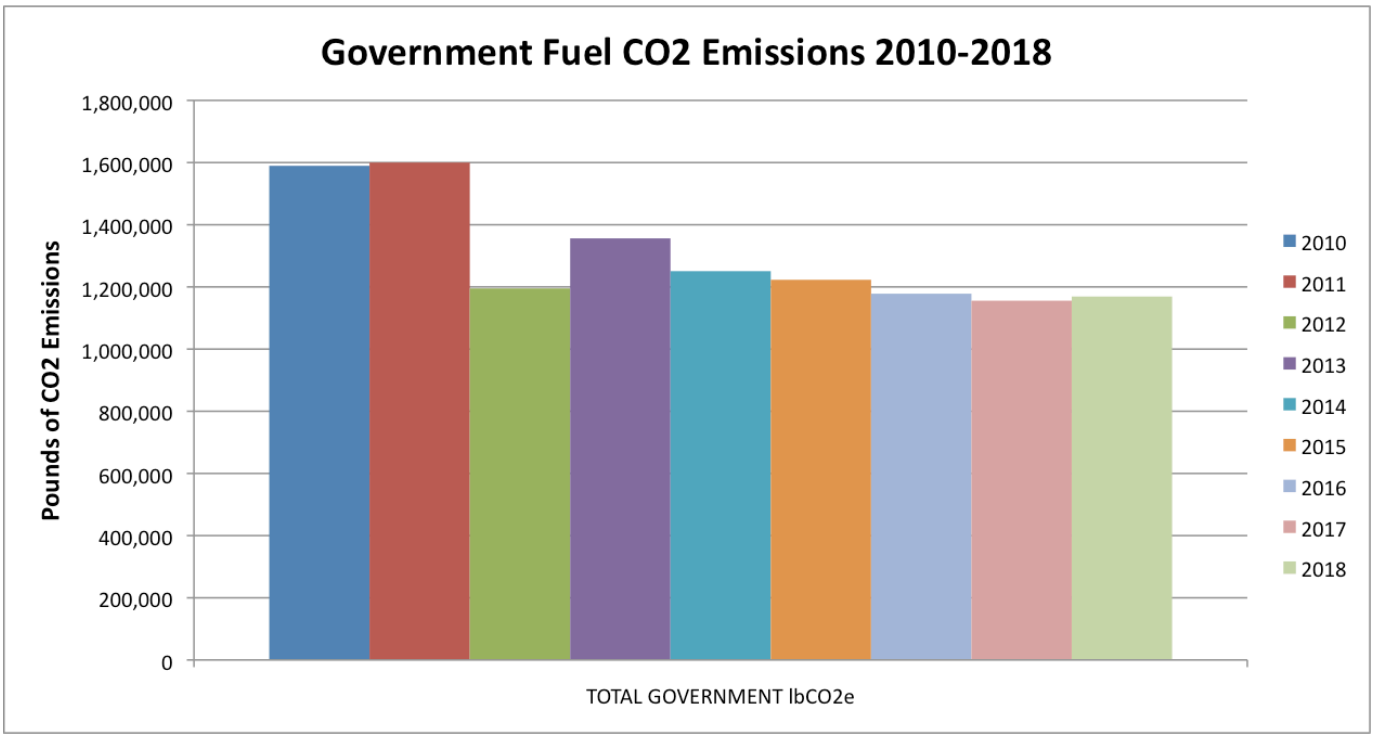


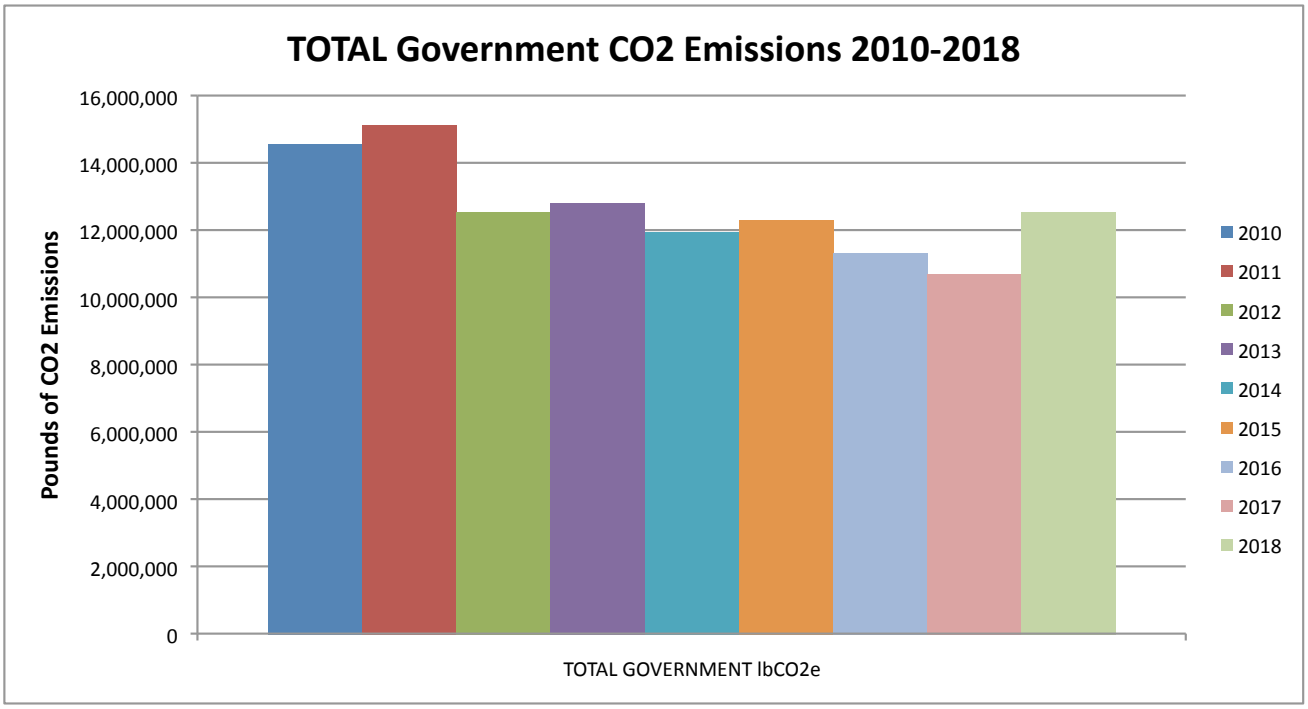


*2010 Snowmaking water data not available


Government Electricity CO2 Emissions 2010-2018
Pounds of CO2 Emissions
12,000,000
10,000,000
8,000,000
6,000,000
4,000,000
2,000,000
0
TOTAL Government Electricity lbCO2e
2010
2011
2012
2013
2014
2015
2016
2017
2018


Government Natural Gas CO2 Emissions 2010-2018
Pounds of CO2 Emissions
2,500,000
2,000,000
1,500,000
1,000,000
500,000
0
TOTAL GOVERNMENT lbCO2e
2010
2011
2012
2013
2014
2015
2016
2017
2018





Conversion Factors Used:

TriState (SMPA): 2.12 lb CO2e/kWh (pre-2012) 1.96 lbCO2d/kWh (2012) 1.93 lbCO2e/kWh (2013) 1.99 lbCO2e/kWh (2014) 1.871 lbCO2e/kWh (2015) 1.776 lbCO2e/kWh (2016) 1.595 lbCO2e/kWh (2017)

Black Hills Energy: 11.68 lbCO2e/therm **Source Gas (2010-2016):** 11.88 lbCO2e/therm

Gasoline: 20.02 lbCO2e/gallon (tail-pipe emissions only per governmnet GHG protocol)

Diesel: 22.44 lb CO2e/gallon (tail-pipe emissions only per governmnet GHG protocol)

The Compact of Mayors

Goals, Objectives and Commitments

The Compact of Mayors is an agreement by city networks – and then by their members – to undertake a transparent and supportive approach to reduce city-level emissions, to reduce vulnerability and to enhance resilience to climate change, in a consistent and complimentary manner to national level climate protection efforts.

The Compact of Mayors builds on the ongoing efforts of Mayors[1] that increasingly set ambitious, voluntary city climate commitments[2] or targets for greenhouse gas (GHG) emissions reduction and to address climate risk; report on progress towards achieving those targets by meeting robust, rigorous and consistent reporting standards (as established through City Networks); and make that information publically available by reporting through a recognized city platform[3].

The Compact of Mayors aims to:

- Enable recognition of new and existing[4] city-level commitments through the Compact by making annual reporting data on local climate action publically available;
- Establish robust and transparent data collection standards;
- Commit to common reporting processes for local climate action that allow for consistent and reliable assessment of progress towards meeting those targets;
- Create an evidence base of the greenhouse gas impact of city action to enable capital flows into cities to support city governments taking further action and to be held responsible for that action and the associated investments;
- Demonstrate the commitment of city governments to contribute positively towards more ambitious, transparent, and credible national climate targets by voluntarily agreeing to meet standards similar to those followed by national governments; and
- Encourage national governments to actively support additional city action by recognizing local commitments, establishing more enabling policy environments and directing resources to cities to limit any further increase in global warming and to appropriately resource both mitigation and adaptation local climate action.

[1] Senior elected representative of a city-level and/ or the City Council (if this is required for a commitment) that represent a city administration and may agree to such a commitment.
[2] Intended to align with relevant internationally recognized approaches.
[3] E.g. carbon*n* Cities Climate Registry, CDP Cities
[4] Recognize existing city-level commitments, e.g. , US Mayors Climate Protection Agreement (2005), the EU Covenant of Mayors (2008), Making Cities Resilient Campaign (2010), the Global Cities Covenant on Climate – the Mexico City Pact (2010), the Durban Adaptation Charter (2011) among others.

To show compliance with the Compact, Mayors will:

- Register "City Climate Commitments" (targets for GHG emissions reduction and plans to adapt to climate change);
- Report annually on progress towards achieving GHG emissions reduction targets and assessing climate hazards, using standards established through City Networks; and
- Disclose this information publicly by reporting through a recognized city platform.

Under this Compact, We, the leading global city networks, ICLEI-Local Governments for Sustainability (ICLEI), C40 Climate Leadership Group (C40), United Cities and Local Governments (UCLG) commit to mobilize our members, other cities, networks and initiatives, to engage in the following:

Target Setting

Establish a cooperation framework to collect and aggregate new and existing city commitments and climate data. Encourage cities to register:

- voluntary "City Climate Commitments" including GHG reduction targets as a compliment to internationally recognized approaches;" and
- local climate adaptation plans.

Reporting Standards

Adopt minimum, standard and transparent reporting as a way of measuring progress towards meeting "City Climate Commitments" that include mitigation and adaptation and measuring "compliance" with the Compact.

For mitigation, compliance means reporting that is:

- sufficiently robust and rigorous to allow for reliable sectoral-level reporting of GHG emissions;
- consistent with the Global Protocol on Community-scale GHG Emissions (GPC) as the new globally recognized standard for community scale emissions reporting[5]; and
- inclusive of activity data (also referred to as emission drivers) to allow for compliance monitoring without requiring third party verification or review.

For adaptation, compliance means reporting on:

- climate change adaptation commitments;
- plan(s) to reduce vulnerability or enhance resilience to climate change; and
- key relevant climate change stresses and shocks (hazards) the city is facing, based on an agreed risk framework.[6]

[5] The GPC 2.0 will be released at the COP 20 in Lima, as the new global accounting and reporting standard for city-level GHG emissions. This is a joint activity by the World Resources Institute, C40 and ICLEI, and is supported by a number of international organizations.

Reporting Platform

Allow for efficiency and ease of reporting for city officials as well as uptake by international governance processes and bodies and other third parties by:

- designating the carbon*n* Climate Registry as the common, publically available repository for Compact-related data; and
- enabling and supporting annual reporting by local governments against the Compact via existing city reporting platforms by creating automatic linkages to the carbon*n* Climate Registry as the single data repository to ease reporting burden for participating cities (i.e. reducing the need for reporting multiple times on different platforms) and to simplify data aggregation.

Compliance

- Define "Compact compliance" as registration of City Climate Commitments (mitigation targets and adaptation commitments), annual reporting of emission levels consistent with the GPC standard, and registration of climate adaptation plans and reporting on climate change stresses and shocks.
- Define "intent of Compact compliance" as registration of City Climate Commitments, with reporting of emissions at a level not yet consistent with the standards adopted[7].
- Recruit local governments to commit to the Compact and engage with other city networks to mobilize a substantial increase in the number of cities world-wide adopting GHG emission and risk reduction targets.
- Support capacity building in cities not yet able to meet Compact requirements, but having expressed interest in doing so.
- Assess compliance on an annual basis and in time for the Secretary General's Climate Summit and COPs 20 and 21, in Lima and Paris respectively.

Aggregation

Aggregate existing reported City GHG reduction targets to quantify impact of city commitments made to date.

Governance

- Establish a secretarial function for the Compact of Mayors – led by the three global city networks - to facilitate cooperation, exchange and expertise around the Compact of Mayors. This function will also outline technical support available to local governments to achieve Compact compliance.
- Identify and invite Compact Supporters to outline their offers of assistance and support to local governments, and coordinate the offers in an open, transparent manner.

[6] A common risk framework is to be jointly developed by the City Networks, building on existing frameworks, and in line with relevant international processes including sustainable development and disaster risk reduction.
[7] Intention to meet annual reporting requirements within 1 year of the initial Compact commitment indicates intent to comply.

Endorsing Partners

CDP
Cities Alliance
CityNet
Council of European Municipalities and Regions (CCRE / CEMR)
FLACMA (Latin American Federation of Cities, Municipalities and Municipal Associations)
ICLEI Africa
ICLEI East Asia
ICLEI Europe
ICLEI Latin America and Caribbean
ICLEI North America
ICLEI Oceania
ICLEI South Asia
ICLEI South East Asia
Institute for Sustainable Communities
Metropolis
R20 - Regions of Climate Action
The Climate Group
UCLG Africa
UCLG Asia Pacific (ASPAC)
UCLG Middle East and Asia (MEWA)
UN-Habitat
UN Secretary-General's Special Envoy for Cities and Climate Change
World Bank
World Resources Institute (WRI)
World Wildlife Fund

For More Information

C40 Cities Climate Leadership Group

www.c40.org / contact@c40.org

ICLEI – Local Governments for Sustainability

Bonn Center for Local Climate Action and Reporting – carbon*n* Center

www.iclei.org / www.carbonn.org / carbonn@iclei.org

United Cities and Local Governments

www.uclg.org / info@uclg.org

Proposal to Complete Town of Mountain Village's Corporate and Community Greenhouse Gas Emissions Inventory and Report

November 13, 2019

lotus
engineering & sustainability

COVER LETTER

Dear Members of the Town of Mountain Village Selection Committee,

On behalf of Lotus Engineering and Sustainability, LLC. (Lotus), I am pleased to submit the enclosed response to the Request for Proposals (RFP): Complete Town of Mountain Village's Corporate and Community Greenhouse Gas Emissions Inventory and Report.

Lotus is a women-owned, data-driven, and client-centered boutique engineering and sustainability consulting firm. Since 2012, we have delivered sustainability solutions for public and private sector clients throughout the United States, with an emphasis on Colorado and the Rocky Mountain region. Collectively we have worked with over 50 government entities in the state of Colorado. We love working with mountain communities, and we understand their unique perspective. With an office in Crested Butte, we see the impacts that come with growth, tourism, and recreation. We understand that there is a unique challenge to preserve this beautiful alcove of our state.

We combine the pragmatic approaches of engineering and finance with the innovative approaches of sustainability. While the reduction in carbon emissions may be the end goal, we realize that community buy-in is not possible without the integration of community values. We excel at helping clients look at their environmental initiatives through various social and economic lenses.

We bring unparalleled expertise in greenhouse gas (GHG) emissions. In recent years, we have completed more GPC-compliant (the standard followed by the Compact of Mayors) GHG emission inventories than most any other consulting firm in Colorado. We use GHG inventories as a way to inform subsequent mitigation work, and we have led the development of half a dozen climate action plans in Colorado. Most recently and relevant to this work, we have completed GHG inventories for the City of Aspen, Routt County, Summit County, and Park City, UT. We have also lead Denver's 80 x 50 climate mitigation work, which is becoming one of the gold standards of climate action plans, and we developed Summit County's first-ever climate action plan (which was just adopted by all cities within Summit County).

We know that for climate strategies to elicit powerful policy improvements and changes to the status quo (i.e. make the difference that we seek) they must be grounded in reality, supported with defensible numbers, and be presented to the community in a graphics-rich and accessible format. It is our priority to deliver accurate, transparent, beautiful, and defensible work products to help the Town of Mountain Village achieve its goals, thereby building accountability and eventual success.

We are not just a consulting firm. We are a small, dedicated team that loves our work and would love doing this work with you. This energy is present in our approach, commitment, and deliverables.

We would be honored to work with the Town of Mountain Village.

Emily Artale
Principal Engineer and Co-Owner
Lotus Engineering and Sustainability
A: 1627 Vine St, Denver CO 80206
E: emily@lotussustainability.com
P: 303.709.9948

TABLE OF CONTENTS

Photo from Dominik Lange / Unsplash

Cover Photo from Town of Mountain Village Facebook Page

Introduction

We understand the Town of Mountain Village's (Town) goals are to pass a resolution committing the Town to the Global Covenant of Mayors (previously known as Compact of Mayors), including: 1) creating a greenhouse gas (GHG) emissions inventory, 2) setting an emissions reduction target, and 3) developing a climate action plan.

Our team knows how important this work is and how important it is that it is done well. Our expertise is built off real "feet on the street" experience. We have managed and administered sustainability programs and projects for the public sector as both consultants and employees, and we thrive at aligning the constraints and opportunities to produce an efficient and strategic configuration.

We know that strong, reliable GHG emissions inventories are essential for evaluating mitigation programs and policies, assessing the effectiveness and attainment of policies and measures, and making long-term, ambitious emission reduction commitments. Most recently, and relevant to this work, Lotus developed Summit County's first climate action plan and strategy and led the City and County of Denver's 80x50 Climate Action Plan stakeholder process.

We see ourselves as an extension of our clients' staff and help develop climate action plans that not only direct the community toward a more sustainable and vibrant future, but also engage community leadership, municipal staff, disenfranchised and frontline communities, and the community's network of stakeholders.

Organizational Structure

WHO WE ARE

Lotus is a women-owned, data-driven, client-centered boutique sustainability consulting firm located in Denver and Crested Butte, Colorado.

We make sustainability easier and more transparent by listening to and understanding our clients' needs by providing data, tools, and analysis to help them make informed decisions that move the needle. Our approach focuses on working with credible, organized information and facilitating a thoughtful process to develop strategies that will work best in the community. Given the need for communities to continually adjust their climate plans going forward, we strive to ensure that a community has greater skills and capacity to do this work upon completion of our time with them.

Lotus' small size allows us to be nimble and agile. We can make project decisions quickly, without getting additional approval. The consultants we present to you in this proposal are the people who will be working on your project, creating a streamlined and efficient process. We are detailed-oriented and highly organized to ensure that the right steps are taken in the right order and the end goals are achieved in an effective and efficient manner.

While our GHG emissions accounting and climate action and adaptation planning expertise is a great fit for this project, we believe our love of this work is just as important and it is what drives us every day.

COMPANY HISTORY

Lotus has been in business since 2012, building off each team member's previous positions in energy engineering, consulting, and government programs. Lotus supports public and

private sector clients with sustainability initiatives, climate action and adaptation plans, GHG emission accounting, program design and management, and market/regulatory analyses. Our broad knowledge base is complemented by our ability to communicate and address environmental, sustainability, and regulatory policy issues to a variety of stakeholders, whose interests and motivations might range from hedging risk, minimizing environmental impact, cost reduction, or public relations, among others.

We are a Denver certified women-owned business, emerging business enterprise, small business enterprise, and disadvantaged business enterprise.

MANAGEMENT STRUCTURE

Lotus is managed by two Principals who share 50/50 ownership of the company: Emily Artale; PE, CEM, and LEED AP, and Hillary Dobos; MBA. Two additional members of the team include Julia Ferguson; MURP, PMP, and our Associate, Rachel Meier; MENV. Both Julia and Rachel assist with all projects. We have two offices: one located in Denver and the other located in Crested Butte, CO.

The primary contact for this project would be:

Emily Artale
Principal Engineer and Co-Owner
Mailing Address: 1627 Vine Street, Denver, Colorado 80205
Mobile: 303.709.9948
Email: emily@lotussustainability.com

Emily lives and works in Crested Butte, CO and can make roundtrip visits to Mountain Village within one day without incurring additional travel expenses, unless requested.

KEY PERSONNEL

Our senior-level team brings exceptional expertise. Individual resumes are provided in *Appendix A*.

Emily Artale, Principal Engineer and Co-Owner of Lotus will ***lead the project, and provide research, analysis, and writing support to the project*****.** As a professional engineer and program manager, Emily develops, facilitates, and implements programs that help solve energy efficiency and sustainability challenges. Emily has worked with public-sector clients to develop GHG emission inventories and analyze the reduction potential of GHG reduction strategies. Emily has led our GHG emissions inventory work for the Cities of Park City (UT), Denver (CO), Lakewood (CO), Westminster (CO), Longmont (CO), and Boulder (CO). She has performed GHG forecasting and GHG modeling for Cities of Denver (CO), Lakewood (CO), Westminster (CO), Longmont (CO), and the Counties of Summit (CO) and Boulder (CO). She has also led or participated in every CAP developed by Lotus. Emily is known for her critical thinking, technical review, data analysis, communications, and public speaking. Emily received her B.S and M.S. degrees in civil/environmental engineering from the University of Colorado at Boulder.

Emily is currently wrapping up GHG inventories for the City and County of Denver, Grand Canyon Trust, and Las Cruces, NM. She is providing GHG forecasting and modeling support on a variety of projects and will only be leading a couple of projects starting late 2019 and into early 2020. She will have availability to lead the GHG accounting and climate action planning for the Town of Mountain Village.

Hillary Dobos, Principal and Co-Owner of Lotus will ***provide project support and will be a task lead*****.** Hillary is known for her GHG accounting; project and program management; market and regulatory/policy creation and analysis; facilitation; communications (internal and external); and report writing. Hillary managed the Boulder County, CO, Summit County, CO, and Denver 80x50 projects, as well as supported or led efforts with City of Boulder (CO), Park City (UT), and the City of Lafayette (CO). The majority of these projects included forecasting GHG emissions as well as calculating them. Also, she has led private sector GHG work with clients ranging from local banks to Fortune 100 companies. Hillary also completed the first Colorado State Government GHG inventory and led the Colorado Carbon Fund – the first statewide voluntary carbon offset fund - which calculated emission for companies, individuals, and air travel. Hillary has served on various local and national boards focused on conservation, energy efficiency, C-PACE, and renewable energy. Hillary earned her B.A. in Art History and Economics from Bowdoin College and her MBA from the University of Colorado-Boulder.

Julia Ferguson, Lotus Senior Associate, will ***provide research, analysis, and writing support to the project*****.** Julia has worked on numerous GHG emissions inventories with Lotus including for Boulder County and the Cities of Boulder (CO), Longmont (CO), and Lafayette (CO) and Adams 12 Five Star Schools. She is a certified Project Management Professional and has worked extensively in the public and non-profit sectors where she has developed skills in proposal writing, marketing, project management, program design, and data analysis. She earned her Master's in Urban Planning with a focus on sustainable planning at Cleveland State University and her B.S. in Political Science at the University of Cincinnati.

Rachel Meier, Lotus Research Associate, will ***provide research support and GIS and data visualization work*****.** During her time with Lotus, Rachel has supported the completion of five GHG emissions inventories and forecasts. Additionally, she has helped create inventory management plans, GHG emission reduction strategy tables, and GHG emission inventory reports. Prior to joining Lotus, she supported sustainability and conservation efforts in the non-profit sector in her last two years of professional experience. Rachel earned a Masters of the Environment (MENV) in Planning and Community Engagement from the University of Colorado at Boulder and a B.A. in Environmental Studies and Geography from Gustavus Adolphus College.

Please see *Table 1* for a list of projects each staff member has worked on.

Qualifications

OVERARCHING GHG EXPERIENCE

We appreciate and understand the complexity of implementing sustainability programs across an entire community, which affect homeowners, visitors, employees, schools, religious institutions, and businesses. Sustainability covers a breadth of subtopics that can be a challenge to get ones' arms around, and available data and best practices are constantly changing. We have been doing this work for a long time, with deep roots in Colorado's sustainability field. We know how to do this work, and we also know what might change and how to build in flexibility.

We understand the primary (and secondary) barriers and challenges to collecting accurate GHG accounting data, creating a meaningful GHG emissions inventory, forecasting GHG

emissions, engaging stakeholders, and creating climate mitigation plans. Our broad expertise enables us to ensure that the Town meets their GHG accounting goals and mitigation targets.

Following are a few highlights of the expertise we bring to Mountain Village.

GHG ACCOUNTING, FORECASTING, AND MODELING

Lotus has extensive experience developing and implementing sustainability plans and programs both as consultants and as government employees working in the public sector. We have completed numerous municipal, corporate, and GPC-compliant community GHG inventories, and we have revised and reviewed additional GHG inventories to align with the GPC methodology. Several of these were performed for communities similar to Mountain Village, including the City of Aspen, Routt County, Summit County, and Park City, UT. Alongside our GHG work, we provide documentation, inventory management plans, and training to ensure that our clients can track their data moving forward without the help of consultants. Through research and reporting, communications, GHG modeling, and stakeholder engagement, we help communities identify what they need to do to plan for, mitigate, and adapt to climate change impacts. In return, we have a wealth of lessons learned on the best ways to set clients up for success. See below for a list of local government focused GHG emissions inventories and GHG emissions forecasts Lotus has completed.

For an expanded description of the projects in **bold**, see the *Project Examples* section. *Please note, the information provided in this table is proprietary and confidential and may not be distributed.*

Table 1. List of recent GHG accounting, forecasting, and CAP projects.

Date	Project Name/ Owner	Location	Budget	Scope of Work				Involved Staff
				GHG Inventory*	GHG Training	Forecasting	GHG Reduction Targets	
2018	Adams 12 School District	Adams County, CO	$17,500	X		X		Julia, Emily
2016-2019	Alpine Bank	Various	$3,000 annually	X				Hillary, Julia, Emily
2017-2018	Boulder County	Boulder County, CO	$52,000	X	X	X	X	Hillary, Julia, Emily
2018	City of Aspen	Aspen, CO	$18,000	X		X		Hillary, Julia,
2016-Present	City of Boulder	Boulder, CO	$9,965 - $12,847	X				Hillary, Julia, Emily

Date	Project Name/ Owner	Location	Budget	Scope of Work				Involved Staff
				GHG Inventory*	GHG Training	Forecasting	GHG Reduction Targets	
2019	City and County of Denver	Denver, CO	$7,625	X				Emily, Julia
2017	**City and County of Denver 80x50**	Denver, CO	$100,000			X	X	Hillary, Emily
2018	City of Lafayette	Lafayette, CO	$5,000	X				Julia, Hillary
2016, 2019	City of Lakewood	Lakewood, CO	$8,245	X	X		X	Emily, Hillary, Julia
2019	City of Las Cruces	Las Cruces, NM	$34,515	X	X		X	Emily, Julia, Rachel
2017	City of Longmont	Longmont, CO	$29,298	X	X	X	X	Emily, Hillary
2017	City of Park City	Park City, UT	$15,255	X	X			Emily, Hillary
2018	City of Westminster	Westminster, CO	$44,990	X	X	X	X	Emily, Julia
2016 - 2017	CLEER	Roaring Fork Valley	Various	X				Hillary, Emily
2016 - 2019	Eco-products	Various	$2.500 annually	X				Hillary, Julia, Emily
2019	Grand Canyon Trust	Colorado Plateau	$88,000	X	X	X		Hillary, Julia, Emily, Rachel
2019	Holy Cross Energy	Various	$39,000	X	X	X		Hillary, Julia, Emily, Rachel
2019	Routt County	Routt County, CO	$25,000	X	X	X		Hillary, Julia, Emily, Rachel
2018	**Summit County**	Summit County, CO	$62,000	X	X	X	X	Hillary, Julia, Emily

*Includes clients for which we revised and/or updated existing GHG inventories. We have also conducted multiple inventories for several clients, including Boulder, Denver, Lakewood, and Westminster. Multiple inventories may have been completed over various years and/or may include community and municipal inventories.

GHG Accounting

In recent years, we have completed more GPC-compliant (the standard followed by the Compact of Mayors) GHG emission inventories than most any other consulting firm in Colorado. We are fluent in GHG accounting.

Our specific qualifications include:

- We are ***experienced***. We have completed and evaluated over ***40 GHG emissions inventories*** for public and private sector clients using a range of protocols and methodologies.
- We have ***conducted QA/QC*** on a variety of data sets, including current and past GHG data, with a concentration on accuracy and transparency. This has led to the ***revision of several GHG inventories*** to meet current GPC requirements.
- We create a ***customized GHG emissions tracking tool*** that effectively supports your work.
- We are ***diligent about collecting accurate data***. We are well versed in data capture and tracking limitations, and we understand the barriers to creating a single, unified approach to GHG accounting. Through our expertise we can come up with ***creative, transparent approaches*** to collect accurate data. This will ensure that future GHG inventories will be able to be completed internally. In addition, when collecting data, we are ***highly organized*** and will have all questions for the entity prepared prior to outreach to ***ensure minimal repeated data requests***.
- ***We are detail oriented***. We methodically capture all communications from data contacts and document all data assumptions. This will help ensure that all work can be replicated.
- We ***are advisors and teachers***. We have created multiple ***inventory management plans*** (IMP) and can train our clients to ensure that they feel confident performing this work in-house in the future.

Climate Adaptation Planning

Lotus has been delivering climate action planning services since 2014, when we worked on the City of Lakewood's Sustainability Plan. We modeled the GHG reduction potentials for over 30 strategies as part of the Sustainability Plan. At that time, we also investigated using the modeling and forecasting sections of ICLEI's ClearPath. However, we opted to create a Lotus-customized modeling spreadsheet to enhance transparency and incorporate local data assumptions. While our model has been used with all our climate action planning services, it has evolved organically with each project, building on lessons learned and availability of new data. Since then, we have completed over half a dozen climate action planning for municipal clients with similar demographics as Mountain Village, such as Eagle County and Summit County.

Our specific qualifications include:

- We have extensive experience helping ***local leaders and residents*** grapple effectively with the reality that things are going to change in their community.
- We have ***projected emissions out to 2050*** while considering population growth (or decline), increased square footage, national policy, and a changing grid make-up. These models allow our clients to identify target sectors for policies and programs.
- We have helped ***clients set GHG emission reduction targets*** and, if that target is already set, identify strategies that will ultimately achieve those reductions.
- We have ***modeled the GHG emission reduction potential*** of various climate action strategies and compared those strategies against key community values. Also, we have ***estimated initial and ongoing costs and time commitments*** for programs and policies.
- We know how to help a community ***prioritize strategies*** based on the level of risk, the value of the affected system to the community, opportunities to take action, and available resources.
- We focus on helping communities take action by ensuring that ***robust implementation planning*** is part of the climate action plan.
- Two of our team members, Hillary Dobos and Julia Ferguson, ***managed sustainability programs*** while working in the public sector for the ***State of Colorado*** and ***Adams County, Colorado***, respectively. We know how programs work and how important it is to get ***internal buy-in*** from key staff across all departments and how to build on current and past initiatives such as the Town of Mountain Village's adopted CC4CA Policy, ZWAP, and other existing planning efforts in the community.
- When developing climate action plans, we encourage our clients to broaden the lens in which they view success and ***consider how their sustainability strategies need to benefit the entire community***. This often leads to discussions on larger policy changes and ensures larger community buy-in and acceptance.
- Sustainability communication is critical to success. We know that for this information to be effective, it must be understood by the public. We have a data visualization expert who can create ***meaningful graphics using Python, RStudio, and Adobe Illustrator***, in addition to GIS.
- We will ***compare the Town's actions with state-level climate action goals***, identify synergies and obstacles when they exist, and make recommendations as to how the Town can benefit from state commitments.
- We realize that there are different lenses with which to vet climate action strategies. We work with our clients to ***identify key community values that support the entire triple bottom line philosophy*** and use those to help prioritize which actions are most meaningful to the community (i.e., these may include social equity, air quality, cost to implement, etc.) in addition to those actions that will have the largest impact on reducing GHG emissions.
- Building partnerships is paramount to our advising services. We can help to ***foster existing relationships*** and also identify who may make a good partner for future endeavors.

Fluent in Sustainability Issues and Topics

- We have in-depth ***energy specific expertise***. The team's reputation is built off years of working with private and public-sector clients on renewable energy and energy efficiency initiatives. In addition, we have researched and directly worked on ***energy policy and regulations*** on a local (including Executive Orders, PUC regulations, legislation, and ordinances), state (i.e., RPS), and federal level (i.e., carbon taxes, CAFE Standards).
- The team has ***transportation specific expertise***, which spans alternative fuels from biofuels, renewable fuels, and electric vehicles.
- We have extensive experience completing ***waste and recycling projects***, including projects for improved facility and event waste diversion for government operations; supporting regional hazardous waste programs; sitting on the Governor-Appointed Pollution Prevention Advisory Board; and leading waste and recycling initiatives for the State of Colorado.
- We are forward-thinking and understand how difficult it can be to share this information with a non-technical and/or public audience. ***We work with our clients to brainstorm effective communication platforms in addition to traditional, formatted reports*** that may include websites, simplified handouts with data visualizations, informational videos, infographics, interactive PDFs, and other methods of storytelling.

Stakeholder and Community Outreach and Education

- Our team has ***demonstrated strength in stakeholder engagement and facilitation***. We understand the key role of a facilitator in generating feedback from participants, setting ground rules for civil and respectful discourse, and building consensus with multiple and diverse stakeholders.
- We excel at ***communicating*** technical data and reports to a broad, non-technical audience. We build on lessons learned from working with a range of clients to ensure that our work is framed in a way that the audience can relate to.
- We are committed to ensuring that the strategies developed in the Town's climate action plan are ***socially equitable*** and we know how to make that commitment real throughout the planning process.

PROJECT EXAMPLES AND REFERENCES

Below is a list of example recent projects completed by Lotus.

Note: The Lotus team is happy to provide additional project examples (if requested).

City and County of Denver's 80x50 Stakeholder Engagement and Plan

Overview of Work: The City and County of Denver's 80x50 Climate Action Plan establishes a path to reduce community wide GHG emissions by 80 percent by the year 2050. Lotus led the development of Denver's 80x50 Plan by conducting a review of processes and plans already established by the City; conducting a needs assessment; working with a diverse network of over 80 stakeholders and community experts in the fields of energy and transportation to identify the most relevant and impactful strategies for Denver to pursue; modeling the impacts of stakeholder-identified emissions reduction strategies; and drafting a Climate Action Plan that will support the City in achieving its goals. Denver's

80x50 Climate Action Plan can be accessed at https://www.denvergov.org/content/dam/denvergov/Portals/771/documents/EQ/80x50/DDPHE_80x50_ ClimateActionPlan.pdf.

Lotus additionally completed follow-up work for the City to model the impacts of additional strategies that the City is considering pursuing and is continuing to support Denver through annual GHG emissions inventories and a solid waste life-cycle analysis.

How the work has been used: The work is used every day within Denver's Department of Public Health and Environment. The team reports annually on how they are meeting the targets and strategies laid out in the plan. Also, they have created policies and codes to support the CAP. More information can be found here: https://www.denvergov.org/content/denvergov/en/environmental-health/environmental-quality/climate.html

Reference: Elizabeth Babcock, Manager Climate Action Team, City and County of Denver, 720-865-5385 | elizabeth.babcock@denvergov.org

Summit County, Colorado: Developing a GHG Emissions Inventory and Creating a Climate Action Plan

Overview of Work: Lotus completed Summit County's first GHG emission inventory and it was disaggregated by municipality. This analysis included carbon sequestration from forests. Alongside this work, we facilitated numerous stakeholder meetings over 6 months with key community stakeholders to create a CAP and forecasted emissions out to 2050. Once strategies were selected Lotus modeled key GHG reduction strategies to estimate GHG reduction potential and finalized the CAP.

How the work has been used: Many of the strategies and policies are being implemented in the community with each unique municipality signing on to 100 percent renewable energy pledges and several communities updating their codes. In April 2019, Summit County commissioners passed a resolution to adopt the CAP. More information can be found here: https://www.highcountryconservation.org/climate-action-plan/.

Reference: Jess Hoover, Energy Programs Manager, High Country Conservation Center, 970-668-5703 x 104 | jess@highcountryconservation.org

City of Longmont, Colorado: Developing the City of Longmont's 2016 Greenhouse Gas Inventory and Supporting Strategy Development

Overview of Work: The City of Longmont embarked on an aggressive journey to drastically cut GHG emissions. Lotus worked with the City to develop their first GHG emissions inventory and then modeled key GHG emission strategies, with an emphasis on considering equity issues. Lotus continues to work with the City today to update the model and consider additional strategies, such as building electrification.

How the work has been used: The City uses the GHG modeling and inventory to inform Council of high priority actions. Council used the work to justify additional spending on climate change issues and has recently allocated funds to develop roadmaps that will ensure engaging climate conversations with local stakeholders and community members.

Reference: Lisa Knoblauch, Sustainability Program Manager, 303-651-8403 | lisa.knoblauch@longmontcolorado.gov

Proposed Scope of Work

This effort will be a true partnership with the Town; we see our team as an extension of staff, bringing in specialized expertise and resources, while also providing a neutral face for the project.

The general tasks of the proposed project scope include:

- ✓ Task 1: Develop a 2018 Community-wide GPC-Compliant GHG emission inventory.
- ✓ Task 2: Develop a 2018 Corporate GHG emissions inventory.
- ✓ Task 3: Develop Inventory Management Plans.
- ✓ Task 4: Business-As-Usual GHG Emissions Forecast.
- ✓ Task 5: Create GHG Emission Reduction Targets.
- ✓ Task 6: Climate Action Plan.
- ✓ Optional tasks.
- ✓ Project Management.

Task 1: Develop a 2018 Community-wide GPC-Compliant GHG Emissions Inventory

The GPC protocol (the Global Protocol for Community-Scale Greenhouse Gas Emission Inventories) is the required protocol for Compact of Mayors reporting. Task 1 includes the creation of a 2018 BASIC[1] GPC-compliant GHG inventory for the Mountain Village community and accompanying documentation.

Specific subtasks include:

- Customize a Lotus-derived data management and emission calculation spreadsheet. Key aspects of this tool include a summary of data sources; emission factors; emission calculations; and emission summary.
  - Non-GPC emission sources, such as avoided emissions from recycling and renewable energy, will also be included as information-only items.
  - A tab will be included that provides benchmarks for comparable communities.
- Collect data from the existing GHG emissions inventory and from additional sources as needed. To save costs, Lotus will enlist help from the Town via a Google doc (or other shared document platform) to collect data. It is assumed that most data is available. All emails, spreadsheets, and supporting documentation will be provided to the Town.
- Conduct QA/QC review on collected data to ensure that it aligns with best practices and industry knowledge.
- Calculate emissions and complete the 2018 GPC-compliant inventory.
- Compare and contrast the 2018 GPC-compliant inventory with the existing inventory in a brief memorandum.

1 A GPC inventory can be implemented at two levels: BASIC and BASIC+. We budgeted for a BASIC inventory; a BASIC+ inventory can be completed with additional budget. See Optional tasks. A BASIC inventory accounts for all emission sources noted in the RFP.

- Review all findings with the Town.
- Calculate key metrics for future comparison including, but not limited to, emissions by sector, emissions by source, emissions per capita, energy use intensity by building sector, residential electricity and natural gas use per capita.

Deliverables:

- ✓ Project kickoff meeting.
- ✓ GHG inventory tool customized for community emissions.
- ✓ 2018 GPC-compliant GHG inventory with inputs and all accompanying data sources, including emails and original reports and spreadsheets.
- ✓ Brief memorandum comparing and contrasting 2018 GHG inventories.

Task 2: Develop a 2018 Corporate Emissions Inventory

There is no Compact of Mayors required protocol for corporate (i.e. municipal) GHG inventories. Lotus uses the Local Government Operations Protocol for municipal inventories. Task 2 includes the creation of a 2018 municipal GHG inventory for Mountain Village town operations and accompanying documentation.

Specific subtasks include:

- Customize a Lotus-derived data management and emission calculation spreadsheet. Key aspects of this tool include a summary of data sources; emission factors; emission calculations; and emission summary.
- Collect data from the existing GHG emissions inventory and from additional sources as needed. To save costs, Lotus will enlist help from the Town via a Google doc (or other shared document platform). It is assumed that most data are available. All emails, spreadsheets, and supporting documentation will be provided to the Town. Lotus will ensure that collected data aligns with data collection practices employed by neighboring municipalities.
- Conduct QA/QC review on collected data to ensure that it aligns with best practices and industry knowledge.
- Complete the 2018 inventory for municipal operations.
- Compare and contrast the 2018 GPC-compliant inventory with the existing inventory in a brief memorandum.
- Review all findings with the Town.
- Calculate key metrics for future comparison including, but not limited to, emissions by department (or comparable breakdown as provided by the Town), emissions by source, and emissions per city employee.

Deliverable(s):

- ✓ GHG inventory tool customized for municipal emissions.
- ✓ 2018 municipal GHG inventory with inputs and all accompanying data sources, including emails and original reports and spreadsheets.
- ✓ Brief memorandum comparing and contrasting 2018 GHG inventories.

Task 3: Develop Inventory Management Plans

Task 3 includes developing a manual (i.e. inventory management plan [IMP]) describing how to create future community and municipal inventories in-house. Using the spreadsheet tools in Tasks 1 and 2 along with the IMP, staff will be fully equipped to complete future inventories without consultant assistance.

Specific subtasks include:

- Prepare an IMP that explains how the inventory was created and any assumptions that were made, provides a guide for future data collection, and informs calculation methodology.
  - The IMP will also make recommendations on which data should be updated on a regular basis and which data can be updated on a less regular basis.
- We have an "open-door" policy. In the event that you have reasonable follow-up questions after the contract expires, Mountain Village is always invited to call us directly for clarification. More involved assistance will be charged at an hourly rate.

Deliverable(s):

- ✓ Inventory Management Plan.

Task 4: Business-As-Usual GHG Emissions Forecast

Task 4 includes modeling a business-as-usual (BAU) projection until 2050.

Specific subtasks include:

- Select baseline year in connection with recommendations from Colorado House Bill 19-1261, CC4CA Policy, and ZWAP. (The Compact protocol, GPC, does not provide any recommendations relating to forecasting or GHG emission reductions.)
- Assess impact of historic data prior to current GHG inventory year and data quality. We recommend including medium to high quality data (as determined by the team) and sources that makeup a significant portion of GHG emissions.
- Model BAU emissions from past until 2050 considering changes in population, emission factors, etc.
- Provide a numerical comparison of data from baseline year to present, including relevant tables, graphs and charts.

Deliverable(s):

- ✓ BAU model.

Task 5: Create GHG Emission Reduction Targets

Task 5 will include identifying a list of key GHG emission reduction strategies based on research, Lotus' previous work, and work completed by the City's peers.

It should be noted that to be near the proposed budget submitted by Zoe Dohnal in an email dated October 28, 2019 in response to RFP questions, we present a consultant-driven GHG emission reduction effort, where we present recommendations based

on previous work, experience, and research. Recommendations will be supplemented by additional research and feedback from Town staff and the Green Team Committee. However, an involved stakeholder engagement effort will exceed the budget constraints; additional stakeholder engagement is listed under "Optional Tasks" below. Stakeholder engagement efforts can vary greatly, and, if the Town chooses, Lotus can present different options for consideration.

Specific subtasks for identifying GHG emission reduction strategies include:

- Research existing and proposed Town and neighboring municipality GHG initiatives and strategies to look for potential synergies.
- Combine research with Lotus' extensive database of common GHG emission reduction strategies (based on other local government work, state energy office recommendations, and recommendations from national laboratories).
- Work with Town staff and the Green Team Committee to identify relevant community values with which to vet against the GHG reduction strategies.
- Work with Town staff and the Green Team Committee to identify appropriate GHG reduction targets per strategy based on recommendations from Colorado House Bill 19-1261, CC4CA Policy, ZWAP, and leading peers and other influential communities.
- Conduct a high-level modeling effort to determine GHG emission impacts on the chosen target year. Reduction potentials will be linked to the 2018 community-wide and municipal GHG inventories and will include the business-as-usual GHG emissions scenarios.
- Create a realistic GHG emission reduction goal based on final model results.

Deliverables:

- ✓ Proposed GHG reduction strategies.
- ✓ Matrix of proposed strategies against community values.
- ✓ Two virtual discussions with Town staff and Green Team committee to discuss community values and GHG reduction targets.
- ✓ Survey with Town staff and Green Team committee to achieve final buy-in.
- ✓ Final summary of GHG reduction strategies, compared against community values, with reduction targets.

Task 6: Climate Action Plan

Lotus will prepare a summary report that documents the work performed to date, key findings from the inventory, community outreach and engagement strategy, a list of the final climate action strategies and associated GHG emission reduction targets, and the next steps.

To ensure that the final reduction targets are adopted by Town Council and the community, Lotus will recommend how to engage key local and regional stakeholders to build accountability. This engagement and accountability will drive successful implementation of future sustainability strategies.

Specific subtasks include:

- Create a final Climate Action Plan. The plan will include a summary of all work completed; key findings from the community and municipal inventories; recommended GHG reduction strategies along with GHG reduction targets and a comparison against community values; implementation timeline; and information on emerging legislation, policies, and other relevant data that could impact the future of the Town's plan. An executive summary will be prepared to allow the Town to share a report synopsis with the community. It should be noted that some clients prefer an online, website-based plan. If the Town prefers this, we can work with the Town's IT department to provide key data. A more formal update may be pursued as well, see *Optional Tasks*.
- In addition, Lotus will provide a guide for the Town on how to solicit stakeholder and community feedback to ensure successful implementation of the plan.
- The plan will be written and formatted so that it is easily understood and received by the public with visuals and clear and concise writing. Initial content will be provided as a Word document for feedback. It is assumed that there will be one round of edits. After feedback is completed a final plan will then be developed in InDesign.
- Present the draft plan to the Green Team Committee and final plan to the Council. Lotus will make the drive back and forth to the Town in one day.

Deliverables:

- ✓ Summary report formatted in InDesign.
- ✓ Executive summary formatted in InDesign.
- ✓ Summary PowerPoint presentations for Green Team Committee and Council.

Optional Tasks

The budget we have provided does not include the following items. We believe that the addition of these activities may enhance the project outcomes, and we would be happy to discuss adding these to our scope of work if the Town desires.

- Conduct a BASIC+ GPC-compliant inventory.
- Provide in-person GHG inventory training.
- Conduct in-depth GHG reduction modeling.
- Lead stakeholder engagement including in-person facilitated meetings and online surveys.
- Lead public engagement including in-person meetings and in-person and online surveys.
- Create two- to three-minute videos to provide another way for community members and organizational stakeholders to learn more about climate change and engage in the climate action planning process.
- Update Town's website to include climate action plan data and/or supporting information, such as key data visualizations, instead of or in addition to the formatted report.

- Enter GHG emissions data into ICLEI's ClearPath.
- Prepare standalone graphic design and visuals for final report.

Project Management

Specific subtasks:

- Regular check-in emails.
- Monthly phone call with the Town.
- At least one phone call to discuss the GHG inventory tool for Task 1 and Task 2.
- At least one phone call to review the final findings for Task 1 and Task 2.
- Review assumptions included in Task 4.
- Monthly invoice reporting.

Deliverable:

- ✓ Monthly invoice reports.

PROJECT PLAN

We see our team as an extension of your staff, bringing in specialized expertise to accomplish the goals set out in the RFP. We will work with your team to identify data contacts. Where appropriate, we will look to your team to make introductions between Lotus and potential data sources and provide feedback on each deliverable and assumptions as necessary.

Project Schedule

Assuming a January start date, Lotus proposes completing this work by July 2020. The proposed timeline is presented below. Note Lotus is willing to work with your schedule.

TASK	January		February		March		April		May		June		July	
	1st Half	2nd Half	1st Half	2nd Half	1st Half	2nd Half	1st Half	2nd Half	1st Half	2nd Half	1st Half	2nd Half	1st Half	2nd Half
Task 1: Develop 2018 GPC-compliant GHG emissions inventory														
Task 2: Develop 2018 municipal GHG emissions inventory														
Task 3: Develop inventory management plans														
Task 4: Business-As-Usual GHG Emissions Forecast														
Task 5: Create GHG Emission Reduction Targets														
Task 6: Climate Action Plan														
Project Management														

Table 2. Proposed project timeline.

Project Budget

Following is our cost and fee proposal. All proposed services are included in the costs shown below, unless otherwise noted (see the preceding section titled *Optional Tasks*). We are very excited to work with the Town, and we want to design a project that meets your needs. We are happy to modify our approach to better fit within the Town's scope if needed.

TASK AND SUBTASK	Lotus Labor Hours					Graphic Design	Total Lotus Labor	Total Subconsultant Labor	Total Labor Costs	Mileage		Total Costs
	Emily		Hillary	Julia	Rachel					Mileage	Per Diem	
	Regular	Travel	Regular	Regular	Regular							
	$ 120	$ 60.00	$ 120	$ 98	$ 75	$ 70						
Task 1: Develop 2018 GPC-compliant GHG emissions inventory	15			15	30		60	0	$ 5,520.00		$ -	$ 5,520.00
Task 2: Develop 2018 municipal GHG emissions inventory	15			15	30		60	0	$ 5,520.00			$ 5,520.00
Task 3: Develop inventory management plans	7			10	18		35	0	$ 3,170.00		$ -	$ 3,170.00
Task 4: Business-As-Usual GHG Emissions Forecast	6		8	6			20	0	$ 2,268.00		$ -	$ 2,268.00
Task 5: Create GHG Emission Reduction Targets	28		5		15		48	0	$ 5,085.00		$ -	$ 5,085.00
Task 6: Climate Action Plan	15	6	3	10	30	30	94	30	$ 7,850.00	$ 341.28	$ 10.00	$ 8,201.28
Project Management	8						8	0	$ 960.00		$ -	$ 960.00
TOTAL	**94**	**6**	**16**	**56**	**123**	**30**	**325**	**30**	**$ 30,373.00**	**$ 341.28**	**$ 10.00**	**$ 30,724.28**

Table 3. Proposed project budget.

Part of our mission is to empower our clients to complete future projects in-house and use the work in their everyday jobs. Our deliverables are very transparent; we keep records of all emails, phone calls, and original data sets to leave a paper trail for the next iteration.

We also have an open-door policy if previous clients have questions months after the contract has ended, and we are happy to answer a reasonable amount of additional questions at no additional fee after the project is completed. If the client requires changes and/or enhancements to final work products, we will charge an hourly rate – no retainer needed.

Appendix A: Resumes

EMILY ARTALE

Lotus Founder, Co-Owner and Principal Engineer

lotus
engineering & sustainability

ENGINEER
ENTREPRENEUR
PROGRAM MANAGER
ACTION-ORIENTED LEADER

Emily brings nearly 15 years of experience combining technical and pragmatic engineering with holistic and innovative problem-solving to the sustainability field. Her expertise in development, management, and analysis has resulted in measurable cost and greenhouse gas savings for her clients.

EXPERIENCE

LOTUS ENGINEERING & SUSTAINABILITY, LLC.
Crested Butte, CO
Founder, Co-Owner and Principal Engineer, 2012–present
Founded sustainability consulting firm

- Advises clients on sustainability issues, having provided expertise to over 30 organizations.
- Leads climate action planning process.
- Leads clients to integrate environmental justice issues with all sustainability strategies.
- Develops robust decision-analysis tools and models for GHG accounting, GHG scenario forecasting and community solar analyses.
- Evaluates energy projects, including renewable energy projects for local municipalities.
- Completes GPC-compliant GHG emission inventories for public agencies.
- Leads occupant engagement behavior impact modeling efforts.
- Develops, manages climate mitigation effort for Las Cruces, New Mexico focused on highlighting community values.
- Led the Colorado Energy Office's Demonstration Project for Low-Income Solar.
- Led City and County of Denver's 80x50 facilitation and strategy development process.
- Developed, managed Gunnison's GV-HEAT program, an income-qualified energy efficiency rebate program.

TRIDENT ENERGY SERVICES, INC.
Longmont, CO
Engineer, 2009-2012

Launched energy efficiency programs. Spearheaded the Main Street Efficiency Initiative, leading 50 businesses in achieving an average annual energy savings of 15 percent. Co-developed the Energy Management Assistance Program, improving the energy efficiency of local governments and schools. Executed energy audits and utility bill analyses.

NATURAL CAPITALISM SOLUTIONS
Longmont, CO
Project Manager, 2008-2010

Advised clients on executing sustainable practices. Worked with businesses and governments to implement sustainable practices in the areas of agriculture, manufacturing and energy. Co-authored paper with Hunter Lovins for the United Nations on lifting Asian countries out of poverty using sustainable manufacturing.

EMILY ARTALE

SKILLS

Critical Thinking
Technical review
Communications
Data analysis
Public speaking

EDUCATION

University of Colorado at Boulder
M.S., Civil & Environmental Engineering, 2005
B.S., Environmental Engineering, 2002

CERTIFICATIONS

LEED AP
Professional Engineer
Certified Energy Manager

EXPERIENCE

BROWN AND CALDWELL
Golden, CO
Project Manager, 2006-2008

Analyzed technical environmental data. Performed permitting and compliance activities for Denver-Metro local governmental agencies. Assisted with greenhouse gas emission inventory verification for major airline. Developed Excel-based tools used to calculate water pollutant levels and air emission values. Assistant coordinator for watershed groups.

CAMERON-COLE, LLC.
Boulder, CO
Engineer, 2005-2006

Devised technical solutions for large clients. Managed Clean Water Act and related groundwater and storm water discharge permitting and compliance for large companies. Assisted in designing industrial wastewater treatment plant improvements. Performed greenhouse gas emission inventories for Fortune 500 companies.

GET IN TOUCH

www.lotussustainability.com
emily@lotussustainability.com
303.709.9948

INTERESTS

Mountain biking
Cooking
Snowboarding

HILLARY DOBOS
Lotus Co-Owner & Principal

lotus
engineering & sustainability

FACILITATOR
ENTREPRENEUR
CREATIVE LEADER / PROBLEM SOLVER
PROGRAM MANAGER

Hillary has managed programs and projects for the public and private sector for almost 15 years. Hillary is known for her management skills, meeting and stakeholder facilitation, market and regulatory/policy creation and analysis, and communications (internal and external), and project and program management.

EXPERIENCE

LOTUS ENGINEERING & SUSTAINABILITY, LLC.
Denver, CO
Co-Owner and Principal, 2012–present
Provides leadership support to Lotus team

- Advises clients on sustainability, providing support to over 25 organizations.
- Leads climate action planning with local governments.
- Guides companies and public sector entities in accounting for greenhouse gas emissions, setting reduction goals and prioritizing mitigation strategies.
- Coaches government sustainability teams in creating successful programs.
- Advises organizations in identifying sustainability priorities, setting goals and achieving objectives.
- Creates technical reports on market trends, policy, and finance.

COLORADO ENERGY OFFICE
Denver, CO
Senior Program Manager, Various Programs, 2010-2012
Energy Performance Contracting
Managed the award-winning EPC program. Directed program that secured investments in energy, water, and fleet efficiency upgrades and renewable energy. Led program in supporting $40 million in projects in 2012 and $60 million in 2013, securing Colorado's position as a top-five state for EPC investment. Educated contractors in the EPC process and ensured that they maintained the highest levels of quality. Advised Energy Service Companies, fostering a successful EPC community.

Greening Government
Led state government agencies in reducing resource use, thus saving state funds. Devised and implemented reductions in energy, water, paper, and petroleum use. Assisted in creating and executing State Environmental Preferable Purchasing Policy. Developed, implemented, funded, and assessed state sustainability programs and developed future reduction goals and metrics. Tracked, calculated, and reported water and energy use in 2000+ state buildings, petroleum use in the 6000+ vehicle fleet, and State Government's greenhouse gas footprint.

HILLARY DOBOS

BOARDS

New Energy Improvement District Board, 2019-present

Pollution Prevention Advisory Board
Governor Appointed, 2011-2019

The Nature Conservancy
Elected to Young Professional Board, 2012-2018

Colorado Carbon Fund Board of Directors
Member, 2012-2014

National Energy Service Coalition Board
Elected State Representative, 2012-2013

Colorado Energy Service Coalition Board
Elected Public Chair, 2012-2013

State of Colorado Greening Government Council
Director, 2011-2013

SKILLS

Project/program management

Report writing

Communications

Policy creation and analysis

Facilitation

EDUCATION

University of Colorado
Leeds School of Business
MBA, Sustainability and Project Management, 2010

Bowdoin College
B.A., Economics and Art History, 2004

CERTIFICATIONS

Environmental Law and Regulation
University of Washington

GET IN TOUCH

www.lotussustainability.com

hillary@lotussustainability.com

303.800.5541

EXPERIENCE

Colorado Carbon Fund
Spearheaded all aspects of fund including fundraising and program development. Developed program to successful spin out of the Energy Office into a self-sufficient nonprofit in 2012. Increased demand for carbon offsets through calculating greenhouse gas emissions for dozens of companies and public sector clients, devising marketing campaigns and developing strategic partnerships. Monitored regional and national policy issues for implications on the state.

NATIONAL RENEWABLE ENERGY LABORATORY
Golden, CO
Project Engineer, 2009-2010

Researched and reported on variety of energy, policy and economic issues. Analyzed cap-and-trade, carbon tax, and renewable energy policy as well as market and technology assessments through data collections, literature reviews, industry reviews, and writing spearhead analysis. Co-authored and supported various NREL publications. Assisted in developing a detailed pro-forma levelizing cost of energy models for various solar technologies and financing structures.

CASCADIA CONSULTING GROUP, INC
Seattle, WA
Associate, Research and Analysis, 2005-2007

Devised, implemented and managed waste and recycling plans. Led projects ranging from $100k to over $2 million for governments and companies including NYC, Home Depot, U.S. Army, Pentagon, Delaware, and Starbucks.

AMERICORPS
School Partnerships Liaison, 2004-2005

Led key aspects of developing IslandWood School through promoting the program to teachers, parents and students, including many inner-city schools.

INTERESTS

Traveling with family

World Cup soccer

Reading

JULIA FERGUSON
Senior Associate

lotus
engineering & sustainability

URBAN PLANNER
INNOVATIVE LEADER
PROGRAM / PROJECT MANAGER
RELATIONSHIP BUILDER

Julia has managed sustainability projects and and programs for local governments and the nonprofit sector for over 10 years. Julia brings expertise in sustainability plan development and implementation, communication, and capacity building across organizations and regions. Her projects have resulted in operational savings, improvements in sustainability metrics and increased citizen engagement.

EXPERIENCE

LOTUS ENGINEERING & SUSTAINABILITY, LLC.
Denver, CO
Senior Associate, 2017-Present

Provide high-quality consulting services on all areas of sustainability to a diverse set of clients

- Leads stakeholder engagement and community outreach for the development of community sustainability plans, programs, and policies.
- Performs detailed analysis on carbon emissions, greenhouse gas inventories, and emissions modeling.
- Advises clients on sustainability planning, programming, and implementation through effective stakeholder engagement processes and thorough technical, financial and project analysis.
- Authors technical documentation related to sustainability analyses and reporting.
- Communicates sustainability strategy development to broad audiences and provides technical expertise for the implementation of sustainability goals and strategies.
- Secured funding and managed program implementation for community-based energy efficiency programs

ADAMS COUNTY GOVERNMENT
Brighton, CO
Sustainability Coordinator**,** 2014-2017

Developed, managed and implemented the County's comprehensive Sustainability Program. Drafted and coordinated the adoption of sustainability policies related to energy use, waste and other priorities; increased county diversion rates for events from 8% to 38% in one year. Led the coordination across departments to revise code and development regulations in support of sustainability and renewable energy development; as a result the county was awarded national-level SolSmart Gold designation. Identified and managed the implementation of energy efficiency and renewable energy projects and programs, generating over $100k in annual savings. Obtained grant funding and technical support for sustainability projects in transportation and renewable energy. Collaborated with and advised local governments and special district partners on sustainability projects and programs across jurisdictions.

GREEN CORPS
Cleveland, OH
Program Manager, 2013-2014

Managed all aspects of program development, implementation and expansion for a nonprofit. Managed budgeting and fundraising activities to achieve programmatic growth; managed a budget of $650K across five locations. Facilitated the acquistion and sustainable management of new land for urban farms. Led development and implementation of both staff professional development and a dedicated sustainability and environmental science curriculum for high school students.

JULIA FERGUSON

BOARDS

Solar United Neighbors Advisory Board
2019-Present

SKILLS

Project/program management

Data analysis

Grant writing

Policy creation and implementation

Presentations and reports

Stakeholder engagement and facilitation

EDUCATION

Cleveland State University
Levin College of Urban Affairs
Masters of Urban Planning, Design and Development, 2010

University of Cincinnati
B.A., Political Science, 2008

CERTIFICATIONS

Project Management Professional (PMP)

National Renewable Energy Lab (NREL)
Energy Executives Graduate

EXPERIENCE

Buckeye Community Manager, 2011-2013
Site Manager, 2009-2011

Oversaw all aspects of urban farms on former brownfield sites, as well as the development of community engagement programs for sustainability. Developed a new environmental and sustainability education program for community residents; increased community participation by 45%. Created collaborative relationships with funding partners and community agencies to increase the impact of educational programs. Practiced sustainable land cultivation and management techniques to increase production on urban farm sites and surpass weekly sales goals.

CLEVELAND STATE UNIVERSITY
Cleveland, OH
Sustainability and Community Engagement Assistant, 2008-2010

Researched and reported on variety of sustainability policy issues and impacts on private business. Conducted detailed research and authored reports on sustainable business practices; focus areas included sustainable materials management, waste reduction and sustainable packaging and transit. Planned, coordinated and directed campus and community events on sustainability policy and sustainable business development. Trained staff, faculty and students in sustainable materials management and sustainability policy development and analysis.

GET IN TOUCH

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julia@lotussustainability.com

216.346.7478

INTERESTS

Gardening

Cooking

Hiking

RACHEL MEIER
Research Associate

lotus
engineering & sustainability

ANALYST
DATA VISUALIZER
GEOGRAPHER
ORGANIZER

Rachel is the newest member of the Lotus team. She brings years of experience performing spatial analysis and data visualization to federal, state, and non-profit organizations. Rachel is known for her detail-oriented nature, passion for learning and strong organization skills.

EXPERIENCE

LOTUS ENGINEERING & SUSTAINABILITY, LLC.
Denver, CO
Research Associate, 2019-Present
Supports sustainability projects for a diverse array of public- and private-sector entities.

- Assists with greenhouse gas inventories and research in support of projects.
- Performs document and report reviews as a part of Lotus' quality assurance process.
- Creates data visualizations and public-facing communications materials for clients.
- Authors and creates documents and other products to support Lotus business development efforts.

THE NATURE CONSERVANCY
Santa Fe, NM
GIS Specialist, 2018-2019

Provided cartography and spatial analysis support for all chapter prorgams in the New Mexico chapter. Performed spatial analysis to support all programs including urban heat island analysis, electric vehicle charging station planning, and riparian habitat mapping. Developed a UAV program for monitoring conservation easements, preserves, and forest restoration efforts. Maintained and populated data and record databases, GIS library and manual files.

Boulder, CO
Intern, Climate Action through Conservation Project, 2016-2017

Led the spatial analysis team in developing a methodology for NGOs to use geospatial analysis and statistical data to model carbon stocks. Established an organizational system which helped maximize database management. Produced new maps, tables and other graphical outputs in ArcMap and Microsoft Excel to generate focus areas for future carbon sequestration efforts by TNC. Collaborated with colleagues to create a report outlining policy suggestions for TNC staff supported by spatial analyses.

COLORADO ENERGY OFFICE
Denver, CO
Student Project Lead, REV West Charging Station Analysis Project, 2017

Determined optimal locations for electric vehicle fast charging stations using QGIS, informing future construction of the REV charging corridor on Colorado's highways. Created maps and tables that will be used in the identification of funders for the fast charging stations throughout the corridor. Presented to the CEO project team on where to construct the stations, easing EV drivers' range anxiety, and increasing EV sales in CO and throughout the West.

RACHEL MEIER

SKILLS

Data analysis

Data visualization

Spatial analysis and cartography

Report writing

Grant writing

EDUCATION

University of Colorado-Boulder
Masters of the Environment (MENV), 2017

Gustavus Adolphus College
B.A., Environmental Studies & Geography, 2016

NATIONAL WEATHER SERVICE, TWIN CITIES FORECAST OFFICE
Chanhassen, MN
Student Intern, Landslide Mitigation Project, 2015

Conducted research and statistical analysis of historical rainfall totals to quantify a metric for predicting potential future landslides. Collaborated with state, local, research universities and NGOs to produce a joint report given to Minnesota Governor Mark Dayton, affecting future policies addressing actions taken to mitigate landslide damage across the state of Minnesota.

GET IN TOUCH

www.lotussustainability.com

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612.558.6296

INTERESTS

Live music

Cooking & Baking

Hiking

RUBY CANYON ENGINEERING

Proposal To:

UPDATE TOWN OF MOUNTAIN VILLAGE CORPORATE AND COMMUNITY GREENHOUSE GAS EMISSIONS INVENTORY AND REPORT

November 14, 2019

Ruby Canyon Engineering, Inc.
743 Horizon Ct. Suite 385
Grand Junction, Colorado 81506
(970) 241-9298
www.rubycanyoneng.com

Proposal Cover Sheet

Ruby Canyon Engineering, Inc. (RCE) is pleased to provide the Town of Mountain Village (Mountain Village) with a proposal to assist Mountain Village with its GHG reduction targets, GHG inventories and climate action plan (CAP).

Proposal prepared by David LaGreca and Zach Eyler.
Please contact Zach Eyler (contact information in table below) with any questions regarding RCE's proposal.

Consulting Team:

Name	Title	E-mail Address	Phone Number
Zach Eyler	Vice President	zeyler@rubycanyoneng.com	970.241.9298 x15
David LaGreca	Environmental Scientist	dlagreca@rubycanyoneng.com	970-368-0540
Nina Pinette	Environmental Scientist	npinette@rubycanyoneng.com	970.241.9298
Jessica Stavole-Carter	Sustainability Manager & Env. Scientist	jstavole@rubycanyoneng.com	440.376.2942
Emily Schosid	Sustainability Program Coordinator University of Denver	emilyschosid@gmail.com	303.871.4354

Statement of Qualifications

RCE was formed in 2005 in Grand Junction, Colorado as an organization dedicated to providing greenhouse gas (GHG) related services and facilitating GHG emission reductions. RCE provides a broad range of technical consulting services to companies/entities wishing to conduct GHG inventories, report their emissions to U.S. EPA, develop climate action plans or carbon footprints, and execute strategies for reducing their GHG emissions. From 2013 – 2018, Ruby Canyon Engineering was named Best Verification Company in North America in the Environmental Finance market survey.

As a small business, RCE has earned its reputation through providing high-quality technical services and personal attention to the individual needs of clients. RCE has nine employees, the majority of which are based in Grand Junction, CO. Employees are also based in Loveland, CO and Houston, TX. RCE has a satellite office in Mexico City as well, operating our Ruby Canyon Mexico branch with four employees.

Ruby Canyon Engineering has over 10 years of experience with GHG inventories and is highly knowledgeable around emission estimation for all six GHGs, emission scopes, project boundaries, baseline determination, calculation methods, mass balance equations, emission factors, relevant emission scopes and materiality concepts. RCE has an exceptional understanding of the requirements for GHG inventories reported under various programs such as California GHG Reporting, WRI/WBCSD GHG Protocol, The Climate Registry (TCR), EPA Mandatory Reporting, CDP, Ontario and British Columbia GHG reporting, as well as Mexico RENE GHG reporting. RCE also completed the ANSI accreditation program to become an ISO 14065 approved GHG validation and verification (V&V) body on October 9, 2009. From 2010 – 2018, RCE has completed **over 450** complex organizational level GHG verifications in a wide variety of sectors including local governments, transportation, waste, mining, manufacturing, electric power, pulp and paper, and oil & gas industries.

In addition, the RCE team is quite knowledgeable of the types of emission sources and associated data activity typically found in city and corporate operations including stationary combustion for building heating and cooling and back-up generators, mobile emissions from vehicles and purchased electricity. Having verified large inventories in the past, RCE is also familiar with appropriate assumptions and calculations for Scope 3 emission sources such as business travel, paper usage and waste for a more comprehensive accounting of GHG emissions sources.

Our team has direct experience with municipal climate action planning, and extensive knowledge of the myriad contemporary sustainability strategies required to achieve the goals laid out in those plans. RCE recognizes the complexities of local emissions profiles and is fully versed in designing individualized solutions to meet carbon reduction goals. Having partnered with numerous municipalities, governments, universities and companies in scoping and addressing their respective impacts on climate change, RCE presents a uniquely cultivated project history upon which to support The Town of Mountain Village in their climate initiatives.

RCE provides data-driven insight into resource-efficient approaches to reducing emissions highlighted in the initial GHG inventory. Having completed energy-intensity and carbon footprint studies for industrial manufacturers, RCE applies scientific rigor to all GHG inventories and Climate Action Plans. The RCE team incorporates extensive in-house experience and advanced education in climate science as it relates to localized impacts, municipal energy efficiency programs, and corporate partnerships in mitigation strategies, with consultants specializing in scalable climate action planning. The project team will include leaders in the field of GHG analysis, sustainability planning, building science, and local policy, with a successful track record of drafting climate action plans for communities with characteristics similar to those comprising The Town of Mountain Village.

Examples of relevant work conducted by RCE and our team over the past few years are included below.

- In 2017, RCE verified Mexico City's GHG inventory under Mexico's mandatory RENE GHG reporting program
- In 2015-2017, RCE verified County of San Diego's CY 2013 and 2016 TCR GHG Inventory
- In 2011 and 2015, RCE verified TCR GHG inventories for the City of Austin, Texas

- In 2015, RCE verified an ISO 14064 GHG inventory for the City of Cambridge, Massachusetts
- In 2012-2014, RCE conducted TCR GHG inventory verifications for four California public organizations including:
    - San Benito County
    - County of Hollister
    - County of San Juan Bautista
    - County of Davis
- In 2018, RCE worked with an Ivy League university to assist them in correctly accounting for Scope 2 emissions under TCR. RCE also worked with this university to analyze potential GHG mitigation options.
- In 2012-2013, RCE developed the GHG inventory for the Alameda-Contra Costa Transit District in California to the TCR program. This included a variety of sources of GHG emissions including stationary, mobile and fugitive.
- In 2017-2018, RCE completed a TCR GHG inventory verification for Waste Connections that includes hundreds of waste management facilities and emission sources.
- In 2012-2018, RCE conducted TCR GHG inventory verifications for multiple colleges and universities with a wide range of emissions sources, including:
    - Boston College
    - Boston University
    - College of the Holy Cross
    - Massachusetts Institute of Technology
    - Stanford University
    - UC Davis
    - UC Irvine
    - UC Merced
    - UC Office of the President
    - UC San Diego
    - UC San Francisco
    - UC Santa Barbara
    - UC Santa Cruz
    - Wellesley College
    - Wheaton College
    - Yale University
- In 2015, RCE subcontractor, Emily Schosid, produced the Climate Action Plan for the Town of Blacksburg, VA
- Specific to The State of Colorado, RCE has completed TCR GHG verifications for Denver Water, consulted for methane mitigation in the North Fork Valley and completed Grasslands verifications in addition to holding educational events and volunteering in the Grand Junction community

References

RCE has completed over 450 entity or facility GHG verifications over the past seven years and maintains a highly competent staff of lead verifiers and GHG experts with experience in developing and verifying greenhouse gas emission inventories. Most relevant to Mountain Villages' needs, RCE has provided services for the following related entities:

Client	Description of GHG Services Provided	Client Contact Information
The County of San Diego	TCR GHG Verifications: 2011, 2012, 2013, 2014, 2015, 2016. GHG inventory included county buildings, office space, and other facilities, vehicle fleet, water delivery, street lights, and fugitive sources.	Susan Freed Energy and Sustainability Program County of San Diego 1600 Pacific Highway San Diego, CA 92101 T (858) 229 9809 Susan.Freed@sdcounty.ca.gov
Mexico City	RENE Mandatory GHG reporting verification: 2017	M.I. Javier Orlando Avilés Sayas Project Manager, Climate Change Office Ministry of the Environment of Mexico City Secretaría De Medio Ambiente (T) + 52 (55) 52 78 99 31 ext. 6852, 6882 javiles.sma@gmail.com
City of Cambridge, MA	ISO 14064-3 Verification: 2008, 2012, 2016	Bronwyn Cooke Sustainability Planner, City of Cambridge 344 Broadway Cambridge, MA 02139

		T (617) 349 4604 bcooke@cambridgema.gov
Town of Blacksburg, VA*	Climate Action Plan: 2015. Advisory Council, Technical research, process, data and CAP document review and recommendation	Carol Davis Sustainability Manager T (540) 443-1617 Town of Blacksburg 141 Jackson Street Blacksburg, VA 24060 cdavis@blacksburg.gov
University of Denver*	Climate and Sustainability Plan: 2018. Updates to expired Climate Action Plan, community/stakeholder engagement	Chad King Sustainability Director Center for Sustainability University of Denver T (303) 871-3345 1770 S. Williams Street Denver, CO 80210 chad.king@du.edu

* This reference provided by RCE subcontractor, Emily Schosid

RCE Proposed Project Team Members

RCE will assign a five-person team for the development of the greenhouse gas emissions inventory and climate action plan. RCE has included the resumes of all potential team members including the Climate Action Plan expert from The University of Denver. RCE will also determine one team member to lead the consulting process and remain the point of contact for the Town of Mountain Village.

Resumes are included at the end of this proposal.

Name	Email Address	Role
David LaGreca	dlagreca@rubycanyoneng.com	Lead Consultant
Jessica Stavole-Carter	jstavole@rubycanyoneng.com	Team Member
Nina Pinette	npinette@rubycanyoneng.com	Senior Team Member/Peer Reviewer
Zach Eyler	zeyler@rubycanyoneng.com	Senior Team Member
Emily Schosid	emilyschosid@gmail.com	Team Member/ CAP Expert

Work Plan and Technical Approach

As an accredited GHG verification body for multiple GHG reporting programs across North America, RCE will approach Mountain Village's GHG inventory development process with "verification quality" in mind. RCE has developed very methodical systems when collecting, compiling, and analyzing GHG data and calculations (by source, scope, GHG type, etc.). This will offer the Mountain Village a high quality and accurate inventory that includes QA/QC and data validation checks. In addition, RCE has extensive experience working with government organizations and prides itself on quick and responsive communication with its clients. Throughout the inventory development process, RCE will identify potential areas for emissions reduction opportunities, aiding Mountain Village in addressing climate change and achieving significant, verifiable emission reductions.

Project Management

RCE will manage the work from its Grand Junction office and will establish one team member to serve as the main point of contact. RCE utilizes various file sharing programs, including MS Sharepoint and Dropbox to facilitate the exchange of information and relay information regarding deadlines and status updates for project milestones. RCE will schedule at minimum monthly appointments with the Mountain Village staff to ensure effective communication between RCE and the Mountain Village and ensure that project timelines are met. All staff members and management at RCE have excellent project management experience. This is demonstrated by the fact that RCE completes on average 150 verifications/year with six full-time employees. RCE will prioritize the Town of Mountain Village's GHG inventory and CAP to ensure all deadlines, obligations, meetings and deliverables are met. As evidenced by the timely completion of the highly complex inventory verification for Mexico City in 2017, RCE has the focus and the capacity to delivery projects on time and on budget. RCE coordinates with our clients to seek out disparate and varied data sets across multiple

departments in the process of developing GHG inventories, producing thorough emissions reporting for cities and corporations across North America since 2010.

Mountain Village Obligations

Please note that the Mountain Village will initiate and provide contacts for individuals managing all data sources requested by RCE in addition to access to requested data and documents. In order to meet the proposed timelines, data and documents must be delivered to RCE in a timely manner. The Mountain Village will also be asked to confirm that all appropriate emissions sources and community activities are included within Mountain Village's geographic and corporate boundaries. Finally, the Mountain Village must be available for questions and discussion as the inventories are prepared and respond to any questions by RCE in a timely manner.

Task A: Update and expand corporate and community GHG Emissions Inventories and forecast for Mountain Village

RCE will update and expand Mountain Village's corporate and community GHG inventories based on the methods used in the Global Covenant of Mayors Common Reporting Framework (Compact of Mayors Protocol), the Greenhouse Gas Protocol's Global Protocol for Community-Scale Greenhouse Gas Emission Inventories (GPC), and The Climate Reserve's General Reporting Protocol (GRP). RCE will make best attempts to use 2019 data for the Mountain Village's inventory, but if the needed data is not available, then the most recent years available will be used. The inventories will adhere to all CC4CA and Compact of Mayors requirements, as described in the relevant protocol and guidance documents.

While no community inventory is fully comprehensive, using a robust framework will provide as complete of a picture of the community-scale emissions as is feasible. The selected Compact of Mayors methodology will build upon standards used by other cities to allow for comparable results. The initial step will be a scoping process of selecting and confirming GHG emission sources and geographic boundaries. RCE will work together with Mountain Village staff to ensure the appropriate emissions sources and community activities are included in the inventory. RCE will also provide the Mountain Village with an inventory scoping tool to assist in the establishment of their GHG boundaries.

RCE will follow the most current Compact of Mayors guidelines for inventories. Guidelines for the inventory include:

- Reporting three GHGs including carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), with the option of reporting hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), sulfur hexafluoride (SF_6), and nitrogen trifluoride (NF_3).
- GHG emissions shall be reported in metric tonnes of each gas as well as CO_2 equivalent (CO_2e)
- Scope 1
    - Stationary, Transportation, Waste, Wastewater and Fugitive GHG emissions
    - Industrial Processes and Product Use (IPPU)
    - Agriculture, Forestry and Other Land Use (AFOLU), if relevant
- Scope 2
    - Stationary and Transportation
    - Purchased electricity, Purchased Steam
- Scope 3 (Optional)
    - Stationary, Transportation, Waste
    - All other GHG emissions occurring outside the Mountain Village boundary as a result of activities occurring within the Mountain Village boundary

The selected methodology will categorize GHG emissions by the Compact of Mayors sectors as well as an additional two identified by GPC including the following:

- Stationary energy (buildings, electricity, manufacturing, oil & gas systems)
- Transportation (on-road, off-road, railways, transit, marine)

- Waste including solid waste, water, and wastewater (operations of facilities, process emissions)
- Industrial processes and product use (process emissions)
- Agricultural, forestry, and other land use (manure management, afforestation)
- Community-wide consumption and use of materials (materials, fuels, electricity T&D losses)
- RCE will assist the Mountain Village in establishing the scope, main sector, and sub-sector for all emission sources and activities.
- Emission factors used throughout will be the most recent factors available, from sources including IPCC, US EPA, GPC, and local sources.

RCE will begin the data collection by reviewing/establishing the Mountain Village's inventory management plan to screen the data collection process. With the Mountain Village's input and the contacts that the Mountain Village will provide, RCE will prioritize any necessary changes and suggest improvements consistent with the selected methodology. RCE will also implement QA/QC procedures to ensure continuous improvements of data sets and data validation at the time of collection. For areas where data is not currently being collected by the Mountain Village, RCE will establish new data collection procedures.

RCE will utilize available activity data from Mountain Village sources, such as municipal energy usage (kW-hrs, mmBTUs), public transportation data (gallons, miles), building areas (square footage), waste and recycling (tonnage, gallons), that can be used for estimating emissions from refrigerants and agriculture. RCE can utilize U.S EPA MMR reports to estimate emissions from any manufacturing and industrial processes. Data activity for community activities can be compiled through the use of surveys as well as carbon intensities and emission factors from established sources. RCE has verified numerous GHG emissions reports and is quite familiar with data records from local gas and electric utilities. RCE will need to collect additional information for landfill and wastewater emissions such as landfill characteristics, waste-in-place, WWTP operations, and wastewater BOD analysis if available. RCE can utilize the US EPA LMOP database for supplementary information regarding landfill operations. RCE will use the latest census information to estimate community-wide activities for homes, businesses, and private transportation.

If requested to do so, RCE will develop a Scope 3 inventory of emission sources for tourist and temporary vendors transportation, energy, and waste. Scope 3 analysis is not included in the original Scope of services described in this proposal and can be negotiated if desired.

RCE will organize the GHG emissions in MS Excel spreadsheets by scope, sector, GHG type, and biogenic origin (if applicable). RCE has existing GHG calculation and summary spreadsheets that can be easily updated on an annual basis and used for trend analysis. RCE plans to perform a risk assessment of the data sources using a technical approach similar to the approach used for RCE's verification purposes. The assessment will identify areas of uncertainty and help determine minimum data sample sizes. RCE will evaluate the Mountain Village's GHG personnel, information control systems, and data management procedures to ensure that the proper data is collected and compiled. All calculations, data sources, assumptions, and key contacts will be made available to the Mountain Village.

RCE will conduct an internal peer review of the developed inventory to ensure that all sources and received data are properly accounted for, and that the inventory adheres to the Compact of Mayors and CC4CA. The Project Lead will address all questions or corrections noted by the peer reviewer and, if needed, will ask the Mountain Village for any additional information.

<u>Model Historic Trends and a "Business as Usual" Projection</u>
RCE will also assess current Mountain Village corporate and residential emissions to determine future GHG mitigation strategies and areas of emphasis for the Mountain Village's climate change planning process. RCE will work together with the Mountain Village to establish the BAU (business-as-usual) forecast and parameters that affect high and low forecast cases.

Based upon available information, RCE believes that the Mountain Village should choose a baseline year of 2010 since regional GHG and energy-use baseline began to be tracked in 2010. RCE will use the Mountain Village's 2017 GHG inventory (or most recent data available) to estimate historic emissions from 2010-

present. RCE can add a line item in our cost proposal to reevaluate the 2010 GHG inventory and update it if the Mountain Village chooses to. To estimate historical emissions RCE will use changes in population, energy demand, vehicle travel, solid waste generation, area changes and other relevant factors. RCE will also complete a contribution analysis based upon ICLEI's GHG Contribution Analysis Excel Tool in order to describe changes in emissions between 2010 and 2019, including but not limited to variations such as population, energy demand, vehicle travel, and solid waste generation, segregated between community and corporate activities.

For the model to estimate "Business as Usual" emission to 2050, RCE recommends the following intervals - 2025, 2030, 2040 and 2050. In order to evaluate near-term progress and future emission trends, RCE suggests an interim year of 2022 (to evaluate near-term progress). RCE will calculate percent change in each of the community sectors listed above.

Final GHG Inventory Report, Methods and Training for Continued Inventory Management

At the conclusion of the data collection, analysis, and peer review, RCE will prepare a GHG inventory report for the Mountain Village. RCE will provide an outline to the Mountain Village prior to the drafting of the report to ensure that all areas and topics are covered. The Mountain Village can expect that the report will include an introduction and background information, objectives, chosen methodology (broken into major end use and sector), data collection and analysis, a general assessment of GHG emission sources, GHG emissions calculations, QA/QC procedures, inventory results, recommendations for future inventories and GHG mitigation efforts, forecast methods, and a conclusion. The report will also include high-quality charts, tables, graphs, photos, and illustrations to be catered to Mountain Village's desired publication format. A word document version of the Mountain Village's GHG emissions report will also be provided to ensure efficient updates for future inventory years.

RCE will provide the Mountain Village with an electronic copy of the calculation spreadsheet used to develop the baseline year greenhouse gas emissions inventory. This spreadsheet can be used in future years and will offer a year-to-year comparison tool, enabling the Mountain Village to view their emission increases and decreases on a year-to-year basis. RCE will also hold one to two training sessions, as needed, in order to train the Mountain Village, staff on how to populate, update, and calculate inventories utilizing the calculation spreadsheet in future years.

During these sessions, RCE will provide clear instructions for the use of the inventory development tool. RCE will provide the Mountain Village with a background on Scope 1, Scope 2, and Scope 3 categories, data sources, as well as basic unit conversions and emission factors to ensure that staff understand the fundamentals of GHG reporting outside of the calculation spreadsheet. Once fundamentals are in place, RCE will then walk the Mountain Village staff through RCE's calculation spreadsheet, explaining how to populate and utilize the spreadsheet. RCE will ensure that staff can perform calculations for subsequent years. Also, RCE will illustrate how to compare current inventory results to those of prior years; RCE's calculation spreadsheet will automatically calculate a prior year comparison by source if values are input correctly. RCE will also train staff on the modeling performed so that staff can update as needed in the future.

Separately or as part of the final training, RCE will hold an exit meeting with the Mountain Village to ensure that all of the necessary information, documents, and training materials have been provided so that future inventory years can be efficiently and accurately calculated.

Deliverables

- Comprehensive community GHG inventory update and expansion for 2018 (or most recent data)
- Comprehensive corporate GHG inventory update and expansion for 2018 (or most recent data)
- Mountain Village community & corporate breakout and comparison
- Estimated emission inventories and emission trends over the historical period of 2005 – 2019
- BAU modeled projections for emissions through 2050 with interim intervals
- Updated 2010 inventory (optional)
- Final GHG inventory report (2018 or most recent data)

- Electronic copy of the calculation spreadsheet
    - This can also be used by the Mountain Village as a template for future inventories
- Detailed explanation of methodologies used and any necessary resources in information training sessions for continued inventory management
- Training for all pertinent Mountain Village staff
- Benchmark comparison document to The City of Aspen, Vail, Summit County, or other comparable municipalities

Task B: GHG Emission Reduction Targets

While no climate action plan can address every emissions source, it is imperative that the focus be placed on crucial point-source and large emitters. Upon completion of the GHG inventory and baseline determination, RCE will analyze the findings and the nature of emissions sources based on 1) Scope, 2) Materiality (<5% of total inventory), and 3) Relative ease of mitigation. This analysis will establish a framework upon which to specify focal points for emission reductions, and provide a firm, numerical baseline to create measurable, verifiable metrics for successfully reducing the Mountain Village's GHG emissions in subsequent years.

RCE will utilize the GHG inventory trend analysis from the baseline year to present, in addition to energy consumption and emission profiles, to identify and prioritize short-term and long-term emissions reduction opportunities based on contribution by facility and service. Once opportunities have been reviewed and discussed with the Mountain Village and with The Green Team, RCE will document any benchmarks and targets that have been established. Based on the 2017 inventory, building energy use is the largest single source of emissions and will be a focal point of targeted emissions reductions. RCE staff have direct training and experience in existing building energy efficiency and as such will work with the Mountain Village to establish targets, such as the "80 by 50" challenge, or tailor targets specifically to the Mountain Village.

By targeting emissions reductions corresponding to CO House Bill 19-1261 Section 1 (g), RCE will facilitate the Mountain Village's adherence to a rapid drawdown of emissions to match statewide ambitions. RCE will coordinate the climate action planning process with the target-development phase by analyzing differing potential schemes combining various sector-specific GHG reductions and determining maximum feasible targets within each. For instance, in achieving the target set in the bill of a fifty-percent reduction by 2030 for the Mountain Village, RCE may analyze a combination of home energy retrofits with on site PV installations to ascertain the farthest reaching, economically feasible emission reduction targets in the building sector. Additionally, RCE will utilize planning strategies and established targets adopted by CC4CA and the Zero Waste Action Plan as guidelines, exceeding these where practicable. RCE aims to orient the Mountain Village towards a leadership role in all coordinated emissions reductions agreements.

In the process of modeling emissions to establish targets, RCE recommends the following intervals. In order to evaluate near-term progress and future emission trends, RCE suggests an interim year of 2020 (to evaluate near-term progress), 2025, 2030, 2040 and 2050. All targets will be designated in the form of quantifiable, verifiable metrics in the form of percentage change relative to baseline (2005 or 2010) levels by the target year. For instance, "Mountain Village will reduce Scope 1 emissions from corporate natural gas usage by 30% relative to the baseline (2005 or 2010) by 2025". RCE will provide and explain to the Mountain Village any all raw data, emission factors, assumptions and other background information relevant to the development of the GHG emission reduction targets.

At every intersection in the development of GHG emission reduction targets RCE will solicit input from the expertise of the Green Team Committee. In order that targets that are set are ultimately achieved, community buy-in is imperative. RCE will maintain an open channel of consistent communication with the Town and with the Green Team Committee so that the targets and outcomes are designed by the community, and manifest with the leadership and assistance of RCE. RCE will create a guide to the chosen targets complete with requisite emissions values (tCO_2e) or intensities to achieve the established reductions goals.

<u>Deliverable</u>

- Emission Reduction Target Guide

Task C: Recommended Actions to Reduce GHG Emissions

Although the GHG inventory process will take place simultaneously with Climate Action Plan (CAP) development, results of the inventory will not be known until after initial stages of this project are well underway. In the interim, RCE will focus on gathering County staff and community input first through a Request for Information to solicit interest in public outreach sessions, targeted meetings, open houses, charrettes, and/or focus groups. Once RCE has a calibrated understanding of the magnitude of different emissions sources present within the Mountain Village, RCE will consult with community members and the Green Team to determine priorities and desired outcomes. Listening to the community and integrating elements from the community forums into the CAP will increase buy-in and a feeling of personal investment for key stakeholders. Stakeholder engagement is key to promoting the triple bottom line of sustainability and ensuring transparency with the public.

In addition, RCE is experienced in providing public outreach services within communities, including survey development, to assess the impacts of Lane County's social, environmental, and financial performance. RCE will work with the Mountain Village to develop a Community Workshop toolkit to solicit and record public input; any input collected will be used to help structure the CAP and prioritize emission reduction and climate adaptation goals.

In order that efforts are not duplicated and that important partnerships are not ignored, RCE will first work with the Mountain Village to enumerate all ongoing climate-related activities within the various level of, each of the 5 city governments of San Miguel County with, as well as corporate efforts underway. A CAP is a comprehensive, standalone document that can help guide the Mountain Village's GHG management and strategies. Entities within the Mountain Village and nearby communities have already invested significant time, energy, and resources in developing their commitment to sustainability and reducing GHG emissions. As a result, a comprehensive database will be developed specifying all existing sustainability and climate goals from the towns, county government and NGOs, including the Town of Telluride Action Plan and the 2010 STRATEGY. All underlying goals from existing plans will serve as foundational documents, underlying the elaboration of the comprehensive climate plan. The CAP will be unique to Mountain Village's specific goals and objectives, with clear prioritization of action items. The CAP will include the GHG inventory itself, as well as a snapshot of any progress made in reducing emissions. At the same time, it is a living document that should be updated on a regular basis as milestones are met or targets and goals change.

In the course of development of the Climate Action Plan (CAP), RCE will work together with Mountain Village staff to establish emissions reduction goals and energy efficiency targets (as described in Task B), define best practices, identify cost-efficient and highest-potential mitigation strategies, and map out timelines for implementation. The CAP will also illustrate how Mountain Village compares to other counties, where data is available. The CAP can also address key social, environmental, and financial aspects of sustainable operations. RCE will develop Mountain Village's Climate Action Plan incorporating the conclusions reached through the community and corporate GHG Inventories, community meetings, stakeholder interviews, and based upon the methods used in the Greenhouse Gas Protocol's *Global Protocol for Community-Scale Greenhouse Gas Emission Inventories (GPC) and the Compact protocol.* Use of these established platforms will enhance the transparency of the evaluation process of Mountain Village's inventory, better identify potential impactful actions, and give stakeholders easier access to the results.

The process will be iterative, based upon consistent feedback and discussion between the County, RCE's GHG inventory team, and RCE's CAP team. Simply put, the CAP will be created from the three combined inputs underlying the advancement of sustainability - Environmental improvement, Social benefit, and Economic viability. Achieving these three factors at all stages will be the litmus test upon which RCE will assess strategic decisions. Following each committee meeting, a summary of outcomes will serve as documentation of decisions made, and the agreed upon next steps to be taken. Development of a community workshop toolkit will facilitate productive discourse, and substantive input to the CAP process, as described previously in this section.

RCE will identify and recommend 10-15 primary measures that will facilitate Mountain Village's GHG reduction targets. RCE will also identify and discuss potential challenges or opportunities in meeting the GHG emission reduction goals. An initial assessment of the 2017 inventory and previous RCE experience would suggest paralleling some of the Town of Telluride's CAP strategies, such as energy audits, for local synergistic effects of aligned initiatives. In addition, RCE can assist with tapping into existing state financing options, screening contractors, and quantifying savings opportunities from home and commercial energy retrofits. While a focus on building energy consumption is prudent given its two-thirds share of emissions, RCE will investigate potential opportunities in the categories of Materials and Waste and Transportation such as landfill gas utilization/destruction projects, increasing ridership of the Galloping Goose and Gondola, and achieving the aims of the ZWAP initiatives. RCE will summarize and make available all data sources, emission intensity values, along with any and all assumptions made in development of the CAP recommendations.

Deliverable

- Climate Action Plan document

Task D: Final Report

RCE has provided in-depth reports on client emissions profiles and presented analytics to support a range of sustainability initiatives since 2010. Incorporating our experience with emissions intensities for our high-profile fertilizer client, RCE will provide detailed analytics regarding per-capita or per unit of revenue emissions and display it in an aesthetic, yet informative manner. The report will entail a summary of findings from the GHG inventories and the CAP along with a synthesis of ideas uncovered throughout the process. The report will be similar in format to that provided in 2018, but with the key additions of improved graphics, highlighted goals and outcomes, and a focus on bottom line considerations for successful achievement of the targets laid out in Task B.

RCE will incorporate design strategies and layout used in our Market Research Report for Coal Mine Methane in Colorado, available here. The report will include emerging considerations in policy, legislation, protocols and marketplaces and discuss their impacts on the development of the CAP for Mountain Village. RCE will provide the final report in both Microsoft Word and PDF formats. At the conclusion of Tasks A through D, RCE will present the plan to the Green Team Committee as well as to the Council and shall make the presentation materials available as well.

Deliverable

- Final Report including summary of: Corporate/community GHG Inventory, Established Emissions Reductions Targets, Climate Action Plan
- Presentation to Green Team Committee and Council

Proposed Project Timeline

RCE proposes the following schedule for the different Tasks. RCE is flexible and can modify this schedule to better meet the needs of Mountain Village.

Schedule & Deliverables		
Activity	**Party Responsible for Deliverable**	**Estimated Date**
Notice to Proceed & Sign Service Agreement	RCE & Mountain Village	December 20, 2019
Kick-off Meeting	RCE & Mountain Village	January 6, 2020
Data and Documentation Requests	RCE	Early January 2019
Receipt of Requested Data	Mountain Village	Late January 2020
Visit to the Mountain Village	RCE & Mountain Village	February 2020
• Data Collection • Data Analysis • Perform Risk Analysis • Prepare 2018 inventory	RCE	February – March 2020
Complete Task A Deliverables	RCE	Late March 2020
Peer Review	RCE	1 week after inventory complete
Emission Reduction Target Guide	RCE	April 2020
Deliver Climate Action Plan	RCE	Late May/ Early June 2020
Provide feedback on all draft deliverables	Mountain Village	Mid June 2020
Deliver Final Report	RCE	Early July 2020
Presentation to Green Team and Council	RCE	Early/ Mid July 2020
Staff trainings on inventory	RCE & Mountain Village	Early/ Mid July 2020
Exit Meeting	RCE	Mid July 2020

Budget

RCE proposes the following budget. RCE has included estimated travel expenses for two trips to Mountain Village and proposes all travel expenses to be reimbursed on actuals. If additional trips are necessary, RCE will also bill those on actual travel costs.

Task A	Activity	Est. Hours	Rate	Cost
	GHG Inventory	65	$115	$7,475
	GHG Inventory Travel Expenses (Est.)	N/A	N/A	$250
Task B				
	GHG Targets	20	$115	$2,300
Task C				
	Climate Action Plan	45	$115	$5,175
	Climate Action Plan Travel Expenses (Est.)	N/A	N/A	$250
Task D				
	Final Report	15	$115	$1,725
Task A,B,C,D				
	Labor	145	$115	$16,675
	All travel expenses (Est.)	N/A	N/A	$500
	ESTIMATED TOTAL			**$17,175**

Terms & Conditions

Contract Type

The proposed contract is a firm, fixed-fee. RCE is open to exploring other pricing structures with the Mountain Village based on the final scope of work, including working on a time & materials basis with defined rates and not-too-exceed limits. All travel expenses will be billed on actuals.

Invoice Submission

RCE proposes to submit invoices based on deliverables noted in each Task and the proposed schedule:

- Task A-1: RCE visit to the Mountain Village and data collection: 20% of total budget + travel expenses
- Task A-2: Delivery of draft 2018 inventory: 25% of total budget
- Task B: Delivery of GHG targets: 15% of total budget
- Task C: Delivery of Climate Action Plan: 30% of total budget
- Task D: Final report and training: 10% of total budget

Payment Terms

Invoice balance due 30 calendar days from invoice date.

Change Orders

<u>In-Scope Changes</u>

The current bid and proposal will include all in-scope changes encountered during consulting activities.

<u>Out-of-Scope Changes</u>

RCE will make best efforts to complete all work within the current proposed price. However, RCE will consider out-of-scope changes to be additional costs and will submit a change order request that defines the change in scope. RCE and the Mountain Village will agree upon any change orders prior to submitting an invoice. RCE considers out-of-scope changes to be required when alterations, modifications or changes are made to the originally agreed upon scope of work. The following items represent a change in scope and may require a change order:

- Changes in reporting methods that were not identified in the original scope of work

- Identification of unreported GHG sources or changes in project boundaries which materially change the inventory or cause significant effort
- Use of reporting protocols not identified in original scope of work
- Delays in the schedule not due to RCE, which extend the schedule more than 90 days beyond the original completion date

David LaGreca

Staff Environmental Scientist

Summary

David LaGreca began working at Ruby Canyon Engineering in 2017. Since then, he has become increasingly engrossed in the political and scientific underpinnings of evolving greenhouse gas market places. David became certified under the Climate Action Reserve Landfill and General Protocols in 2017, leading numerous CAR Landfill and assisting in Livestock projects as verification team member. He has worked as lead verifier on projects in the Ontario and British Columbia mandatory greenhouse gas reporting mechanisms, along with leading inventory verifications for government entities and private companies under The Climate Reserve. Additionally, he has thoroughly researched and reported on emerging markets in Latin America including Mexico's evolving EMA standards, functioning as lead verifier under RENE and Programma GEI while assisting with translation for the RCE team. David provided support for greenhouse gas inventory consulting for domestic and international abandoned mine methane (AMM) and coal mine methane (CMM) projects through the US EPA in addition to contributing to CMM Country Profile updates. He has also conducted sampling and project work in Livestock and ODS under California's ARB protocols. Along with GHG audits, he has developed corporate sustainability plans and conducted market analysis for environmentally-preferred purchasing standards for retailers. David has conducted feasibility analyses for adopting and advancing corporate performance within LEED and Energy Star building rating systems.

David graduated in 2015 from the University of Denver with a Master of Science in Environmental Policy and Management, emphasizing Energy and Sustainability. He wrote extensively on life cycle analysis in commercial product and building sciences, culminating with a thesis on deep energy retrofits in residential homes. In 2009, David obtained a Bachelor of Science degree from the University of Colorado at Boulder in Environmental Studies, where he presented his research and design of a new-urbanist, sustainable city plan. Since graduation, David has focused on understanding environmental systems and the interconnectedness of human activities with ecological impacts. He spent time as a research intern with an environmental consulting company, and as sustainability lead/ project manager for a green building company in Grand Junction, CO.

Experience

<u>GHG Organizational Verifications</u>

- Lead verifier for GHG verifications under The Climate Reserve GRP and EPS including CalPERS, Denver Water, Port of Los Angeles, and Aquarium of the Pacific
- Team member for GHG verifications under The Climate Reserve including Waste Connections, University of California Irvine, University of California San Diego, Tower Companies, and Environmental Science Associates. Verifications included assessment of GHG emissions from many facilities: cogeneration units, mobile fleet sources, purchased electricity and gas, HVAC systems, fugitive landfill gas, and office buildings.
- Team member for GHG verifications under Climate Disclosure Project and Airport Climate Accreditation protocols including assessment of GHG emissions from Port Authority New York/New Jersey
- Lead verifier for GHG verifications under Mexico's RENE and Programma GEI including two SKY EPS electricity production facilities

- Team member for GHG verifications under Mexico's RENE and Programma GEI for Soriana, four Pemex Oil and Gas facilities, multiple CFE facilities, PetStar

GHG Project Verifications

- Lead verifier for GHG verifications in U.S. carbon markets under The Climate Action Reserve (CAR) Landfill Protocol including City of Walla Walla (WA), St. Landry Parish (LA), City of Thomasville (GA), University of North Carolina, LP Gill (NE), Moccasin Mike (WI), Stones Throw (AL) and Citrus County (FL)
- Team member for GHG verifications under ARB using CAR Livestock protocol including Stotz and CSE Triple G Dairies, and Old River
- Team member for several GHG project verifications under ARB under the ODS protocol for A-Gas Rem Tec

GHG Consulting

- Co-authored PowerPoint presentation given at the 2017 UNECE Workshop on Coal Mine Methane and Abandoned Mine Methane in the context of Sustainable Energy
- Team member in preparing U.S. EPA active and abandoned coal mine methane inventories for 2015 & 2016
- Updated Mexico, Turkey, and China's Country Profiles for U.S. EPA Global Methane Initiative
- Assisted with calculations, report drafting, and report editing for CF Industries 2015 & 2016 GHG inventories

Sustainability Consulting

- Developed corporate sustainability plan for the multi-sales channel retailer, Oregon Mountain Community, along with the architecture/engineering company, Mountain Design Group
- Devised template for validating corporate sustainability claims based on those made by Patagonia
- Conducted feasibility analysis and implementation strategy for US EPA Indoor Air and Net-Zero home standard, and outlined/ implemented environmentally-preferred purchasing plan for construction building materials for Senergy Builders
- Conducted feasibility analysis for LEED HOMES standard adoption
- Researched and presented development plan to County Commissioners for sustainable development at Henderson Mine site in Clear Creek County on behalf of Mountain Design Group
- Researched and edited publication of *Powering Forward: What Everyone Should Know About America's Energy Revolution* by Colorado Governor Bill Ritter

Events

- Energy Efficiency Markets Panelist at Environmental Leadership Awards Conference, 2018
- Colorado Communities Symposium, 2018
- Climate Leadership Awards, 2018

Education

- University of Denver, MAS, Environmental Policy and Management, 2015
- University of Colorado Boulder, BS Cum Laude, Environmental Studies, 2009

Work History

- Staff Environmental Scientist, Ruby Canyon Engineering, 2017-present
- Project Manager/Sustainability Lead, Senergy Builders, 2016-2017
- Policy Research Intern, Natural Capitalism Solutions, 2015

Jessica Stavole-Carter
Sustainability Manager & Environmental Scientist

Summary

Jessica joined Ruby Canyon Engineering (RCE) in 2014 and is continuing to pursue her interests in international environmental policy and sustainable development by emphasizing areas of research pertaining to U.S. and international greenhouse gas markets while leading RCE's expansion into the sustainability field. Jessica is certified in G4 Sustainability Reporting under the Global Reporting Initiative and in Product Life Cycle Accounting and Reporting under the World Resources Institute. Jessica has participated as a lead verifier for entity verifications such as universities and airports reporting under The Climate Registry and the Airport Carbon Accreditation program, landfill projects reporting under the Climate Action Reserve, renewable energy projects under the Verified Carbon Standard, and fuel switching projects under the Climate Investment Branch. She has also worked as a verification team member on various carbon offset projects and corporate greenhouse gas inventories, contributing to the preparation of and data analysis for verification documents following ISO 14064-3 standards and has received training on Mexico's General Law on Climate Change and National Register of Emissions (RENE).

Prior to her work at RCE, Jessica worked for Indiana University's Office of Sustainability (IUOS) where she was responsible for planning and implementing the campus-wide Fall and Spring Energy Challenges. While at IUOS, she developed a weatherization model to more effectively track and improve upon the electricity and water usage across campus. Her prior research experience includes performing cost-benefit analysis on heavy-duty Compressed Natural Gas (CNG) vehicles utilizing factors such as the Social Cost of Carbon (SCC) at Indiana University, developing a risk-assessment model for monitoring the underwater acoustical impact of the installation of offshore wind turbines on endangered species such as the North Atlantic Right Whale at the Department of Energy's Pacific Northwest National Lab (PNNL), and conducting Biophysics research on the thermal denaturation of the protein horseheart cytochrome *c* at Xavier University. Jessica presented her Biophysics research at the American Physical Society March 2012 conference in Boston, MA.

Experience

GHG Entity Verifications:

- Lead Verifier for Dallas/Fort Worth International Airport (DFW) 2014 and 2015, Phoenix Sky Harbor International Airport (PHX) 2015 and 2017, the Metropolitan Airport Commission 2015, Portland International Airport (PDX) 2013, Hillsboro Airport (HIO) 2013, and Portland – Troutdale Airport (TTD) 2013 reporting under the Airport Carbon Accreditation program. Also lead verifier for Port Authority of New York and New Jersey airports (LGA, JFK, EWR, TEB, SWF) for 2014 – 2016.
- Lead verifier for complete entity verifications under TCR including the Port of Portland, Stanford University, Yale University, Eastern Municipal Water District, Marin Sanitary Service, South San Francisco Scavenger Company, and Specialty Solid Waste and Recycling. Included assessment of GHG emissions from many facilities: cogeneration units, mobile sources, purchased electricity and steam, lab gases, HVAC systems, and office buildings.
- Team Member for facility GHG emissions inventory verifications under Massachusetts' Mandatory Greenhouse Gas Emissions Reporting Regulation including Specialty Minerals precipitated calcium carbonate manufacturing and various universities such as Harvard University. Included assessment of GHG emissions from the combustion of natural gas for electricity generation, the combustion of fossil fuels for stationary and mobile sources, and the production of precipitated calcium carbonate and lime.

GHG Project Level Verifications:

- Lead Verifier for the following landfill projects reporting under the Climate Action Reserve: Berkeley County Landfill Gas Project, Kimble Sanitary Landfill Gas Project, City of Thomasville MSW Landfill, Eagle Point Landfill, and Wolf Creek Landfill.
- Lead Verifier for the following projects reporting under the Voluntary Carbon Standard: Capricorn Ridge IV Wind Farm Project, Greensburg Wind Farm Project, and Clinton Landfill Gas Project.

Greenhouse Gas Consulting:

- Co-authored PowerPoint presentations given at the 2014 IETA Regina Working Session ("Snapshot of North America Offset Systems and Protocols"), the 2014 9th Session of the UNECE Group of Experts on Coal Mine Methane ("Overview of North American GHG Markets: Opportunities for CMM"), and the 2014 EPA Coalbed Methane Outreach Program Conference ("Summary of U.S. Coal Mine Methane Emissions & Available CMM Resources").
- Team member responsible for preparing the 2013 U.S. EPA active coal mine methane and 2013 U.S. EPA abandoned coal mine methane inventories.

Education

Indiana University, Master of Science in Environmental Science (Concentration in Energy), 2014

Indiana University, Master of Public Affairs, 2014

Xavier University, B.S., Biology (Minor in Environmental Science and Concentration in Physics), 2012

Publications

Carlson TJ, MB Halvorsen, S Matzner, AE Copping, and J Stavole. 2012. Monitoring and Mitigation Alternatives for Protection of North Atlantic Right Whales during Offshore Wind Farm Installation. PNNL-21959, Pacific Northwest National Laboratory, Richland, WA.

Copping AE, LA Hanna, RS Butner, TJ Carlson, MB Halvorsen, CA Duberstein, S Matzner, JM Whiting, KM Blake, and J Stavole. 2012. Environmental Effects of Offshore Wind Development. Fiscal Year 2012 Progress Report . PNNL-21852, Pacific Northwest National Laboratory, Richland, WA.

Work Experience

- Sustainability Manager & Environmental Scientist, Ruby Canyon Engineering, May 2014 – present
- Energy and Built Environment Intern, Indiana University Office of Sustainability (IUOS), May 2013 – May 2014.
- Research Assistant for Dr. Kerry Krutilla, Indiana University, August 2012 – May 2014.
- Department of Energy SULI Intern, Pacific Northwest National Laboratory (PNNL), May 2012 – August 2012.
- Research Assistant for Dr. Justin Link, Xavier University Department of Physics, January 2010 – May 2012.
- Summer Service Intern, Civic Garden Center, May 2010 – Aug 2010.
- Teacher, Great Lakes Science Center, May 2008 – December 2009

Volunteer Experience

- Adoption Coordinator, Cats League & Assistance of the Western Slope, May 2016 - Present
- Founder, Evanston Community Learning Center, June 2010 – May 2012
- Co-founder and Steering Committee Member, N.E.X.U.S. Community Garden, August 2009 – May 2012
- Intern, Cleveland Metroparks Zoo, May 2004 – August 2007

Nina Pinette
Staff Environmental Scientist

Summary

Nina Pinette is an environmental scientist at Ruby Canyon Engineering with experience in technical research, data collection and analysis, and report writing for qualifying greenhouse gas (GHG) emission inventories and reduction projects. Her recent activities include work on GHG inventories and carbon offset projects under both voluntary and compliance standards. Nina is versed in GHG emissions regulations in North America including the U.S. EPA's Mandatory GHG Reporting Rule; British Columbia's Greenhouse Gas Industrial Reporting and Control Act, Greenhouse Gas Emission Reporting Regulation, and Greenhouse Gas Emission Control Regulation; Ontario's Climate Change Mitigation and Low-Carbon Economy Act and Greenhouse Gas Emissions Reporting Regulation; California's AB 32; and Mexico's General Law on Climate Change. She contributed to EPA white papers on coal mine methane and the EPA active coal mine methane and EPA abandoned coal mine methane inventories.

Nina is a team member for RCE's GHG validation and verification work in U.S., Canadian, and Mexican carbon markets. She is skilled in developing verification and sampling plans, conducting risk assessments, and interfacing with clients and registries to resolve findings. She is a Lead Verifier for organizational verifications for the California Air Resources Board (ARB), British Columbia's Reporting Regulation, Ontario's Reporting Regulation, Mexico's National Emissions Registry (RENE), Mexico's Programa GEI, The Climate Registry (TCR), and the CDP program which include assessing GHG emissions from a variety of sources: industrial processes; mining operations; manufacturing; public-sector organizations including cities, universities, and utilities; pulp and paper production; waste sector; electricity generation and transactions; and transportation sector. Nina is also an accredited verifier for the Airport Carbon Accreditation (ACA) program. She is an ARB-accredited transactions specialist for electric power entities and fuel suppliers, an ARB-accredited Lead Verifier and Project Specialist for livestock, ozone depleting substances, and mine methane capture projects; a Lead Verifier for Nitric Acid Production, Ozone Depleting Substances, Coal Mine Methane, and Livestock projects under the Climate Action Reserve (CAR); a lead verifier for projects under the British Columbia offsets program; and a lead verifier for projects under Verra's Verified Carbon Standard (VCS).

Experience

<u>GHG Organizational Verifications</u>

- Lead verifier for GHG inventories under the California ARB: University of California San Francisco, University of California Santa Barbara, Imperial Irrigation District, Powerex Corp., Chapel Street Environmental, and Dow Chemical Company.
- Lead verifier for GHG inventories under TCR: Waste Connections, Sonoma County Water Agency, New York Power Authority, Port of Portland, Denver Water, Seattle City Light, University of California San Francisco, California Department of Water Resources, Rio Tinto's Kennecott Utah Copper, and Utah Transit Authority. Verifications included assessment of emissions from gas and coal-fired power plants, cogeneration units, mobile sources (light rail, commuter rail, busses), copper and gold mines, copper concentrator, refinery, smelter, landfills, wastewater treatment, transportation infrastructure, purchased electricity and steam, lab gases, HVAC systems, and office buildings.
- Lead verifier for GHG inventories under British Columbia's Reporting Regulation for Howe Sound Pulp and Paper Mill, Skookumchuck Pulp Mill, Powerex Corp., Chemical Lime, Neucel Specialty Cellulose Mill, and Quinsam Coal Corporation. Verifications included assessment of GHG emissions from quicklime production, biomass combustion, fossil fuel combustion by mobile and stationary sources, and fugitive methane emissions.

- Lead verifier for GHG emissions inventory verifications under Mexico's RENE including Mexico City, CFE power plants, PepsiCo vehicle fleet, and a large bus company.
- Lead verifier for GHG emissions inventories under CDP including Port Authority of New York and New Jersey which includes airports, marine terminals, ports, rail transit, tunnels, and bridges.
- Lead verifier for facility GHG emissions inventories under Mexico's Programa GEI.
- Peer Reviewer for airport verifications under ACA: Level 3+ - Dallas-Fort Worth International Airport; Level 2 - Phoenix Sky Harbor International Airport, Portland International Airport, Hillsboro Airport, Portland-Troutdale Airport; and Level 1: Minneapolis-St. Paul International Airport.
- Lead verifier for GHG emissions inventories under Massachusetts' Mandatory GHG Emissions Reporting Regulation including hospitals and universities—Mass General Hospital and MIT, Specialty Minerals precipitated calcium carbonate manufacturing, power plants, landfills, manufacturing operations, a U.S. Air Force Base, and an Irving Oil terminal. Verifications included assessing GHG emissions from fuel combustion for electricity generation, precipitated calcium carbonate and lime production, landfill fugitives, landfill gas and other biogas combustion, fugitive emissions from HVAC systems, process emissions from manufacturing, and combustion of fossil fuels by stationary and mobile sources.
- Lead auditor for Rio Tinto facilities to the EPA Mandatory GHG Reporting Rule: Kennecott Utah Copper, US Borax's Boron Operations, and Rio Tinto Alcan's Sebree Aluminum Smelter. Audits included review of emissions calculations and compliance with applicable subparts of the rule.

<u>GHG Project Verifications</u>

- Lead verifier and project specialist for verifications of GHG Offset Project Data Reports under California's Compliance Offset Program for ozone depleting substance (ODS) projects, livestock projects, and mine methane capture projects.
- Lead verifier for GHG verifications in U.S. carbon markets under The Climate Action Reserve (CAR): landfill projects, ozone depleting substance (ODS) destruction projects, nitric acid production projects, coal mine methane projects including a VAM project, and livestock projects.
- Lead verifier for GHG verifications in U.S. carbon markets under Verra's Verified Carbon Standard for landfill projects, a renewable energy project, and a clean energy and energy efficiency project.
- Lead verifier for GHG verifications in Canadian carbon markets for projects under BC's Climate Action Secretariat including greenhouse and sawmill fuel switching projects and a landfill project.

<u>GHG Consulting:</u>

- Contributor to Colorado Energy Office's report "Greenhouse Gas Neutrality Assessment of Coal Mine Methane and Waste-to-energy Pyrolysis Projects", June 2016.
- Co-author for presentations given at 2010 EPA Coalbed Methane Outreach Program Conference.
- Contributor to U.S. EPA active and abandoned coal mine methane inventories for 2009 & 2010.
- Contributor to EPA white papers: "Financial Incentives and Regulatory Oversight for U.S. CMM Recovery Projects" and "Coal Mine Methane: The True Unconventional Gas: A Survey of Issues Concerning Ownership, Control and Development of Emission Reduction Projects" and EPA presentation "Coal Mine Methane Projects and Major U.S. GHG Registries".
- Contributor for Project Descriptions and Monitoring Plans for the Voluntary Carbon Standard (VCS) projects including an Abandoned Mine Methane Recovery Project.

Education

Muhlenberg College, B.S., Environmental Science and Political Science, 2009

Work History

- Staff Environmental Scientist, Ruby Canyon Engineering, February 2010—present
- Conservation & Land Management Intern, Chicago Botanic Garden and the Bureau of Land Management, June 2009-January 2010
- Forest Research Technician, Cooperative Forestry Research Unit, University of Maine, May—August 2007

Zach Eyler
Vice President, Greenhouse Gas Programs

SUMMARY

Zach serves as Vice President for Ruby Canyon Engineering (RCE), utilizing his broad experience with greenhouse gas (GHG) programs and renewable energy to assist on a variety of work including GHG verifications, technical research and other client projects. In addition, he assists the company in understanding GHG regulations and policies across North America and internationally, using this knowledge to analyze potential new areas of growth. Specifically, Zach is helping lead Ruby Canyon's expansion into California's AB 32 cap-and-trade program, Canadian province GHG programs and into Latin America. Zach has completed a wide range of verification work for projects across registries (CAR, BC CAS, TCR, ACR) including landfills, livestock, oil/gas, coal mine methane, fuel switching, ODS, nitric acid production, and GHG entity inventories. Zach is currently an accredited Lead Verifier for the California mandatory reporting, Ontario mandatory reporting, CAR, BC CIB and ACR programs. Zach is also a California ARB accredited Lead Verifier and Project Specialist for livestock, ODS and mine methane capture projects.

Zach also leads RCE's involvement with the International Emissions Trading Association (IETA) in providing advice and comments on active GHG programs across North America. Zach has provided input on the design and structure of GHG programs in California, British Columbia and Ontario. Zach has also provided input on still developing programs, such as in Washington and Oregon.

Prior to joining Ruby Canyon, Zach worked at Element Markets since 2008 where he managed over 15 carbon offset projects, as well as conducting all GHG policy and regulatory analysis to support the company's trading activities and client relationships in the U.S. and Canada. He also served as a company representative on carbon offset working groups including the Coalition for Emission Reduction Policy (CERP) and the Canadian Industry Provincial Offsets Group (IPOG).

EXPERIENCE

<u>GHG Entity Verifications:</u>

- Lead Verifier and Independent Reviewer for California ARB mandatory GHG reporting verifications for 2015-2018
    - Verifications included power generation, general stationary combustion and manufacturing facilities
- Lead Verifier and Independent Reviewer for Ontario mandatory GHG reporting verifications for 2015-2018
    - Verifications included power generation, stationary combustion and a petrochemical facility.
- Lead Verifier and Independent reviewer for Mexico's RENE GHG reporting verifications for 2017-2018
    - Verifications included power generation (Federal Electricity Commission (CFE) power plants), glass production facilities, manufacturing and transportation companies.
- Lead verifier for complete entity verifications under The Climate Registry (TCR) for Virgin America and Utah Transit Authority. Verification included assessment of GHG emissions from aircraft, mobile sources (light rail, commuter rail, busses and vans), transportation system infrastructure, and office buildings.

GHG Project Level Verifications:

- Lead verifier for GHG verifications in U.S. carbon markets under the Climate Action Reserve (CAR) for multiple project types: landfill, ozone depleting substance destruction, nitric acid, and livestock.
- Lead verifier for GHG verifications in Canadian carbon markets for projects under the British Columbia carbon offset program (CIB/PCT) including fuel switching projects.
- Lead verifier for Canadian Standards Association
- Lead verifier for GHG verifications under the California Air Resources Board (ARB) compliance offset program for livestock methane, ozone depleting substance destruction, mine methane capture and forestry projects.
- Lead verifier for GHG verifications in the Regional Greenhouse Gas Initiative (RGGI) program and completed the first-ever RGGI offset project verification for a landfill in Maryland.
- Lead verifier for GHG verifications under the American Carbon Registry program.

GHG Consulting:

- Offset protocol development for CARB (compliance) coal mine methane protocol in 2012
- Lead efforts to develop CAR (voluntary) Mexico ODS destruction protocol in 2015
- Consulting with Fiscalini Farms for compliance livestock project with the California ARB offset program
- Consulting with Vessels Coal Gas for voluntary and compliance mine methane capture projects at active underground and abandoned mines for the California ARB offset program
- Consulting with Refrigerant Exchange for ODS destruction projects under the California ARB offset program
- Consulting for the completion of Alameda-Contra Costra Transit District's GHG inventory under TCR

AUDIT CERTIFICATION / REGISTRATION PROGRAMS

- ARB Lead Verifier and Project Specialist for Livestock, Ozone Depleting Substances and Mine Methane Capture project types
- CAR Lead Verifier Landfill, Livestock, Ozone Depleting Substances, Nitric Acid, and Nitrogen Management Project types
- TCR Lead Verifier for GHG inventory reporting
- BC CIB Lead Verifier for fuel-switching and Landfill project types
- Lead Verifier for California GHG mandatory reporting
- Lead Verifier for Ontario GHG mandatory reporting
- Lead Verifier for Mexico RENE mandatory reporting

EDUCATION

North Carolina State University, B.S., Environmental Technology, 2005
Duke University, Masters of Environmental Management, Energy & the Environment, 2008

WORK HISTORY

- Vice President, Ruby Canyon Engineering, March 2015 - Present
- Project Manager, Ruby Canyon Engineering, March 2012 - March 2015
- Director, Element Markets, 2011 – 2012
- Manager, Element Markets, 2010 – 2011
- Analyst, Element Markets, 2008 – 2010

Emily Schosid

Sustainability Planner and Coordinator, University of Denver

Summary

Emily Schosid currently serves as the Sustainability Program Coordinator at the University of Denver, after serving as the Campus Sustainability Planner for Virginia Tech and as a Sustainability Coordinator at the Yale School of Forestry and Environmental Studies and at the University of Colorado Boulder. Her work in these capacities has focused on educating campus communities about sustainable best practices on a personal level, long-range campus planning to reach aggressive institutional sustainability goals, and collaborating with campus and community partners to bring a diverse audience to the table and increase our collective impacts. Emily has assisted in writing several campus-level and municipal carbon action plans looking at 3-year, 7-year, and 30-year time horizons, as well as several sustainability plans for private businesses and business districts. Her work has focused on incorporating a diverse community perspective through qualitative data collection and coding, which allows for a much richer understanding of how carbon action plans can work to improve the quality of life of those impacted by it.

Emily holds a Masters in Environmental Management from the Yale School of Forestry and Environmental Studies, where she focused her thesis research on creating sustainable communities from an inter-personal perspective. She did extensive research on how to facilitate a meaningful conversations with diverse stakeholders, understanding the cultural trends that feed sustainable behaviors, and how to make complex science accessible to laypeople. While working on her BA in Environmental Studies at the University of Colorado Boulder, she focused on public perceptions of climate science and how alternative presentations – such as art or theatre – can be used to bring communities together to understand and solve the complex issue of climate change. Emily is also set to finish an MS in Marketing from the University of Denver in March 2018, where she has focused on how marketing principles can be applied to sustainability education in community-based contexts.

Experience

Climate Action Planning

- Collaborating with the University of Denver Sustainability Council to transition DU from an expired three-year Climate Action Plan to a CAP that addresses 2025 and 2050 Carbon Neutrality goals in short- and long-term steps.
- Assisted with the research for and creation of the Town of Blacksburg's Climate Action Plan as part of the CAP Advisory Committee. Reviewed and gave feedback at each step while identifying next steps. *http://www.blacksburg.gov/home/showdocument?id=5773*
- Worked with campus partners to transition Virginia Tech from its expired three-year Climate Action Plan to a dynamic plan based on the Association for the Advancement of Sustainability in Higher Education (AASHE) Sustainability Tracking, Assessment, and Rating System (STARS) protocol.

Sustainability Planning

- Develop new programming at the campus- and community level to help organizations reach their sustainability and carbon neutrality goals, including a green business certification for the Town of Blacksburg, a tailgate recycling program for Virginia Tech and off-campus partners, and Internship Programs for Virginia Tech and the University of Denver.
- Provide waste system analyses for organizations at the building- or campus-level, and develop recommendations for improving diversion rates through community education, infrastructure, and marketing campaigns.
- Provide energy system analyses at the individual level for homeowners – in Boulder County - and renters – in the City of Denver - and develop recommendations for improving energy efficiency and reducing demand.

Creating Sustainable Communities

- Partnered with the Town of Blacksburg Sustainability Office to present the Sustainability Week annual programming, which showcased efforts taken by the campus and the town to create a sustainable community. This was recognized at the state level by the Governor's Environmental Excellence Awards (Bronze) and at the National Level by the US Green Building Council Best of Green Schools awards.

Education

- University of Denver, MS, Marketing, 2018
- Yale School of Forestry and Environmental Studies, MAS, Environmental Management, 2012
- University of Colorado Boulder, BA, Environmental Studies, 2009

Work History

- Sustainability Program Coordinator, University of Denver, 2016-Present
- Campus Sustainability Planner, Virginia Tech, 2013-2016
- Sustainability Coordinator, Yale School of Forestry and Environmental Studies, 2010-2012

EcoAction Partners 2019 Proposal to Update the Town of Mountain Village Corporate & Community Greenhouse Gas Emissions Inventory & Report

Table of Contents

Greetings!

EcoAction Partners is pleased to provide the following proposal to Update the Town of Mountain Village Corporate and Community Greenhouse Gas Emissions Inventory and Report.

EcoAction Partners has appreciated the long and successful working relationship with the Town of Mountain Village for well over a decade. And with that, EcoAction is pleased to provide this proposal so Mountain Village can meet the Compact of Mayors compliance requirements which include: 1) creating a greenhouse gas emissions inventory, 2) setting an emissions reduction target, and 3) developing a climate action plan.

The primary focus of this proposal is for Item One (1): Creating the Mountain Village Greenhouse Gas Emissions Inventory for both the Corporation of the Town of Mountain Village and the Mountain Village Community. EcoAction Partners' current Mountain Village Community Greenhouse Gas Inventory follows the Global Protocol for Cities, which also meets the Inventory Protocol for the Compact of Mayors. This includes tracking: stationary energy use, transportation energy use (ground and air), waste, wastewater, and fugitive emissions. Mountain Village's current GHG Inventory data and analysis are comparable and compatible with EcoAction Partners regional GHG Inventory analysis. EcoAction Partners proposes to continue to update the separate Mountain Village Corporate (previously Government) Energy Use & GHG Emissions Report, the emissions of which are included within the Community Inventory, but are separately and more-intensively analyzed in this dedicated report.

To meet the other requirements for the Compact of Mayors, EcoAction Partners invites Mountain Village to participate in the regional process for (2): setting emission reduction targets (that are currently proposed on page five), and (3): Updating the regional Climate Action Plan.

In addition to the Mountain Village Community Greenhouse Gas Emissions Inventory and the Mountain Village Corporate Energy Use & GHG Emissions reports, EcoAction proposes supplementary services that are available "ala carte" to best meet Mountain Village's needs. Finally, EcoAction would welcome the opportunity to work with Mountain Village communications & marketing staff to develop the GHG Inventory report in-house in an attractive, concise, easy-to-read report that outlines the GHG emissions baseline, targets and reduction plan. Or if preferred, EcoAction welcomes working with another contractor to assist in developing a Mountain Village Climate Action Plan.

EcoAction Partners brings our 10+ years of experience working with all the municipalities, utility providers and citizen groups in San Miguel and Ouray Counties on Greenhouse Gas Emissions and energy reduction programs to this proposal. Thank you very much for your consideration!

Heather Knox
EcoAction Partners Executive Director

EcoAction Partners' Consultant Qualifications:

Since our inception in 2006, EcoAction Partners (previously The New Community Coalition) has worked closely with Mountain Village toward increasing sustainable practices and reducing Greenhouse Gas emissions. Mountain Village, along with Telluride and San Miguel County, was a founding member of our organization, which was created to serve as the regional solution so each government did not have to have its own environmental sustainability department.

In 2009, EcoAction Partners secured a 4-year block grant from the previous Colorado Governor's Energy Office to support the New Energy Economy and advance energy efficiency and renewable energy in our region. To facilitate this grant, EcoAction formed the Sneffels Energy Board (previously the Western San Juan Community Energy Board), with all governments within Ouray and San Miguel counties, as well as utility partners (SMPA & Black Hills), businesses and citizens. The vision of Sneffels Energy Board is to preserve our clean air, water, and environment for future generations. The Sneffels Energy Board has met quarterly since 2009, and continues to meet today, to collaborate on setting and accomplishing regional sustainability goals, reducing consumption of valuable natural resources through project implementation, sharing information from the Colorado statewide sustainability network, researching successful programs from other communities as possible models to implement locally, providing community outreach and engagement, and addressing policy barriers on both a local and state level. Advantages of this regional approach include a stronger voice to influence political change, combined resources and greater economy of scale to apply for and implement grant programs, and sharing of experiences across the region. EcoAction continues to lead the Sneffels Energy Board and track regional progress towards reducing greenhouse gas (GHG) emissions and other sustainability practices.

As part of this grant, EcoAction Partners led the Sneffels Energy Board through the creation of the collaborative regional Sustainability Action Plan, (STRATEGY), completed in 2011. This Collaborative Sustainability Action Plan for Ouray & San Miguel Counties 2010-2020 is essentially a Climate Action Plan* to guide multi-jurisdictional energy action planning and collaboration to effectively manage energy resources and meet energy, transportation fuel, water, and waste reduction goals. The plan provides a mission, guiding principles, goals, objectives, and action items. This guide used the findings collected by EcoAction Partners on regional energy use, regional governments and utility partner input, and information from collaborative planning meetings. The Sustainability Action Plan prioritizes the greatest opportunities for sustainability initiatives and provides a methodology for ongoing collaboration. Since 2010, regional governments and communities have developed a strong understanding of the factors influencing use of our resources and have made progress to increase energy efficiency, decrease water consumption, increase local renewable energy, increase waste diversion and provide community outreach and education to increase participation in energy and water reduction efforts.

***Note:** At the time of development, the term "Sustainability Action Plan" was determined to be more agreeable and versatile regionally than "Climate Action Plan" since a portion of the population in the region, including some elected officials, did not believe in climate change.

Sustainability Action Plan Objectives:

- Community Engagement: Policy decisions & public visual measure of progress.
- Energy Consumption: Decrease per-capita energy consumption 20% by 2020.
- Renewable Energy: 20% of the region's electricity from renewable energy by 2020.
- Transportation: Reduce energy consumed per capita by ground and air travel.
- Water: Decrease water consumption by 10%
- Landfill Waste Reduction & Recycling: Divert 75%
- Agriculture & Forests: Utilize regional natural resources wisely, increase local food production.

In part because of the successful working group of the Sneffels Energy Board, EcoAction Partners was awarded a second grant to develop a baseline Greenhouse Gas Inventory for our region of San Miguel and Ouray Counties. Each of the main jurisdictions in the region (including Mountain Village) contributed $1,000 as matching grant funds for this inventory. This regional inventory was preferred by the Sneffels Energy Board, over each jurisdiction contributing $6,000 to obtain its own GHG Inventory.

This regional inventory was developed by the University of Colorado at Denver with data collection and assistance from Kim Wheels. Since the initial inventory was created, Wheels has managed and updated our region's GHG data, as well as creating and updating jurisdiction-specific inventories upon request and with adequate financial support. Gathering and analyzing our region's Greenhouse Gas emissions data has been an essential service that EcoAction Partners has provided to Mountain Village and our other government partners since 2010. As part of this process, EcoAction Partners has also analyzed and presented community-wide utility use for Mountain Village, including electricity, natural gas, and water use.

The creation of the Greenhouse Gas Inventory has allowed the Sneffels Energy board to have a baseline to track progress toward regional GHG emission reduction goals. In 2009, Mountain Village (along with Telluride, Norwood, Ophir, & San Miguel County) had adopted a goal to reduce GHG emissions 20% by 2020 from 2005 levels. Prior to this process, however, not all of our local governments were tracking their own government energy usage, let alone community-wide emissions. In addition, our utility companies did not have an easy methodology of providing data on utility use for the region, as it had never been requested before and their software had not been designed with this form of analysis in mind. GHG activity data had not been collected from other sources either, so this initial effort took a great amount of collaboration and participation by many partners. Thus, with the development of this baseline inventory, a methodology for activity data collection was established and all jurisdictions now have a 2010 baseline from which to track progress toward the goals in the Sustainability Action Plan, as well as their own governmental GHG emissions.

Since tracking began, regional governments have made significant progress in reducing their GHG emissions through energy efficiency projects of all government buildings and facilities, renewable energy projects, and Renewable Energy Credit (REC) purchases. Initially government energy emissions were approximately 3% of our overall GHG emissions. The most recent data (2018) shows regional government energy emissions are now 1.2%. Mountain Village government overall GHG emissions are 14% lower (2018) than the 2010 baseline levels.

Governments are making progress and leading the way, but in order to achieve community-wide GHG emissions reduction goals, the entire community must participate and make progress. Region-wide & per community, over 50% of emissions are associated with building energy use (electricity and natural gas), with the rest of the emissions resulting from vehicle transportation, airplane travel, food, and waste along with other consumptive uses. Annual analysis of community emissions by EcoAction Partners and the Sneffels Energy board has helped prioritize successful programs to engage the entire community.

In 2018 EcoAction was contracted to create a Mountain Village Community GHG Inventory and report with 2017 data, using the regional GHG Inventory methodology. The regional inventory was updated then, as it had been over previous years, to maintain consistency with the Global Protocol for Community-Scale Greenhouse Gas Emission Inventories. EcoAction received support from LEIF, LLC, the firm that holds the copyright for the GHG Inventory software used, to ensure the software methodology and emissions factors were up-to-date with the GPC. This is the protocol followed by the Global Compact of Mayors (and the Global Covenant of Mayors) and includes tracking of: stationary energy use, transportation energy use (ground and air), waste, wastewater, and fugitive emissions. To develop the initial Mountain Village GHG Inventory, EcoAction Partners led a meeting of partners within San Miguel County, to discuss the allocation of regionally-shared resources, and the challenges associated with accurately splitting some of these. Addendums to the report identify this breakdown of SMC regional resources and the “Bases for data & calculations”.

The 2017 & 2018 Mountain Village Community GHG reports include energy use analysis, benchmark comparisons to similar communities and an explanation of the challenges of benchmarking accurately, and recommendations developed with staff and Green Team for achieving GHG reduction. EcoAction Partners presented the analysis to Town Council in December of 2018, and an updated version in October 2019, with 2018 data. These reports are attached for reference in Addendum A.

Additionally, since Deanna Drew’s departure from Mountain Village town staff, EcoAction Partners has been contracted by Mountain Village to update the Mountain Village government (now termed “Corporate”) “Energy Use and Greenhouse Gas” reports for 2017 & 2018. At the direction of Town Council and the Green Team, the report on 2018 government energy use included additional analysis completed in collaboration with Town Staff.

Now with 2020 impending, EcoAction Partners and the Sneffels Energy Board will be reviewing progress and updating our regional Sustainability Action Plan (Climate Action Plan) and updating GHG reduction goals. Proposed goals are in agreement with the newly adopted State of Colorado goals as follows:

- 26% reduction by 2025
- 50% by 2030
- 90% by 2050

These are the goals included in Colorado Communities of Climate Action (CC4CA), which the Town of Mountain Village adopted as part of the CC4CA Policy Agenda 2018-2019 in August 2019. This defines greenhouse gas (GHG) reduction targets as more than a 26% reduction by 2025, using 2005 as the baseline year for achieving this goal. EcoAction Partners recommends continuing to use 2010 as the baseline due to unavailability of previous years' GHG activity data.

Additional Actions/Experience:

In 2008, EcoAction Partners supported the development of the Zero Waste Action Plan (ZWAP) for the Town of Mountain Village to adopt, which outlines the Town's commitments to energy and climate protection, as well as resource conservation and waste management, water management, toxin reduction and community education and engagement.

Here is an excerpt introducing this report that EcoAction Partners (previously New Community Coalition) initiated: *"Gary Liss & Associates (GLA) wrote this Plan, with funding provided by the Town of Mountain Village and The New Community Coalition. GLA would like to acknowledge the leadership of Kris Holstrom and The New Community Coalition, who recognized the need for this Plan. Kris made all the arrangements to engage our firm, showed us all the existing facilities and services for solid waste, reuse and recycling in the area, and convened meetings with Town Councils of both Telluride and Mountain Village and with the community and stakeholders in the area. Through this extensive engagement process in February 2008, GLA obtained the information needed to develop this Plan. In addition, GLA obtained significant information from the San Miguel County Sustainability Inventory Prepared by ICLEI (Local Governments for Sustainability U.S.A.) in 2006."*

In 2007 & 2008, EcoAction Partners led a multi-jurisdiction effort among building departments to support development, adoption and implementation of consistent green & energy efficient building codes. Mountain Village and San Miguel County adopted a progressive code in 2008, and Telluride & Ridgway adopted revised versions in 2009. These building codes focused on reducing heat loss, energy efficiency measures, and required larger homes to comply with increasingly energy efficient standards. In addition, Mountain Village adopted the REMP program (modeled off of other mountain resort community programs) to address exterior energy use. Mountain Village has since updated to the 2012 IECC, maintaining progressiveness incorporated into the 2008 code. These energy efficiency codes help reduce the energy use & resulting GHG emissions associated with newly constructed buildings that last through the lifetime of each structure.

A calculation to assess the GHG emissions savings associated with the Gondola Transportation System was requested by town council & completed by EcoAction Partners based on 2010 gondola use.

In 2014, EcoAction Partners championed a new program with San Miguel County, called SMC Green Grants, modeled after the REMP program from Aspen, CO. The SMC Green Grants program used a one-time energy impact fee of $100K to demonstrate how building permit fees could be used tenfold to reduce Greenhouse Gas Emissions. SMC Green Grants funded a total of 18 projects that reduced GHG emissions 750 mt-CO2e annually for the life of the projects and included funding $12K to Mountain Village to upgrade the Gondola Terminal lighting to LED lighting, for an estimated annual energy savings of 130,000 kwh/year (approximately 8% of gondola's total electricity) which equates to approximately 143 mt-CO2e saved annually. Overall, the SMC Green Grants proved to be a successful way to reduce energy and GHG emissions within the community. Telluride initiated the Telluride Green Grants Program in 2019 with their REMP funds, and contracted with EcoAction Partners to administer the program for the community.

In 2015, Mountain Village Council member, John Howe, was the representative on EcoAction Board. He championed a new LED light bulb program to utilize the SMPA rebate and a government match on sales to encourage community members to switch to LEDs. EcoAction saw the success Mountain Village had with this program and took it on for the region. EcoAction has operated the Greenlights LED Program for the region since 2015 (including Mountain Village since 2016) selling a total of over 15,500 bulbs, reducing approximately 275 mt-CO2e of GHG emissions annually.

In 2017, EcoAction Partners released our EcoAction Report with 7 years of GHG Inventory Data & a program update. This report is an example of a similar report EcoAction would welcome producing with the Mountain Village Communications & Marketing team, or provide data & information for a report and climate action plan to be produced with another contractor.

In 2018 & 2019 EcoAction Partners calculated the GHG benefits of the Mountain Village Farm-to-Community program for reporting on the results of the program and to support continuation.

EcoAction Partners Leadership Team Bios:

Full resumes provided in **Addendum B**

Kim Wheels

Kim Wheels is the Energy Specialist for EcoAction Partners since the organization's inception in 2007. In this role she coordinates the regional Sneffels Energy Board, comprised of elected officials, government staff, utility representatives, and community citizens of Ouray and San Miguel Counties. This Board established a regional Sustainability Action Plan in 2011 and adopted goals to reduce energy use and increase renewable energy, reduce landfill waste, and achieve other sustainability objectives. Kim tracks the regional GHG emissions annually, and presents on progress toward reaching goals to the governments and communities. She also works to engage the community members and businesses in participating in EcoAction's programs to reduce carbon emissions and assists the building departments with maintaining updated Building Energy Codes.

Kim holds a B.S. in Mechanical Engineering from Worcester Polytechnic Institute in Massachusetts, which she followed with over 8 years of experience as a Mechanical Engineer with power and design engineering firms. She acquired her professional engineering license in 2002, and has completed courses in renewable energy and green building design with Solar Energy International. Upon first moving to Colorado, she worked with Resource Engineering Group in Crested Butte, CO incorporating energy efficiency, renewable energy systems, and sustainable design practices into the design of mechanical systems for homes and commercial buildings. Currently, in addition to her efforts with EcoAction Partners, she owns an energy services business (Lotus Energy Solutions) that provides Home Energy Ratings, energy audits, and other energy consulting services throughout the region.

Heather Knox

Heather Knox graduated with a B.A. from Colorado College, and settled in Telluride/Mountain Village in 1995. Heather worked for Mountain Village Metro District (the pre-cursor to the Town of Mountain Village) in a variety of roles including executive assistant for the soon-to-open Telluride Conference Center, then as a group coordinator/manager, and ultimately promoted to the position of Director.

Under Heather's leadership she was able to cut the annual tax payer subsidy for the Telluride Conference Center by 82% ($750K+). Heather finished her career for Mountain Village as the Director of Economic Development, which managed the Telluride Conference Center, the Guest Services Department, marketing & homeowner communications, and MV events and economic incentive grants.

Following this, for 6 years, Heather was the Executive Director of the Palm Theater, helping the Palm transition from a generous annual contribution for the naming of the theatre to self-sufficiency. Heather brought in a successful after-school dance program under a new non-profit, Palm Arts.

Heather followed her passion in 2013 and began working in environmental stewardship as the Executive Director of EcoAction Partners in 2014. EcoAction Partners mission is to track the region's Greenhouse

Gas emissions and implement programs to reduce energy and waste. This work is extremely meaningful. Heather is a member of the State of Colorado Pollution Prevention Advisory Board Assistance Committee, overseeing CO Recycling Resources Economic Opportunity grants and rebate programs with annual grants/rebates of $7.6 million. Heather also serves on the SMART (San Miguel Authority for Regional Transit) Community Advisory Committee.

Olivia Pedersen:

Currently working as a Freelance Graphic Designer, Olivia is studying to get her Masters in Sustainability. Through her studies Olivia has learned about sustainable frameworks & certifications and how to apply them to program development, product design and business models to build sustainable futures. Originally from Telluride, and having returned after a whirlwind of experiences, Olivia and EcoAction Partners are happy to have found one another. Olivia appreciates the work of EcoAction Partners for the vast amount of initiatives and programs EcoAction provides for bettering the region.

Olivia's graphic design background, allows her to prepare stimulating presentations with visuals and infographics that powerfully communicate programs and summarize results.

Personnel Billing Rates:

Name:	Position:	Rate:
Heather Knox	Executive Director	$85
Kim Wheels	Energy Specialist	$85
Olivia Pedersen	Graphic Designer	$65

References:

Town of Telluride:
Karen Guglielmone
970.728.0190
KGuglielmone@telluride-co.gov
Mayor: Delanie Young
dyoung@telluride-co.gov

Sneffels Energy Board:
Acting Chair: Todd Brown
970.708.7916
tbrown@telluride-co.gov

San Miguel County:
Kris Holstrom
970.708.0289
krish@sanmiguelcountyco.gov

Detailed Proposal of Tasks & Costs

	Cost	Timeline	Personnel
1A. MV Community GHG Inventory Tasks	$2,720		
Activity Data - gathering for the MV Community-wide Inventory - Activity data gathering across regional partners who provide it. This is part of the annual regional GHG Inventory update. Some transportation data is now only potentially available through the state. - Emissions factor update (electricity & natural gas) is part of the annual regional GHG Inventory update - Manipulation of data for use in GHG Inventory software	$1,020	January - May; timeframe varies based on response time from partners	K. Wheels
GHG Inventory - calculation & analysis of GHG emissions - activity data entry into software that has been developed by EcoAP for MV-specific GHG Inventory analysis of 2017 & 2018 data - Outcomes include: Calculated emissions data; anaylsis with pie charts - Benchmark review for all GHG sources; comparison to San Miguel County & Telluride Inventories for 2019	$680	providing Activity Data	K. Wheels
Utility Use analysis (charted over time, from baseline of 2010) - Electricity - reviewed for accuracy & charted to display different sources of electricity* *Regional electricity analysis process includes working with SMPA to obtain updated emissions value; Tri-State supply mix; & SMPA program data (community solar farm, net-metered system data, & Green Program RECs) - Natural gas - reviewed for accuracy, analyzed with number of accounts & performing temperature-normalized analysis - both of the above analyzed with respect to external factors: population (visitor & census), economy (new construction), weather (temperature & snowfall) - Water & Wastewater use (part of regional process) - analyzed over time, compared to regional communities, & benchmarked per capita & visitor population **TSG utility use can be separated from Community Use as done in past years for analysis purposes, upon request & when data necessary is provided by TSG	$1,020	April	K. Wheels
MV-Specific Transportation analysis - support to another contractor to help with this analysis - Analysis of MV-specific transit, CDOT, vehicle and other data available to determine a more accurate vehicle-related GHG emissions value. Incorporatation of results into GHG Inventory software service above	$680	contractor dependent	K. Wheels
Update the gondola-related transportation savings calculation, originally performed in 2010	$340	February-March	K. Wheels
MV Community GHG Inventory Report - MV benchmarks to SMC, Telluride, Telluride&MV combined, & Aspen (GHG values only available) - similar to 2017 & 2018 GHG reports developed - presentations & meetings with Green Team & Council - incorporation of recommendations developed in discussions with MV staff, Green Team, and from Sneffels Energy Board update of the regional Sustainability Action Plan	$2,550	May - June	K. Wheels with support from H. Knox & review by EcoAP Board
*Optional graphic design formatting of the report	$1,040	June	O. Pederson
Meetings & discussions to support any of the above tasks / services, if awarded to any other RFP awardee. To be billed hourly ($85/hr), as needed.			K. Wheels
1B. MV Corporate (previously termed Government) Energy Use & GHG Inventory Report* **- report format created by Deanna Drew, EcoAP began updating with 2016 data** ***note the corporate energy use & emissions are included within the total MV Community GHG Inventory. This report is an additional detailed analysis to support corporate emissions reduction.** Spreadsheets of monthly utility data fro 2010 through 2019 provided by MV staff Annual water & wastewater data collected separately through regional GHG Inventory process. Charts including 2019 data created - use & cost - electricity, natural gas, fuel, water, & CO2 emissions. Analysis of 2019 use performed with support & collaboration of MV staff Tracking of progress of all utility uses toward 20% by 2020 goal from 2010 benchline - incorporation of recommendations developed in discussions with MV staff, Green Team, and success stories from other jurisdictions as applicable	$2,720		K. Wheels with support from H. Knox & review by EcoAP Board
*Optional graphic design formatting of the report	$520		O. Pederson
2. Emissions Target Setting - regional review & update with Sneffels Energy Board: In 2020 EcoAction Partners will lead the Sneffels Energy Board through a review of progress toward reaching goals established in the regional Sustainability Action Plan. The adoption of new goals in accordance with CC4CA's statewide goals will be considered and discussed. (included in MV Sneffels Energy Board support of $1500)	$0	Jan-June	K. Wheels
3. Climate Action Planning - 2020 update of Regional Sustainability Action Plan with Sneffels Energy Board. In 2020 EcoAction Parters will lead the Sneffels Energy Board through the process regional Sustainability Action Plan progress review & update during 2020. (included in MV Sneffels Energy Board support of $1500) - Support CAP contractor in gathering & hosting MV stakeholder meetings for MV-specific CAP process - Provide support to any CAP contractor, with historical information regarding goals adopted, accomplishments, studies performed, and all other sustainability-related activities accomplished by or pertaining to MV since MV's participation in creating EcoAP in 2006	$1,700 $0 $1,020 $680	Thru 2020: Sneffels Energy Board sets timing contractor dependent	K. Wheels
Total of proposed services:	$12,270		

Addendum A

Mountain Village 2017 Greenhouse Gas Inventory Report

Prepared by EcoAction Partners
for the Town of Mountain Village

December 18, 2018

Overview:
In 2018, the Town of Mountain Village contracted with EcoAction Partners to create a Mountain Village-specific Greenhouse Gas Inventory. Working from the baseline regional San Miguel and Ouray County GHG Inventory that EcoAction Partners manages and updates annually, EcoAction Partners modified the calculations to focus on Mountain Village specific data to create the results shown in this report.

History:
The regional GHG Inventory was initially developed by the University of Colorado at Denver with data collection input from EcoAction Partners. It was funded through a matching grant in which Mountain Village, Telluride, San Miguel County, Ridgway, City of Ouray and Ouray County each contributed $1000. The calculations are in accordance with ICLEI protocol established by 2010. Since then it has been updated to align with the subsequent "Global Protocol for Community-Scale Greenhouse Gas Emission Inventories".

Mountain Village adopted a goal to reduce overall GHG emissions 20% by 2020, from 2005 baseline levels, however our regional GHG and energy-use baseline began to be tracked in 2010. Thus progress toward this goal is determined based on data from 2010 forward.

Shared regional resources:
As part of the analysis, Mountain Village desired clear understanding of how GHG emissions associated with shared regional resources were allocated between jurisdictions. Thus, EcoAction Partners created a summary of how these resources have been allocated in the past and coordinated a meeting of representatives from Mountain Village, Telluride, San Miguel County, and Telluride Ski & Golf, to review and discuss allocations for each of these resources. The agreed-upon outcome for each of these are detailed in Appendix A. The resources discussed include:

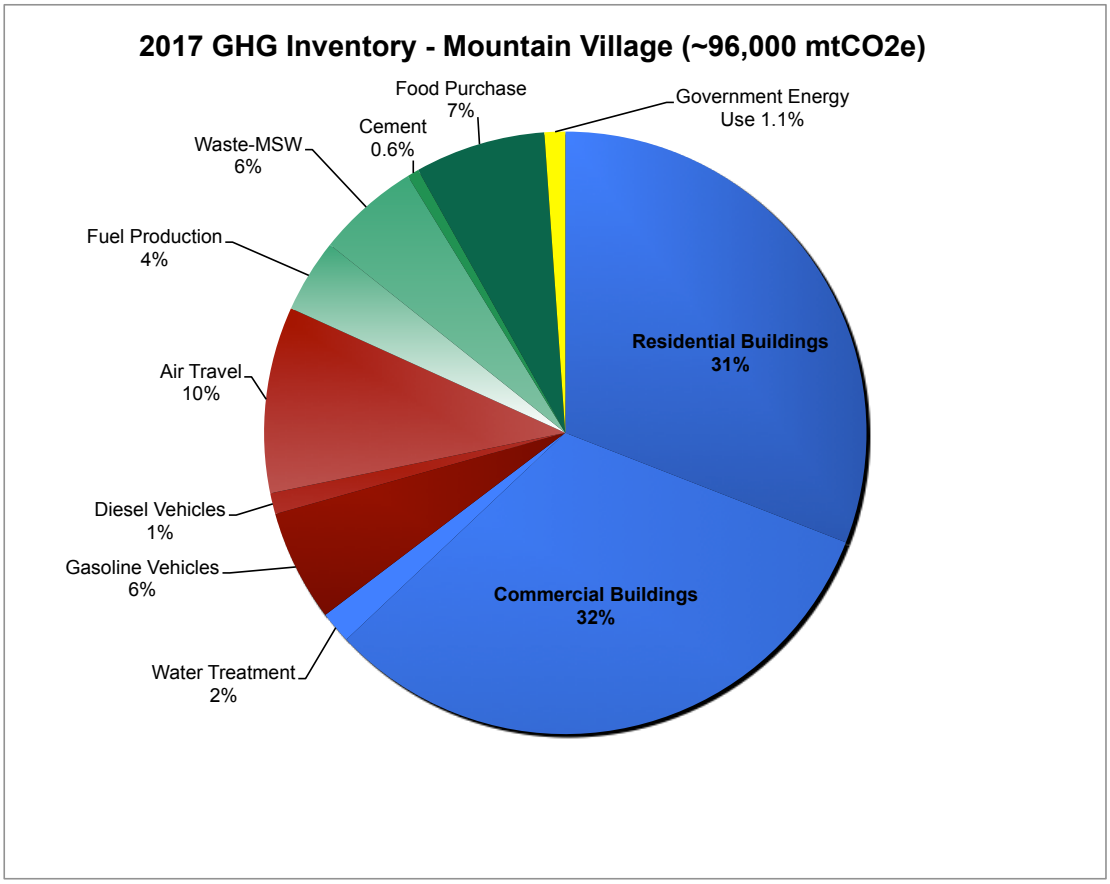
- Regional airports
- Waste Water Treatment Plant
- Gondola
- Telluride Ski and Golf's utilities including water use
- Festivals
- Transit services

2017 Mountain Village GHG Inventory Results
Mountain Village's total GHG emissions for 2017 were approximately 96,000 mtCO2e (metric tons of carbon dioxide equivalent).

Equivalencies:

- 96,000 mtCO2e is equivalent to over 105,000,000 pounds of coal burned.
- 96,000 mtCO2e is also equivalent to the energy used by 10,366 average U.S. homes in one year. (MV has 1675 residences)
- 96,000 mtCO2e is the amount of carbon that can be sequestered by just over 113,000 acres of U.S. forests in a year.

The detailed pie chart below breaks those emissions down per category, explained further below the pie chart. See Appendices for more detailed explanation of allocation per jurisdiction and calculation methodologies.



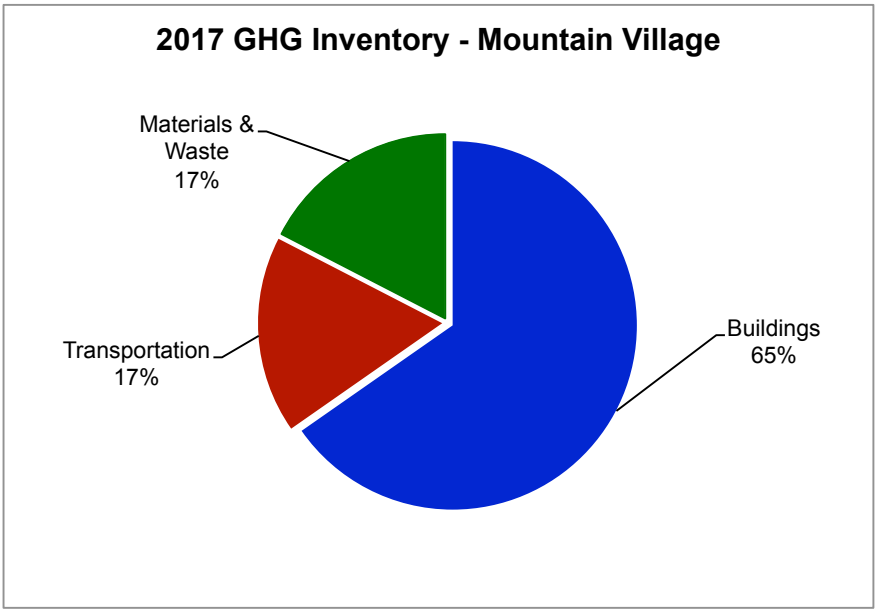
- Government Energy Use – Electricity and natural gas use by Town of Mountain Village government, including building energy use, streetlights, town plaza snowmelt, and other exterior uses. Note: Gondola electricity use is 100% offset by SMPA Green Blocks, so Gondola electricity use does not contribute to GHG emissions. Gondola natural gas use does contribute toward TMV GHG emissions.
- Residential Buildings – electricity and natural gas use for homes, including exterior lighting, snowmelt systems, and patio fireplaces. Renewable electricity associated with net-metered solar systems, SMPA solar farm purchases, and Green Blocks offsets decrease the emissions associated with residential building emissions.
- Commercial Buildings– electricity and natural gas use for commercial buildings and other use, including exterior lighting, snowmelt systems, patio fireplaces, and Mountain Village ski area operations. Renewable electricity associated with net-metered solar systems, SMPA solar farm purchases, and Green Blocks offsets decrease the emissions associated with commercial building emissions.

- Water Treatment – Electricity used by Town of Mountain Village for treatment and pumping of water
- Gasoline Vehicles – Emissions from gasoline vehicles
- Diesel Vehicles – Emissions from diesel vehicles
- Air Travel – Emissions associated with airplane fuel & enplanements at Telluride Airport & Montrose Regional Airport. (for allocations, See Appendix A)
- Fuel Production – Processing emissions associated with gasoline and diesel fuel before the fuel enters vehicles
- Waste – Emissions associated with Municipal Solid Waste taken to landfill to decompose
- Cement – Emissions associated with cement for Mountain Village, based on Colorado's total economy
- Food Purchase – Emissions calculated based on Mountain Village's total population of census and visitors

Additional Items:
These items contribute to reducing MV's GHG emissions and are incorporated into the overall total calculated value of 96,000 mtCO2e:

- Open Space Carbon Sequestration – Mountain Village's dedicated open space is a mixture of grasslands, wetlands and mixed forest. All of these areas sequester carbon and thus reduce GHG emissions by a total of approximately 0.31 mtCO2e, or 0.3% of MV's total GHG Inventory.
- SMPA Community Solar Farm – Mountain Village's total participation in the community solar farm is the equivalent of 0.16 mtCO2e, or 0.2% of MV's total GHG Inventory.
- Gondola electricity use has been annually offset with 2,000,000 kWh of SMPA Green Blocks, equivalent to 1600 mt-CO2e, or 1.7% of MV's total GHG Inventory.
- On-site Net-metered Solar PV Systems – Government, residential & commercial on-site systems produce a total of 108,000 kWh/year, reducing GHG emissions annually by approximately 87 mt-CO2e, or 0.1% of MV's total GHG Inventory.
- Gondola Transportation – Gondola use reduces vehicle transportation between Telluride and Mountain Village. In a previous study by EcoAction Partners for Mountain Village, it was estimated that gondola usage reduced GHG emissions by approximately 2,700 mt-CO2e in 2010, or 2.8% of MV's total 2017 GHG Inventory.

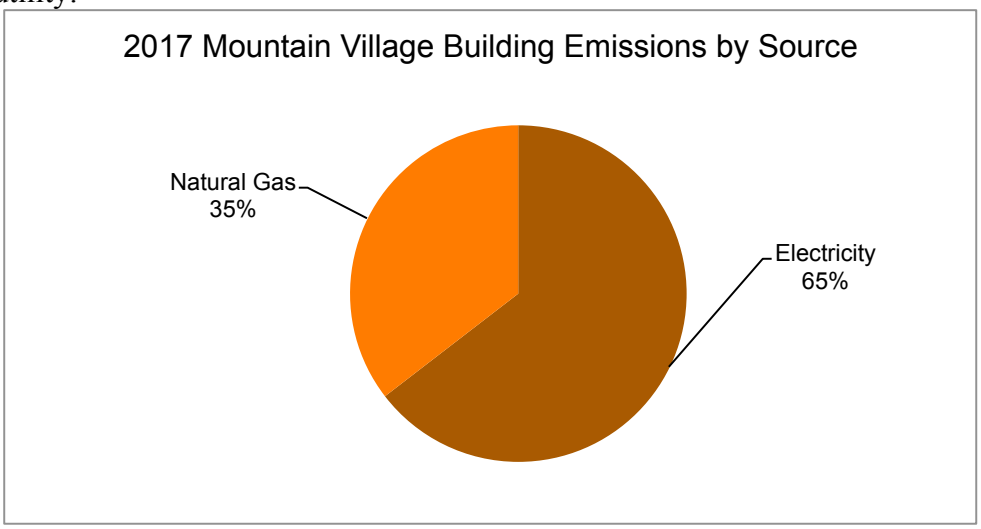
Simplified pie chart



The pie chart above simplifies the Mountain Village Inventory by showing 3 main categories:

1. Buildings – 65%
2. Transportation – 17%
3. Materials & Waste – 17%

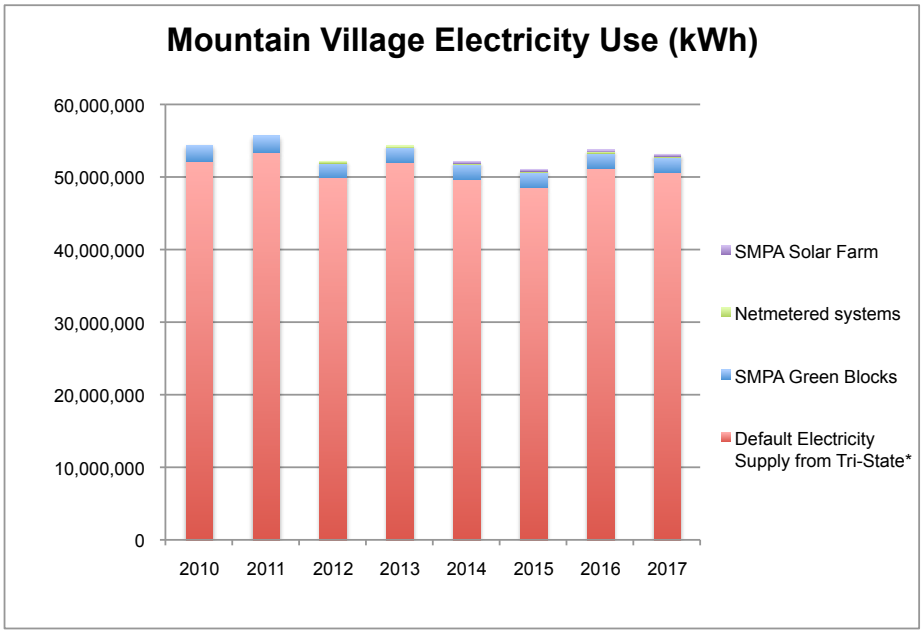
Clearly, building energy consumption is the largest category of GHG emissions. The next pie chart shows just the Building emissions portion of the above pie chart (government, residential, & commercial combined) broken down per utility:



Electricity emissions are impacted by overall usage and the emissions factor, which reflects the amount of renewable energy that is part of our overall electricity mix. This value is provided to SMPA from Tri-State annually, and has been steadily decreasing since 2010, from 2.12 to 1.776 lb-CO2e/kWh.

Natural gas emissions are also impacted by overall usage and the emissions factor, which is determined how the natural gas is produced. In 2010, Source Gas provided this factor at 5.4 kg-CO2e/therm. For 2017, the natural gas emissions factor was provided by Black Hills at 5.33 kg-CO2e/therm.

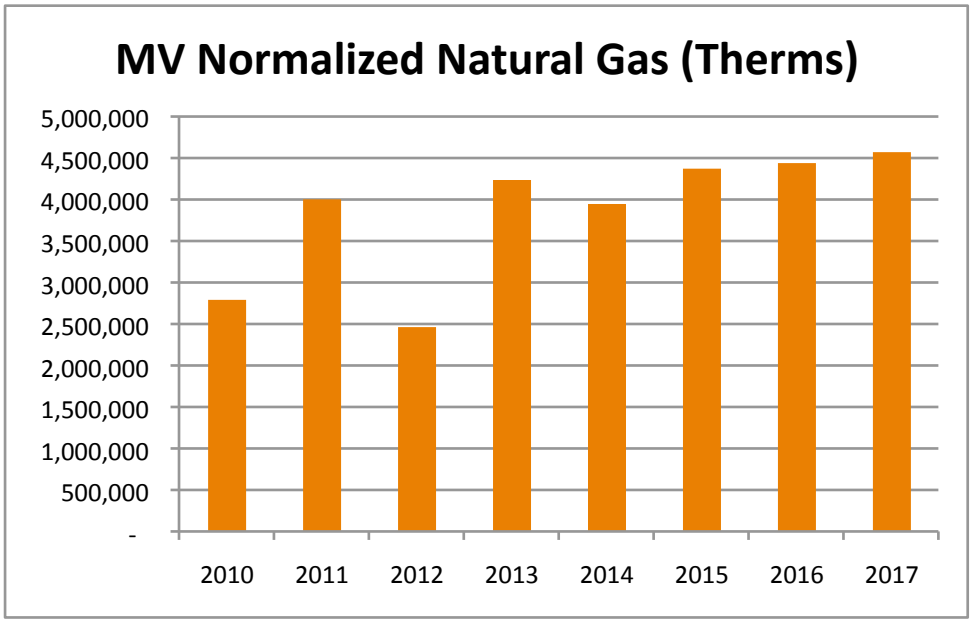
Natural gas and electricity data is provided annually from the utility companies, broken down by jurisdiction. It's accurate data that is easy to track and analyze progress toward reduction goals. Mountain Village's electricity and natural gas usage have been tracked since 2010, with analysis presented annually by EcoAction Partners to Town Council. The following graphs were presented in July of 2018:



**Default Electricity Supply from Tri-State Generation & Transmission Association, Inc. - Tri-State reports that 30% of this comes from a renewable energy source.*

Electricity use associated with MV's SMPA community solar farm purchases, net-metered solar systems, and SMPA Green Blocks offsets do not contribute to MV's GHG emissions. Electricity emissions in the pie charts are associated with Mountain Village's "Default Electricity Supply from Tri-State" which is over 50,000,000 kilowatt-hours annually. Notable is that overall use has decreased since 2010, despite an increase in people, buildings, and overall economy. Continuing to increase renewable energy in our electricity mix and decrease electricity use through conservation and efficiency will continue to reduce electricity-related emissions.

Mountain Village Electricity GHG emissions:
GHG emissions associated with the "Default Electricity" consumed is calculated using the Tri-State emissions factor for each year.
2010 – 52,191,724 kWh produced 50,300 mtCO2e
2017 – 50,622,946 kWh produced 41,000 mtCO2e
Thus, since 2010, MV has seen an 18.5% reduction in emissions from electricity use.



Natural gas use has been steadily increasing, when adjusted to account for varying winter temperatures. This increase is in line with increased building and snowmelt square footage being constructed in Mountain Village. Overall natural gas use can be reduced through efficiency and conservation measures, addressing new construction through energy efficient building codes and existing buildings through implementing Energy Conservation Measures, such as weatherization, increasing insulation, and improving tuning mechanical heating systems and controls.

Mountain Village Natural Gas GHG emissions:
(In 2010, some of MV's natural gas use was assigned by Source Gas to San Miguel County, resulting in an inaccurate baseline for Mountain Village. Thus, 2011 data is used for baseline purposes.) It is important to note that actual natural gas use is greatly influenced by temperature and snowfall from year to year, influencing actual related GHG emissions. Thus, normalized natural gas use (adjusted for temperature variations) is used to calculate GHG emissions associated with natural gas consumption:
2011 – 4,006,797 therms produced 21,600 mtCO2e
2017 – 4,573,998 therms produced 24,400 mtCO2e
Thus, an 11.5% increase in natural gas related emissions is seen comparing 2011 to 2017.

Per Capita & Comparison Discussion:
Many questions have arisen around analyzing, tracking and comparing GHG emissions on a per population basis. There are many factors to consider in doing so:

- Mountain Village's GHG emissions goal of 20% reduction by 2020 is not based on per capita emissions, but total overall emissions.
- Community GHG Inventories typically follow the GPC protocol (Global Protocol for Community-Scale Greenhouse Gas Emissions Inventories), however calculation methodologies selected for each are based on data available, so no two communities inventories are calculated exactly the same. Specific benchmarks that can be identified as comparable between communities are listed in the table below, but not all are provided in other community's GHG Inventory reports.
- In a resort community such as Mountain Village, some emissions categories are appropriate to analyze per capita, while others are influenced greatly by part-time residents and visitor population. Others are somewhere in between. Thus, the most fair "per person" analysis would be to calculate these emissions on a per category basis, not for overall total GHG emissions.

Comparisons (also refer to Local Benchmark Comparison table below):

- Mountain Village's per capita emissions in 2017 were 68.4 mtCO2e/capita.
- Mountain Village's emissions per population including visitors were 26.2 mtCO2e/person.
- Telluride's emissions in 2017 were 28.6 mtCO2e/capita.
- Telluride's emissions per population including visitors were 12.5 mtCO2e/person.
- For another perspective in comparing to Aspen, the combined Telluride & Mountain Village values are 41.5 mtCO2e/capita & 17.2 mtCO2e/person.

Aside from Telluride, Aspen is likely the most comparable town to Mountain Village that has recently completed a GHG Inventory. While Aspen's report did not show any of the comparable benchmarks to the "Local Benchmark Comparison" table below, a few noteworthy comparable aspects to this Mountain Village GHG Inventory are listed here:

- The City of Aspen's 2014 GHG Inventory reports total emissions of 394,341 mtCO2e.
- Aspen's population within Emissions Inventory Boundary was 8,427 residents, so on a per capita analysis, the City's emissions are 46.8 mtCO2e/capita
- Aspen's electricity is provided by Aspen Electric, which sourced 75% renewable electricity in 2014 (it has since increased to 100%), and Holy Cross Electric, which reports 25% of its electricity is from renewable sources. The resulting joint electric profile is 70% renewable energy.
- 100% of ski area emissions associated with electricity and natural gas used to run lifts and facilities on Aspen Mountain, Aspen Highlands, and Buttermilk ski areas are included in the Aspen GHG Inventory
- 100% of Aspen airport emissions are included in the Aspen GHG Inventory. Aspen's airport emissions have increased 15% since first reported in 2004.
- Aspen's report uses a more detailed commuter analysis than the MV GHG Inventory and assigns 50% of total vehicle miles traveled of commuter trips to Aspen.
- Aspen's GHG Inventory does not include emissions associated with food consumption, fuel production, or cement use.
- Aspen's long- term reduction targets are 30% below 2004 levels by the year 2020 and 80% below those levels by 2050.

The pie chart below depicts sources of Aspen's GHG emissions as tracked in the City's inventory. By comparing it to Mountain Village's pie chart, the differences in emissions tracked are evident.

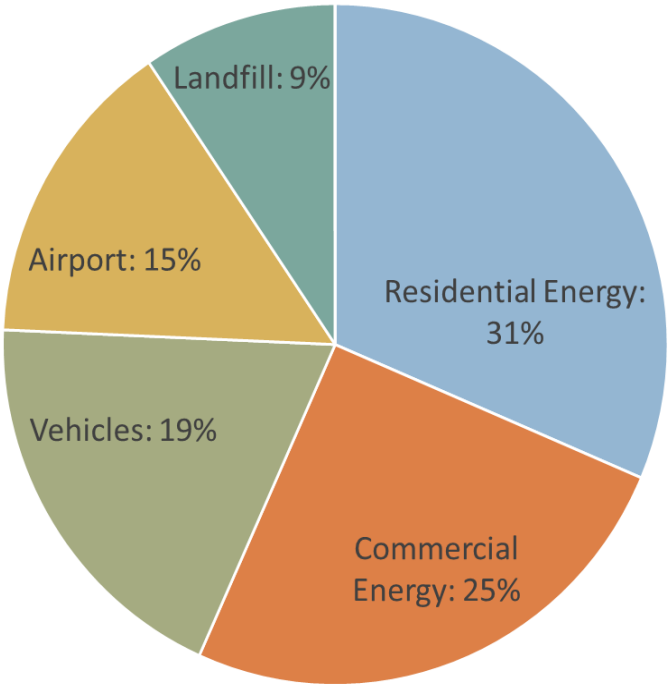


Figure 6. Percent of Aspen's GHG emissions by sector, 2014

**Sourced from 2014 ASPEN COMMUNITY- WIDE GREENHOUSE GAS (GHG) INVENTORY*

Recommendations for GHG Emissions reductions:
It is recommended that Mountain Village review the current adopted goal for 2020 and consider establishing new future targets for GHG emissions. In order to create an accomplishable action plan, it is recommended that MV consider targets per category, in addition to overall total emissions targets. Utilize the benchmark factors per emissions source in the table below as a reference for adopting targets and tracking emissions reductions.

The Regional Sustainability Action Plan (STRATEGY) developed in 2010 by the Sneffels Energy Board is a comprehensive document for San Miguel and Ouray Counties, and all of the jurisdictions within. The STRATEGY is a guide to multi-jurisdictional energy action planning providing a framework to facilitate streamlined, inter-entity collaboration in our region's efforts to effectively manage energy resources, reduce energy costs and meet energy, water, waste and transportation fuel reduction goals. Within it is an extensive list of region-wide and jurisdiction-specific actions for reducing GHG emissions and achieving region-wide sustainability goals. Mountain Village was represented throughout the development of this document by Bob Delves and Deanna Drew. It is available at http://www.ecoactionpartners.org/sustainability-action-plan

Recent discussions with MV staff and Green Team, resulted in the following list of ideas for MV to reduce emissions. A comprehensive plan would also address Transportation, Food, Waste & Consumption areas of the GHG Inventory.

Maximize partnership possibilities with other organizations

Renewable Electricity
- Collaborate with SMPA toward increasing local renewable electricity
- Support new Community Solar Farm development & include as an option for REMP
- Promote SMPA Green Blocks & efficiency programs along with MV Incentives

Community Programs to address existing homes & buildings

- Continue MV program development & implementation
    - Farm-to-Community Program
    - Composting Incentive Program
    - Incentivize smart controls for snowmelt systems and electric heat tape
    - Incentivize on-site renewable energy systems
    - Consider an incentive program for larger housing units / hotels to install smart energy controls

- Continued participation in EcoAction Partners' regional programs:
    - Green Lights
    - SMPA IQ Weatherization
    - Green Business Certification Program for Lodging, Restaurants, Retail, & other businesses
    - Green Property Manager Program to address part-time / unoccupied homes
    - Community Composting

Franchise fees for electricity & natural gas

- Develop new agreements with utilities & use funds for GHG-reduction projects & programs

Building Energy Code Adoption:

- 2018 IECC with amendments that progress energy efficiency
- Reconsider size categories & HERS scores
- Scale toward Net Zero home as size increases
- Require house electricity offset of 100%, through Green Blocks, on-site renewable energy, or other equivalent
- Consider adding natural gas offset requirement, through Green Blocks, RECs or equivalent
- Incentivize small homes < 3000 SF & net-zero, passive home construction through financial or expedited process
- Require solar panels or solar-ready provisions on all new construction
- Require smart energy control systems on new lodging units and larger residences

Renewable Energy Mitigation Program (REMP):

- Eliminate or reduce free 1000 SF of snowmelt allowed
- Address outdoor fireplaces and infrared heaters
- Continue double-incentive for on-site renewable energy mitigation

Local Benchmark Comparison:

Description of Benchmark	San Miguel County, CO (2017)	Telluride, CO (2017)	Town of Mountain Village, CO (2017)	Aspen, CO (2014)	Mountain Village & Telluride (2017)	Units of measurement	Notes
Total GHG Emissions	**244,000**	**67,500**	**96,000**	**394,391**	**163,500**	mtCO2e	
Avg. Res. electricity use	894	728	1268			kWh/hh/mo	
Avg. Res. Natural gas use	110	73	197			therms/hh/mo	*incl snowmelt systems
Avg. Res. Electricity (kWh/sf/yr)	4.70	5.19	5.23			KWh/sf/yr	
Avg. Res. Natural Gas/sq.ft/yr	0.28	0.30	0.36			therms/sf/yr	*incl snowmelt systems
Avg. Comm/ Ind./ Pub. Buildings Energy use intensity	227	335	343			Kbtu/ft²/year	
Vehicle Miles per person per day	17.0	27.0	28.0			VMT/person/day	*per census population
Water	189	168	266			gallons/person/day	*not including snowmaking
Wastewater	118	73	184			gallons/person/day	*per census population
Municipal Solid Waste	6.8	10.0	18.1			lb/person/day	*per census population
GHG Emissions per capita	**30.2**	**28.6**	**68.4**	**46.8**	**41.5**	Mt-CO2e/person/year	*per census population
GHG Emissions per capita + visitors	**17.2**	**12.5**	**26.2**		**17.2**	Mt-CO2e/person/year	*per capita incl Visitors

Mountain Village GHG Inventory
Appendix A
San Miguel County Shared Resources Notes

SMC Shared Resources Meeting for GHG Inventories
Wednesday July 11, 10-12 at WPL Telluride Room
(Note this document was updated after the meeting with outcomes & findings)

The aim of this meeting is to reach consensus as to how the GHG emissions associated with each shared resource will be assigned between the Telluride & Mountain Village GHG Inventories. Allocations for Telluride's inventories from 2010-2017 are explained below, along with associated Mountain Village analyses. The SMC inventory includes all jurisdictions (including Telluride & MV) and thus is inclusive of these resources.

Allocation methodologies to consider for each resource:

- Location of utility meters determines how electricity and natural gas values are provided by SMPA and Black Hills Energy
- % of county population
- Is data available to parse resources between communities?
- Allocation of tourist impact to Telluride & Mountain Village versus rest of SMC or greater region?

<u>Regionally Shared Resources</u>

Wastewater Treatment Plant – Telluride & MV & SMC subdivisions

MV: 15% ownership, $30,000 toward solar PV system, 35% of use
Towns working toward Regional Sewer District (~5 years?)

- Electricity & natural gas: 100% to Telluride
- Biogas emissions (nitrogen & methane) from all 10,000+ visitors: 100% assigned to Telluride
- *Could allocate all of the above based on % of use. Group agreed to continue allocation to Telluride*

*WasteWater analysis charts (no impact to GHG Inventory emissions)
35% assigned to MV, 65% assigned to Telluride.
(For improved Telluride analysis – breakout of SMC subdivision population needed)

*Food GHG emissions are calculated using WWTP population accounting
35% assigned to MV
65% assigned to Telluride, minus SMC subdivision population of 1035

Gondola – eliminates vehicle traffic between MV & Telluride

100% of electricity & offset assigned to MV.
Natural gas & diesel use allocated to MV.

- TMVOA (through TMV electricity bills) purchases Green Blocks to offset electricity use by 100% (in 2017 offset was over by 30,000 kWh & adjusted by TMVOA for 2018 onward), so electricity use does not show up in GHG pie.

Telluride Ski & Golf – operations in MV, Telluride, & County land

electricity & natural gas allocated per meter location
(provided this way by SMPA & Black Hills Energy for all regional utility use)

- TSG operations include:
  - Office space & Businesses in MV core
  - The Peaks & other lodging
  - On-mountain operations
  - Conference Center
  - Telluride - Base of Gondola & Lift 7 operations
- *Could ask for TSG assistance in separating utility bills based on location of service, to reassign emissions accordingly*

Regional airports – serve region

- Telluride airport: 100% allocated to SMC, divided 50/50 between Telluride & MV
- 65% of Montrose airport to San Miguel County – group agreed to split 50/50 between Telluride & MV

Vehicle Transportation – data provided per county

Emissions assigned as % population of SMC

- Vehicle registration data & CDOT studies are basis for current Inventory
- Transit Services (some shared among jurisdictions)
- *Traffic count data for Telluride & MV would provide better data specific to community driving, but wouldn't account for distance of travel to each town*

Telluride Festivals – all 3 governments resources utilized

Electricity & water use tied to Telluride Town Park

- Located in Telluride Town Park
- Gondola used
- Camping in outlying areas, with school bus transportation
- People travel to region for festivals
- Benefits all businesses

Mountain Village Sunset Series – MV resources

- Located in Mountain Village
- Gondola used
- Regional benefit

Others – serve region, allocated by location

- Wilkinson Public Library - Telluride
- Telluride Medical Center – Telluride
- Telluride School District – Telluride
- Telluride Mountain School - SMC

Data Gaps

Trash & Recycling –

- Bruin provides data per jurisdiction. Has not provided for 2017. Telluride fined Bruin for lack of 2016 & 2017 data. Bruin data is only part of the waste picture.

- Waste Management – Private company, data not available. Could be requested through jurisdiction contracts, similar to MV's contract with Waste Management.
- 2017 Regional & SMC Inventories – data from EcoAction Partner's Regional Waste Diversion Study. 2015 data trash & recycling per jurisdiction

Transportation –

- Region 10 study data not applicable. It focuses on gaps in transit services.
- CDOT data tracks highway travel only, not all roads.
- Registered vehicles in counties relies upon average CO annual mileage.
- Off-Road vehicle use is increasing, but not accounted for.

Affordable Housing –

- Regional impacts on transit studies & transportation emissions
- GHG calculation could be done to compare impacts of reducing commute mileage for local employees

Food -

- Population-based calculation, including visitors. Telluride is based on 65% of WWTP, minus estimated SMC subdivision population served by WWTP (~1035). Mountain Village would be 35% of WWTP population.
- A food study would be helpful for more accurate food emissions & tracking reduction associated with farmers markets & programs.

Propane data –

- Estimate from 2010
- Private companies, updated data not currently available

Mountain Village GHG Inventory
Appendix B
Bases for GHG Inventory Calculations

Carbon Emissions Footprint Calculator for Cities ™

The workbook is provided to facilitate future updates to Ouray and San Miguel's Greenhouse Gas (GHG) Emissions Inventory. This inventory was completed for 2010 based on ICLEI/WRI protocols and the Demand-Centered Hybrid Life Cycle Analysis methodology (Ramaswami et al., 2008 - see Resource 3). EcoAction Partners uses the workbook to update our regional GHG Emissions Inventory annually.

General data:
Census Population – obtained annually from the Colorado DOLA website
Visitor Population
- SMC visitor values are calculated using the Telluride & Mountain Village Wastewater Treatment Plant BOD data.
- Ouray County visitor estimates are obtained from the visitor centers in Ridgway & Ouray

# of Households, SF of commercial & residential buildings – these values are not used in overall GHG emissions calculations, but are collected for other benchmarking purposes. The Ouray County & San Miguel County Assessors offices provide this data.

Energy (blue):

Residential & Commercial Building Energy Use:
Electricity
- SMPA provides data annually per community for residential, commercial & irrigation (provided in 1st quarter for previous year). Data is categorized as non-renewable sales, Green Blocks sales, SMPA community solar farm production, & net-metered system production.
- Tri-State emissions factor - provided to SMPA annually based on Tri-State's total mix of electricity sources (provided late in year for the previous year, thus GHG Inventory value is a year behind when presented to governments, but gets updated during the following year.)

Natural Gas
- Black Hills Energy Corporation (previously SourceGas) provides data annually – per community for residential, commercial & irrigation (provided in 1st quarter for previous year).
- Emissions factor – In 2010, Source Gas provided this factor and in 2017, Black Hills Energy Corporation provided the BHE value. Inventories from this transition onward utilize this Black Hills emissions factor.

Propane
- based on initial 2010 estimate from regional propane companies, who are not obligated to release information and have not provided data since.
- Emissions factor – LGOP default factor from 2010

Government Energy Use:
Government electricity & natural gas use – provided annually by governments: utility bill data, Green Blocks purchases, renewable system production, REC purchases

Water / Wastewater Treatment Electricity & Natural Gas - provided annually by governments from utility bills

Transit (red):

Vehicle Transportation:
Transportation tail-pipe emissions are calculated using total Vehicle Miles Traveled (VMT), which is derived using two different methods - vehicle registration and average daily traffic. VMT is divided by average regional vehicle fleet fuel economy to calculate fuel consumption, which is used to determine GHG emissions from surface transportation. The Colorado Department of Public Health and Environment (CDPHE) conducts on-road vehicle surveys to characterize the Colorado vehicle mix (95% gasoline, 5% diesel).

Vehicle Registration Method:
- # Vehicles registered in San Miguel & Ouray Counties updated annually
- Vehicle Miles Travelled (VMT) estimate per vehicle / year, per EPA – 12,000

Average Daily Traffic Method:
- Average Daily traffic counts of Vehicle Miles Travelled (VMT) per county per Colorado Department of Transportation (CDOT) studies (2009), based on 342 working days/year

Gasoline (95% per CDPHE)
- 20.1 average MPG per CDPHE (2010)

Diesel (5% per CDPHE)
- 6.3 average MPG per CDPHE (2010)

Airline Transport:
- Annual aircraft fuel (jet fuel and aviation gasoline) used is provided annually from the Telluride Airport and the Montrose Regional Airport (65% of passengers travel to OC & SMC).
- Emissions factors used are from the Department of Energy (DOE).
- Total number of enplanements (passengers) is also tracked to obtain emissions/person.

Emissions values for all fuels are sourced from The Carbon Registry, local government protocol, September 2008.

Materials and embodied energy (transboundary reporting):
This section will count all the GHG emissions associated with producing and transporting key materials to OC & SMC, including food, cement, and fuel. Just like electricity, these materials are produced outside the boundaries of the community but are essential to community life. WRI and ICLEI are continuously updating their guidelines on how to include these trans-boundary emissions, termed "Scope 3 Emissions."

Food:
This calculation was originally based on 2005 BLS Economic Census data for 2009$ for average annual household dollars spent on food. Recently, due to the relatively large percentage of households in the region that are not fully occupied year-round, and the annual influx of visitors that contribute to our regional food carbon footprint, all GHG Inventories (2010-2016) were converted in 2017 to use the average food carbon footprint for annual mtCO2e/person found in industry studies published online. This carbon footprint value is used with the regional visitor data (vs census) to calculate our annual food-related emissions.

Waste & Recycling: calculated using EPA WARM methodology

- We have 2 main waste haulers for the region.
- Bruin provides annually updated data for volumes of waste and recycling collected throughout the region.
- Waste Management provided total data in 2010 for collection in Montrose, Delta, San Miguel & Ouray Counties, but has not provided updated data since.
- The Sneffels Waste Diversion Planning Project was completed in December 2016 by EcoAction Partners. It includes an analysis of total volume of waste and recycling. This is the most accurate regional information currently available. Thus OC & SMC total waste data is based on this study.
- Values from the study are used with WARM* emissions data to calculate annual waste & recycling emissions.
  **Waste Reduction Model (WARM) was created by the U.S. Environmental Protection Agency (EPA) to help solid waste planners and organizations estimate greenhouse gas (GHG) emission reductions from several different waste management practices.*

Cement:

- Total cement consumed in Colorado in 2007 is multiplied by % of state census population located in OC & SMC.

Fuel Production:

- The fuel production emissions factor represents emissions from the production and shipping of fuels. Also known as Wells-to-Pumps, W2P, or WTP Emissions
- The emissions factor for Gasoline, Diesel, & Jet Fuel is multiplied by the total gallons of each fuel used in the region to obtain overall annual emissions.
- WTP Emissions values for all fuels are sourced from the 2017 GREET WTP analysis.

Water & Wastewater Treatment Emissions:
Regional governments provide annual gallons of water treated at each plant. These values are utilized with annual census & visitor data, using ICLEI Protocol for Fugitive Emissions from Wastewater equations (10.2, 10.8 and 10.10)* to calculate annual emissions associated with water and wastewater treatment.
*See ICLEI Local Government Operations Protocol v 1.0 for more information

Mountain Village 2018 Greenhouse Gas Inventory Report

Prepared by EcoAction Partners
for the Town of Mountain Village

November 1, 2019

Overview:
In 2018, the Town of Mountain Village contracted with EcoAction Partners to create a Mountain Village-specific Greenhouse Gas Inventory. Working from the baseline regional San Miguel and Ouray County GHG Inventory that EcoAction Partners manages and updates annually, EcoAction Partners modified the calculations to focus on Mountain Village specific data from 2017. This inventory was updated this year to create the 2018 results reported here.

History:
The regional GHG Inventory was initially developed by the University of Colorado at Denver with data collection input from EcoAction Partners. It was funded through a matching grant in which Mountain Village, Telluride, San Miguel County, Ridgway, City of Ouray and Ouray County each contributed $1000. The calculations are in accordance with ICLEI protocol established by 2010. Since then it has been updated to align with the subsequent "Global Protocol for Community-Scale Greenhouse Gas Emission Inventories".

Mountain Village adopted a goal to reduce overall GHG emissions 20% by 2020, from 2005 baseline levels, however our regional GHG and energy-use baseline began to be tracked in 2010. Thus progress toward this goal is determined based on data from 2010 forward.

Shared regional resources:
As part of the analysis, Mountain Village desired clear understanding of how GHG emissions associated with shared regional resources were allocated between jurisdictions. Thus, EcoAction Partners created a summary of how these resources have been allocated in the past and coordinated a meeting of representatives from Mountain Village, Telluride, San Miguel County, and Telluride Ski & Golf, to review and discuss allocations for each of these resources. The agreed-upon outcome for each of these are detailed in Appendix A. The resources discussed include:

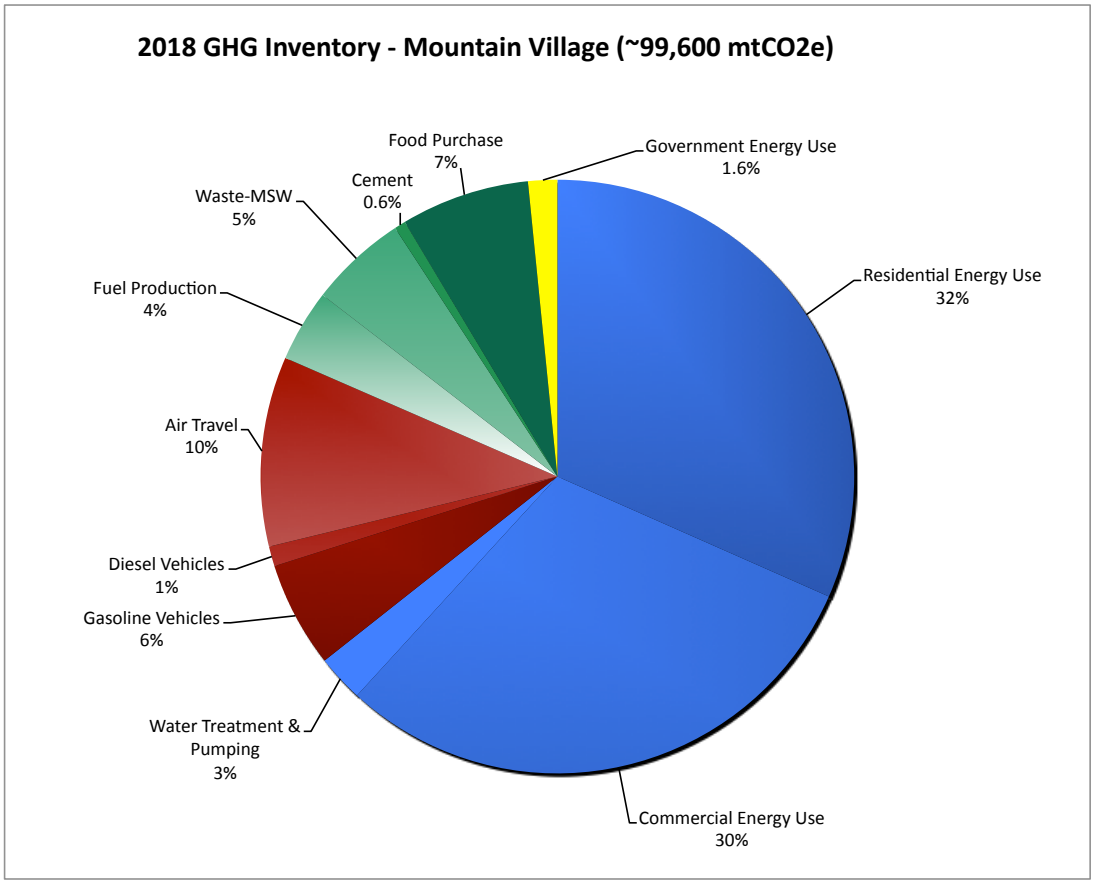
- Regional airports
- Waste Water Treatment Plant
- Gondola
- Telluride Ski and Golf's utilities including water use
- Festivals
- Transit services

2018 Mountain Village GHG Inventory Results
Mountain Village's total GHG emissions for 2018 were approximately 99,600 mtCO2e (metric tons of carbon dioxide equivalent). This is an increase of 3.75% over 2017 emissions of 96,000 mtCO2e.

Equivalencies:

- 99,600 mtCO2e is equivalent to over 108,885,000 pounds of coal burned.
- 99,600 mtCO2e is also equivalent to the energy used by 11,900 average U.S. homes in one year. (MV has 1675 residences)
- 99,600 mtCO2e is the amount of carbon that can be sequestered by over 117,000 acres of U.S. forests in a year.

The detailed pie chart below breaks those emissions down per category, explained further below the pie chart. See Appendices for more detailed explanation of allocation per jurisdiction and calculation methodologies.



- Government Energy Use – Electricity and natural gas use by Town of Mountain Village government, including building energy use, streetlights, town plaza snowmelt, and other exterior uses. Note: Gondola electricity use is 100% offset by SMPA Green Blocks, so Gondola electricity use does not contribute to GHG emissions. Gondola natural gas use does contribute toward TMV GHG emissions. Government portion of emissions increased from 2017 to 2018 (see Town of Mountain Village 2018 Government Energy Use and Greenhouse Gas Report for details).
- Residential Buildings – electricity and natural gas use for homes, including exterior lighting, snowmelt systems, and patio fireplaces. Renewable electricity associated with net-metered solar systems, SMPA solar farm purchases, and Green Blocks offsets decrease the emissions associated with residential building emissions.
- Commercial Buildings– electricity and natural gas use for commercial buildings and other use, including exterior lighting, snowmelt systems, patio fireplaces, and Mountain Village ski area operations.

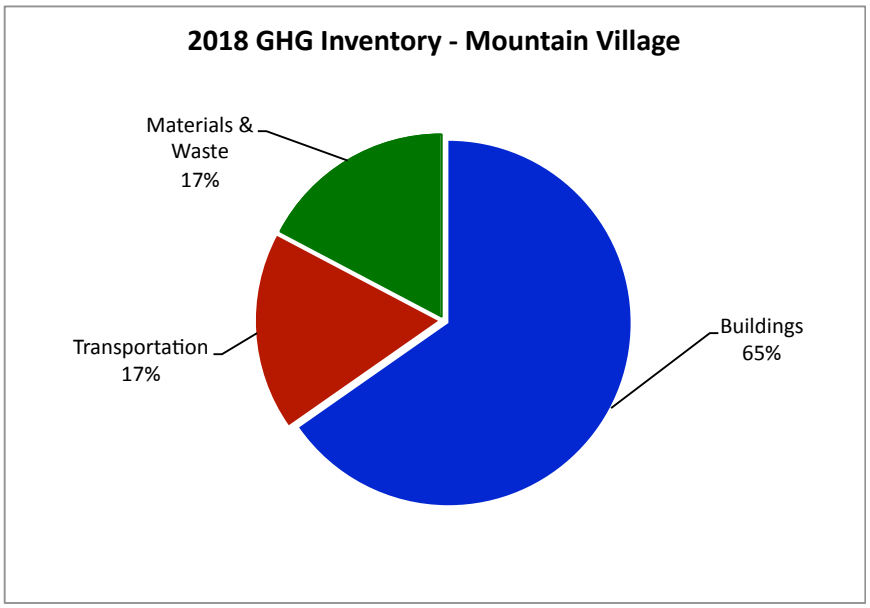
Renewable electricity associated with net-metered solar systems, SMPA solar farm purchases, and Green Blocks offsets decrease the emissions associated with commercial building emissions.

- Water Treatment & Pumping – Electricity used by Town of Mountain Village for treatment and pumping of water. Water electricity emissions increased from 2017 to 2018 (see Town of Mountain Village 2018 Government Energy Use and Greenhouse Gas Report for details on water use).
- Gasoline Vehicles – Emissions from gasoline vehicles
- Diesel Vehicles – Emissions from diesel vehicles
- Air Travel – Emissions associated with airplane fuel & enplanements at Telluride Airport & Montrose Regional Airport. (for allocations, See Appendix A)
- Fuel Production – Processing emissions associated with gasoline and diesel fuel before the fuel enters vehicles
- Waste – Emissions associated with Municipal Solid Waste taken to landfill to decompose
- Cement – Emissions associated with cement for Mountain Village, based on Colorado's total economy
- Food Purchase – Emissions calculated based on Mountain Village's total population of census and visitors

Additional Items:
These items contribute to reducing MV's GHG emissions and are incorporated into the overall total calculated value of 99,600 mtCO2e:

- Open Space Carbon Sequestration – Mountain Village's dedicated open space is a mixture of grasslands, wetlands and mixed forest. All of these areas sequester carbon and thus reduce GHG emissions by a total of approximately 312 mtCO2e, or 0.31% of MV's total GHG Inventory.
- SMPA Community Solar Farm – Mountain Village's total participation in the community solar farm is the equivalent of 170 mtCO2e, or 0.17% of MV's total GHG Inventory.
- Gondola electricity use is 100% offset with SMPA Green Blocks (~1,872,500 kWh), equivalent to 1500 mt-CO2e, or 1.5% of MV's total GHG Inventory.
- On-site Net-metered Solar PV Systems – Government, residential & commercial on-site systems produced over 115,600 kWh in 2018, reducing GHG emissions by approximately 93 mt-CO2e, or 0.09% of MV's total GHG Inventory. Electricity used while these systems were producing electricity does not get metered, so the numbers under-represent the total production of electricity by these systems.
- Gondola Transportation – Gondola use reduces vehicle transportation between Telluride and Mountain Village. In a previous study by EcoAction Partners for Mountain Village, it was estimated that gondola usage reduced GHG emissions by approximately 2,700 mt-CO2e in 2010, or 2.7% of MV's total 2017 GHG Inventory.
- Farm-to-Community Program – This program began in 2018 and offset approximately 6 mt-CO2e in it's first year. In 2019, the net total GHG emissions impact from the program is estimated to be a reduction of 16 mt-CO2e in GHG emissions. These estimates are conservative. See annual report for this program for other un-calculated benefits.

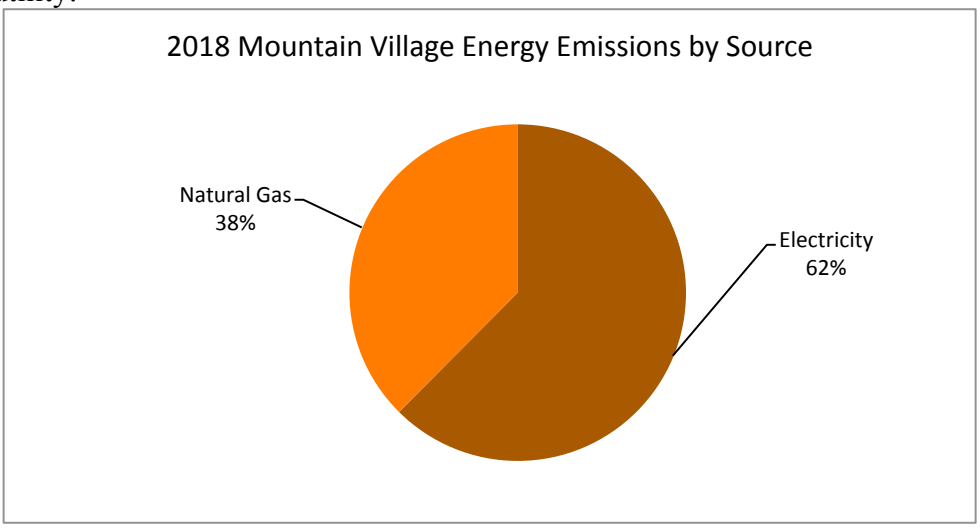
Simplified pie chart



The pie chart above simplifies the Mountain Village Inventory by showing 3 main categories:

1. Buildings – 65%
2. Transportation – 17%
3. Materials & Waste – 17%

Clearly, building energy consumption is the largest category of GHG emissions. The next pie chart shows just the Building emissions portion of the above pie chart (government, residential, & commercial combined) broken down per utility:



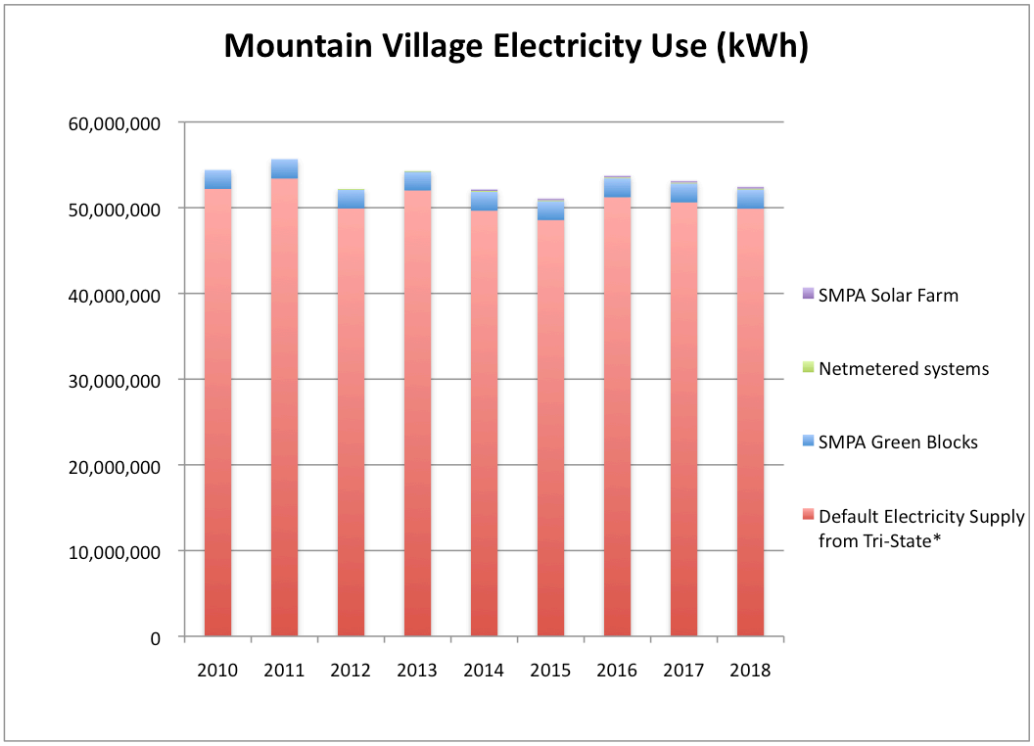
Electricity emissions are impacted by overall usage and the emissions factor, which reflects the amount of renewable energy that is part of our overall electricity mix. This value is provided to SMPA from Tri-State annually and has been steadily decreasing since 2010, from 2.12 to 1.595 lb-CO2e/kWh.

Natural gas emissions are also impacted by overall usage and the emissions factor, which is determined how the natural gas is produced. In 2010, Source Gas provided this factor at 11.88 lb-CO2e/therm. For 2017 & 2018, the natural gas emissions factor was provided by Black Hills at 11.68 lb-CO2e/therm.

Natural gas and electricity data is provided annually from the utility companies, broken down by jurisdiction. It's accurate data that is easy to track and analyze progress toward reduction goals. Mountain Village's

electricity and natural gas usage have been tracked since 2010, with analysis presented annually by EcoAction Partners to Town Council. The following graphs show electricity and natural gas use from 2010 to 2018.

Mountain Village Electricity Use:

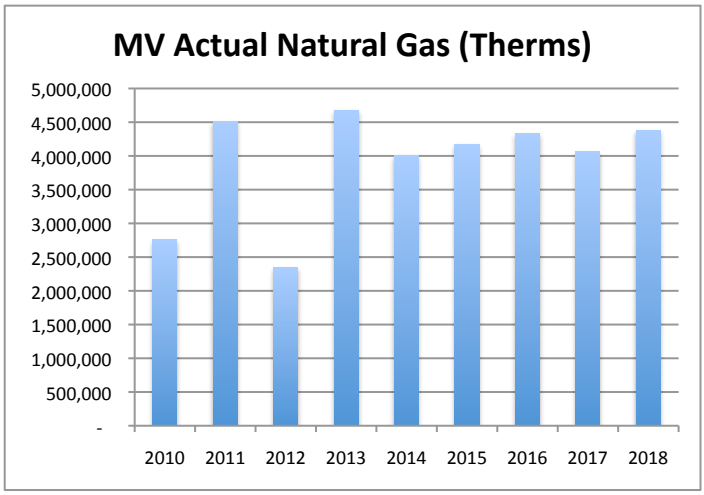


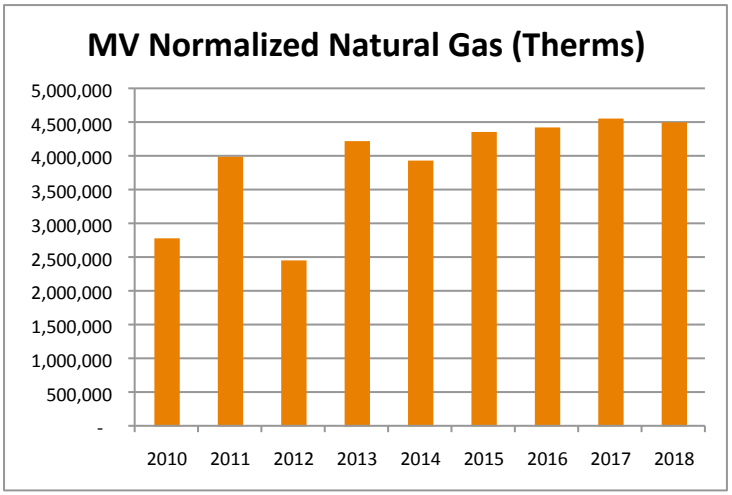
**Default Electricity Supply from Tri-State Generation & Transmission Association, Inc. - Tri-State reports that 30% of this comes from a renewable energy source.*

Electricity use associated with MV's SMPA community solar farm purchases, net-metered solar systems, and SMPA Green Blocks offsets do not contribute to MV's GHG emissions. Electricity emissions in the pie charts are associated with Mountain Village's "Default Electricity Supply from Tri-State" which is approximately 50,000,000 kilowatt-hours annually. Notable, is that overall use has decreased by 3.6% since 2010, despite an increase in people, buildings, and overall economy. Continuing to increase renewable energy in our electricity mix and decrease electricity use through conservation and efficiency will continue to reduce electricity-related emissions.

Mountain Village Electricity GHG emissions:
GHG emissions associated with the "Default Electricity" consumed is calculated using the Tri-State emissions factor for each year.
2010 – 52,191,724 kWh produced 50,300 mtCO2e
2018 – 49,885,933 kWh produced 39,300 mtCO2e
Thus, since 2010, MV has seen a 21.9% reduction in emissions from electricity use.

Mountain Village Natural Gas Use:





*In 2010, some of MV's natural gas use was assigned by Source Gas to San Miguel County, resulting in an inaccurate baseline for Mountain Village. Thus, 2011 data is used for baseline purposes.
*In 2018, Black Hills Energy updated their database to improve location accuracy of meters. As a result, some meters previously included within Mountain Village boundaries have been reallocated to San Miguel County.

Actual natural gas use is greatly influenced by temperature and snowfall from year to year, to a greater extent than electricity use. Thus actual natural gas use is reviewed with respect to these weather variations. Normalizing natural gas use is a calculation process performed to adjust for temperature variations. It does not adjust for snowfall.

In general, natural gas use has been increasing, when adjusted to account for varying winter temperatures. This increase is in line with increased building and snowmelt square footage being constructed in Mountain Village. Overall natural gas use can be reduced through efficiency and conservation measures, addressing new construction through energy efficient building codes and existing buildings through implementing Energy Conservation Measures, such as weatherization, increasing insulation, and improving tuning mechanical heating systems and controls.

Mountain Village Natural Gas GHG emissions:
To understand progress toward addressing GHG emissions, emissions associated with normalized natural gas have been used to calculate GHG emissions associated with natural gas consumption:
2011 – 4,006,797 therms produced 21,600 mtCO2e
2017 – 4,573,998 therms produced 24,400 mtCO2e
2018 – 4,502,366 therms produced 24,000 mtCO2e
Thus, an 11% increase in natural gas related emissions is seen comparing 2011 to 2017 & 2018.

Factors influencing Energy Use & GHG Emissions:
Multiple variables impact annual use of electricity and the resulting GHG Emissions. These include:

- Population – Census & Visitors
- Economy:
  - New Construction
  - Hotel Occupancy
  - Restaurants & Businesses
- Weather:
  - Winter (& Summer) Temperatures
  - Snowfall
- Emissions factors – Electricity, natural gas & other fuels

Charts tracking these variables from year-to-year follow this report, with further explanation of their influence provided in the annual GHG Inventory presentation given by EcoAction Partners.

Per Capita & Comparison Discussion:
The Mountain Village 2017 GHG Inventory report provided an extensive section covering a discussion regarding per capita analysis and comparisons to other jurisdictions' GHG Inventories. Since overall emissions and inventory results for Mountain Village have not dramatically changed between 2017 and 2018, this section was not recreated for this 2018 report. The 2017 Benchmark comparison table is included again at the end of this report for reference. The wastewater treatment plant benchmark line was revised, as it is not feasible to accurately separate wastewater gallons and visitor population values between Mountain Village and Telluride. The notes column was revised to improve clarity and address town council questions regarding the bases for the benchmark values and reasons for why Mountain Village values are higher than Telluride values.

Recommendations for GHG Emissions reductions:
It is recommended that Mountain Village adopt the new Colorado state goals for GHG emission reductions, and consider adopting a target of carbon neutrality by 2030.

The Regional Sustainability Action Plan (STRATEGY) developed in 2010 by the Sneffels Energy Board is a comprehensive document for San Miguel and Ouray Counties, and all of the jurisdictions within. The STRATEGY is a guide to multi-jurisdictional energy action planning providing a framework to facilitate streamlined, inter-entity collaboration in our region's efforts to effectively manage energy resources, reduce energy costs and meet energy, water, waste and transportation fuel reduction goals. Within it is an extensive list of region-wide and jurisdiction-specific actions for reducing GHG emissions and achieving region-wide sustainability goals. Mountain Village was represented throughout the development of this document by Bob Delves and Deanna Drew. It is available at http://www.ecoactionpartners.org/sustainability-action-plan.

This regional plan and the goals within it will be updated during 2020 by the Sneffels Energy Board. Mountain Village council & staff representatives are invited to be a part of this important discussion and planning process. Recommendations from the Green Team and Mountain Village staff will be valuable for the community-specific portion of the plan and will also contribute toward the regional planning process.

Discussions with MV staff and Green Team have resulted in the following list of ideas for MV to reduce community GHG emissions. A comprehensive plan to reduce GHG emissions would also address Transportation, Food, Waste & Consumption areas of the GHG Inventory. See the MV 2018 Town Government Energy Use & Greenhouse Gas Report for further recommendations.

Maximize partnership possibilities with other organizations

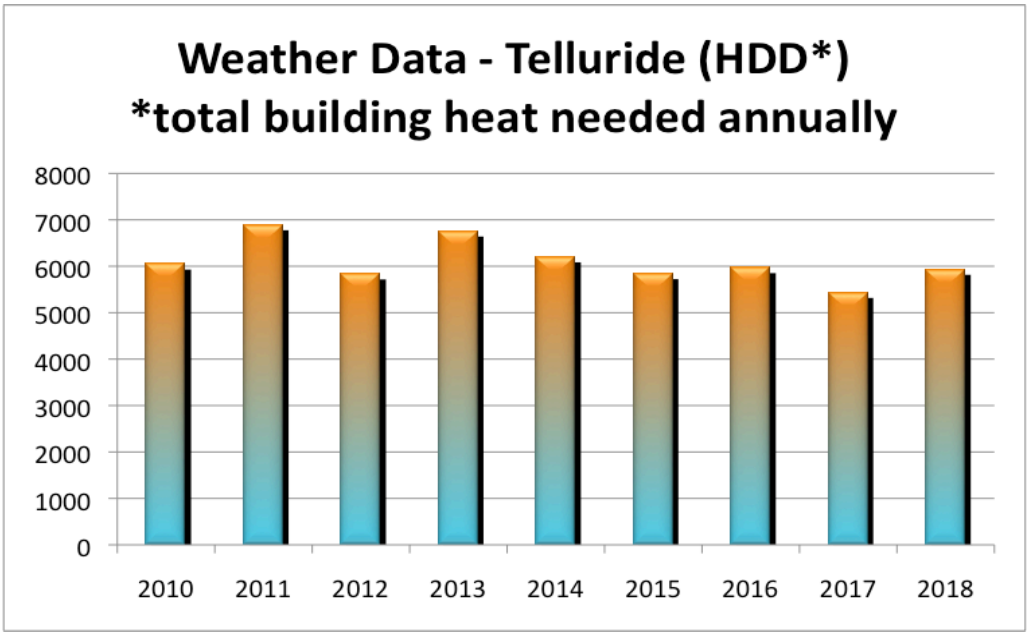
Renewable Electricity
- Collaborate with SMPA toward increasing local renewable electricity
- Support new Community Solar Farm development & include as an option for REMP
- Promote SMPA Green Blocks & efficiency programs along with MV Incentives

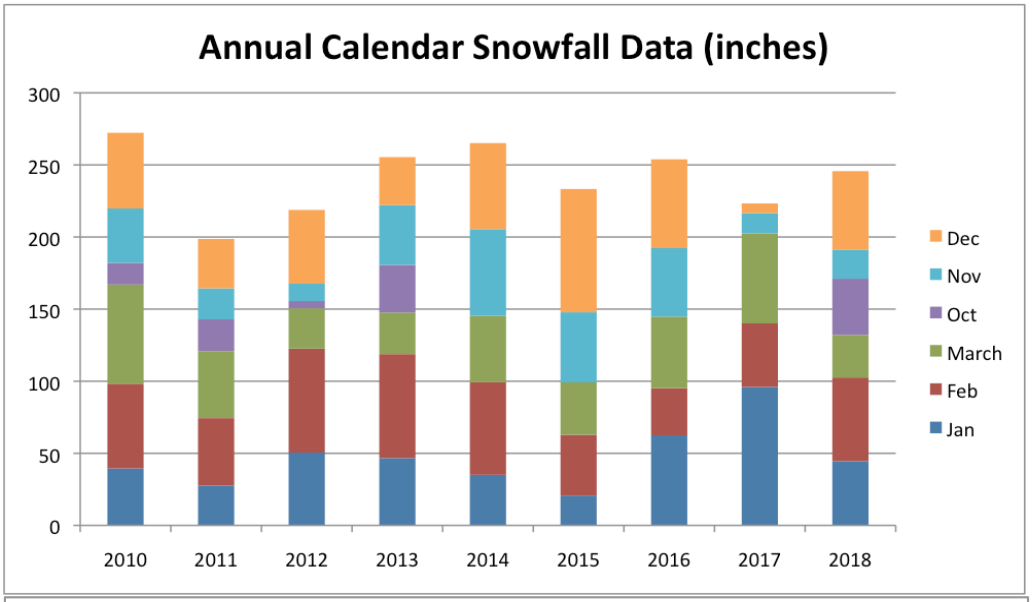
Community Programs to address existing homes & buildings
- Continue MV program development & implementation
    - Farm-to-Community Program
    - Composting Incentive Program
    - Incentivize smart controls for snowmelt systems and electric heat tape
    - Incentivize on-site renewable energy systems
    - Consider an incentive program for larger housing units / hotels to install smart energy controls

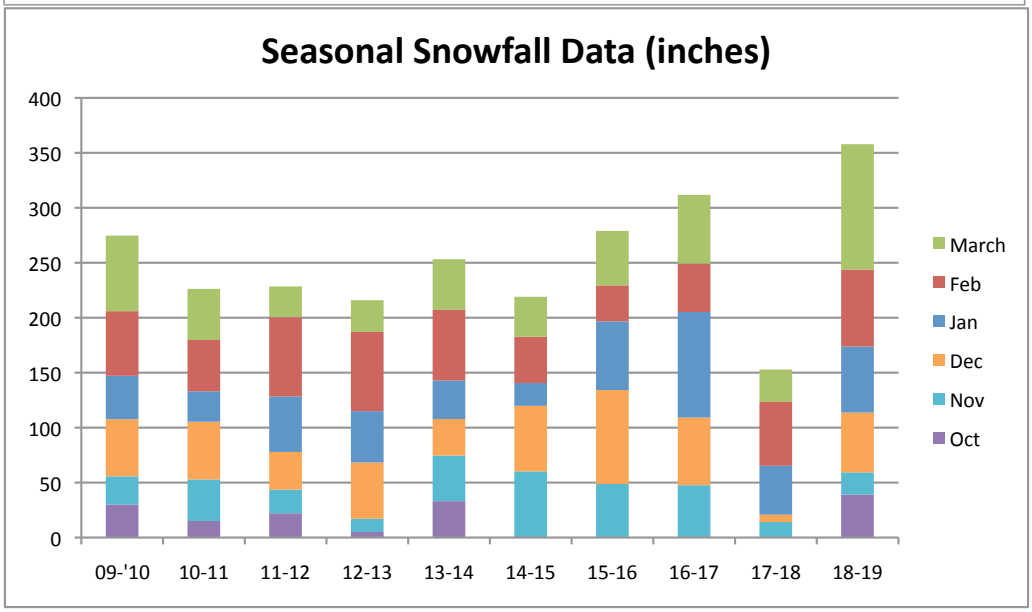
- Continued participation in EcoAction Partners' regional programs:
    - SMPA IQ Weatherization
    - Green Business Certification Program for Lodging, Restaurants, Retail, & other businesses
    - Green Property Manager Program to address part-time / unoccupied homes
    - Community Composting

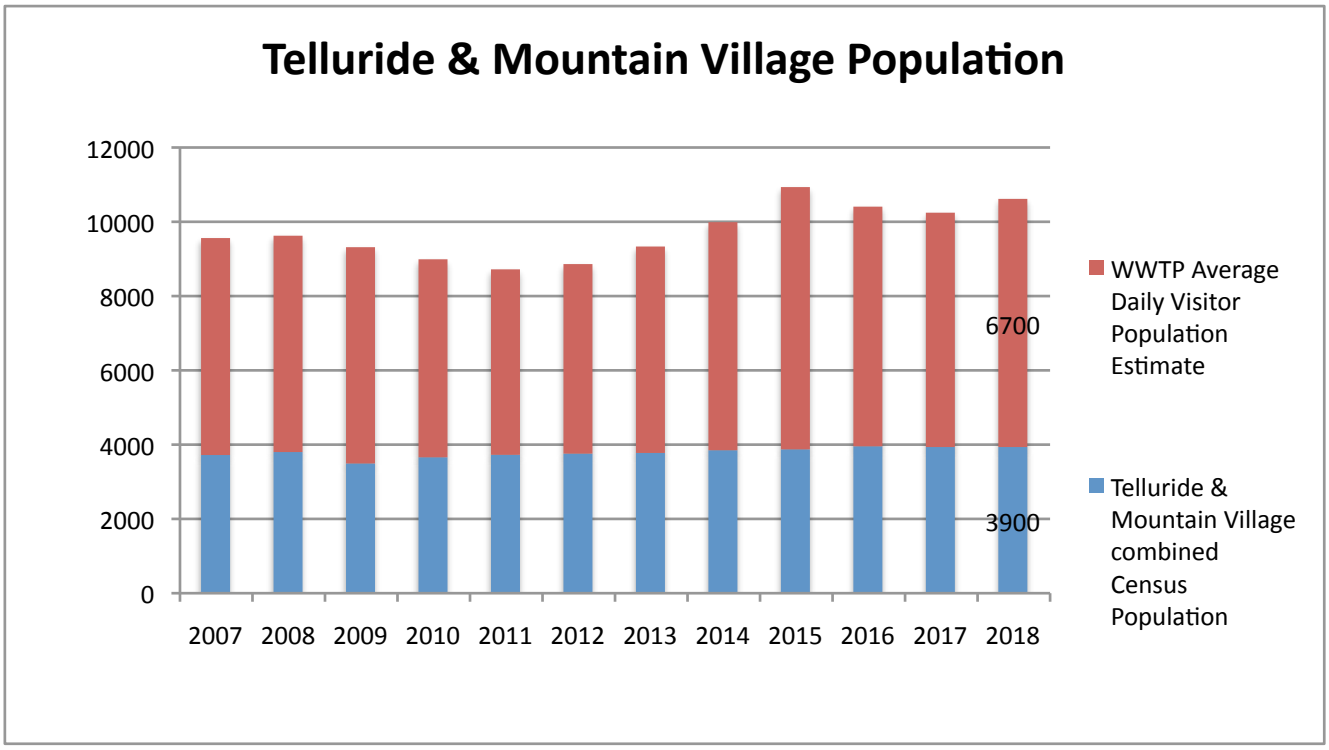
Building Energy Code Adoption:
- 2018 IECC with amendments that progress energy efficiency
- Reconsider size categories & HERS scores
- Scale toward Net Zero home as size increases
- Require house electricity offset of 100%, through Green Blocks, on-site renewable energy, or other equivalent
- Consider adding natural gas offset requirement, through Green Blocks, RECs or equivalent
- Incentivize small homes < 3000 SF & net-zero, passive home construction through financial or expedited process
- Require solar panels or solar-ready provisions on all new construction
- Require smart energy control systems on new lodging units and larger residences

Renewable Energy Mitigation Program (REMP):
- Update fees to offset carbon to match current costs & solar production values
- Eliminate or reduce free 1000 SF of snowmelt allowed
- Address outdoor fireplaces and infrared heaters
- Continue double-incentive for on-site renewable energy mitigation


Weather Data - Telluride (HDD*)
*total building heat needed annually
8000
7000
6000
5000
4000
3000
2000
1000
0
2010
2011
2012
2013
2014
2015
2016
2017
2018


Annual Calendar Snowfall Data (inches)
300
250
200
150
100
50
0
2010
2011
2012
2013
2014
2015
2016
2017
2018
Dec
Nov
Oct
March
Feb
Jan


Seasonal Snowfall Data (inches)
400
350
300
250
200
150
100
50
0
09-'10
10-11
11-12
12-13
13-14
14-15
15-16
16-17
17-18
18-19
March
Feb
Jan
Dec
Nov
Oct



Conversion Factors Used:

TriState (SMPA):	2.12 lb CO2e/kWh (pre-2012)	1.96 lbCO2d/kWh (2012)	1.93 lbCO2e/kWh (2013)
	1.99 lbCO2e/kWh (2014)	1.871 lbCO2e/kWh (2015)	1.776 lbCO2e/kWh (2016)
	1.595 lbCO2e/kWh (2017)		
Black Hills Energy:	11.68 lbCO2e/therm	**Source Gas (2010-2016):** 11.88 lbCO2e/therm	
Gasoline:	20.02 lbCO2e/gallon (tail-pipe emissions only per governmnet GHG protocol)		
Diesel:	22.44 lb CO2e/gallon (tail-pipe emissions only per governmnet GHG protocol)		

Local Benchmark Comparison from 2017:

Description of Benchmark	San Miguel County, CO (2017)	Telluride, CO (2017)	Town of Mountain Village, CO (2017)	Aspen, CO (2014)	Mountain Village & Telluride (2017)	Units of measurement	Notes
Total GHG Emissions	**244,000**	**67,500**	**96,000**	**394,391**	**163,500**	mtCO2e	
Avg. Res. electricity use	894	728	1268			kWh/household /month	
Avg. Res. Natural gas use	110	73	197			therms/household /month	including snowmelt systems
Avg. Res. Electricity (kWh/sf/yr)	4.70	5.19	5.23			KWh/sf/yr	
Avg. Res. Natural Gas/sq.ft/yr	0.28	0.30	0.36			therms/sf/yr	including snowmelt systems
Avg. Comm/ Public Buildings Energy use intensity	227	335	343			Kbtu/ft²/year	
Vehicle Miles per person per day	17.0	27.0	28.0			VMT/person/day	per census population
Water	189	168	266*			gallons/person/day	*not incl snowmaking; see water use chart in government report
Wastewater (this line revised from MV 2018 report)	118				73*	gallons/person/day	*per capita incl visitors & all emissions offset by Telluride government REC purchase
Municipal Solid Waste	6.8	10.0	18.1			lb/person/day	per census population
GHG Emissions per capita	**30.2**	**28.6***	**68.4**	**46.8**	**41.5**	Mt-CO2e/person/year	per census population; *Telluride's GHG value incorporates REC offsets
GHG Emissions per capita + visitors	**17.2**	**12.5***	**26.2**		**17.2**	Mt-CO2e/person/year	per capita incl Visitors; *Telluride's value incorporates REC offsets

Mountain Village GHG Inventory
Appendix A
San Miguel County Shared Resources Notes

SMC Shared Resources Meeting for GHG Inventories
Wednesday July 11, 10-12 at WPL Telluride Room
(Note this document was updated after the meeting with outcomes & findings)

The aim of this meeting is to reach consensus as to how the GHG emissions associated with each shared resource will be assigned between the Telluride & Mountain Village GHG Inventories. Allocations for Telluride's inventories from 2010-2017 are explained below, along with associated Mountain Village analyses. The SMC inventory includes all jurisdictions (including Telluride & MV) and thus is inclusive of these resources.

Allocation methodologies to consider for each resource:

- Location of utility meters determines how electricity and natural gas values are provided by SMPA and Black Hills Energy
- % of county population
- Is data available to parse resources between communities?
- Allocation of tourist impact to Telluride & Mountain Village versus rest of SMC or greater region?

<u>Regionally Shared Resources</u>

Wastewater Treatment Plant – Telluride & MV & SMC subdivisions

MV: 15% ownership, $30,000 toward solar PV system, 35% of use
Towns working toward Regional Sewer District (~5 years?)

- Electricity & natural gas: 100% to Telluride
- Biogas emissions (nitrogen & methane) from all 10,000+ visitors: 100% assigned to Telluride
- *Could allocate all of the above based on % of use. Group agreed to continue allocation to Telluride*

*WasteWater analysis charts (no impact to GHG Inventory emissions)
35% assigned to MV, 65% assigned to Telluride.
(For improved Telluride analysis – breakout of SMC subdivision population needed)

*Food GHG emissions are calculated using WWTP population accounting
35% assigned to MV
65% assigned to Telluride, minus SMC subdivision population of 1035

Gondola – eliminates vehicle traffic between MV & Telluride

100% of electricity & offset assigned to MV.
Natural gas & diesel use allocated to MV.

- TMVOA (through TMV electricity bills) purchases Green Blocks to offset electricity use by 100% (in 2017 offset was over by 30,000 kWh & adjusted by TMVOA for 2018 onward), so electricity use does not show up in GHG pie.

Telluride Ski & Golf – operations in MV, Telluride, & County land

electricity & natural gas allocated per meter location
(provided this way by SMPA & Black Hills Energy for all regional utility use)

- TSG operations include:
  - Office space & Businesses in MV core
  - The Peaks & other lodging
  - On-mountain operations
  - Conference Center
  - Telluride - Base of Gondola & Lift 7 operations
- *Could ask for TSG assistance in separating utility bills based on location of service, to reassign emissions accordingly*

Regional airports – serve region

- Telluride airport: 100% allocated to SMC, divided 50/50 between Telluride & MV
- 65% of Montrose airport to San Miguel County – group agreed to split 50/50 between Telluride & MV

Vehicle Transportation – data provided per county

Emissions assigned as % population of SMC

- Vehicle registration data & CDOT studies are basis for current Inventory
- Transit Services (some shared among jurisdictions)
- *Traffic count data for Telluride & MV would provide better data specific to community driving, but wouldn't account for distance of travel to each town*

Telluride Festivals – all 3 governments resources utilized

Electricity & water use tied to Telluride Town Park

- Located in Telluride Town Park
- Gondola used
- Camping in outlying areas, with school bus transportation
- People travel to region for festivals
- Benefits all businesses

Mountain Village Sunset Series – MV resources

- Located in Mountain Village
- Gondola used
- Regional benefit

Others – serve region, allocated by location

- Wilkinson Public Library - Telluride
- Telluride Medical Center – Telluride
- Telluride School District – Telluride
- Telluride Mountain School - SMC

Data Gaps

Trash & Recycling –

- Bruin provides data per jurisdiction. Has not provided for 2017. Telluride fined Bruin for lack of 2016 & 2017 data. Bruin data is only part of the waste picture.

- Waste Management – Private company, data not available. Could be requested through jurisdiction contracts, similar to MV's contract with Waste Management.
- 2017 Regional & SMC Inventories – data from EcoAction Partner's Regional Waste Diversion Study. 2015 data trash & recycling per jurisdiction

Transportation –

- Region 10 study data not applicable. It focuses on gaps in transit services.
- CDOT data tracks highway travel only, not all roads.
- Registered vehicles in counties relies upon average CO annual mileage.
- Off-Road vehicle use is increasing, but not accounted for.

Affordable Housing –

- Regional impacts on transit studies & transportation emissions
- GHG calculation could be done to compare impacts of reducing commute mileage for local employees

Food -

- Population-based calculation, including visitors. Telluride is based on 65% of WWTP, minus estimated SMC subdivision population served by WWTP (~1035). Mountain Village would be 35% of WWTP population.
- A food study would be helpful for more accurate food emissions & tracking reduction associated with farmers markets & programs.

Propane data –

- Estimate from 2010
- Private companies, updated data not currently available

Mountain Village GHG Inventory
Appendix B
Bases for GHG Inventory Calculations

Carbon Emissions Footprint Calculator for Cities ™

The workbook is provided to facilitate future updates to Ouray and San Miguel's Greenhouse Gas (GHG) Emissions Inventory. This inventory was completed for 2010 based on ICLEI/WRI protocols and the Demand-Centered Hybrid Life Cycle Analysis methodology (Ramaswami et al., 2008 - see Resource 3). EcoAction Partners uses the workbook to update our regional GHG Emissions Inventory annually.

General data:
Census Population – obtained annually from the Colorado DOLA website
Visitor Population
- SMC visitor values are calculated using the Telluride & Mountain Village Wastewater Treatment Plant BOD data.
- Ouray County visitor estimates are obtained from the visitor centers in Ridgway & Ouray

# of Households, SF of commercial & residential buildings – these values are not used in overall GHG emissions calculations, but are collected for other benchmarking purposes. The Ouray County & San Miguel County Assessors offices provide this data.

Energy (blue):

Residential & Commercial Building Energy Use:
Electricity
- SMPA provides data annually per community for residential, commercial & irrigation (provided in 1st quarter for previous year). Data is categorized as non-renewable sales, Green Blocks sales, SMPA community solar farm production, & net-metered system production.
- Tri-State emissions factor - provided to SMPA annually based on Tri-State's total mix of electricity sources (provided late in year for the previous year, thus GHG Inventory value is a year behind when presented to governments, but gets updated during the following year.)

Natural Gas
- Black Hills Energy Corporation (previously SourceGas) provides data annually – per community for residential, commercial & irrigation (provided in 1st quarter for previous year).
- Emissions factor – In 2010, Source Gas provided this factor and in 2017, Black Hills Energy Corporation provided the BHE value. Inventories from this transition onward utilize this Black Hills emissions factor.

Propane
- based on initial 2010 estimate from regional propane companies, who are not obligated to release information and have not provided data since.
- Emissions factor – LGOP default factor from 2010

Government Energy Use:
Government electricity & natural gas use – provided annually by governments: utility bill data, Green Blocks purchases, renewable system production, REC purchases

Water / Wastewater Treatment Electricity & Natural Gas - provided annually by governments from utility bills

Transit (red):

Vehicle Transportation:
Transportation tail-pipe emissions are calculated using total Vehicle Miles Traveled (VMT), which is derived using two different methods - vehicle registration and average daily traffic. VMT is divided by average regional vehicle fleet fuel economy to calculate fuel consumption, which is used to determine GHG emissions from surface transportation. The Colorado Department of Public Health and Environment (CDPHE) conducts on-road vehicle surveys to characterize the Colorado vehicle mix (95% gasoline, 5% diesel).

Vehicle Registration Method:
- # Vehicles registered in San Miguel & Ouray Counties updated annually
- Vehicle Miles Travelled (VMT) estimate per vehicle / year, per EPA – 12,000

Average Daily Traffic Method:
- Average Daily traffic counts of Vehicle Miles Travelled (VMT) per county per Colorado Department of Transportation (CDOT) studies (2009), based on 342 working days/year

Gasoline (95% per CDPHE)
- 20.1 average MPG per CDPHE (2010)

Diesel (5% per CDPHE)
- 6.3 average MPG per CDPHE (2010)

Airline Transport:
- Annual aircraft fuel (jet fuel and aviation gasoline) used is provided annually from the Telluride Airport and the Montrose Regional Airport (65% of passengers travel to OC & SMC).
- Emissions factors used are from the Department of Energy (DOE).
- Total number of enplanements (passengers) is also tracked to obtain emissions/person.

Emissions values for all fuels are sourced from The Carbon Registry, local government protocol, September 2008.

Materials and embodied energy (transboundary reporting):
This section will count all the GHG emissions associated with producing and transporting key materials to OC & SMC, including food, cement, and fuel. Just like electricity, these materials are produced outside the boundaries of the community but are essential to community life. WRI and ICLEI are continuously updating their guidelines on how to include these trans-boundary emissions, termed "Scope 3 Emissions."

Food:
This calculation was originally based on 2005 BLS Economic Census data for 2009$ for average annual household dollars spent on food. Recently, due to the relatively large percentage of households in the region that are not fully occupied year-round, and the annual influx of visitors that contribute to our regional food carbon footprint, all GHG Inventories (2010-2016) were converted in 2017 to use the average food carbon footprint for annual mtCO2e/person found in industry studies published online. This carbon footprint value is used with the regional visitor data (vs census) to calculate our annual food-related emissions.

Waste & Recycling: calculated using EPA WARM methodology

- We have 2 main waste haulers for the region.
- Bruin provides annually updated data for volumes of waste and recycling collected throughout the region.
- Waste Management provided total data in 2010 for collection in Montrose, Delta, San Miguel & Ouray Counties, but has not provided updated data since.
- The Sneffels Waste Diversion Planning Project was completed in December 2016 by EcoAction Partners. It includes an analysis of total volume of waste and recycling. This is the most accurate regional information currently available. Thus OC & SMC total waste data is based on this study.
- Values from the study are used with WARM* emissions data to calculate annual waste & recycling emissions.
  **Waste Reduction Model (WARM) was created by the U.S. Environmental Protection Agency (EPA) to help solid waste planners and organizations estimate greenhouse gas (GHG) emission reductions from several different waste management practices.*

Cement:

- Total cement consumed in Colorado in 2007 is multiplied by % of state census population located in OC & SMC.

Fuel Production:

- The fuel production emissions factor represents emissions from the production and shipping of fuels. Also known as Wells-to-Pumps, W2P, or WTP Emissions
- The emissions factor for Gasoline, Diesel, & Jet Fuel is multiplied by the total gallons of each fuel used in the region to obtain overall annual emissions.
- WTP Emissions values for all fuels are sourced from the 2017 GREET WTP analysis.

Water & Wastewater Treatment Emissions:
Regional governments provide annual gallons of water treated at each plant. These values are utilized with annual census & visitor data, using ICLEI Protocol for Fugitive Emissions from Wastewater equations (10.2, 10.8 and 10.10)* to calculate annual emissions associated with water and wastewater treatment.
*See ICLEI Local Government Operations Protocol v 1.0 for more information

KIM WHEELS

PO Box 803
Ophir, CO 81426

(970) 708-9674
email: kim@ecoactionpartners.org

SUMMARY

Energy consultant with experience in program management, renewable energy systems energy efficiency and building science. Excellent problem solving, project organization, and leadership skills. Enjoys challenging assignments and working in a team-oriented environment. Working to decrease regional greenhouse gas emissions and energy use with energy & green building program management at sustainability non-profit and as a business partner providing energy consulting services for the region.

ENERGY EFFICIENCY AND RENEWABLES EXPERIENCE

ECOACTION PARTNERS Telluride, CO — February, 2007 - Present

Community Energy Coordinator
Energy Program Specialist for EcoAction Partners, the region's sustainability non-profit organization. Coordinate Sneffels Energy Board of Ouray & San Miguel Counties, track and analyze GHG emissions and energy use for San Miguel and Ouray Counties, present on progress toward accomplishing goals in Sustainability Action Plan. Engage residents & businesses of each community through implementation of programs that decrease the region's energy use and greenhouse gas emissions. Current projects include: analyzing 2010-2018 GHG Inventory and energy data for Sneffels Energy Board 2020 update of the regional Sustainability Action Plan, compiling and communicating accomplishments across the region, increasing participation in Green Business Certification program, and engaging regional building departments in updating building energy codes.

LOTUS ENERGY SOLUTIONS, LLC Telluride, CO — June, 2008 - Present

Business owner & technical expert
Lotus Energy Solutions is a small local business focused on providing home and small commercial energy efficiency services for the San Miguel County region. Services provided include ENERGY STAR Certification for new homes including Home Energy Ratings (HERS) and Manual J calculations; Home Energy Audits with use of blower door, duct blaster, and infrared camera; & other Home Energy Consulting services designed to help our clients build and retrofit high performing homes. LES is a mission-based company with the intention of reducing regional carbon emissions through promoting energy efficiency and renewable energy technologies.

VERITAS SOLAR, LLC. Norwood, CO — August, 2006 – April, 2007

Renewable Energy System Designer
Designed solar electric and solar hot water systems for remote homes & cabins, utility grid-tied homes, & commercial buildings. Selected equipment, assist with installations, trouble-shoot installation/operation difficulties, and provide on-going maintenance and guidance to system owners.

Energy Efficiency Expert
Performed complete energy analysis of homes based on plans or on-site evaluations, utilizing computer-modeling software. Provided energy conservation and HVAC system design recommendations to architects, builders, and homeowners.

SOLAR ENERGY INTERNATIONAL Carbondale, CO

Renewable Energy Classes — June - August, 2006
Solar Hot Water; Solar PV Design and Installation; Micro-Hydro Systems; Wind Power Design and Installation; Passive Solar Design Principles; Natural Home Building

Renewable Energy Intern – Work/Trade Program — November, 2005
Assisted with various several energy projects including biodiesel processing and a Solar in the Schools program. Reviewed "Appleseed Biodiesel Processor" plans and assembled a biodiesel processor for upcoming course. Researched biodiesel-related websites and organized a reference list to be used in SEI biodiesel summer course. Assisted with design of a rack for solar panels to be mounted on roof of the Solar in Schools bus. Worked in exchange for partial tuition payment for renewable energy and natural home building courses.

OFFICE for RESOURCE EFFICIENCY Crested Butte, CO

Sustainability Non-profit Organization Volunteer February – May, 2006

- Developed a plan for the beginnings of a cardboard recycling program at Crested Butte ski resort. Researched availability of recycling services and options for other materials.
- Assembled a report on available renewable energy and energy efficiency grants and other financial incentives available in the region.

ENGINEERING EXPERIENCE

RESOURCE ENGINEERING GROUP, INC. Crested Butte, CO February – May, 2006

Mechanical Engineer
Designed mechanical systems for homes and commercial buildings, incorporating energy efficiency, renewable energy systems, and sustainable design practices. Provided complete plans and specifications for various types of HVAC systems including ground-source heat pump, active solar, and evaporative cooling. Utilized computer simulation software to analyze energy usage of homes. Designed systems for buildings of different construction types, including strawbale, ICF, and SIP Systems.

CARTER & BURGESS, INC. Ft. Worth, TX 1999- 2004

Mechanical Engineer, P.E., C.E.M. - Retail & Distribution Division
Responsible for leading and coordinating the mechanical engineering design performed by Carter & Burgess for Distribution Centers. Responsible for training new engineers in the program, dispersing design and drafting work among other engineers and drafters, coordinating design changes, performing quality control. Designed HVAC systems and develop special design changes to distribution center design. Prepared plans and specifications, performed code reviews, coordinated with vendors, reviewed equipment submittals, and responded to contractor information requests. Prepared reports certifying compliance with energy efficiency and air quality requirements.

- Continually determined and evaluated project workload, personnel availability, and coordination between team members for mechanical group. Responsible for developing quality assurance checklists, special project budget estimates, project timelines, and ensuring consistency of design among team members. Met regularly with Mechanical Discipline Leader to ensure smooth operation and coordination of mechanical group.
- Modified prototypical design to comply with California state codes, including energy efficiency standards. Specified higher efficiency HVAC equipment, modified ventilation airflows and ductwork design, and utilized non-metal-building walls where necessary to comply with local requirements and seismic-related design changes. Provided energy-efficiency documentation to local authorities to exhibit compliance with regulations.

E.I.T., Energy Services Group - Facilities Division
Provided energy design services for new central energy plants, as well as analysis for optimization, replacement and expansion of existing systems. Scope of the projects included evaluating current systems and equipment, analyzing the benefits of implementing modern energy-saving equipment, designing utility power plants, and recommending the implementation of energy management techniques. Performed energy audits and developed computer simulations to compare actual measured energy use to future predicted energy use. Clients included universities, manufacturing plant operators, retail store chains, military bases, district energy users, corporations, public institutions and other facility owners.

DUKE ENGINEERING & SERVICES Ft. Worth, TX 1997-1999

Mechanical/Systems Engineer
Performed consulting engineering work for utility companies in the power industry. Completed high quality engineering design and documentation required to maintain continuous operation at power plants. Duties included revising, developing, and verifying engineering calculations, drawings and reports; developing plant modification packages; database development and utilization.

Chairman: Recycling, Community Service, and Charitable Donation Committee of DE&S Ft. Worth Office

- Created and organized an office paper and aluminum can recycling program. Program was well-received and supported by office personnel. 5000 pounds of paper were recycled in the program's first six months. Program is still operating.
- Responsible for initiating and coordinating committee activities which increased DE&S's community involvement and company recognition in the Ft. Worth area. Organized office community service activities such as a Ft. Worth anti-graffiti painting party and DE&S participation in WalkAmerica for March of Dimes in Ft. Worth. Established a corporate membership with the local YMCA.

STONE & WEBSTER ENGINEERING CORPORATION Boston, MA 1996-1997

Career Development Engineer, Mechanical Department, Power Division

Participant in the Career Development Program which gave new engineers exposure to numerous aspects of company operation, site trips, and the ability to rotate between different engineering assignments.

- Lungmen Project Assignment: Designed turbine building steam systems of a power plant. Developing drawings, designed piping systems, established design parameters, and developed engineering calculations. Wrote letters to other companies involved in designing the plant in order to exchange design information. Became a successful, contributing team-member of a large, multi-disciplinary project.
- Piping, Valve, and Component Group Assignment: Developed design specifications and verified data on piping and instrumentation, process flow, and utility flow diagrams for a hazardous chemical disposal program. Performed flooding calculations for a plant turbine building. Developed database tables of piping and other plant components used in the design of power plants. Learned and applied practical engineering skills in a variety of engineering duties.

LICENSES/ORGANIZATIONS

Home Energy Rating System (HERS): *training May, 2008; certification in process*
Professional Engineer (PE)**:** Licensed in Mechanical Engineering since 1/2002
National Council of Examiners for Engineering and Surveying (NCEES)**:** Council Record; 12/2002

ENGINEERING EDUCATION

WORCESTER POLYTECHNIC INSTITUTE Worcester, MA
Bachelors of Science, Mechanical Engineering - Thermal/Fluid and Environmental Interests: May 1996; GPA 3.8

EDUCATIONAL PROJECT WORK

MAJOR QUALIFYING PROJECT (MQP): Construction of an air cushion vehicle (ACV) and development of a representative mathematical model. Modified an existing hovercraft design to accommodate instrumentation used to measure several operation parameters. Compared physical data to values obtained mathematically.

INTERDISCIPLINARY PROJECT: *A Study of Farming on the Innichberg: Preserving a Unique Culture*
On-site study of the mountain farming system economy and culture of Innichen/San Candido, Italy. Presented recommendations for improvement of farm economics and maintenance of the mountainside's delicate environmental balance. President's IQP Awards Competition Finalist.

HEATHER KNOX

PO BOX 2441, TELLURIDE, CO 81435 | 970.729.3362 | HKNOX9500@GMAIL.COM

EXPERIENCE

EcoAction Partners: Executive Director **Jan. 2014 – Present**

Directs EcoAction Partners, the regional sustainability organization serving the towns of Telluride, Mountain Village, Ophir, Norwood, Ridgway and Ouray, and San Miguel and Ouray Counties

Strategic Partnerships:

- Initiated the Green Lights LED Program with San Miguel Power Association and regional governments. Greenlights has allowed residents and businesses to purchase LED bulbs at up to 75% off by leveraging the SMPA LED light bulb rebate of up to 50% along with a government match. Through this regional program 15,500 LED bulbs were purchased and installed, reducing approximately 275 mt-CO2e of GHG emissions annually. The program served 9 regional governments in 2019 .
- Partnered with Energy Outreach Colorado and San Miguel Power Association, to implement the San Miguel Power Association Income Qualified Program (SMPA IQ). SMPA IQ brings home weatherization services to low and mid-income individuals in San Miguel, Ouray counties and sections of Montrose, Delores and San Juan counties. The weatherization program is the precursor for the SMPA IQ Solar program, which provides solar panels to further off-set utility costs for low and mid-income individuals and families. Since the inception in 2016, Energy Outreach Colorado has provided over $300K in funding for weatherization improvements to these needy homes.
- Proposed and created the Green Projects Grant Program (GPGP) for San Miguel County to put a $100K energy impact fee to work. All application, marketing and grant committee review materials were created and distributed. Matching grants to 18 public and private entities were provided reducing carbon by 1.5 million pounds for the life of the projects.
- Partnered with San Miguel Power Association and regional schools to expand the Truth or Dare educational challenge. Seven regional schools now participate in this program. Through small student actions, this one-week program reduces energy and waste, and educates students on what they can do to reduce their carbon footprint, and develop lasting habits.
- Served our regional festivals for Compost, Recycling & Trash services (CRT) for waste reduction: Mountain Film, Telluride Bluegrass Festival, 4th of July Celebration, The Ride, Blues and Brews, TMVOA Sunset Concerts, and others.
- Secured State of Colorado Resource Recovery, Recycling, Economic Opportunity Grant for implementation of an neighborhood composting program for the Town of Ophir.
- Participated in the Sneffels Energy Board: a regional group with SMPA and Black Hills Energy serving the governments of Telluride, Mountain Village, Norwood, Ophir, Ridgway, Ouray, and San Miguel and Ouray Counties.
- Operates bi-annual regional electronics recycling with San Miguel County and the Town of Telluride.

Heather Knox Consulting: Events, grants, & non-profit management consulting **2013**

Clients include:

- Telluride Adaptive Sports Program, as Grants Manager
- EcoAction Partners, as Transition Manager & Interim Executive Director

Telluride School District: Executive Director of the Michael D. Palm Theatre & Palm Arts **2007 – 2013**

Managed all aspects of the Michael D. Palm Theatre, a 30,000 square foot versatile performance facility with comfortable seating for 660, a 3,332 square foot stage, a full fly rail system with 38 line sets, 288 dimmed lighting circuits, performance sound equipment, and wide screen cinema with dual 35 mm projectors and a large format digital projector and surround sound, welcoming approximately 15,000+ annual visitors.

Highlights:

- 2008 – Navigated the Palm Theatre through the culmination of a five-year $100K annual funding commitment. Created a trustee program to provide $30K in annual operating support. Developed new revenue streams for long term sustainability.
- 2009 – Directed the creation of a new 501c3 organization, **Palm Arts, Inc.** to facilitate donations, secure special event liquor licenses, and support the Michael D. Palm Theatre. The ability to obtain liquor licenses increased Palm rental income by 20%.
- 2011 – Developed the business plan and pro forma for an after-school dance program when the previous local dance school closed. Palm Arts Dance Program now offers a full array of dance classes (23+ per week) for students, preschool through 12th grade. Liquor licensing and the dance program, now provide more than 20% of the Palm Theatre's annual operating budget.
- 2013 – Created a Summer Dance Series to bring professional dance performances back to Telluride in the summers. Series drew 1000 attendees over two performances and engaged new sponsors and donors.

Duties & Accomplishments:

- Selected national and international talent for the Live at the Palm Series (5-8 performances per season). Coordinated with the Rocky Mountain Arts Consortium (RMAC) on routing opportunities for the artists selected. Negotiated performance contracts and executed commitments; oversaw event marketing and ticket sales. Managed a $65-75K series budget; leveraged grant funds and sponsorship to maximize budget.
- Managed all event rentals for the 25+ groups who use the Palm theatre for 175 annual event days. Increased rental and services income by 30% over 3 years through new bookings, partnerships, and appropriately billing for services.
- Coordinated all aspects of the special event liquor license permitting process. Submitted event plans to the Board of Education for approval. Managed the liquor application process (applications, fees, postings, product purchases) and event-day staff management. TIPS Certified on safe liquor service practices. Liquor sales generate approximately $20K annually for Palm Arts.

- Introduced risk-free digital programming (50+ events per year) to increase use of the Palm Theatre. Digital programming brought $10K annually through earned income and fundraising program support.
- Provided professional oversight of the Palm Arts Dance School to ensure success; managed an annual budget of $120K.
- Launched a capital campaign and managed the construction and budget ($55K) for a dedicated dance studio.
- Researched and wrote grants for Michael D. Palm Theatre & Palm Arts. Increased grant funding by 70% from FY 2008 to FY 2013, despite an overall reduction in state, local and national grant funding available.
- Developed and managed the Palm Theatre's annual budget of $300K. Created long and short term equipment, maintenance and capital repair/replacement plans.

Town of Mountain Village **1997 - 2007**

Director of Economic Development **December 2005 – September 2007**

Directed all activities and operations of Economic Development in Mountain Village: developed and produced new and existing events, managed public relations and communications, coordinated destination marketing, directed guest services, provided economic analysis for strategic facility development and managed existing facilities.

Duties & Accomplishments:

- Managed the 50+ personnel in the departments that collectively comprised the Economic Development Department: Guest Services, the Telluride Conference Center, Mountain Village Events, Marketing and Communications, and the proposed Mountain Village Adventure Center.
- Determined levels of staff, equipment and resources needed to effectively accomplish departmental services and programs. Assessed needs and strategically planned for the future of the various departments.
- Developed and implemented departmental operating and capital budgets of $2.4 million annually.
- Developed a strategic grant process using Return on Investment Reports for Mountain Village Owners Association (now TMVOA) and the Town of Mountain Village; directed the grant process, which awarded $640K in grant funding to more than 35 organizations (2006).
- Directed the development and production of 25+ Mountain Village signature events and more than 35 outside promoted events (2006).
- Developed and executed town-wide customer service strategy for all business license holders. Worked in conjunction with Telluride Ski and Golf Co. and the Telluride Tourism Board to implement initiatives.
- Managed communications and marketing to all Mountain Village stakeholders through newsletters, press releases, advertising, website design and content, surveys, and event and facility marketing.
- Implemented directives from Mountain Village Owners Association Board of Directors and Mountain Village Town Council, and handled special projects on behalf of the Town Manager.

Director of the Telluride Conference Center **2002 - September 2007**
(Held concurrently with the Director of Economic Development from 2005)

Managed all aspects of the Telluride Conference Center, a 20,000+ square foot multi-use meeting and events facility with on-site audiovisual, catering and beverage service, which serves 10,000+ annual guests for conferences and events.

Duties & Accomplishments:

- Reduced annual deficit by 82% from $946K in 2001 to $178K in 2006 through creative revenue generation and a reduction in overhead.
- Implemented in-house food & beverage service (2002-2003). Created policies and procedures to ensure high quality catering service; created policies and procedures to ensure the security of the liquor license, inventory, and cash revenue. F&B netted $244K annually (2006).
- Managed all rental and event contracts for groups utilizing the facility.
- Developed and managed revenue and expense budgets of $662K and $840K respectively (2006).
- Hired and managed 30+ full time and part time staff.
- Created long and short term plans for facility upkeep, capital improvements, repair, replacement and maintenance.
- Standardized a consistent, high-quality customer experience for event coordinators and guests utilizing the facility.
- Worked closely with the Telluride Tourism Board on Telluride Conference Center marketing, advertising and Familiarization (FAM) Trips.
- Established a commission structure for lodging properties to incentivize group bookings.

EDUCATION

El Pomar Non-Profit Executive Leadership Program **June 2013**
One of twenty Colorado executives selected by application for this two-week program; certified.

The Colorado College Colorado Springs, CO **1990 – 1994**
Bachelor of Arts; Graduated with honors

REFERENCES AVAILABLE UPON REQUEST

EXPERIENCE

FREELANCE DESIGNER
California, Oregon & Colorado, 2014-2019
Website Designer - Telluride Outfitters 2019
Website Designer - Pilates Balance 2019
Layout Designer - Telluride Arts Transfer Warehouse
Potential Donor Info Booklet 2018
Website Designer - Original Thinkers Festival 2018
Layout Designer - Program, Original Thinkers Festival 2018
Website Designer - The Steeping Leaf Tea 2018
Graphic Designer - Arts + Architecture Festival 2018
Program, Website Design, Wayfinders, Swag
Logo Designer - Green Team, Town of Mountain Village 2018
Mural - Telluride Works Workspace 2018
Brand Identity Designer - Silo 2017
Graphic Designer - Adidas Film Deck, Sockeye 2017
Production Designer - Adidas Interactive PDF, Clever.ly 2016
Brand & Book Designer - New Era Healthy Eating 2016
Brand & Annual Report Designer - Quetzeltrekkers 2016
Environmental Design - Revant Optics Headquarters 2015
Movie Poster Designer - JK Serious Productions 2014, 2016

ADVENTURE CENTER SUPERVISOR
Telluride Ski Resort, Colorado, 2018 Winter
Manage Adventure Center day to day
Manage Employees
Manage Outfitter Relations
Manage Guest Services
Point of Sale

CHIEF EXPERIENCE OFFICER - GUIDE
G Adventures, USA, 2017
Provides authentic creative experiences for clients.
Plans & executes itineraries for transnational foreign group travel. Managed accommodation logistics on the road.
Maintains vehicles, trailers, camping equipment and abide state regulations for commercial drivers. Represent "G Adventures" as a brand ambassador and the face of the company.
Manages trip budget and track expenses.

WHITEWATER RAFT GUIDE
Blue Sky Rafting, Oregon, 2016 Summer
Provided excellent customer experience. Guided boat through white water strategy. Performed gear and vehicle maintenance.

GRAPHIC DESIGNER - IN HOUSE
Revant Optics, Portland, Oregon 2014 - 2016
Marketing Graphic Design for a broad range of initiatives for website, email marketing, blog, social media, events, products, and packaging.
Highlights:
+Developed brand story for product line launches.
+Created unique branded graphic pattern for packaging.
+Designed infographics to explain products and brand.

OLIVIA PEDERSEN

FREELANCE GRAPHIC DESIGNER

831-212-3065
www.oliviapedersen.com
oliviapedersendesign@gmail.com

EDUCATION

Bachelor of Science in Liberal Arts
emphasizing in Cultural Anthropology
& Human Interaction
Minor in Graphic Design
Master of Arts in Sustainable Design.
Portland State University
Portland, Oregon 2014
GPA 3.5

Master of Arts in Sustainable Design
Minneapolis College of Art & Design
Online Program (In Progress)

DESIGN EXPERTISE

Branding & Identity
Interactive Design (UX / UI)
Marketing & Communication
Layout Design
Packaging
Illustration & Infographics

SUSTAINABLE FRAMEWORKS EXPERTISE

Household & Lifestyle Sustainability
Cradle to Cradle
The Natural Step
Persuasive Design
Systems Thinking
Creative Leadership
Innovation Tools & Techniques
Biomimicry
Sustainable Packaging Design

THANK YOU FOR READING!

RFP: Update Town of Mountain Village Corporate & Community GHG Inventory and Report

Town of Mountain Village

November 13, 2019

Request for Proposals:

Update Town of Mountain Village Corporate and Community Greenhouse Gas Emissions Inventory and Report

Prepared for

Town of Mountain Village

Prepared by

AET Group Inc.

531 Wellington St. North
Kitchener ON N2H 5L6
T (519) 576-9723
www.aet98.com

November 13, 2019

COVER SHEET

November 13, 2019

Zoe Dohnal

The Town of Mountain Village
455 Mountain Village Blvd. Suite A
Telluride CO 81435

RE: RFP to Update Town of Mountain Village Corporate and Community GHG Emissions Inventory and Report

Proponent's Legal Name:	AET Group Inc.
Mailing Address:	531 Wellington Street North, Kitchener, Ontario N2H 5L6
Contact Name / Email (Admin.):	Scott Freiburger / sfreiburger@aet98.com
Contact Name / Email (Technical):	Stephen Boles / sboles@aet98.com
Telephone:	(519) 576-9723
Facsimile:	(519) 570-9589

I confirm I have the full authority and capacity to represent the proponent in all matters relating to the proposal and I confirm that the proponent agrees to be bound by all of the terms and conditions of this RFP.

_____

Authorized Signature

Scott Freiburger

_____

Print Name

Principal, Managing Director

_____

Title

Table of Contents

1. INTRODUCTION / UNDERSTANDING OF CLIENT'S NEEDS

The Town of Mountain Village (the 'Town') is seeking an innovative and qualified consulting team to assist in the completion of an inventory and forecasting for both its corporate and community-at-large greenhouse gas (GHG) emissions and a *Climate Action Plan* for the Town. The GHG inventory and *Climate Action Plan* to be delivered in this project will be strategic and comprehensive documents that will:

- guide the reduction of the Town's corporate and community energy use and GHG emissions, including alignment with existing plans and policies (e.g. Zero Waste Action Plan, Comprehensive Plan);
- guide the re-definition of long-term GHG reduction targets for the Town. Interim GHG reduction goals will also be defined to monitor progress in meeting the long-term targets;
- contribute to the awareness of Town staff and community stakeholders to the energy/GHG reduction issue;
- provide forecasting of the Town's GHG emissions to 2050, and;
- identify GHG reduction opportunities and monitoring procedures as well as an implementation framework.

AET Group Inc. (AET) is pleased to submit our proposal to provide the Town with a highly-experienced option for leading your project. As a collective group, our team:

- has several decades of GHG management experience in a range of government and industry sectors;
- has over 200 hours of energy and GHG management training;
- includes a range of professionals including Professional Engineers, Certified Energy Advisors, Certified Environmental Auditors, LEED Accredited Professionals, Greenhouse Gas Quantifiers, Greenhouse Gas Verifiers, and Building Science Specialists;
- has developed or verified the community GHG inventories for major North American municipalities, including the Regional Municipality of Waterloo, the City of Yellowknife, and the City of Montreal; and,
- has extensive experience working with municipalities having completed over 1,000 municipal environmental projects across North America (including many GHG management projects in the USA for clients including National Milk Producers Federation, Environmental Defense Fund, Eaton Corp., and Cigna Healthcare).

In addition to the above, AET's internal dedication to corporate energy conservation and sustainability is ingrained in our culture and has been recognized with numerous environmental and sustainability awards. We feel that our own internal dedication to corporate energy conservation and sustainability is well aligned with the Town of Mountain Village, making AET the perfect proponent to lead your project.

At AET we are always thrilled to be working for and aligning ourselves with forward-thinking progressive leaders like the Town of Mountain Village. We are confident that we have shown AET has the corporate capabilities, professional experience, and sustainability culture to ensure your project achieves the critical success that the Town and its stakeholders demands. We look forward to working with you!

2. QUALIFICATIONS

2.1 PROPONENT PROFILE (AET GROUP INC.)

Established in 1998, AET is a multi-disciplinary environmental consulting, auditing and scientific services firm providing professional services to the built and natural environments in the following core service areas: GHG, Air, Sustainability, Audits, Management Systems, Energy, Building Sciences, Compliance, Waste, Mitigation, Water and Home Flood Protection. AET is headquartered in Kitchener Ontario and has additional offices in Cambridge, London and Exeter Ontario.

AET has extensive experience working on GHG management projects for USA-based clients. AET was retained by the Environmental Defense Fund to develop GHG emission factors for use in carbon offset protocols for carbon sequestration from rice agriculture in the USA. AET is currently working with the National Milk Producers Federation to develop an industry-wide verification strategy for GHG emissions from the US dairy sector. For the past several years AET staff have led the verification of the corporate GHG inventories of several large US companies, including Eaton Corp., Cigna Healthcare, and Compass Minerals. In the area of municipal waste, AET has led waste characterization projects in ten states over the past several years. With over 1,000 projects completed across the USA, Canada, South America, Europe and the Caribbean, AET offers extensive experience, capabilities and a proven track record that assures that our clients receive extensive value, credible results and effective solutions. Quality service, solid performance and professional integrity are embodied in all aspects of our work which has allowed us to benefit from a high level of client satisfaction and repeat business. As a result of our extensive experience, technical proficiency and diversified capabilities, AET has positioned itself as a highly credible and sought-after consulting firm.

AET's team of 35 employees include certified sustainability professionals, certified GHG quantifiers and verifiers, communication specialists, LEED accredited professionals, professional engineers, climate change scientists, certified auditors, management system specialists, certified energy advisors, and building science specialists. AET's team has extensive experience working with public sector organizations on a range of sustainability and climate change projects including GHG inventory development, strategic plan development, sustainable procurement and life-cycle product analysis, GHG verifications, and group facilitation.

2.2 VALUE ADDED

AET is proud to showcase the following aspects of our proposal which add additional value to our submission beyond the competitive pricing that we have proposed.

1. Award-Winning Corporate Sustainability Commitments

AET's own corporate sustainability commitments are perfectly aligned with those of the Town of Mountain Village. AET sets an example for our clients by not only recommending sustainability practices but by adopting such practices within our own operations. This is most evident in the greening of our office building, sustainability policy, green purchasing policy and our role as a Tri-Pledging Partner of Sustainable Waterloo Region's Regional Sustainability Initiative which includes a pledge to reduce our GHG emissions by 40% by 2021, a reduction of water

usage by 30% by 2025 and an increase in our landfill waste diversion to 90% by 2023. AET has since been awarded Sustainable Waterloo Region's "Most Active Green Team" award three years in a row (2014, 2015, 2016).

AET's head office is powered by 100% renewable electricity and 100% renewable natural gas. To reach our goal of producing more energy than we consume, AET will be finalizing our Net Positive Building Plan that will include a 15.2kWh roof-mounted solar array with power banks and two electric charging stations that will be accessible to all employees and the community after business hours and weekends. All reports are printed on paper that is FSC certified, 100% recycled content, chlorine free and manufactured using biogas energy. As part of our sustainability commitments AET has registered to certify our head office with the Canada Green Building Council Zero Carbon Building Standard for existing buildings. Additionally, AET is in the process of completing the final steps to become a B-Corp Certified Corporation.

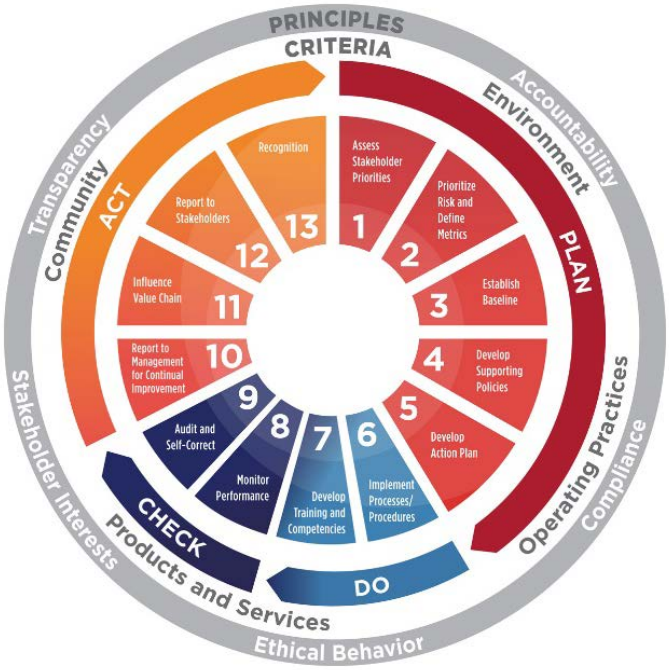
AET was awarded the 2009 and 2012 Environment and Sustainable Business Excellence Award from the Greater Kitchener Waterloo Chamber of Commerce. Through our commitment to sustainability, AET has received recognition in a number of local and national competitions including ECO Canada's Top Employer 2018, listed as one of Waterloo Area's Top Employers 2019, and being awarded one of Canada's Greenest Employers 2019.

2. Project Plant-A-Tree

In 2013, AET initiated and launched the "Project Plant a Tree" Program to give back to the communities in which we work. As a company committed to being green and giving back, AET is planting trees throughout the local communities in which we work to make the world a greener place for all of us to live. As part of AET's fight against climate change, AET is committing 1% of annual profits to planting trees through partnerships with local communities. "Project Plant a Tree" is a value-added component of our proposal for the Town of Mountain Village.

3. Proprietary Sustainability Implementation Process

AET's proprietary *"Sustainability Implementation Process"* is a guidebook and graphic tool that will provide the Town with an implementation path going forward. The process is based on the classic management systems "Plan-Do-Check-Act" approach for continuous improvement, yet has been enhanced with discrete steps and guidance based on AET's decades of experience working with clients in implementing sustainability projects. It is our intention that the Sustainability Implementation Process (shown below) will provide Mountain Village with a consistent and credible framework to follow after this initial project has been completed, thereby giving the Town's team invaluable ownership of the implementation phase of the project.



2.3 PROJECT EXPERIENCE

In Appendix A to this proposal, numerous projects have been selected to showcase our team's experience providing services of a similar size, complexity, and scope as the Town of Mountain Village's project. Projects have been selected for the following core areas of expertise desired by the Town:

- Municipal GHG emissions quantification
- Organizational GHG reduction plans and targets
- Data research, collection, and analysis
- Energy management planning and conservation
- Sustainability
- Community engagement programs

Select client references have been provided in Section 2.5 that will attest to the integrity of our team's management, competency, and commitment to quality.

2.4 CLIENT REFERENCES

The following client references have been provided that will attest to the integrity of our team's management, competency, and commitment to quality, as well as our experience providing services of a similar size, complexity, and scope as the Town of Mountain Village's project.

	Reference #1	Reference #2	Reference #3
Organization Name	Municipal Property Assessment Corp. (MPAC)	City of Yellowknife	Envirings Inc. (contract for Federation of Canadian Municipalities)
Contact Name & Title	Jeff Nicholson Manager, Facilities and Fleet Operations	Chris Greencorn Director, Public Works and Department	Mary Trudeau Director
Address	1340 Pickering Parkway Pickering, ON L1V 3C0	4910 52 Street Yellowknife NT X1A 2N4	111 Mason Terrace Ottawa, ON K1S 0L2
Industry	Public Sector (Property Assessment)	Municipal Government	Municipal Government
Telephone Number & Email	289-923-2098 Jeff.nicholson@mpac.ca	867-920-5637 cgreencorn@yellowknife.ca	613-231-3537 m.p.trudeau.water@gmail.com
Description of Engagement	Preparation of organizational GHG inventory and identification of GHG reduction opportunities	Quantification of community GHG emissions from waste and wastewater management; carbon sequestration assessment	Assessment of best practices for reducing GHG from municipal waste management in Canada
Reference for AET Team Member	Stephen Boles	Stephen Boles Selena Fraser-Arvai	Selena Fraser-Arvai
Time Period of Engagement	2019 – 2023 (4 months per year)	2019 (4 months)	2019
Budget	$15,775	$66,710	$35,000

2.5 PROJECT TEAM

AET has assembled a highly experienced team to lead the Town of Mountain Village's project. Biographies and role descriptions of all team members are provided below and an organizational chart displaying the relationship between team members is also provided. CVs for all team members are provided as Appendix B.

Project Manager

Stephen Boles (AET Group Inc.), B.E.S., MSc., EP (Sustainability)

- B.E.S., Bachelor of Environmental Studies (Geography), University of Waterloo
- MSc., Master of Science (Natural Resources Management), University of Alaska Fairbanks
- ISO 14064-3: Greenhouse Gas Verification using ISO 14064

Stephen is the Manager of GHG and Sustainability Services with AET Group. Stephen has been active in the climate change community as a scientist and consultant for over 20 years. Stephen received his Master of Science degree from the University of Alaska Fairbanks in 1998 and spent the next eight years working as a scientist at one of the world's leading climate change research centers at the University of New Hampshire. As a consultant, Stephen has led GHG management projects (GHG quantification, GHG verification) for dozens of clients in various industry sectors, including several Fortune 500 multinationals. In addition to his GHG management expertise, Stephen has managed projects in a range of other areas pertaining to sustainability, including carbon offset development, life cycle assessments, risk and opportunity planning, and corporate sustainability implementation. Stephen served on the international working group that conducted the review of the ISO 14064 family of standards.

Stephen is a dual citizen of the USA and Canada.

Stephen will serve as Project Manager and Lead GHG Analyst on this project and will oversee all technical aspects of the engagement and report writing.

Project Management Experience

Over the past three years, Stephen has effectively managed numerous projects concurrently with a similar scope and budget as the Town of Mountain Village's project. Several examples are provided in the table below:

Client	Project	Timeframe	Budget
City of Yellowknife	Water / Wastewater GHG Quantification	Oct 2019 - present	$66,710
Environment Canada	Organic Waste GHG Calculator	Nov 2018 – Nov 2019	$95,130
MPAC	GHG Inventory & Reduction Plan	Feb 2019 – May 2019	$15,775
Eaton Corp.	Zero Waste to Landfill Program Verification	July 2019 – Nov 2019	$21,405
Eaton Corp.	Corporate GHG Verification	Mar 2019 – June 2019	$22,165
Province of Alberta	Oil Sands Facility GHG Verification	Aug 2018 – Nov 2018	$24,600
Nat. Milk Prod. Fed.	Industry GHG Reporting / Verification Strategy	Jul 2018 – Dec 2018	$21,750
Province of BC	GHG Quantification Methodology for ICI Sector	Jan 2018 – Apr 2018	$12,000
Libro Credit Union	Environmental Assessment & Reduction Plan	Sep 2017 – Feb 2018	$17,500

Other Team Members

Selena Fraser-Arvai (Sub-contractor), B.Eng, M.Eng, P.Eng.

- B.Eng., Environmental Engineering, Carleton University
- M.Eng., Environmental Engineering, Carleton University
- ISO 14064-1: Greenhouse Gas Quantification using ISO 14064

Selena Fraser-Arvai is a registered P.Eng. with the Professional Engineers of Ontario and holds her own Certificate of Authorization (CofA) to practice engineering. Selena has over twelve years of experience solving a diverse breadth of environmental and energy related problems. She has provided her expertise to studies and projects related to GHG and CAC emission identification, quantification and verification; energy efficiency; climate change impacts and adaptation; environmental impact assessment; and environmental processes and systems. Selena has extensive municipal GHG quantification experience. Selena was the project manager on the update of the City of Yellowknife's 2009 GHG inventory and recently completed a project for the Federation of Canadian Municipalities to identify best practices in reducing GHG emissions from municipal waste management. Ms. Fraser-Arvai was one of the first recipients of the CSA-GHG Inventory Quantifier (CSA GHG-IQ) certification, after beta testing the program for the CSA in 2009.

Selena will serve as a Senior GHG Analyst on this project and will contribute to the GHG analyses and report writing.

Evan Jones (AET Group Inc.), B.A.Sc., B.Sc, GHG-IQ, GHG-V, P.Eng.

- B.A.Sc., Bachelor of Applied Science (Mechanical Engineering), University of Waterloo
- B.Sc, Bachelor of Mathematics and Physics, University of Toronto
- ISO 14064-1: Greenhouse Gas Quantification using ISO 14064
- ISO 14064-2: Carbon Emission Reduction – GHG Projects

Evan Jones is a Senior Project Manager at AET Group and is a CSA-certified GHG Inventory Quantifier (GHG-IQ) and a CSA-certified GHG Verifier (GHG-V). Evan is a registered P.Eng. with the Professional Engineers of Ontario and has over 20 years of work experience as a consultant and systems manager for one of Canada's largest real estate management firms. Evan has served as project manager for numerous GHG reduction projects that have been developed following the ISO 14064-2 standard, all of which are listed on the CSA CleanProject registry of carbon offset projects. Evan has also served as an instructor for CSA courses related to the ISO 14064 standard (including ISO 14064-2) and has taught over 300 students over the past ten years.

Evan will conduct an internal peer review of the completed GHG quantification and project documentation.

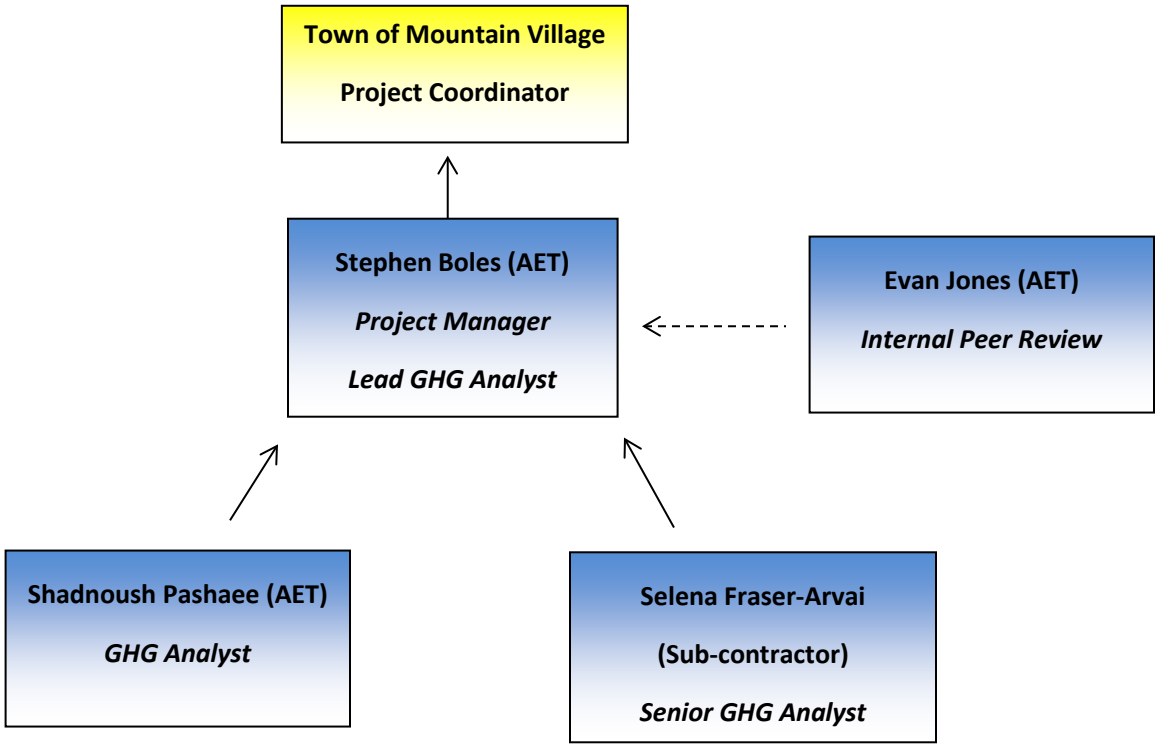
Shadnoush Pashaee (AET Group Inc.), B.Arch, M. Arch, M.S.

- Bachelor of Architecture, Yazd University (Iran)
- Master of Architecture, Azad Yazd University (Iran)
- Master of Science (Environmental Engineering), Concordia University (Montreal)

Shadnoush Pashaee is a Project Consultant at AET Group and has a diverse background in GHG management and energy efficient building design. Shadnoush's graduate project for her Master of Science degree from Concordia University involved the preparation of the GHG inventory for the City of Montreal. Prior to starting her graduate degree in Montreal, Shadnoush gained several years of experience in the field of building energy studies (energy auditing, energy modeling, efficient building design). Recently Shadnoush has been leading the quantification of GHG from the City of Yellowknife's water and wastewater management systems.

Shadnoush will serve as a GHG Analyst on this project and will contribute to the GHG analyses and report writing.

Project Team Organizational Chart



3. APPROACH

Our proposed approach for the Town's project has been framed around the following three deliverables as described in the RFP document:

DELIVERABLE 1: Corporate and Community GHG Emissions Inventory and Forecast Report

DELIVERABLE 2: GHG Emission Reduction Targets

DELIVERABLE 3: Climate Action Plan (Recommended Actions to Reduce GHG Emissions)

A detailed description of each task proposed to accomplish the Town's deliverables is provided on the following pages. In the approach described below, note that AET has presented Deliverable 2 (GHG Emission Reduction Targets) as a task included in the completion of Deliverable 3 (Climate Action Plan). A task-based timeline is provided in the Gantt chart that is included in Section 3.3 of this proposal. The Gantt chart also contains completion dates for project deliverables.

3.1 CORPORATE AND COMMUNITY GHG EMISSIONS INVENTORY AND FORECAST REPORT

Task 1: Review of Existing GHG Inventory, Input Data and Reporting Protocol

Prior to the project kick-off meeting, AET will take the following steps:

1. Conduct a thorough review of the Town's existing 2017 GHG inventory prepared by Eco-Action Partners.
2. Provide the Town with a list of data (e.g. project studies, fleet and building energy consumption data) that should be compiled by the Town and other data stakeholders and provided to AET such that an initial data review and gap assessment can be conducted. AET will review the data sources provided to identify data issues (if any) that will need to be resolved, including:
    - missing or incomplete sources of data,
    - data of questionable quality or accuracy,
    - validity of assumptions made in the data collection methodology.
3. Review the GHG reporting frameworks that the Town is committing to following. The Town has stated its corporate and community GHG inventory document must be prepared in compliance with the Global Covenant of Mayors (GCOM) and the Colorado Communities of Climate Action (CC4CA) programs. The GCOM protocol sub-divides corporate and community GHG emissions into the sectors shown on the following page. AET will conduct a thorough review of the requirements of the GCOM and CC4CA reporting programs and will provide a recommendation on the GHG quantification approach that positions the Town with the most robust inventory in terms of alignment with GCOM and CC4CA. AET's recommendation will be based on several considerations including relevancy of GHG sectors for the Town of Mountain Village, data availability, and establishment of an inventory structure that maximizes the efficiency of converting the existing 2017 GHG inventory into compliance with GCOM and CC4CA.

The Town is also encouraged to consider structuring its GHG inventory to be aligned with the City Inventory Reporting and Information Systems (CIRIS) and the *Global Protocol for Community-Scale Greenhouse Gas Emission Inventories* (GPC-GHG) developed by the Greenhouse Gas Protocol organization. AET will provide feedback to the

Town on how the GHG inventory can be structured with the maximum flexibility to respond to all leading municipal GHG reporting programs.

At the conclusion of this task AET will provide a Data Readiness and GHG Framework recommendations report.

GHG Sector	Corporate Operations	Community-at-large
Required Components		
STATIONARY ENERGY	Municipal Building energy use Street Lighting	Residential building energy use Industrial/Commercial/Institutional (ICI) building energy use
TRANSPORTATION	Municipal vehicle fleet Transit	On- and off-road vehicles Railway Aviation
WASTE	Waste from municipal operations	Wastewater treatment Solid waste management Biological treatment Incineration
ENERGY GENERATION		Electricity-only Combined heat-power Steam
Optional Components (include if significant)		
INDUSTRIAL PROCESSES AND PRODUCT USE (IPPU)		Industrial processes Product Use
AGRICULTURE, FORESTRY, AND OTHER LAND USE (AFOLU)		Livestock (enteric fermentation, manure management) Land conversion

Task 2: Kick-off Meeting

Soon after project award, representatives of AET and the Town will meet in Mountain Village to confirm a number of issues including:

- scheduling of key events,
- scope of work and deliverables,
- confirmation of roles and responsibilities,
- identification of sources and key contacts to be approached for providing input data,

- review of findings presented in the Data Readiness and GHG Framework recommendations report

In addition to the in-person kickoff meeting, AET proposes bi-weekly teleconference meetings through the duration of the project with the Town staff representative(s) to ensure the Town is kept apprised of the project progress and has the opportunity to provide input throughout.

Task 3: Data Collection and Processing

The collection of data will be initiated as soon as possible to avoid potential delays. It is anticipated that Town staff will assist with the identification of specific data contacts and coordination of data collection efforts from them. Organizations and/or individuals that may be approached for providing data for the corporate and/or community GHG inventory will be identified. A list of potential data sources is provided below:

- Municipal organizations (Town of Mountain Village, San Miguel County);
- utilities (e.g. Mountain Village Utilities, San Miguel Power Corp.);
- other energy providers (e.g. fuel oil, propane, renewables);
- public sector energy users (schools, hospitals);
- major private sector energy users;
- secondary data sources (e.g. census, EPA GHG Reporting Program, USDA).

A data transfer plan and timetable will be prepared at the outset of this task to monitor progress in the delivery of the required data sets to AET. The AET team has worked with numerous large and complex organizations in the planning and implementation of GHG management systems. These experiences have allowed us to develop data collection procedures tailored to complex organizations and projects that maximize efficiency, ensure consistent data reporting and high data quality, and reduce the burden of work on any one individual.

As data is delivered to AET, we will thoroughly review the data to determine that it is of acceptable quality for use in the project (lacking gaps, valid assumptions have been made). This process will benefit from the extensive experience AET has in both the development and verification of organizational energy and GHG inventories, in which we have developed leading expertise in data quality assessments. In instances where local data is not available or the data that has been provided by the local sources is deemed to be not of acceptable quality, our team will identify defensible sources of data to generate estimates, such as the *Commercial Buildings Energy Consumption Survey (CBECS)* published by the US Energy Information Administration. We have experience working with replacement or proxy data sources for many clients and have an expert knowledge of the most reliable sources of data that are available for use in energy and GHG emission assessments.

Task 4: Calculation of GHG Emissions / Development of Data Management and Calculation Tool

The Town's GHG emissions will be calculated as per the requirements of the GCOM calculation protocol. GHG emissions will primarily be calculated using activity data and emission factors. Emission factors are values that when multiplied with a source of activity data (data collected in data collection phase) result in the associated GHG emissions. AET brings extensive experience in the evaluation and selection of the most temporally and geographically relevant emission factors from the most trusted sources and has performed this service for

numerous clients in the industrial, municipal, institutional and commercial sectors. We will use emission factors from the US EPA, the Greenhouse Gas Protocol, and from other recognized sources such as the Intergovernmental Panel on Climate Change (IPCC).

A GHG inventory requires quantification of several different GHG, including carbon dioxide, methane, and nitrous oxide. Each type of GHG will be separately quantified and reported. In addition, all GHG emissions will be converted to CO_2e (carbon dioxide equivalent) using global warming potential values published in the IPCC assessment reports.

As part of the GHG calculations task, AET will conduct analyses and assessments of the corporate and community GHG data with a focus on the following:

- Energy consumption profiles by energy type (natural gas, electricity, propane, diesel, heating oil, transportation fuels, renewables) and sector;
- GHG emission profiles by energy type and sector;
- Corporate and community energy consumption and GHG emissions calculated both as absolute values and as intensity-based values (the intensity-based calculations will be performed using intensity-based indicator(s) defined by the Town and may include measures such as CO_2e / per capita).

Results of the calculations and analyses will be reported in the GHG Inventory report. A spreadsheet-based inventory management tool and a Data Management Manual will also be prepared for both corporate and community that contains all of the original sources of data, emission factors, GHG calculations, and GHG emission forecasts. The spreadsheet tools will be easy-to-use resources that can be maintained by Town staff going forward.

Task 5: GHG Emission Forecasting

AET will prepare a business-as-usual (BAU) GHG emission forecast to 2050 for both corporate and community as a whole, and also by GHG emission sector. The number of GHG impact variables that will be included in the forecasting analysis will include projected population, predicted electricity generation composition, and projected economic growth.

In addition to the BAU forecast, AET will prepare a 'beyond BAU' GHG emission forecast to 2050 using additional impact variables not included in the BAU forecast. Examples of other impact variables that could be considered by the Town for the 'beyond BAU' forecasting analysis include policy actions (adopted and proposed), fuel efficiency standards, and predicted renewable energy implementation. AET will work closely with Town staff to develop realistic assumptions for each of the impact variables on which the forecasts will be based. For each of the GHG impact variables that are selected a range of assumptions (conservative through optimistic) will be developed such that the GHG emission forecasts will encompass a range of potential values as opposed to one specific number.

Results of the BAU and beyond-BAU forecasting analyses, including the percentage change for each sector, will be reported in the GHG Inventory document. Details pertaining to the calculations and variables used in the forecasts will be described in the GHG Data Management Manual and associated spreadsheet tools that will be prepared for both the corporate and community GHG inventory.

Task 6: Benchmarking

Benchmarking is an effective way to compare an organization's GHG performance against its peers. Benchmarking can also be an opportunity to glean ideas for challenges or opportunities pertaining to achieving GHG reductions that could also be applicable to the Town of Mountain Village.

The Global Covenant of Mayors database will be used to identify five North American communities with a similar population that will be used for benchmarking purposes. There are currently 12 North American communities in the GCOM database with a population of under 10,000.

Mountain Village's GHG emissions will be benchmarked against absolute indicators (e.g. total GHG by scope and sector) and normalized indicators (e.g. per capital GHG by scope and sector).

Task 7: Preparation of Inventory Report and Data Management Manual

Note that draft versions of the GHG Inventory Report, GHG Data Management Manual, and GHG Inventory and Forecast Spreadsheet Tool will be provided to the Town for review and comment prior to the issuance of the final versions. Prior to the draft versions of the reports and spreadsheet tool being submitted to the Town, an AET team member (not involved with the completion of Tasks 1-4) will conduct an independent review of the inventory data and documentation as a quality assurance step.

1. **GHG Inventory Report** (combined document including both corporate and community inventories)
    - Executive Summary;
    - background and context to the project, including a discussion of any regulatory and voluntary GHG reporting programs that the Town is responding to;
    - a review of the GHG management frameworks and protocols that were followed;
    - a description of GHG emission sources that were included in the inventory;
    - a review of the data collection and GHG calculation process;
    - highlights of GHG emissions, summarized by sector;
    - highlights of the 2050 GHG emission forecasts, and,
    - results of the benchmarking assessment.
2. **GHG Data Management Manual** (combined document for corporate and community inventories)
    - a description of the protocol / framework that was followed;
    - parameters of the GHG inventory (emission sectors included, base year, etc.);
    - description of individual GHGs and their associated global warming potential values;
    - a full list of all data sources, including citations and contact information;
    - a full listing of all GHG emission factors and conversion equations (with their sources);
    - procedures used to address missing or incomplete sources of data;

- a description of all assumptions made in the development of the GHG inventory and forecasting;
- a description of any formulae used in the inventory and forecasting calculations; and,
- instructions on the interpretation, use, and maintenance of the associated spreadsheet database.

3. **GHG Calculation & Forecast Spreadsheet Tool**
    - source data, emission factors, and calculations (GHG emissions and forecasts); and,
    - 'User Guide' for updating the inventory data in future years.

Task 8: Staff Training

AET will equip the Town with a tool that can be easily updated in future years. This will provide empowerment to the Town's employees to manage and own the GHG inventory project going forward. AET will use the following techniques to ensure this empowerment occurs:

- the GHG calculation and forecasting tool will be spreadsheet-based, ensuring a familiarity and ease of updating for Town staff in future years
- a 'User Guide' will be prepared as a quick reference manual to guide Town staff in how to update the inventory data in future years
- AET will provide 4 hours of training to Town staff on the use and updating of the GHG calculation and forecasting tool (to be delivered during the time period of the Council presentation)
- AET will donate 8 hours each of the next 3 years (2021-2023) to conduct a free review of the GHG calculation and forecasting tool that has been updated by Town staff

3.2 CLIMATE ACTION PLAN & GHG REDUCTION TARGET DEFINITION

Task 1: Identification of GHG Reduction Opportunities

AET will prepare a set of high-potential GHG reduction opportunities (for both corporate and community) based on the following sources of information:

- results of the benchmarking assessment against comparable communities;
- review of relevant documentation that showcases planned GHG reduction opportunities (e.g. Zero Waste Action Plan);
- input received from other key contacts at organizations that provided sources of data to the community GHG inventory (e.g. utilities, large energy consumers, etc.);
- consultation with Town staff and Green Team Committee, and,
- AET's extensive experience working with clients in the planning and implementation of GHG reduction strategies.

AET will prepare a "reduction opportunity description" template document to be distributed to corporate and community representatives. Town staff will assist with identification of individuals and organizations to approach. It is assumed that 8 individuals/organizations will be contacted to contribute for both community and corporate

reduction opportunities (combined). AET will conduct 1-hour telephone interviews with each of the 8 individuals/organizations.

Prior to initiating the next task (ranking and prioritization of opportunities) AET will have a two-hour webinar meeting with Town representatives to review the preliminary GHG reduction opportunities identified, including feedback obtained during the telephone interviews.

Task 2: Ranking and Prioritization of GHG Reduction Opportunities

Prioritization and ranking of GHG reduction opportunities must include a consideration of the significance of emissions sources, the amount of influence that the Town and/or community has over the emissions source, potential links to other corporate initiatives and priorities, and the cost and feasibility of implementing the reduction actions. Criteria used to evaluate opportunities might include:

- potential for meaningful GHG emissions reductions
- initial project costs and lifecycle costs
- expected financial savings
- availability of resources from various sources including corporate budgets and grants from government and utilities
- payback, return on investment (ROI)
- other benefits, e.g. maintenance savings; capital improvement; improved comfort or productivity; public relations value, etc.

Using the criteria listed above, and any additional criteria identified by the Town, each of the high-potential opportunities will be assessed within the context of a "feasibility matrix". The feasibility matrix will be used to assign the opportunities to one of the following categories of implementation priority: SHORT-TERM (0 – 5 years) / MEDIUM (5 – 10 years) / LONG-TERM (over 10 years).

Task 3: Definition of Reduction Targets

The results of the prioritization will be a primary consideration for the definition of GHG reduction targets. Other considerations in the definition of targets include alignment with the GHG reduction programs that the Town has committed to (CC4CA).

The feasibility matrix results will allow AET to recommend a realistic and achievable GHG reduction target (for both corporate and community) that correspond to each of the implementation priority timeframes. Long-term targets will be defined as well as "interim" goals. The interim goals will serve as the measurable outcomes that are to be accomplished in the interest of advancing the Town towards meeting its longer-term corporate and community GHG reduction target. AET will recommend targets that follow the "SMART" principles: **S**pecific, **M**easurable, **A**ttainable, **R**ealistic, **T**ime-Bound.

Task 4: Implementation and Monitoring Strategy

AET has extensive experience working with organizations in the development of their sustainability implementation and monitoring strategies. Our implementation strategies for sustainability initiatives are based on the classic Plan-Do-Check-Act approach common to management systems (e.g ISO 14001), resulting in a practical, systems-based approach to sustainability implementation that leads to continual improvement.

Given the range of reduction opportunities that will be identified, it is impossible at this time to provide details on the actual implementation steps that will be recommended. These will be described for each of the selected high-priority reduction opportunities in the Climate Action Plan document. However, AET can state with confidence that all implementation strategies that we develop for the Climate Action Plan will adhere to the following principles:

- Implementation must build upon existing efforts within the community to **avoid duplication**;
- Implementation must leverage, align, and guide the existing plans, policies, programs and initiatives that impact energy and GHG reduction planning;
- Implementation must include the definition of **performance indicators** that will be used to monitor progress in achieving the objectives of the Climate Action Plan;
- Implementation must facilitate **cross-departmental/cross-functional collaboration** by breaking down silos within the Town and community;
- Implementation must introduce a **consistent** approach to decision-making;
- Implementation must introduce **accountability** by ensuring individuals/departments/organizations are identified to provide oversight and management of the reduction opportunities;
- Implementation must lead to **continuous improvement** of the management of the reduction opportunity and lead towards achievement of goals that have been defined by the Town.

AET recognizes the need for a robust, defensible, and consistent monitoring procedure to enhance the accuracy and credibility of the Town's GHG reduction efforts. AET has helped numerous clients in the establishment of data monitoring systems that prepare them with a rich set of data and performance indicators that are verifiable and in compliance with industry best practice.

Task 5: Communication and Outreach Strategy

AET will develop a communications strategy to build momentum with the target audiences of the Climate Action Plan, including internal branches and departments of the Town, Council Members, members of the public and other stakeholders. We will build on the success of prior successful engagement and communication initiatives that the Town has led and will also take into account other innovative and effective communication strategies identified in the benchmarking assessment. The communication and outreach strategy may include:

- Development of short, key messages that can be included in staff e-mails, updates, newsletters, bulletin boards and shared on social media;

- Visual showcasing of the outcomes of this process. To implement this, a short video/PowerPoint deck and display materials may be recommended. The video will be appropriate for all audiences and can be showcased on the Town's web site, as well as its Twitter, Facebook and YouTube (and other social media) channels;
- Provide engaging training modules to rally staff around the goals and action items set out in the Climate Action Plan. For example, two high-impact modules could be delivered as lunch and learn sessions. The first could be "the need to lead and take action" which will engage staff as leaders in sustained energy management actions. The second module could be "early wins, sustaining long term action" which will engage participants in identifying actions which they have started, identifying any challenges and possible solutions, and collaborating on tracking and troubleshooting over the long term. It is suggested that this second module could be conducted regularly (biannually) to ensure that staff have the ability to collaborate to ensure sustained learning and action;
- An on-line information portal with links to key reports, opportunity to submit "best practices" which can then be shared corporately and publicly, and contact information to key staff who can assist in troubleshooting any issues as they arise;
- A mechanism to address questions & concerns of Staff and/or other key stakeholders

The goal of these tactics is to prepare for self-sustaining momentum as the program rolls out.

Task 6: Preparation of Climate Action Plan

Note that a draft version of the Climate Action Plan will be provided to the Town for review and comment prior to the issuance of the final version. The Climate Action Plan will contain the following:

- Executive Summary;
- Background and context to the project, including a discussion of any regulatory and voluntary GHG reporting programs that the Town is responding to;
- A review of the process for identifying high potential GHG reduction opportunities;
- Results of the GHG reduction opportunity identification process;
- Results of the ranking and prioritization of high-potential GHG reduction opportunities;
- Details of the process for re-defining GHG reduction targets;
- Details of the implementation and monitoring strategy for each high-potential GHG reduction opportunity;
- Recommended communication and outreach strategy; and,
- Recommended alignment of Climate Action Plan with other municipal policies and plans.

The draft version of the Climate Action Plan will be presented and reviewed with the Town's Green Team Committee via webinar. This will provide an opportunity for the Green Team Committee to ask questions and provide comments to AET prior to the issuance of the final version of the Plan.

The final version of the Climate Action Plan will be presented to Council (in-person) by AET. This will provide an opportunity for Council to ask questions and provide comments to AET prior to formal adoption and acceptance of the Plan.

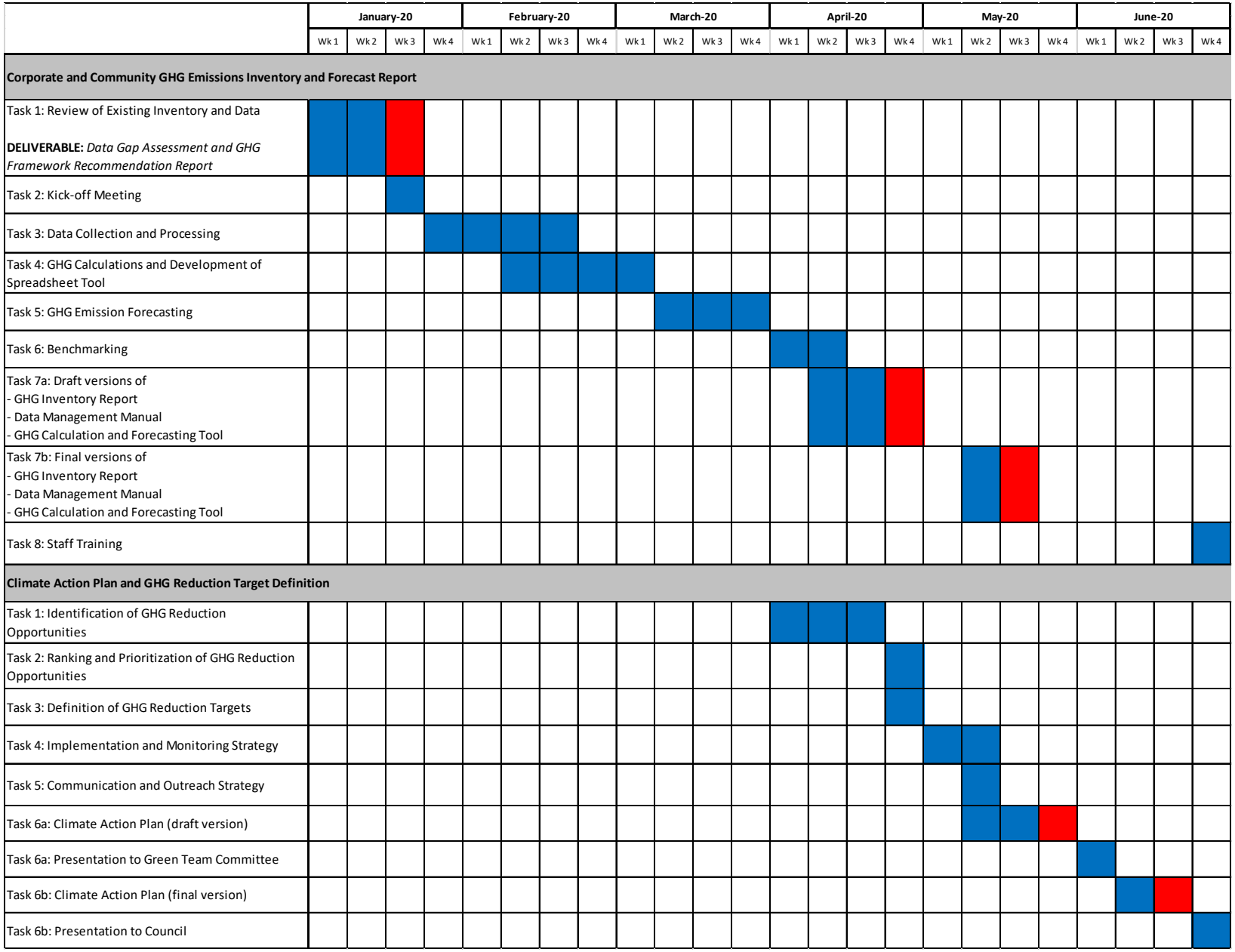
3.3 PROJECT DELIVERABLES

Please refer to the table below for a description of project deliverables and anticipated completion dates (assuming January 1, 2020 project start date).

Anticipated Completion Date	Deliverables
3rd week of January 2020	Data Gap Assessment and GHG Framework Recommendation Report
4th week of April 2020	Draft Versions of: ▪ GHG Inventory Report ▪ Data Management Manual ▪ GHG Calculations and Forecasting Tool
3rd week of May 2020	Final Versions of: ▪ GHG Inventory Report ▪ Data Management Manual ▪ GHG Calculations and Forecasting Tool
4th week of May 2020	Draft version of Climate Action Plan (including GHG reduction targets)
3rd week of June 2020	Final version of Climate Action Plan (including GHG reduction targets)

3.4 WORK PLAN SCHEDULE

The Gantt chart timeline on the following page indicates the performance and delivery dates for project tasks (blue cells) and deliverables (red cells).


January-20
February-20
March-20
April-20
May-20
June-20
Wk 1
Wk 2
Wk 3
Wk 4
Corporate and Community GHG Emissions Inventory and Forecast Report
Task 1: Review of Existing Inventory and Data
DELIVERABLE: Data Gap Assessment and GHG Framework Recommendation Report
Task 2: Kick-off Meeting
Task 3: Data Collection and Processing
Task 4: GHG Calculations and Development of Spreadsheet Tool
Task 5: GHG Emission Forecasting
Task 6: Benchmarking
Task 7a: Draft versions of
- GHG Inventory Report
- Data Management Manual
- GHG Calculation and Forecasting Tool
Task 7b: Final versions of
- GHG Inventory Report
- Data Management Manual
- GHG Calculation and Forecasting Tool
Task 8: Staff Training
Climate Action Plan and GHG Reduction Target Definition
Task 1: Identification of GHG Reduction Opportunities
Task 2: Ranking and Prioritization of GHG Reduction Opportunities
Task 3: Definition of GHG Reduction Targets
Task 4: Implementation and Monitoring Strategy
Task 5: Communication and Outreach Strategy
Task 6a: Climate Action Plan (draft version)
Task 6a: Presentation to Green Team Committee
Task 6b: Climate Action Plan (final version)
Task 6b: Presentation to Council

4. COST OF SERVICES

AET proposes to perform this work on a fixed price basis (including all expenses and disbursements) at a cost of **$42,200 (US Dollars)**. Our fees are based upon the specific scope of work described in this proposal. Variations to the scope of work or time schedule as defined herein if requested by the Town of Mountain Village may require modification of the cost and/or project schedule. Should these conditions be modified during the implementation of the project, no changes to the scope of work defined herein or changes in excess of AET's quoted fee will be incurred without the Town of Mountain Village's prior authorization.

A breakdown of the fixed price according to the primary project deliverables is presented below.

Project Deliverable	Cost ($)
Corporate and Community GHG Emissions Inventory and Forecast Report	$19,900
Climate Action Plan and GHG Reduction Target Definition	$22,300
TOTAL	**$42,200**

APPENDIX A: EXAMPLES OF RELEVANT PROJECT EXPERIENCE

Client	Regional Municipality of Waterloo
Project Date	2012
Expertise Demonstrated	Municipal GHG emissions quantification
AET Team Member	Stephen Boles
Description	AET conducted the third-party verification for the Regional Municipality of Waterloo's community greenhouse gas (GHG) inventory that was prepared to meet the requirements of Partners for Climate Protection (PCP). The verification project required AET to thoroughly review the Region's community GHG inventory and forecast models for data accuracy, data quality, and conformance with both the PCP program and the International Local Government GHG Emission Analysis Protocol.

Client	Municipal Property Assessment Corp. (MPAC)
Project Date	2019 - 2023
Expertise Demonstrated	Organizational GHG reduction plans and targets Energy management planning and conservation
AET Team Member	Stephen Boles
Description	MPAC is the largest assessment jurisdiction in North America, responsible for assessing more than 5 million properties in Ontario. AET was retained by MPAC for a five-year contract beginning in 2019 to develop and manage the organization's GHG inventory and to identify MPAC's GHG reduction opportunities. MPAC's GHG inventory includes GHG emissions from energy consumption in dozens of MPAC offices and hundreds of corporate fleet vehicles. AET identified a range of GHG reduction opportunities for consideration by MPAC, each of which was categorized against several ranking criteria including potential GHG reduction to be realized, implementation cost, payback period.

Client	City of Yellowknife
AET Team Member	Stephen Boles, Selena Fraser-Arvai, Shadnoush Pashaee
Project Date	2019 – 2020
Expertise Demonstrated	Municipal GHG emissions quantification

Description	AET Group has been retained by the City of Yellowknife to quantify the GHG emissions from the City's water and wastewater systems (which includes biomass energy use) and to identify opportunities to enhance carbon sequestration within the City's natural assets (forests, wetlands). Team members Stephen Boles and Selena Fraser-Arvai are leading this project.

Client	Federation of Canadian Municipalities (FCM)
AET Team Member	Selena Fraser-Arvai
Project Date	2019
Expertise Demonstrated	Municipal GHG emissions quantification Data research, collection, and analysis
Description	Ms. Fraser-Arvai (as a subcontractor to Envirings Inc.) served as a GHG expert for municipal sector reseach in waste and wastewater management. Selena was responsible for quantifying the GHG emission reduction potential from a compendium of best-practice activities in the waste sector.

Client	City of Montreal
AET Team Member	Shadnoush Paraee
Project Date	2018 - 2019
Expertise Demonstrated	Municipal GHG emissions quantification Data research, collection, and analysis
Description	AET team member Shadnoush Pashaee prepared the GHG inventory for the City of Montreal as part of her graduate project at Montreal's Concordia University. Shadnoush's project involved the development of quantification models for the following sources of GHG: stationary energy, transportation energy, waste, and wastewater treatment.

Client	Libro Credit Union
AET Team Member	Stephen Boles
Project Date	2017 – 2018
Expertise Demonstrated	Organizational GHG reduction plans and targets Energy management planning and conservation

Description	Libro Credit Union is a financial services organization serving customers across southern Ontario. AET Group was retained by Libro in 2017 to conduct a corporate environmental impacts assessment including water use, waste generation, and energy consumption. AET's assessment involved both desk-top assessments of Libro data and documentation and on-site energy and waste audits. The project also included the development of Libro's baseline GHG inventory and identification of GHG reduction opportunities. Each reduction opportunity identified by AET Group was categorized against several ranking criteria including potential GHG reduction to be realized, implementation cost, payback period.

Client	Ausable Bayfield Conservation Authority (ABCA)
AET Team Member	Stephen Boles
Project Date	2014
Expertise Demonstrated	Community engagement and outreach
Description	AET conducted an assessment of the carbon sequestration potential of existing forest lands and new forest planting projects within the watershed managed by the ABCA. AET also reviewed existing and future opportunities (e.g. carbon offsets) for the ABCA to generate additional revenue sources from the carbon sequestration of its managed lands. One outcome of this project was the 'Footprint to Forests' program, a local fund-raising effort to generate funds for increased tree planting initiatives in the ABCA watershed. AET was intimately involved in the planning and implementation of outreach efforts for the program.

Client	Environment and Climate Change Canada (ECCC)
AET Team Member	Stephen Boles
Project Date	2018 - 2019
Expertise Demonstrated	Data research, collection, and analysis
Description	AET Group was retained by ECCC to develop a public-facing tool for the calculation of GHG from the treatment and disposal of organic waste. The calculator will be used by both public-sector and private-sector stakeholders, including municipal governments. In the development of the calculator AET conducted an extensive review of existing calculation tools and best practices in organic waste GHG calculations. AET solicited feedback at various stages of the project from a stakeholder advisory group with pan-Canadian representation.

Client	County of Huron
AET Team Member	Stephen Boles
Project Date	2014 – 2015
Expertise Demonstrated	Community engagement and outreach Sustainability
Description	AET led the development of a 'Sustainable Manufacturing Toolkit' to introduce the principles of corporate sustainability to the manufacturing sector in Huron County. AET engaged extensively with stakeholders (Huron Manufacturing Association, Huron Sustainability Steering Committee) to obtain feedback on the toolkit and to promote its availability. Following the completion of the Huron County project, AET developed an improved version of the toolkit that could be applied to any industry sector. This proprietary sustainability implementation process has become a fundamental approach that AET follows with our clients and will be included as a value-added component of our work with the Town of Mountain Village.

APPENDIX B: CVs OF TEAM MEMBERS

BIOGRAPHY

Stephen is the Manager of Greenhouse Gas (GHG) and Sustainability Services with AET Group. Stephen has been active in the climate change community as a scientist and consultant for over 18 years. Stephen received his Master of Science degree from the University of Alaska Fairbanks in 1998 and spent the next eight years working as a scientist at one of the world's leading climate change research centres at the University of New Hampshire. He researched how changes in the management of agriculture and forestry land uses influence GHG emissions.

As a consultant, Stephen has led or participated in numerous environmental compliance engagements pertaining to both the federal and provincial levels. He has led GHG management projects (GHG quantification, GHG verification) for dozens of clients in various industry sectors, including several Fortune 500 multinationals. In addition, Stephen has managed projects in a range of other areas pertaining to sustainability, including carbon offset development, life cycle assessments, risk and opportunity planning, and corporate sustainability implementation. Stephen served on the international working group that conducted the recent review of the ISO 14064 family of GHG management standards.

EMPLOYMENT HISTORY

AET Group Inc. – Manager, GHG & Sustainability Services

Kitchener, Ontario, Canada — June 2015 to present

Stephen oversees business development activities such as proposal writing and client relationship development. Stephen also manages and provides consulting expertise for GHG and sustainability projects for a wide range of public sector and private sector clients

Kuzuka Ltd. – President

Exeter, Ontario, Canada — June 2006 to May 2015

Stephen was the founder and President of Kuzuka and grew the firm into a credible and sought-after GHG and sustainability services consulting firm. Stephen oversaw all business development activities such as proposal writing and client relationship development. Stephen also managed and provided consulting expertise for GHG and sustainability projects for a range of public sector and private sector clients

University of New Hampshire – Research Scientist

Durham, NH, USA — February 1999 to May 2006

Stephen spent eight years working as a scientist at the University of New Hampshire as a member of the research team that developed the Denitrification-Decomposition (DNDC) model for agricultural nutrient cycling applications. DNDC is currently being used by the Canadian federal government to improve agricultural GHG emission factors and has been adopted by the State of California as the primary tool for developing GHG emission estimates in the new rice agriculture offset protocol.

Education

- B.Sc., Bachelor of Science (Geography), University of Waterloo
- M.Sc., Master of Science (Natural Resources Management), University of Alaska, Fairbanks

Certification/Training

- CSA Greenhouse Gas (GHG) Verification Course
- Certified Environmental Professional (EP), Canadian Environmental Certification Approvals Board

Areas Of Expertise

- Environmental Compliance Auditing
- Greenhouse Gas Management
- Corporate Sustainability Management
- Greenhouse Gas Verification

SELECT PROJECT HIGHLIGHTS

Greenhouse Gas Management & Verification

Role: Lead Verifier
Client: Alberta Ministry of Environment and Parks
Location: Edmonton, Alberta, Canada
Duration: August 2015 – present
Activities: Stephen led government verifications of several carbon offset projects (conservation cropping, wind energy, energy efficiency, cattle feeding), facility emissions compliance reports (oil and gas sector) and renewable fuels standard compliance against the province of Alberta's GHG regulations (SGER, CCIR) and Renewable Fuels Standard.

Role: Lead Verifier
Client: Cigna Insurance
Location: Hartford, Connecticut, USA
Duration: December 2015 – present
Activities: Cigna is one of the largest providers of private health insurance in the USA. Since 2015 Stephen has led the verification of Cigna's GHG emissions.

Role: Lead Verifier
Client: Eaton Corp.
Location: Cleveland, Ohio, USA
Duration: November 2011 – present
Activities: Eaton Corp. is a manufacturer of automotive and electrical components, employing over 100,000 people in nearly 300 manufacturing facilities around the world. Since 2011, Stephen has led the verification of Eaton's global energy and GHG emissions and has served as the lead verifier of Eaton's corporate Zero Waste to Landfill program.

Role: Lead Verifier
Client: Regional Municipality of Waterloo
Location: Waterloo, Ontario, Canada
Duration: March 2012 – May 2012
Activities: Stephen led the verification of the Region of Waterloo's community GHG inventory as part of a program for Canadian municipalities to develop GHG inventories and GHG reduction plans, *Partners for Climate Protection*

Role: Lead Verifier
Client: SAI Global
Location: Toronto, Ontario, Canada
Duration: July 2014 - present
Activities: As a sub-contractor to SAI Global, Stephen is the lead verifier of GHG emission reports in multiple industry sectors (food manufacturing, paper manufacturing, institutional, pharmaceuticals) that must be verified to meet the requirements of the province of Ontario's mandatory GHG reporting regulation

Role: GHG Management Expert
Client: Algonquin Power and Utilities Corp. (APUC)
Location: Oakville, Ontario, Canada
Duration: 2014, 2018
Activities: APUC is a leading Canadian-based power-generation and utility company.

Stephen led a comprehensive review and assessment of APUC's GHG management and reporting system to identify areas of opportunity for efficiency and accuracy improvement.

Role: GHG Inventory Development
Client: Public sector property assessment organization
Location: Toronto area, Canada
Duration: 2019 - 2021
Activities: The client is a public sector organization that oversees Ontario property assessment. Stephen led the development of the organization's GHG inventory and reduction strategy.

Sustainability Projects

Role: Carbon Opportunities Consultant
Client: Ausable Bayfield Conservation Authority (ABCA)
Location: Exeter, Ontario, Canada
Duration: September 2011 – December 2011
Activities: Conducted an assessment of the carbon sequestration potential of existing forest lands and new forest planting projects within the watershed managed by the ABCA.

Role: Team Member (Corporate Sustainability Plan)
Client: Food manufacturer
Location: Toronto are, Canada
Duration: 2012 - 2013
Activities: Stephen was on a team that developed the corporate sustainability plan for one of Canada's most recognizable food manufacturers. The plan included an assessment of internal actions and supply chain initiatives.

Role: Project Manager (Environmental Impacts and Reduction Assessment)
Client: Southern Ontario credit union
Location: Southern Ontario, Canada
Duration: 2017
Activities: Stephen was the project manager for an environmental impacts assessment of a southern Ontario credit union that included energy, water, waste and air emission assessments along with recommendations on footprint reduction strategies.

Role: Project Manager (Organic Waste GHG Calculator)
Client: Environment and Climate Change Canada (ECCC)
Location: Gatineau, Quebec
Duration: 2018 - 2019
Activities: Stephen is the project manager in the development of an organic waste GHG calculator for ECCC. The tool will be an improved version of the existing ECCC Waste GHG Calculator, and will provide increased functionality to stakeholders in the management and planning of organic waste GHG reduction strategies.

Role: Project Manager (Industry Verification Strategy)
Client: National Milk Producers Foundation (NMPF)
Location: Washington DC
Duration: 2018 - 2019
Activities: Stephen is the project manager in the development of an industry-wide GHG verification strategy for the US dairy sector.

BIOGRAPHY

Evan Jones is a Senior Project Consultant within the GHG and Sustainability Division at AET Group (AET). Evan has reviewed over a dozen GHG reduction projects including building energy efficiency; wind power; landfill gas; reforestation; hydroelectricity; solar PV; integrated solar; transportation switching; biogas digester; and wood waste electricity generation under the Technology Early Actions Measures program. Additionally, Evan has verified over 75 building based GHG inventories for LEED EAcg applications and developed/adapted GHG project documents for Landfill Gas Capture and Solar Swimming Pool heating projects, all posted on the CSA CleanProject Registry. Evan is a registered Professional Engineer and holds a Bachelor of Applied Science in Mechanical Engineering along with a Bachelor of Science in Mathematics and Physics.

PROFESSIONAL EXPERIENCE

- As the Energy and Sustainability Information Manager for Brookfield Global Integrated Solutions (BGIS), Evan streamlined energy and GHG reporting for approximately 50,000 buildings in North America and completed on-going quality control, energy savings calculations, energy benchmarking, and improvement of software tools and associated written processes. Evan prepared GHG inventories for CIBC bank, TD bank, TELUS, BMO, Purolator, Canada Post, Bell Canada and was an active participant in the technical committee input into updating of ISO 14064 series of standards.

- As Principal for 3P Analysis and Consulting, Evan completed verification of building GHG inventories for LEED EAc6 applications and reviewed a variety of Greenhouse Gas projects including transportation switching, solar cooling and heating, and building energy and efficiency. Evan participated in federal government consultations into “Design and Implementation of a Greenhouse Gas Offset System for Canada,” and reviewed energy savings results for over two dozen buildings as part of Energy Performance Contracts carried out by Cinergy Solutions.

- As a Technical Representative for Voluntary Challenge and Registry Inc., Evan prepared technical summary documents for Champions in Action group. Evan reviewed and validated GHG projects related to biogas digester, wind generated electricity, wood waste electricity generation, and building energy efficiency. He developed specifications for a web-based individual GHG calculation tool; modified, enhanced, and maintained CO2 Tool spreadsheet for calculating GHG emissions; participated in a GERT pilot program and Technical Review of British Columbia Buildings Corporation energy efficiency project; assisted in development and presentation of workshop materials for small and medium sized companies under the Environmental Supply Chain Management pilot program; and assisted in the development of the Telework registry website and teleTRAC software tool.

- As an Energy Analyst Specialist for Vestar/Rose Technology Group, Evan participated in first Canadian emission reduction trade based on energy efficiency project and supervised the Energy Analysis Group, who were responsible for collecting, entering, and analyzing utility bill information for savings calculations and project development; maintenance of weather and utility rates; hourly building simulation; and various internal reporting activities. Evan developed section 6.1 of ASHRAE Guideline 14P Measurement of Energy and Demand Savings; continued the development

Education

- B.A.Sc., Mechanical Engineering, University of Waterloo
- B.Sc., Mathematics and Physics, University of Toronto

Certification / Training

- Professional Engineer, Ontario
- Designated trainer for all of CSA delivered GHG courses related to ISO 14064 standard.
- Certified GHG Inventory Quantifier and GHG Verifier
- Updated CSA GHG Verification course in 2016 with new material
- Certified ISO 9001 Integrated Management Systems Lead Auditor

Areas of Expertise

- GHG Verifications
- GHG Inventory Quantification
- Building energy use analysis, modeling, and savings calculations.
- Building energy benchmarking, data compilation, and analysis.

of a computer software to handle deregulated utility environments, additional cost criteria, greenhouse gas emission calculations and automated uploading of utility data; developed action plan to integrate waste audit/management services into company offering; and developed company internal waste reduction, composting and recycling programs. Through his work, Evan decreased the turnaround time of energy analysis requests from 5 to 2 days, created a chargeback system for utility rate and weather data maintenance, resulting in over $30,000 of direct profits in a two-year period, and developed automated electronic weather data retrieval software which saved over $40,000 annually.

PROFESSIONAL TRAINING

- "ISO 9001 Quality Management Systems (QM), Management Systems Auditing (AU) and Leading Management Systems Audit Teams (TL)", 5-day training, Feb 22-26, Markham, 2016

- "ISO14064-1 Essentials GHG Emissions Specification with guidance at the organization level for quantification and reporting of greenhouse gas emissions and removals", 2-day training, covering ISO standard for GHG inventories. Nov 26-27, Toronto, 2007

- "ISO14064-2 Essentials GHG Emissions Specification with guidance at the project level for quantification, monitoring and reporting of greenhouse gas emission reductions or removal enhancements", 2-day seminar covering ISO standard for GHG projects. Nov 28-29, Toronto, 2007

- "GHG Project Essentials and Validation and Verification Course", 5-day training, covering quantification, validation and verification of GHG projects. June 6-10, Toronto, 2005

- Participation in American Society of Heating, Refrigeration and Air-Conditioning Engineers committee developing Guideline 14 'Measurement of Energy and Demand Savings, 1997-2001

BIOGRAPHY

Shadnoush Pashaee is a Project Consultant within the GHG and Sustainability Division at AET Group (AET). Shadnoush has over 9 years of experience in the Construction and Environmental fields managing and leading a team. Her experience and strong interpersonal and organizational skills help assist with the success of GHG and Sustainability projects. Shadnoush holds a Master of Science, Master of Architecture, and Bachelor of Architecture.

PROFESSIONAL EXPERIENCE

- As a Research Assistant at Concordia University, Shadnoush developed a methodology on municipal GHG emissions and completed an assessment of GHG emissions in Montreal Islands, using the results to create a database for urban GHG emission assessments.
- As Head Designer at Kayson, Shadnoush managed construction sites, focusing her expertise on energy efficiency in buildings. She developed the initial Energy Audit based on client information and maintenance records and used the collected information to design building infrastructure details.
- As a Coordinator Assistant at Fildeh Company, Shadnoush completed extensive research on building energy efficiency and simulated energy performance in buildings.
- As a Permit Coordinator at Tehran Municipality, Shadnoush completed in-depth technical reviews of project documentation and performed quality control of building energy efficiency. She prepared applications for planning and building control departments and drew up land use plans designating residential, industrial, and green areas. Additionally, she supervised the construction of homes in consultation with housing associations.

PRESENTATIONS

- An Assessment of Greenhouse Gas Emissions from Municipal Activities, CSCE 2019, Laval.
- Assessment of Greenhouse Gas Emissions from Montreal Island, Energir 2019, Montreal.
- Role of Public Transportation in Mitigation Municipal GHG Emissions, Tehran Municipality 2016, Tehran.

CONFERENCE PAPERS

- S. Farahani, C. An Assessment of Greenhouse Gas Emission from Municipal Activities, 17th International Environmental Specialty Conference, CSCE 2019, Laval, QC, Canada, 2019.
- S. Farahani, N. Sadeghi Factors Contributing to Energy Efficiency in Buildings, 1st International Civil Engineering and Energy Conference, Iran, 2016.

Education

- M.Sc., Concordia University. Thesis: Assessment of GHG emissions in Montreal Island
- M.Arch., Azad Yazd University. Thesis: Design a center by consideration of energy efficiency
- B.Arch., Yazd University

Awards

- Split Concordia Merit Scholarship, Concordia University
- Ministry of Science Scholarship, Yazd University

Areas of Expertise

- GHG Emissions
- Project Organization
- Team Management
- Energy Efficiency
- Auto Cad
- Matlab
- Revit

Selena Fraser-Arvai, P.Eng., M.Eng.

Education

- M.Eng., Environmental Engineering, Carleton University, 2008
- B.Eng., Environmental Engineering, Carleton University, 2005

Certifications and Training

- Licensed Professional Engineer, Province of Ontario, 2012
- World Bank Cities & Climate Change Leadership, 16-hr e-Training Course, 2011
- GHGenius Training, 8-hr Lifecycle Modelling Training Course, 2011
- Canadian Standards Association (CSA) Certified Greenhouse Gas Inventory Quantifier (GHG-IQ Certificate #0024B), 2009
- CO_2 Introductory Training and Offset Project Development, 16-hour Training Course, 2009

Experience overview

Ms. Fraser-Arvai has twelve years of experience identifying, quantifying and verifying GHG and CAC emissions. She has provided her GHG expertise to numerous projects spanning voluntary quantification to mandatory reporting for government compliance, in all major sectors (including industrial, commercial, residential, transportation and waste). She has also carried out GHG reduction estimation and validation to comply with government program funding requirements.

She has recently provided her GHG quantification expertise to a project that involved developing GHG reduction estimates of best-practice initiatives in the waste sector for the Federation of Canadian Municipalities (FCM).

She has acted as associate verifier, lead verifier and/or designated signing authority for GHG verifications for both compliance purposes as well as GHG offset projects.

Her expertise is rounded out with experience in assessing climate change impacts and adaptation measures; environmental impact assessment; environmental processes and systems; and program, policy and project evaluation.

Ms. Fraser-Arvai is registered as a Professional Engineer in the Province of Ontario.

Project Experience

Selena Fraser-Arvai Consulting

GHG Review, Roseburg Forest Products, 2019. Sub-contractor to Welburn Consulting. Ms. Fraser-Arvai ensured Roseburg Forest Product's voluntary application under Environment and Climate Change Canada's Output Based Pricing System adhered to all regulatory guidelines and requirements.

GHG Quantification and Review Services, Shopify, Inc. 2019. Ms. Fraser-Arvai provided GHG quantification and review services for a sub-set of Shopify Inc.'s operations.

GHG Expert for Municipal Sector Research in the Area of Waste, Federation of Canadian Municipalities (FCM), 2019. Ms. Fraser-Arvai was part of Envirings Inc.'s team, responsible for quantifying the GHG emission reduction potential from a compendium of best-practice activities in the waste sector.

QA/QC Services, Welburn Consulting, 2018-2019. Ms. Fraser-Arvai provided QA/QC services for several projects involving emissions reporting for compliance purposes (Ontario).

Updating GHG Quantification Methodologies CN Railways, 2018. Sub-contractor for Delphi Group. As a sub-contractor to Delphi Group, Ms. Fraser-Arvai was tasked with reviewing and updating the GHG quantification methodologies used for reporting on CNs Scope 3 emissions.

Electric Mobility Assessment, City of Toronto, 2018. Sub-contractor for Delphi Group. Ms. Fraser-Arvai was a sub-contractor for the Delphi Group on a project identifying electric mobility needs and barriers for the City of Toronto.

Low-Carbon Heating Options for Ontario, Ontario Ministry of the Environment and Climate Change (MOECC), 2018. Sub-contractor for Posterity Group. Ms. Fraser-Arvai was a sub-contractor for the Posterity Group, providing technical GHG expertise related to GHG quantification methods and protocols.

Accelerating the Deployment of Zero-Emission Vehicles (ZEVs), Natural Resources Canada (NRCan), 2017-2018. Sub-contractor for Delphi Group. Ms. Fraser-Arvai was a sub-contractor for the Delphi Group on a project aimed at identifying barriers to accelerating the deployment of zero-emission vehicles in two regions of Canada.

While employed at Marbek/ICF-Marbek/ICF

GHG Verification, Multiple Clients, 2017. Ms. Fraser-Arvai was the lead verifier and/or designated signing authority for several vintage- year 2016 GHG offset projects and compliance verifications in Alberta, Canada.

GHG Inventory, Constellation Brands, 2017. Ms. Fraser-Arvai was responsible for data synthesis and analysis for various transportation modes used by Constellation Brands.

Compliance Instrument Tracking System Service (CITSS) Support, Western Climate Initiative (WCI), 2017. Ms. Fraser-Arvai was responsible for managing the internal team providing as well as client liaison and ensuring contractual arrangements were upheld.

CME Smart Green Program Support, StormFisher Environmental Ltd., 2017. Ms. Fraser-Arvai was responsible for overseeing a team tasked with estimating the energy and GHG savings potential of various energy efficiency projects that could be carried out at StormFisher's biogas facility. The project included the analysis as well as preparing a technical report for submission to the CME.

Final GHG Report, City of Medicine Hat, 2017. Ms. Fraser-Arvai was responsible for compiling existing information into a final GHG report for a solar concentrator (energy generation) project carried out by the City of Medicine Hat, for submission to the CCEMC.

Strategic Environmental Assessment (SEA), Infrastructure Canada, 2016. Ms. Fraser-Arvai was co-researcher and report writer for an SEA for Infrastructure Canada, which involved detailed analysis of environmental effects (positive and negative), completed in accordance with the Cabinet Directive on the Environmental Assessment of Policy, Plan and Program Proposals (2010); work also includes recommendations to mitigate adverse environmental effects or enhance positive effects.

Hotels/Motels & Greenhouses Market Characterization and Achievable Potential, Niagara Peninsula Energy Inc., 2014. Ms. Fraser-Arvai was responsible for researching and reporting on CDM measures in the hotel/motel sector and carrying out interviews with prospective channel partners and influencers.

Retail Council of Canada (RCC) Energy Bright Initiative, 2014. Ms. Fraser-Arvai was responsible for client liaison and assisting these clients in applying for and receiving rebates related to energy efficiency improvements in the commercial sector.

Guidance Document for Canadian Jurisdictions: Options for Addressing Air Pollutant and Greenhouse Gas Emissions from the In-use Diesel Fleet, Canadian Council of Ministers of the Environment (CCME), 2014-2015. Ms. Fraser-Arvai was responsible for researching and reporting on information to assist in developing policy and program option profiles, evaluating these policy and program options, developing case studies, and producing recommendations for best practices in the Canadian context.

Identifying Priority Emission Sources Responsible for Local Anthropogenic Fine Particulate Matter and **Ozone in the Calgary Region Airshed Zone, Calgary Region Airshed Zone (CRAZ), 2014.** Ms. Fraser-Arvai was project manager and responsible for reporting, analysis and review. The project identified emission sources which could be targeted by CRAZ to improve air quality in the region.

Development of CO2 Emission Quantification Methods for Primarily Natural Gas-Fuelled Electricity Generating Units, Environment Canada, 2014. Ms. Fraser-Arvai was responsible for researching, reporting, and identifying the most appropriate CO2 and energy production methodologies for EGUs fuelled primarily with natural gas.

Verification of Specified Gas Emitters Regulation Assertions in the Upstream Oil and Gas Sector, Shell Canada Limited, 2014. Ms. Fraser-Arvai was associate verifier, responsible for reviewing proponent documentation and verifying GHG emission assertions for three sour gas processing facilities in Alberta.

Verification of Emissions Trading Regulation Credit Applications in the Power Generation Sector, ATCO Power, 2011-2012. Ms. Fraser-Arvai was associate verifier, responsible for reviewing proponent documentation and verifying NOX and SO2 emission quantification and credit applications for six power generating facilities in Alberta.

Verification of Specified Gas Emitters Regulation Assertions in the Power Generation Sector, ATCO Power, 2011-2012. Ms. Fraser-Arvai was associate verifier, responsible for reviewing proponent documentation and verifying GHG emission assertions for three power generating facilities in Alberta.

Verification of GHG Offset Projects, Multiple Clients, 2012. Ms. Fraser-Arvai was associate verifier for a number of GHG Offset Projects situated in Alberta, Canada, including projects pertaining to Acid Gas Injection, Enhanced Oil Recovery and Landfill Gas Combustion for energy.

Canadian Offset Supply, Alberta Environment and Sustainable Resource Development, 2012. Ms. Fraser-Arvai was responsible for developing and implementing a method to estimate the technical and realized potential of the number of carbon offsets that could come on-line over the time frame of 2013-2020 for the following offset types: Solution Gas Conservation, Wind Energy, Carbon Capture and Storage and Nitrous Oxide Reductions from Agriculture. The analysis was done at the Provincial level.

Saskatchewan Offset Supply, Saskatchewan Ministry of Environment, 2012. Ms. Fraser-Arvai was responsible for estimating the number of offsets that could come on-line in Saskatchewan over the time frame 2013-2020 for the following offset types: Solution Gas Conservation, Wind Energy, and Landfill Gas Capture and Utilization.

Estimating the Impacts of Proposed NO_X Emission Limits on NO_X Emissions in Alberta and Northeastern British Columbia, Canadian Association of Petroleum Producers (CAPP)/Encana, 2012. Ms. Fraser-Arvai was responsible for estimating NO_X emission reduction potential for several proposed emission limit scenarios on reciprocating engines that run on natural gas.

Assess BLIERS for Petroleum Refineries, Environment Canada, 2011-2012. Ms. Fraser-Arvai was responsible for gathering and synthesizing information from U.S. EPA Consent Decrees of key emission sources to assist Environment Canada in setting Base Level Industrial Emission Requirements (BLIERs) for the petroleum refining sector.

Background Study on Existing Quantification Methods for Estimating and Monitoring of Criteria Air Contaminants (CAC) from Cement Manufacturing, Environment Canada, 2011. Ms. Fraser-Arvai was responsible for researching the various quantification methods, template development, analysis and reporting.

Third-Party Review of the Home Energy Savings Program and Ontario Solar Thermal Heating Incentive Program, Ontario Ministry of Energy, 2012. Ms. Fraser-Arvai was responsible for reviewing the methodology utilized by the Ministry of Energy in calculating the GHG emissions savings of the Home Energy Savings Program (HESP) and the Ontario Solar Thermal Heating Incentive Program (OSTHI). Ms. Fraser-Arvai reviewed the methodology for adherence to accepted GHG quantification practices and emission factors and provided recommendations for improvement.

Costing Climate Impacts and Adaptation: A Canadian Study on Human Health, National Round Table on the Environment and the Economy (NRTEE), 2010. Ms. Fraser-Arvai was responsible for carrying out the majority of tasks related to this project with specific duties including identifying and extracting appropriate climate models and data, liaising with subject matter experts, assisting in the development of damage functions, developing a tool to quantify heat-related impacts, the monetary valuation human health impacts using Health Canada's Air Quality Benefits Assessment Tool (AQBAT), developing high level cost curves for air pollutant reductions, estimating adaptation costs and benefits, presentation preparation and delivery, report preparation and client liaison.

City of Yellowknife Greenhouse Gas Emissions Inventory (2009) Update, City of Yellowknife (sub-contract to Cambria Marshall Cote Ltd.), 2011-2012. Ms. Fraser-Arvai was project manager. Ms. Fraser-Arvai reviewed the model used to develop the previous GHG Inventory for applicability and subsequently updated it and then used the updated model to develop the 2009 GHG Inventory for the City of Yellowknife. She was also responsible for report preparation and client liaison.

Energy Management Literature Review and Needs Analysis for the Commercial and Institutional Buildings Sector. Natural Resources Canada-Office of Energy Efficiency, 2011. Ms. Fraser-Arvai was responsible for data analysis on survey results and preparing presentation materials for the client.

Assessing the Carbon Footprints of Events and Organizations, Tree Canada, 2010. Ms. Fraser-Arvai was responsible for quantifying GHG emissions associated with specific activities and assisted in data collection template design.

Validation of Emission Reductions of Sustainable Development Canada Projects in the Transportation Sector, Sustainable Development Technology Canada (SDTC), 2009. Ms. Fraser-Arvai was responsible for validating the emission reduction claims of two HDDV technologies as well as report preparation.

SPECIATE support for US GHG Inventory, US EPA, 2011. Ms. Fraser-Arvai was responsible for mining the US EPA SPECIATE database for black carbon emission rates from mobile sources, which were used to update emission factors used to develop the US GHG Inventory.

Analysis of Options to Accelerate Removal or Repair of Gross Emitting Light-Duty Vehicles in Alberta, Alberta Environment, 2009. Ms. Fraser-Arvai was responsible for researching various policy and program options aimed at removing gross-emitting vehicles from roadways. Using information on the performance of the policies/programs in other jurisdictions, Ms. Fraser-Arvai developed a tool to estimate the expected emissions reductions and cost for the three different program scenarios.

Environmental Impacts of Combined Heat and Power. Canadian Energy Partnership for Environmental Innovation (CEPEI), 2012. Ms. Fraser-Arvai was responsible for reviewing emission related tools and documents.

Program Evaluation: eco–Nova Scotia, Department of Environment / eco–Nova Scotia, 2011. Ms. Fraser-Arvai was responsible for the technical evaluation of energy savings claims of various projects proponents, developing and updating emission factors to be used in the analysis, developing an in-house database to track information on the various projects, developing an energy savings and emission reductions tool, as well as quantifying the monetary benefits associated with air pollutant emission reductions (in terms of human health).

Evaluation of Natural Resources Canada's Commercial, Institutional and Industrial Energy Efficiency Programs, Natural Resources Canada, 2009-2010. Ms. Fraser-Arvai was involved in nearly every aspect of the study and was responsible for developing an in-house database of all projects within each program, secondary data analysis, auditing of the claimed energy savings, survey development, calculating and justifying final energy and GHG savings, report and presentation preparation and client and sub-contractor liaison.

Analyzing the Economic Impacts of Climate Change for Canada, Environment Canada, 2009. Ms. Fraser-Arvai was responsible for researching the models and methods, analysis and reporting.

Assessing the Economic Value of Protecting the Great Lakes, Ontario Ministry of Environment, 2010. Ms. Fraser-Arvai was responsible for carrying out the literature review and report writing in the first phase of this project. In the third phase, she was responsible for estimating the total cost of low impact design measures that were assumed in the Rouge River Watershed modelling study. This involved researching costs associated with measures such as green roofs, infiltration beds, etc. and carrying out engineering calculations for sizing each of the measures, based on assumed precipitation and flow rates in the area.

Economic Forecasts and Water Use Information for Canada's Natural Resource Sectors, National Round Table on the Environment and the Economy (NRTEE), 2009. Ms. Fraser-Arvai was responsible for researching the economic forecasts in the agriculture, mining, forestry and energy sectors, analysis and reporting.

Evaluation of the Sask-Power Project: Benefit Assessment of Mercury Emission Reductions, Sustainable Development Technology Canada, 2009. Ms. Fraser-Arvai was responsible for researching and identifying damage costs associated with mercury emissions.

Consulting Services for Air Quality Benefits Assessment Tool (AQBAT), Regional Municipality of Peel, 2009. Ms. Fraser-Arvai was responsible for monetizing health impacts using Health Canada's Air Quality Benefits Assessment Tool (AQBAT). In addition, Ms. Fraser-Arvai developed training materials and conducted a training session for the Region staff in order to develop internal capacity to perform Air Quality Benefits Assessment Modeling.

Estimated Environmental Impacts of Canada's Green Municipal Fund Implementation Projects, Federation of Canadian Municipalities (FCM), 2008. Ms. Fraser-Arvai was responsible for updating emission factors used in the analysis as well as updating the method used to quantify environmental impacts (air) of waste projects.

Support to Rail Air Emission Regulations, Transport Canada, 2011. Ms. Fraser-Arvai was responsible for noting and synthesizing comments received at the consultation sessions, preparing summary reports as well as the economic valuation of air quality improvements and report preparation.

Quantification of Air Quality Benefits of Rail and Marine Technologies, Sustainable Development Technology Canada (SDTC), 2010. Ms. Fraser-Arvai developed the study methodology and was responsible for carrying out the human health impact and valuation modelling using Health Canada's Air Quality Benefits Assessment Tool (AQBAT).

Evaluation of Total Cost of Air Pollution Due to Transportation in Canada, Transport Canada (subcontract for RWDI), 2008. Ms. Fraser-Arvai was responsible for modelling the human health benefits associated with air quality improvements (in monetary terms) using Health Canada's Air Quality Benefits Assessment Tool (AQBAT).

Clean Air Portfolio Evaluation, Sustainable Development Technology Canada (SDTC), 2009. Ms. Fraser-Arvai developed the analysis method and was responsible for identifying the sectors which would likely lead to the greatest benefits in terms of air quality improvements. The method involved comparing Environment Canada's Air Pollutant Emissions Inventory against data measured by Environment Canada's National Air Pollution Surveillance (NAPS) Network. Ms. Fraser-Arvai was also responsible for the economic valuation of air quality impacts associated with emissions from heavy-duty diesel vehicles in Canada using Health Canada's Air Quality Benefits Assessment Tool (AQBAT).

Low Impact Development Discussion Paper. CVC, TRCA and LSRCA, 2011. Ms. Fraser-Arvai provided research and writing support for the project.

Light Emitting Diode (LED). Natural Resources Canada, 2009. Ms. Fraser-Arvai was responsible for researching LED technology and preparing content for the Office of Energy Efficiency's website.

2009-2010 Multi-Family Building (MFB) Program Evaluation, Ontario Power Authority (OPA), 2011. Ms. Fraser-Arvai was responsible for evaluating the savings claims of the Toronto Hydro energy efficiency projects, which included a number of on-site visits.

Canadian Integrated Watershed Management: A Scoping Study. Canadian Council of Ministers of the Environment (CCME), 2011. Ms. Fraser-Arvai was responsible for researching IWM in Canadian and International jurisdictions.

Reducing the Carbon Footprint of Canada Day. National Capital Commission (NCC), 2011. Ms. Fraser-Arvai provided expert technical support to the project.

Enbridge Gas Distribution High Performance New Construction Program Support, Enbridge Gas Distribution, 2011. Ms. Fraser-Arvai was responsible for project evaluation including technical evaluation of pre-approved applications.

Municipal Energy Performance Benchmarking Project, Local Authority Services, 2010. Ms. Fraser-Arvai was responsible for the technical evaluation of survey responses, including energy use of various facilities involved in the study.

Advancing Opportunities in Energy Management in Ontario's Industrial and Manufacturing Sector, Canadian Manufacturers and Exporters (CME), 2009. Ms. Fraser-Arvai was responsible for the technical analysis of information provided by facilities, including energy using equipment.

National Renewable Diesel Demonstration Initiative (NRDDI) Final Report, Natural Resources Canada, 2009-2010. Ms. Fraser-Arvai was responsible for developing assessment templates, reviewing reports and analysis.

Inventory & Assessment of Sustainable Community Best Practice Implementation Guides for the Canadian Housing Sector, Canada Mortgage and Housing Corporation (CMHC), 2009. Ms. Fraser-Arvai was responsible for researching existing guidance and preparing templates.

While employed at GENIVAR (now WSP)

Interprovincial Crossings Environmental Assessment Study - Air Quality Assessment, Transports Quebec/Ontario Ministry of Transportation/National Capital Commission, 2008. Ms. Fraser-Arvai performed the air quality assessment for the Interprovincial Crossings Environmental Assessment Study, for both GHGs and CACs.

Jockvale Widening Environmental Assessment - Air Quality Assessment, Ontario Ministry of Transportation, 2008. Ms. Fraser-Arvai performed the air quality assessment for the Jockvale Widening Environmental Assessment.

Research jointly funded by Carleton University and Environment Canada

Real World Test Cycle Development, Emission Rates and Fuel Consumption for Selected Off-Road Spark-Ignited and Compression-Ignited Engines, Environment Canada/Carleton University, 2008. Ms. Fraser-Arvai researched the impacts of emissions test cycles on fuel consumption and emission rates for a sample of off-road engines.

Speciated Hydrocarbon and Carbonyl Compound Emissions from Selected Off-Road Spark-Ignited Engines, Environment Canada/Carleton University, 2008. Ms. Fraser-Arvai developed speciation profiles for a sample of off-road vehicles, which were based on the emissions test results of the above project. The speciation profiles were compiled for submission to the U.S. EPA SPECIATE database.

Professional Affiliations

Professional Engineers Ontario (PEO)

Air & Waste Management Association (A&WMA)

Canadian Standards Association (CSA)

Employment History

Independent Consultant	Independent Consultant	2017-present
ICF	Senior Associate	2012–2017
ICF Marbek	Associate	2011–2012
Marbek Resource Consultants	Consultant	2008–2011
GENIVAR	Junior Engineer	2008
Environment Canada/Carleton University	Graduate Research Assistant/Emissions Analyst	2006-2008
Carleton University	Engineering Recruitment Officer	2005–2006

Proposal for Town of Mountain Village, Colorado

Corporate & Community Greenhouse Gas Inventory, Forecasting and Climate Action Plan

Prepared by: **LEIF LLC**

Contact:
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Opening Letter

LEIF is pleased to submit our proposal to create a Community-wide Greenhouse Gas Inventory, Forecasting and Recommendations Report for the Town of Mountain Village, Iowa. Our team is excited to have the opportunity to work with Mountain Village, a new member of the US Mayor's Climate Protection Agreement.

LEIF LLC, is a woman-owned firm specializing in integrated solutions for measuring, tracking, and communicating sustainability efforts and climate action. LEIF's PhD trained consultants provide technical expertise and bottom-up data collection capacity for scope 1+2+3 greenhouse gas (GHG) emissions accounting efforts compatible with international standards, including the Global Protocol for Community-Scale Greenhouse Gas Emission Inventories (GPC) and LEED for Cities, while also aligning with local needs. The LEIF team has led the field of sustainability for over 35 years of collective experience working with communities across the US to develop community-wide inventories and plans to mitigate emissions, having developed many of the processes, methodological frameworks and protocols for community-wide GHG emissions accounting that are now accepted in the field. The LEIF team brings the Town of Mountain Village deep experience in climate action measurement, tracking and mitigation planning with strong technical knowledge in energy, transportation, waste, water, food, materials, agriculture and land use, gathering the best available data and applying best practice approaches for estimating community-specific greenhouse gas emissions. These efforts are highlighted in a recent "A" grade Leadership rating that LEIF assisted the City of Denver, CO in achieving for the 2015 reported GHG inventory.

The LEIF team has worked with cities, counties and regional planning organizations across the US to address climate, sustainability, and resiliency issues, including for example, the City of Denver, CO to transition their GHG inventory to conform with international protocols, the City of Arvada, CO to increase awareness of community-wide emissions and mitigation strategies, City of Manitou Springs, CO to understand links between GHG emissions and infrastructure resiliency investments, the Minnesota Metropolitan Council to help direct region wide planning efforts to reduce emissions from waste, transportation and land use, Dane County, WI to estimate county-wide GHG emissions across seven emission sectors, and the City of Fort Collins, CO to increase understanding of infrastructure vulnerabilities and resilience, among others. Other efforts to estimate material flows by residential, commercial and industrial sectors are highlighted in recent United Nations International Resource Panel Reports (see section B.3).

Our team's experience working at the urban scale and using systems analysis tools such as life cycle assessment and urban metabolism approaches to comply with international standards and certifications will provide the essential expertise necessary to complete such a study for the Town of Mountain Village.

Upon reviewing our proposal, we hope you will share our belief that we are the preferred partner for the Town of Mountain Village. We look forward to bringing our unique combination of highly experienced technical experts skilled in methods of community-wide greenhouse gas accounting, forecasting and tool development to help Mountain Village create the foundation for an effective climate action plan. Thank you for your consideration. Please also note that LEIF is an objective, independent organization with no known conflicts of interest. We look forward to discussing our approach with you in more detail.

Sincerely,

Rylie Pelton, PhD
CEO, LEIF LLC
www.leifllc.com

Part A – Overview of Proposed Approach

A.1 | Context

After years of engaging in resource and energy conservation efforts and promoting diversified waste management to increase waste diversion, the Town of Mountain Village is taking the next critical steps on the path toward climate action. As a member of the Colorado Communities for Climate Action and with plans to commit to the Global Covenant of Mayor for Climate and energy, the Town has opportunity to reexamine climate, energy and zero waste targets and develop a standardized GHG inventory and emission forecasting assessment consistent with the GCoM reporting requirements, to help the Town of Mountain Village understand status quo impacts and opportunities for reduction. A city's ability to take effective action on mitigating its community-wide carbon footprint through evidence-based policy depends on having access to good quality data, future GHG emissions inventories to monitor progress, and the capacity to distill these data into clear messaging for community leaders and stakeholders. LEIFs experience working with communities large and small, technical expertise in urban-scale greenhouse gas accounting methods and forecasting across a wide variety of emission sectors, including agriculture, and building decision support tools to track emissions will put the Town of Mountain Village on a trajectory to becoming climate action leaders in not only Colorado, but also the US.

A.2 | Proposed Approach

A high-level description of the proposed deliverables and tasks are noted below, with detailed descriptions and proposed timelines available in the Appendix A.

Proposed Deliverables

- Comprehensive report detailing the GHG inventory baseline and forecasted results, data sources and methodology.
- Complete excel-based GHG inventory calculation and tracking tool for future inventory accounting.
- Complete City Inventory Reporting and Information System report for future submission to CDP and compliance with Global Covenant of Mayors, pending interest by the Town of Mountain Village.
- List of high priority climate actions and associated reduction potential, co-benefit and implementation cost indicators infographic, corresponding to summary climate action plan report detailing results for high priority opportunities.
- Presentation materials describing the results of the assessments
- Pending interest from the town, a publicly available web-based GHG inventory and strategy results visualization dashboard.

High-level Overview of Tasks

Task	Task Description	High-level details
1	On-site Project Kickoff meeting	Lead an on-site project kickoff meeting to discuss details of the project and data collection procedures, timelines, and contacts.
2	Identify emission sectors and emission categories	Provide technical capacity to identify relevant emission sectors and categories aligned with Global Covenant of Mayors, LEED for Cities and City Inventory Reporting and Information System
3	Gather data and calculate GHG emissions	Provide the technical capacity and oversight to collect the data and calculate GHG emissions (CO2, CH4 and N2O) across identified emission sectors and subsectors.
4	Complete GHG emission forecasting for 2030 and 2040	Provide the technical capacity to forecast emissions to 2030 and 2040 across priority sectors based on historical trend data including population, economic growth and climate projections.
5	GHG Report and calculation summary	Provide written summary of GHG findings across sectors and subsectors for baseline and forecasted emissions, and methodological details for replicability and consistency.
6	Climate Action Targets and Strategy Initial Review	Examine current climate action and zero waste targets against policy goals and timelines. Lead an on-site meeting to present the results of the inventory baseline and forecasting assessment, present initial recommendations for climate action targets and overview of relevant climate action strategies to City stakeholders (e.g. Green Team Committee). Solicit feedback on initial targets recommendations and strategy options.
7	GHG mitigation strategy scenario, co-benefits and implementation feasibility assessment	Provide the technical capacity to evaluate GHG mitigation policy and technology transition scenarios relevant to the Town of Mountain Village against forecasted business-as-usual emissions to understand mitigation potential for prioritizing climate actions. Examine potential co-benefits and potential implementation feasibility, costs, and funding sources (quantify where applicable).
8	Climate Action Recommendations report	Develop list of high potential opportunities for emission reduction alongside potential co-benefits, and implementation cost indicators and corresponding summary recommendations report for climate action. Develop outreach plan for city to solicit feedback on the plan.
9 (optional)	Interactive web-based GHG inventory for public engagement	Build public facing web-based GHG inventory portal and enable inventory archiving for data visualization and tracking to enhance public engagement with Town of Mountain Village climate action efforts.

Part B | Relevant Experience and Key Personnel

Completion of a greenhouse gas inventory compliant with international standards and certification requires knowledge of highly disparate data sources and expertise applying a variety of bottom-up and top down methods. Therefore, **we posit that a technical assistance team that is at the forefront of research on these topics in local and national arenas, will be an ideal team for the Town of Mountain Village to identify current baseline emissions, future forecasted emissions and point to local opportunities for emission mitigation.**

B.1 | Relevant Team Experience

Past Project Experience	Project description
Denver, CO	GPC BASIC+ and BASIC Greenhouse Gas Inventory (multiple years); web-based data visualization platform; presentation of results to city planners and managers.
Arvada, CO	GPC BASIC+ Greenhouse Gas Inventory (multiple years) and web-based data visualization platform; presentation of results to city council.
Manitou Springs, CO	GPC BASIC Greenhouse Gas Inventory and summary report; infrastructure vulnerability assessment and links to GHG emissions
MetCouncil, MN	Technical assistance on GHG inventory; waste data collection for 188 cities in 7 county region for GHG calculation; technical assistance on data visualization of GHG mitigation scenarios
Telluride and Ouray County, CO	Technical assistance on community GHG Inventory
Dane County, WI	Community Greenhouse Gas Emission Inventory and Climate Action Analysis
Minneapolis, MN	Community Greenhouse Gas Emission Inventory
Adams county, CO	Government Municipal Operations Greenhouse Gas Inventory
MN Regional Indicators	Building Energy forecasting and mitigation scenario analysis
Golden, CO	Community Greenhouse Gas Inventory
Broomfield, CO	Community Greenhouse Gas Inventory and Climate Actions Matrix
Westminster, CO	Government Municipal Operation Greenhouse Gas Inventory
Steamboat Springs, CO	Community Greenhouse Gas Inventory
Louisville, CO	Community Greenhouse Gas Inventory
Eagle, CO	Community Greenhouse Gas Inventory
Central City, CO	Community Greenhouse Gas Inventory and Climate Actions Matrix
Durango, CO	Government Municipal Operation Greenhouse Gas Inventory
Dillon, CO	Community Greenhouse Gas Inventory
Fowler, CO	Community Greenhouse Gas Inventory
Anaheim, CA	Utility meter level data for GHG Inventory of electricity and water

References

Tom Herrod – ICLEI USA (previously at the City of Denver) | tom.herrod@iclei.org
Jessica Prosser – City of Arvada | jprosser@arvada.org
Karen Berchtold – City of Manitou Spring | kberchtold@comsgov.com
Kim Wheels – Eco-Action Partners (San Miguel & Ouray Counties)| kim@ecoactionpartners.org

B.2 Key Personnel

Note: all CVs for Key Personnel are provided in Appendix B

Dr. Rylie Pelton, Chief Executive Officer and Co-Founder at LEIF, has worked with multiple NGOs, fortune 500 businesses, and government organizations to assess the material inputs, outputs and environmental impacts of scope 1, 2 and 3 activities across residential, commercial, industrial, agriculture and municipal users. She has streamlined methods to assess GHG emissions from land use change and urban land expansion, with the methods being consistent with IPCC, US Community Protocol and the Global Protocol for Cities. Rylie led the development of Denver's interactive web-based GHG inventory platform to support climate action planning, which

received an Innovations Award from CDP. She has past consulting experience with the UN Environment Programme on issues of resource efficiency and infrastructure transitions in Southeast Asia. Through Rylie's work at the University of Minnesota's Institute on the Environment, she has pioneered methods for assessing spatially explicit agriculture emissions and supply chain impacts. She has served on the United Nation's International Resource Panel and has developed several co-lead author reports[1] for understanding the material flows of cities and circular economy potential across regions.
Other affiliations: Research Scientist at the University of Minnesota's Institute on the Environment.

Dr. Andrew Fang, Chief Operations Officer and Co-Founder at LEIF, has developed greenhouse gas emissions inventories via sector specific material flow analysis for several communities in the US, across scope 1, 2 and 3 categories and has extended the assessments beyond traditional categories to include key materials needed for life in cities, including for example, food, cement building materials, and water. Andrew brings experience evaluating data applicability and methods for different geolocational contexts, which was recently highlighted in the new forthcoming World Bank report for enhancing community climate action, as well as building decision support tools to evaluate GHG mitigation scenarios from policy and technology transition relative to forecasted BAU emissions.
Other affiliations: Research Fellow at USAID Office of Energy and Infrastructure

Dr. Justin Johnson, Chief Technology Officer at LEIF, brings extensive experience building decision tools incorporating complex data visualizations. His technical expertise enables automatic visualization capabilities of GHG inventory data and to track emissions over time. In addition to Justin's technological capabilities, his work at the University of Minnesota's Institute on the Environment has resulted in cutting edge assessments of ecosystem service impacts and forecasting from economically driven environmental and agricultural change across urban and rural areas, and company-specific supply chains.
Other affiliations: Research Scientist at the University of Minnesota's Institute on the Environment.

Dr. Mark Reiner, Senior Partner/Co-Founder at LEIF, has pioneered the expansion of GHG inventories to include Scope 1, 2, and 3 emissions, providing technical assistance and spreadsheet tools to 20+ communities, including Denver, CO, Minneapolis, MN, Dane County, WI[1]. Mark is a certified professional engineer and has extensive experience using systems thinking to evaluate the inputs and outputs, and related impacts of the primary sectors of urban infrastructure (e.g. energy utilities, transportation, water/wastewater, and building materials). Mark has worked with many communities across both the US and internationally to guide sustainability/healthy city transitions, and to evaluate infrastructure vulnerability and resilience.
Other affiliations: Founder and CEO of WISRD, LLC.

[1] Hillman & Ramaswami 2010

Together, the team offers unparalleled locally, nationally, and internationally recognized expertise and capacity to succeed in the tasks required as part of this Town of Mountain Village Community-wide GHG Inventory, Forecasting and Recommendations Report project.

B.3 | Selected Relevant Publications

Note: Authors in Bold are LEIF founding members

Ramaswami**,** Hillman, Janson, **Reiner,** Thomas (2008). A Demand-Centered Hybrid Life-Cycle Methodology for City-Scale Greenhouse Gas Inventories. *Environmental Science, and Technology*, 6455-61.

Ramaswami**,** Tabory, McFarlane, **Pelton,** (2018). Sustainable Urban Infrastructure Transitions in the ASEAN Region: A Resource Perspective. United Nations Environment Programme, International Resource Panel, Nairobi, Kenya.

Swilling, Hajer, Baynes, Bergesen, Labbe, Musango, Ramaswami**,** Robinson, Salat, Suh, Currie, **Fang,** Hanson, Kruit, **Reiner,** et al. (2018). The Weight of Cities. United Nations Environment Programme, International Resource Panel. United Nations Environment Programme, International Resource Panel, Nairobi, Kenya.

Bringezu, Ramaswami, Schandl, O'Brien, **Pelton,** et al. (2017). Assessing global resource use: A systems approach to resource efficiency and pollution reduction. United Nations Environment Programme, International Resource Panel. Nairobi, Kenya.

Pelton (2019). Spatial Greenhouse gas emissions from US county corn production. *International Journal of Life Cycle Assessment* 24(1): 12-25.

Reiner, Pelton, Fang (2018). Integrating a City's Existing Infrastructure Vulnerabilities and Carbon Footprint for Achieving City-Wide Sustainability and Resilience Goals. Urban Science 2(53): 1-15.

Tong, **Fang**, Li, Yu, Shi, Wang, Wang (2017). Estimating the potential for industrial waste heat reutilization in urban district energy systems: method development and implementation in two Chinese provinces. *Environmental Research Letters* 12 125008.

Tong, **Fang**, Boyer, Hu, Cui, Shi, Kalmykova, **Ramaswami** (2016). Greenhouse gas emissions from key infrastructure sectors in larger and smaller Chinese cities: method development and benchmarking. Carbon Management 7(1-2): 27-39.

Smith, Nelson, **Johnson**, Polasky, Milder, Gerber, et al. (2019). Voluntary sustainability standards could significantly reduce detrimental impacts of global agriculture. Proceedings of the National Academy of Sciences, 116(6): 2130-2137.

Swilling, Hajer, Baynes, Bergesen, Labbe, Musanga, Ramaswami, **Reiner**, et al. (2018). The Weight of Cities: Resource Requirements of Future Urbanization. United Nations Environment Programme, Nairobi, Kenya.

Wood, S., Jones, S. **Johnson, J.**, Brauman, K., Chaplin-Kramer, B. et al. 2018. Distilling the role of ecosystem services in the Sustainable Development Goals. Ecosystem Services, 29: 78-82.

Chaplin-Kramer, R., Sharp, R., Madle, L., Sim, S., Johnson, J., et al. (2015). Spatial patterns of agricultural expansion determine impacts on biodiversity and carbon storage. Proceedings of the National Academy of Sciences, 112(24): 7402-7407.

Part C | Detailed Price Proposal and Distribution of Tasks

Task	Task Description	Subtask Description	Subtask Description	Personnel	Cost for subtask (USD)
Task 1	On-site Project Kick-off meeting and progress updates	1.1	On-site project kick-off meeting	Rylie Pelton (includes travel)	$1,000
Task 2	Identify Emission Sectors/ Categories	2.1	Identify emission sectors and subsectors aligned with GCOM, CIRIS & LEED for Cities	Rylie Pelton	$500
Task 3	Gather data and calculate GHG emissions	3.1	Collect activity and emission factor data across each identified subsector	Intern Rylie Pelton	$5,000
		3.2	Calculate GHG emissions aligned with international protocols		$2000
		3.3	Emissions calculation for local government operations		$1000
		3.4	Benchmarking metrics for tracking performance		$500
		3.5	Compare GPC inventory with past inventory methods; recommend baseline year.	Rylie Pelton	$1000
Total for GPC compliant Inventory					$11,000
Task 4	Complete GHG emission forecasting for 2030 and 2040	4.1	Collect data for developing BAU, high and low growth scenarios for 2030 and 2040 across priority sectors	Intern Andrew Fang (supervise)	$3,000
		4.2	Forecast emissions for 2030 and 2040 for BAU, high and low growth scenarios	Andrew Fang	$3,000
Task 5	GHG Report and calculation summary	5.1	Develop summary report of final emissions inventory and forecasting across sectors and subsectors, methodology and data sources.	Rylie Pelton Andrew Fang	$4000
		5.2	Ongoing Access to Emission Calculation Tool and Training		$1500
		5.3	CIRIS Report for compliance with GCoM		$500
Total cost of GHG emissions forecasting and summary report					$12,000
Task 6	Climate Action Targets and Strategy Initial Review	6.1	Review existing targets; make recommendations for updating targets consistent with CHB 19-1261, CC4CA and ZWAP	Andrew Fang	$1500

		6.2	Identify relevant climate action strategies	Andrew Fang	$2,000
		6.3	Present GHG inventory, forecast, target recommendations and relevant climate action strategy findings to City stakeholders/Green Team Committee.	Rylie Pelton (includes travel)	$2500
		6.4	Solicit input on targets and strategies from Green Team Committee; collate for review	Intern/subcontractor Rylie Pelton (contractor travel)	$1500
Total cost of Target Setting, Initial Strategy Review and Presentation of Results					$7500
Task 7	GHG mitigation strategy scenario, co-benefits and implementation feasibility assessment	7.1	Calculate emissions of technology and policy scenarios	Andrew Fang	$6000
		7.2	Estimate scenario emission mitigation potential	Andrew Fang	$1000
		7.3	Estimate co-benefits (ecosystem services, air, SDGs)	Justin Johnson	$5000
		7.4	Cost and implementation feasibility assessment	Mark Reiner	$5000
Task 8	Climate action recommendation report	8.1	Develop summary report listing high potential emission reduction opportunities across sectors and subsectors, with consideration of co-benefits, costs and funding, feasibility, and policy alignment.	Rylie Pelton Andrew Fang Mark Reiner Justin Johnson	$5000
		8.2	Develop recommendation for soliciting community input on climate action plan	Mark Reiner	$750
		8.3	Present the final climate action plan to the City Council	Rylie Pelton (includes travel)	$1500
Total cost of climate action planning					$24,250
Total for All Tasks (1-8)					$54,750
Task 9 (optional)	Interactive web-based GHG inventory for public engagement	10.1	Build public facing GHG inventory and co-benefit portal	Justin Johnson	$3500
		10.2	Enable inventory archive for tracking and visualization		$3500
Total for optional tasks					$7,000
Total Across All tasks + optional tasks					$61,750

Billing rates for personnel dedicated to this project:

Personnel	Hourly Rates
Rylie Pelton, PhD	$100/hr
Andrew Fang, PhD	$100/hr
Justin Johnson, PhD	$100/hr
Mark Reiner, PhD	$100/hr
Graduate Research Assistant (RA) Intern	$50/hr*

*includes rate for supervising

Part D | Project Management and Proposed Timeline

We anticipate implementing the project over six months, with an additional month to incorporate feedback into final summary report before presentation of final results to Mountain Village City Council.

Proposed timelines are based on an assumed start date of January 3, 2020. Green star represents in-person meeting.

Month	December, 2019				January, 2020					February, 2020				March, 2020			
Week	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Award Date (December 20)																	
Contract Ends (Task 5 complete by May 31)																	
Project check-in meetings																	
Scope of Work																	
Task 1 (On-site Project Kick-off meeting and progress updates)																	
Task 2 Identify Emission Sectors/ Categories																	
Task 3 Gather data, calculate GHG emissions, benchmarks and compare to previous inventories																	
Task 4 Complete GHG emission forecasting for 2030 and 2040																	
Task 5 GHG Report and calculation summary																	
Task 6: Review climate action targets/initial mitigation strategies; present ghg inventory, forecasting, targets and initial strategies to city stakeholders.																	
Task 7 GHG mitigation strategy scenario, co-benefits and implementation feasibility assessment																	
Task 8 Climate action recommendations report and outreach recommendations																	

Month	April, 2020				May, 2020					June, 2020				July, 2020			
Week	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34
Award Date (December 20)																	
Contract Ends (Task 5 complete by May 31)																	
Project Check-in Meeting																	
Scope of Work																	
Task 1 (On-site Project Kick-off meeting and progress updates)																	
Task 2 Identify Emission Sectors/ Categories																	
Task 3 Gather data and calculate GHG emissions																	
Task 4 Complete GHG emission forecasting for 2030 and 2040																	
Task 5 GHG Report and calculation summary																	
Task 6: Review climate action targets/initial mitigation strategies; present ghg inventory, forecasting, targets and initial strategies to city stakeholders.																	
Task 7 GHG mitigation strategy scenario, co-benefits and implementation feasibility assessment																	
Task 8 Climate action recommendations report and outreach recommendations																	

Month	August, 2020				September, 2020					October, 2020				November, 2020			
Week	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34
Award Date (November 12)																	
Contract Ends (Task 5 complete by May 31)																	
Project Check-in Meeting																	
Scope of Work																	
Task 1 (On-site Project Kick-off meeting and progress updates)																	
Task 2 Identify Emission Sectors/ Categories																	
Task 3 Gather data and calculate GHG emissions																	
Task 4 Complete GHG emission forecasting for 2030 and 2040																	
Task 5 GHG Report and calculation summary																	
Task 6: Review climate action targets/initial mitigation strategies; present ghg inventory, forecasting, targets and initial strategies to city stakeholders. Solicit feedback.																	
Task 7 GHG mitigation strategy scenario, co-benefits and implementation feasibility assessment																	
Task 8 Climate action recommendations report and outreach recommendations; final presentation to City Coucnil																	

Appendix A – Detailed Scope of Work

Task 1 On-Site Project Kickoff Meeting

Before beginning the project, the LEIF team will lead an on-site project kick-off meeting to meet with key personnel from the Town of Mountain Village and any other recommended city-wide stakeholders to discuss the overall project goals, clarify expectations and project timelines,

schedule progress update meetings, and obtain any general feedback on the intended approach and data collection procedures for the project to ensure it meets the intended direction and scope. Key questions considered in this process include:

- What are the city's goals for reporting emissions in regard to the Global Covenant of Mayors and internal/public stakeholders?
- Who are the primary contacts necessary for gathering activity and emission data?
- What Mountain Village-specific emission categories are of interest in regard to local government operations?
- What timeframe is convenient and appropriate to review project progress?
- What are the key mitigation strategies of interest for consideration in the climate action recommendations report?
- What are the motivations and goals for updating city-wide climate action targets?

Task 2 Identify Emission Sectors and Emission Categories

Using the Global Protocol for Community-Wide Greenhouse Gas Emissions Inventory Accounting Standard (GPC) and the City Inventory Reporting and Information Systems (CIRIS) reporting framework, which are required for conformance with the Global Covenant of Mayors, as well as the LEED for Cities Certification standard, LEIF will identify the emission sectors and subsectors relevant to the Town of Mountain Village. Previous experience working towards these standards has enabled LEIF to integrate the necessary emission sectors and categories into our proprietary calculation tool (CIFA+^{TM}), enabling LEIF to quickly provide insights on the categories pertaining to the Town of Mountain Village and the associated data collection needs. In general, these sectors include emissions associated with:

- Building energy (residential, commercial, industrial, municipal)
- Fugitive emissions
- Transportation
- Waste and wastewater
- Industrial Processing
- Agriculture and Forestry
- Land Use

In addition to these standard categories, LEIF will provide life cycle emission estimates of consumed materials that are necessary for life within cities, such as food, water, building material, and fuels. Together, these emission sectors will provide the Town of Mountain Village with a comprehensive view of emissions generated by community-wide activities. Categories of greenhouse gas emissions that will be collected include carbon dioxide (CO2), methane (CH4), and nitrous oxide (N2O) emissions, as well as CFCs and PFCs where data is available.

Task 3 Gather Data and Calculate Community GHG Emissions

To support the Town of Mountain Village sustainability and climate action planning efforts, LEIF will provide the City with a best practice emission inventory compliant with CC4CA and the

Global Protocol for Community-Scale Greenhouse Gas Emissions Inventory accounting methodologies and consistent with relevant categories in the LEED for Cities standard. To do so, LEIF will perform the following key tasks:

Key Tasks:

- Task 3.1 Collect data for emission sectors and categories: provision of all activity and emission factor data for GHG estimation and estimation of data quality.
- Task 3.2 Calculate GHG emissions aligned with international protocols: completion of GHG inventory estimation across sectors.
- Task 3.3 Emissions calculation for local government operations: completion of GHG inventory parsed out for city government operations across sectors.
- Task 3.4 Benchmarking metrics for tracking performance: estimation of key performance metrics across emission sectors/categories to benchmark against future emission inventory and peer cities.
- Task 3.5 Compare the updated GPC compliant inventory with past community inventory results/methods, and recommend baseline inventory year.

Task 3.1 Collect data for emission sectors and categories

LEIF will coordinate the collection of data necessary to estimate GHG emissions based on the sectors and emission categories identified in task 2 and the key contacts identified in task 1. To support the development of upcoming sustainability professionals, LEIF will provide an internship opportunity to a graduate student to supervise and mentor in the data collection process for urban-scale GHG inventory development. Across sectors and categories, a combination of activity data (e.g. electricity use, waste disposed in landfills, vehicle miles traveled, etc.), spatially-explicit emission factors, and other key parameters for estimating emissions across sectors will be collected. LEIFs experience collecting such data for cities and counties across the US will enable critical efficiencies that will speed the data collection process. A data quality rating will be made for each set of activity and emissions factors to provide an indication of uncertainty in the inventory results which may be improved in future inventory years. Activity and emissions data related to the LEED for Cities standard categories will also be collected to help enable future certification.

Task 3.2 Calculate emissions aligned with international protocols

The data collected in task 3.1 will be used as inputs to LEIF's proprietary Community Infrastructure Footprinting Analysis (CIFA+) tool, which enables consistent yet flexible calculation of GHG emissions from homes, businesses, industry and land use. CIFA+ initially emerged from the Demand-Centered Hybrid Life Cycle Methodology for City-Scale Greenhouse Gas Inventories[1] and has since been updated to be compliant with GPC BASIC and BASIC+ protocols.

Specifically, CIFA+ helps track emissions from in-boundary (scope 1) and trans-boundary (scope 2 and 3) activities in key areas such as transportation considering origin-destination travel,

building energy, waste and wastewater, industrial activities, land use change, agriculture, forestry and the embodied energy of key materials needed for life in cities (e.g. food, water, fuel and building materials).

Task 3.3 Emissions calculation for local government operations

In addition to the emission sectors required by the GPC and Global Covenant of Mayors (GCoM), LEIF will parse out emissions pertaining specifically to the city government operations, across for example, building energy, vehicle fleets, and waste generation, among potentially other categories of interest by the City. This task is based on data availability and local interest in particular emission categories for better understanding the emissions contributions of municipal operations compared to other emission sources.

Task 3.4 Benchmarking metrics for tracking performance

Key baseline performance metrics such as energy use per building square foot, vehicle miles traveled per person, waste diversion rates, residential GHG emissions per capita, among others, will also be estimated to help benchmark future sustainability performance. These metrics may also be used to compare to other peer cities to help identify potential mitigation strategies of interest. Metrics specifically pertaining to the LEED for Cities Standard will also be estimated and identified within the data collection process.

Task 3.5 Compare GPC inventory with past community inventories and recommend baseline year

To understand the key distinctions between past inventory efforts and efforts to update the inventory for CC4C and GCoM compliance using the GPC protocols, LEIF will compare updated inventory results and methods to past community-wide inventories. This will require access to previous inventory data sources, methods and results, and possibly, communication with past developers of the inventories to increase clarity of modeling choices. Collectively, such information will enable past inventory efforts to be retroactively updated to maintain consistency with GPC methodologies and to track changes in the inventory across community-wide sectors and municipal operations from initial inventory efforts to current efforts. This information will also help inform target setting efforts, which will rely on consistent examination and tracking of emissions from the selected baseline year. Baseline year recommendations will therefore take the results of this comparison into consideration in addition to the stipulations laid out by CHB 19-1261, CC4C and ZWAP.

Task 4 Complete GHG emissions forecasting for 2030 and 2040

To further inform the Town of Mountain Village climate action planning efforts, LEIF will provide a forecast of emissions expected to occur in 2030 and 2040 given current business-as-usual (BAU) trajectories that represent status quo activities and growth expectations. To do so, LEIF will perform the following tasks:

Key Tasks:

- Task 4.1 Collect data for developing BAU, high and low growth scenarios for 2030 and 2040: identify how key benchmarking metrics have changed over time relative to environmental, social and economic parameters.
- Task 4.2 Forecast emissions for 2030 and 2040 for BAU, high and low growth scenarios: completion of emission forecasts across priority sectors for 2030 and 2040 for BAU, high and low growth scenarios.
- Task 4.3 Identify relevant climate action strategies: list of relevant climate action strategies that are known to effect priority sectors and benchmarking metrics to mitigate forecasted emissions.

Task 4.1 Collect data for developing BAU scenarios for 2030 and 2040

The baseline benchmarking metrics identified in task 3.4 help identify the main drivers or contributors of emissions across each of the investigated sectors and will be necessary to help forecast emissions according to status quo activities. As such, these benchmarking metrics in key priority sectors, which will be illuminated in task 3 and based on input from city staff, will be further explored for their historical year-over-year variation relative to environmental and economic factors (e.g. weather, economic growth, new construction). A business-as-usual (BAU) scenario will be developed using the historical trend data that represents the expected trajectories in population and household growth, growth in businesses and GDP, and weather expectations, which may be expected to continue in future years given status quo activities. Our experience with other community-wide GHG inventories suggest that electricity use, energy use for heating and cooling, and transportation from residential, commercial, and industrial activities account for the majority of overall community-wide emissions and will likely be the priority sectors investigated for the Town of Mountain Village. As such, an example of these benchmarking metrics and growth factors for these traditional key priority areas are indicated in table A1.

Table A1. Benchmarking metrics and growth trend examples

Benchmarking Metrics	Growth Factor Trends
VMT/person	Population trends
Fuel efficiency/VMT	Vehicle ownership trends
Energy use (BTU)/sq ft	Residential & Commercial floor area trends
Energy use (BTU)/GDP	GDP trends
CO2e/kWh	Weather (heating and cooling degree day) trends
kWh/person (residential)	Energy use trends
kWh/commercial sq. ft	

In addition to the BAU scenario using historical data, we will also examine the GHG forecasted implications of higher growth and lower growth scenarios (e.g. population and business) to provide a sensitivity assessment of the forecasted emissions. These alternative growth scenarios may be informed by input and feedback from city staff, which may reflect expected growth outcomes from newly implemented or expected policies and programs in the region.

Task 4.2 Forecast emissions for 2030 and 2040 for BAU, high and low growth scenarios

Using the BAU, high and low growth scenario trend data for 2030 and 2040 and associated benchmark metrics, LEIF will provide a forecast of emissions for the agreed upon priority emission sectors. The results of this assessment will provide the Town of Mountain Village with an indication of how emissions are expected to increase over time given growth expectations and status quo activities.

Task 5 GHG Report and Calculation Summary

To facilitate public dissemination of inventory results, future inventory tracking and compliance with Global Covenant of Mayors commitments, LEIF proposes the following key tasks:

Key tasks

- Task 5.1 Summary and Documentation Report: completion of a report summarizing key emissions sources and documentation of methodologies.
- Task 5.2 Data Inputs and Emission Calculation Tool: provision of the excel-based CIFA+ calculation tool complete with Town of Mountain Village data inputs.
- Task 5.3 (optional) CIRIS Report: completion of CIRIS report template for compliance with Global Covenant of Mayors commitments.

Task 5.1 Summary and Documentation Report

Upon completion of the above activities, LEIF will compile an initial final content draft of the Emissions Summary, and Forecasting Report for review by the Town of Mountain Village, which will provide transparency in the approach and estimation methods used for consistent tracking of emissions. The emission summary will outline the relative emission contributions from the different sectors included, as well as highlight the different drivers of emissions within each sector, both for baseline and forecasted emissions. These results will provide the basis for the climate action emission mitigation assessment and community outreach efforts. LEIF will work with the Town of Mountain Village to finalize the report based on feedback from the initial draft, which may ultimately be used for public dissemination. This report will serve as a manual for replicating future inventory efforts, and to provide an audit trail for third party verification.

Task 5.2 Ongoing Access to Emission Calculations Tool and Training

In addition to the above outlined report, LEIF will provide the excel-based CIFA+ tool to the City for future emission inventory estimation and tracking, helping the Town of Mountain Village compare forecasted emissions to tracked annual emissions and benchmark key performance metrics across emission sectors. The City will retain on-going access to the tool at no cost. To help further facilitate the internal capacity for the Town of Mountain Village to complete GPC compliance inventories in future years, LEIF will conduct a training session with Mountain Village city staff to use the CIFA+ tool and to collect the appropriate data as inputs to the tool. LEIF will also provide 4 hours of ongoing support to assist city staff to use the tool in the event of future inquiries on usage, data and/or calculation challenges.

Task 5.3 (optional) CIRIS Report

Upon interest from the Town of Mountain Village, LEIF can input the results of the community-wide emission inventory assessment into the reporting format required by the City Inventory Reporting and Information Systems (CIRIS), which can be directly submitted to CDP for review and compliance with the Global Covenant of Mayors. Such work will provide a template for the City to enable completion of these reports in future inventory years.

Task 6 Climate Action Targets and Strategy Initial Review

Task 6.1 Review existing climate action targets

LEIF will provide a comprehensive review of the current Corporate and Community climate action and zero waste targets to help the Town of Mountain View understand how existing targets address the goals within the timelines stipulated by CHB 19-1261, the Colorado Communities for Climate Action (CC4CA) policy and Zero Waste Action Plan (ZWAP). This gap analysis will help inform recommendations on whether and to what extent Corporate and Community targets should be updated to meet the goals and timelines stipulated.

Task 6.2 Identify relevant climate action strategies

Based on the results of the forecasting assessment and to help inform future climate action policies, LEIF will identify a variety of climate action strategies for the Town of Mountain Village to consider that could have potentially substantial emission mitigation potential for the priority sectors evaluated and the total community-wide emissions overall based on how these strategies may be expected to impact the benchmarks and growth trends identified in the forecasting assessment. These strategies will be identified based on a combination of literature-based studies as well as real world examples of technology and policy implementation.

Examples of such strategies may include (but are not limited to):

- Composting and recycling programs
- Building and transport energy efficiency
- Renewable energy incentives
- Vehicle electrification
- Multi-modal transit incentives
- Streetlighting initiatives
- Urban tree canopy planting programs
- Residential and commercial energy audits
- Waste heat and material exchange
- Strategic densification policies
- District heating and cooling technologies

Task 6.3 Present Inventory, Forecast, Strategies and Target Recommendations

Following the completion of the inventory, forecasting, target review and exploration of relevant climate action strategies, LEIF will present the findings of these assessments at an on-site city stakeholder meeting (e.g. Green Team Committee), at a mutually agreed upon date and location. Such a meeting is intended to increase city leadership and community stakeholder understanding of the inventory accounting methodology and results, and to facilitate dialogue around the inventory, forecasting and climate action target recommendations.

Task 6.4 Solicit input on targets and strategies from key stakeholders

In addition, this meeting will provide the platform to discuss initial potential climate action strategy options and to elicit feedback from key stakeholders regarding interests and concerns around the presented options and to obtain suggestions around other potential strategies of interest. LEIF will collate the feedback into a document that will be made available for open comment for a period of time mutually agreed upon where stakeholders can review and provide further comments for consideration. LEIF will use this feedback to guide the final selection of scenarios representing different sets of mitigation technologies/policies to analyze in the GHG mitigation strategy scenario assessment (task 7).

Task 7 GHG Mitigation Strategy Scenario, Co-benefit and Implementation Feasibility Assessment

Using the feedback from the community regarding relevant climate mitigation strategies that are of interest, LEIF will assess these options via a mitigation strategy scenario assessment which will help the Town of Mountain Village understand how technology transitions and local policies can influence and mitigate future GHG emissions. These strategies will be further evaluated against a variety of other quantitative and qualitative metrics for consideration, as described further in task 7.4.

Key tasks:

- Task 7.1 Calculate emissions of technology and policy scenarios: data gathering and calculation of mitigation scenarios.
- Task 7.2 Estimate scenario emission mitigation potential: estimation of reduction potential compared to forecasted 'business-as-usual' emissions.
- Task 7.3 Estimate co-benefits of climate mitigation strategies and trade-offs associated with implementation costs and feasibility.
- Task 7.4 Develop list of high potential opportunities based on the evaluated reduction potential, co-benefits and implementation feasibility assessment

Task 7.1 Calculate emissions of technology and policy scenarios

To calculate the emissions from technology and policy strategies identified in task 7.1, we will use best available data on adoption/program participation rates from peer cities, to the extent

that data is available, and from literature, paired with our nuanced knowledge of spatially explicit emission factors of different technology options, which will together be incorporated into the CIFA+ tool for evaluation. A sensitivity analysis around alternative participation rate/program adoption assumptions will also be provided, to understand how the emissions from these mitigation scenarios may change under different penetration/technology adoption scenarios.

Task 7.2 Estimate reduction potential for scenario strategies

Using the forecasted emissions from status quo activities, LEIF will estimate the GHG reduction impacts of different climate action policies, programs and technology scenarios projected out to 2030 and 2040, helping the Town of Mountain Village understand the potential to reduce emissions from these different climate action options for reaching community-wide sustainability commitment targets.

7.3 Co-benefits assessment

In addition to the emission reduction potential metrics, LEIF will examine these scenario strategies in the context of other potential co-benefits that could be accrued from implantation, such as how these strategies may effect progress toward the UN Sustainable Development Goals and ecosystem service values (e.g. biodiversity, carbon sequestration potential, water quality, pollination, air quality, etc.). To do so, LEIF will use current and projected land use information provided by the city or obtained through public databases and estimations, and will combine this information with the InVEST software suite to examine ecosystem service potentials.

7.4 Cost and implementation feasibility assessment

In addition to these co-benefits, we will examine potential implementation feasibility in terms of potential cost and ease of implementation, alignment with policy objectives, expected timeline for implementation, and potential funding sources.

Task 8 Climate action recommendation report

Taking the analysis and feedback of the preceding steps, LEIF will develop a climate action plan and recommended outreach plan for soliciting feedback on the plan from a variety of community stakeholders. In particular, LEIF will undertake the following key tasks:

- Task 8.1 Develop a summary climate action report with a list of high potential opportunities, where co-benefits, cost, funding sources, implementation feasibility and policy alignment is considered.
- Task 8.2 Develop recommendations for outreach and engagement to solicit community feedback on climate action plans.

Task 8.1 Develop summary climate action report with list of high potential opportunities

LEIF will collate the results of the preceding tasks into a list of high potential opportunities, where criteria indicators illustrating the reduction potential, co-benefits and potential implementation trade-off will help enable city leadership and stakeholders to quickly gauge the prospective performance and understand trade-offs associated with these technology and policy options. A corresponding climate action plan recommendations report will summarize these high potential opportunities in each sector relative to climate action and zero waste targets, co-benefits, and cost indicators.

Task 8.2 Develop recommendation for outreach and engagement to solicit community input

Following the completion of the climate action plan, LEIF will develop a set of outreach recommendations for the City to engage the public with, in order to solicit input on existing, proposed and potential new actions from a range of community stakeholders. Such recommendations will consider input from city staff and other stakeholders on the types of engagement that are desired and have worked well in the past. A variety of outreach strategies will be considered, including for example, town halls, social media campaigns, dedicated website portals, surveys, etc. and recommendations will be based on the context of the Town of Mountain Village community.

Task 9 (optional) Interactive web-based GHG inventory for public engagement

To support public dissemination and communication of the newly developed city-wide greenhouse gas emissions inventory and climate action plan we propose the following key tasks:

Key tasks:

- Task 9.1 Build public facing GHG inventory portal: completion of interactive data visualization of baseline inventories, forecasted, and climate mitigation scenario results.
- Task 9.2 Enable inventory archive for tracking and visualization: provide access to storing current and future inventories with automatic data tracking visualization.

Task 9.1 Build public facing GHG inventory portal

LEIF will create a publicly accessible web-based platform for the Town of Mountain Village stakeholders to interactively visualize the results of the inventory, forecasting and scenario assessment. Our easy-to-use interface will engage community stakeholders, policy makers, and city planners in the City's inventory accounting and climate action planning efforts, helping illuminate key emission sources across in-boundary and transboundary community-wide activities. Customizable content suited to the local Town of Mountain Village context will be possible through participatory feedback from city leaders and/or key city stakeholders. See ghgfootprint.com/Denver for an example.

Task 9.2 Enable inventory archive for tracking and visualization

In addition to initial baseline and forecasted inventory results, by using our web-based data archive system in combination with the CIFA+ tool, the web-based data visualization platform will automatically update to enable the city stakeholders to visually track inventory data over time. LEIF will train relevant city staff on the use of the archive system for deploying inventory tracking capabilities in future years.

Appendix B- Curriculum Vitae's for Key Personnel

Rylie Pelton
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651-260-9469
Chief Executive Officer/Co-Founder
LEIF, LLC.
Minneapolis, MN 55454

Research Interests: Urban sustainability and resilience, sustainable production and consumption systems, corporate sustainability, regionalized and streamlined life cycle assessments, scenario analysis, decision support systems.

Education:

PhD, Industrial Ecology & Public Health (minor), 2016, University of Minnesota. Dissertation: Improving Sustainability Management Decisions with Modified Life Cycle Assessment Methods. Advisor: Prof. Timothy M. Smith.

MS, Industrial Ecology, 2013, University of Minnesota. Thesis: Hotspot Scenario Analysis: Comparative Streamlined LCA Approaches for Sustainable Procurement and Supply Chain Management. Advisor: Timothy M. Smith

BS, Corporate Environmental Management & Management (minor), 2011, University of Minnesota.

Non-Academic Professional Experience:

- ***Co-Founder and Chief Executive Officer,*** LEIF LLC. Sustainability analytics consulting for governments, businesses and campuses, Minneapolis, MN – 2016-present.
- ***Customer Service Specialist,*** Eureka Recycling. Managed waste reduction customer hotline, St. Paul, MN – 2010.

Professional Research Experience:

General research objectives: Identify best practices for improved sustainability performance across space and life cycle stages, for prioritizing improvement resources.

- ***Post-doctoral Research Associate***, NorthStar Initiative for Sustainable Enterprise (NiSE), Institute on the Environment, University of Minnesota. St. Paul, MN – 2017-present (Dr. Jennifer Schmitt, supervisor).
- ***Post-doctoral Research Associate***, Humphrey School of Public Affairs, Department of Science, Technology, and Environmental Policy, University of Minnesota. Minneapolis, MN – 2017-2018 (Prof. Anu Ramaswami, supervisor)
- ***Graduate Research Assistant***, NorthStar Initiative for Sustainable Enterprise, University of Minnesota, St. Paul, MN – 2013-2016. (Prof. Timothy Smith, advisor)
- ***Graduate Research Fellow***, Biosystems Engineering Buckman Fellowship, Department of Bioproducts and Biosystems Engineering, University of Minnesota, St. Paul, MN – 2011-2013. (Prof. Timothy Smith, advisor)
- ***Undergraduate Research Assistant***, Center for Integrated Natural Resources and Agricultural Management, University of Minnesota, 2008-2011. (Prof. Dean Current, supervisor)

Rylie Pelton
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651-260-9469
Chief Executive Officer/Co-Founder
LEIF, LLC.
Minneapolis, MN 55454

Peer-Reviewed Publications:

1. **Pelton, R.** 2019. Spatial Greenhouse Gas Emissions of US County Corn Production. *International Journal of Life Cycle Assessment,* 24(1): 12-25.
2. Reiner, M., **Pelton, R.**, Fang, A. 2018. Integrating a City's Existing Infrastructure Vulnerabilities and Carbon Footprint for Achieving City-Wide Sustainability and Resilience Goals. *Urban Science*, 2(53): 1-15.
3. Smith, T., Goodkind, A., Kim, T., **Pelton, R**., Suh, S., Schmitt, J. 2017. Subnational mobility and consumption-based environmental accounting of US corn in animal protein and ethanol supply chains. *Proceeding of National Academy of Sciences*. 114(38): E7891-E7899.
4. Bringezu, S., Ramaswami, A., Schandl, H., O'Brien, M., **Pelton, R.** et al. 2017. "Assessing Global Resource Use: A Systems approach to resource efficiency and pollution reduction." *United Nations Environment Programme, International Resource Pane*l, 1-105.
5. Ramaswami, A., Tabory, S., McFarlane, A., **Pelton, R.** 2017. "Sustainable Urban Transitions in the ASEAN Region: An Infrastructure & Resource Perspective" *United Nations Environment Programme, International Resource Panel*, 1-127.
6. **Pelton, R.**, Li, M., Smith, T., Lyon, T. 2016. Optimizing Eco-Efficiency Across the Procurement Portfolio. *Environmental Science & Technology*, 50(11): 59908-5918.
7. Chen, L., **Pelton, R**., Smith, T. 2016. Comparative life cycle assessment of fossil and bio-based polyethylene terephthalate (PET) bottles. *Journal of Cleaner Production*. 137:667-676.
8. **Pelton, R.**, and Smith, T. 2015. Hotspot Scenario Analysis: Comparative streamlined LCA approaches for Green Supply Chain Management. *Journal of Industrial Ecology*. 19(3): 427-440.

Recent Projects

- Smithfield Farms organizational life cycle assessment for US hog supply chain – including county-specific regionalized assessment of feed, livestock production, & meat processing - 2019
- Center for Sustainable Polymers, life cycle assessment of renewable biopolymer - 2018
- McDonalds organizational life cycle assessment of US beef and dairy supply chain – including county-specific regionalized assessment of feed, livestock production, & meat/dairy processing - 2019
- City and County of Denver 2016 greenhouse gas emissions inventory compliant with BASIC standard - 2018
- City and County of Denver 2015 greenhouse gas emissions inventory compliant with BASIC+ standard in the Global Community Protocol; reported inventory achieved Grade 'A' – Leadership rating for Global Covenant of Mayors; online GHG visualization/communication platform – 2017
- City of Arvada 2015 greenhouse gas emissions inventory compliant with BASIC+ standard in the Global Community Protocol; online GHG visualization/communication platform –

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EDUCATION

University of Minnesota — Minneapolis, MN
PhD Candidate - Humphrey School of Public Affairs — 2014 – Present
Science, Technology, and Environmental Policy Program

University of Michigan — Ann Arbor, MI
MS/ME Sustainable Systems/Energy Systems Engineering — 2012

Northwestern University — Evanston, IL
BS Chemical Engineering — 2009

EMPLOYMENT

LEIF, LLC — Minneapolis, MN
Managing Partner/Engineering Consultant — 09/2016 – Present

University of Minnesota – Twin Cities — Minneapolis, MN
Graduate Research Assistant — 06/2014 – Present

The World Bank — Washington, DC
Short-Term Consultant — 03/2018 – 06/2018

International Institute for Applied Systems Analysis — Vienna, Austria
Young Scientists Summer Program Fellow — 06/2017 – 08/2017

University of Michigan — Ann Arbor, MI
Research Associate — 9/2010 – 06/2014

US Environmental Protection Agency — Ann Arbor, MI
ORISE Intern — 05/2012 – 01/2013

PUBLICATIONS

Tong K, **Fang A**, Li Y, Shi L, Wang Y, Wang S, Ramaswami A. (2018) The collective contribution of Chinese cities to territorial and electricity-related CO2 emissions. Journal of Cleaner Production 189: 910–21.

Tong K, **Fang A**, Li Y, Yu H, Shi L, Wang Y, Wang S. (2017) Estimating the potential for industrial waste heat reutilization in urban district energy systems: method development and implementation in two Chinese provinces. Environmental Research Letters 12 125008

Ramaswami A, Tong K, **Fang A**, Lal R, Nagpure A, Li Y, Yu H, Jiang D, Russell AG, Shi L, Chertow M, Wang Y, Wang S. (2017) Urban Cross-Sector Actions for Carbon Mitigation with Local Health Co-Benefits in China. Nature Climate Change 7(10): 736–42.

Ramaswami A, Boyer D, Nagpure A, **Fang A**, Bogra S, Bakshi B, Cohen E, Rao-Ghorpade, A. (2016) Implementing a framework for assessing the food-energy-water nexus from an urban systems perspective: environmental impacts, supply chains and risk. Environmental Research Letters 12 025008

Tong K, **Fang A**, Boyer D, Hu Y, Cui S, Shi L, Kalmykova Y, and Ramaswami, A. (2016) Greenhouse gas emissions from key infrastructure sectors in larger and smaller Chinese cities: method development and benchmarking. Carbon Management 7 (1–2): 27–39.

Fang A, Newell JP, Cousins, JJ. (2015) The energy and emissions footprint of water supply for Southern California. Environmental Research Letters 10 114002

Refereed Conference Proceedings

Fang A, Chan G, Hollingsworth A. Co-Benefits of Cap-and-Trade: How are local air pollution and health benefits distributed in California? *Association of Public Policy Analysis and Management Fall Research Conference*. Washington, DC, November 2018

Fang A, Pelton R, Ramaswami A. Evolution of Community-wide GHG Footprint Approaches: Key Learnings from Implementation in Denver, Colorado. *IPCC Cities and Climate Change Science Conference*. Edmonton, CA, March 2018

Fang A, Wagner F, Kiesewetter G, Assessing the Effectiveness of Urban Emission Control Strategies on Local PM2.5 Levels in Hebei, China, *Proceedings of the YSSP Final Colloquium*. Laxenburg, Austria, August 2017

Fang A, Lal R, Russell A, Ramaswami A. Maximizing Health Co-Benefits of Climate Policy at the City-Scale: Case Study of Jiangsu Province, China, *Interdisciplinary Ph.D. Workshop in Sustainable Development at Columbia University*, New York City, NY, April 2017

PROFESSIONAL ACTIVITIES AND INTERESTS

Professional Memberships: Association for Public Policy Analysis and Management, International Society for Industrial Ecology, Air & Waste Management Association, United States Association for Energy Economics
Research Interests: carbon accounting, air pollution co-benefits, urban energy systems

JUSTIN ANDREW JOHNSON

joh07536@umn.edu
+1 612.961.2382
www.justinandrewjohnson.com

Senior Scientist
Institute on the Environment
University of Minnesota
St. Paul, MN 55108

Research Interests: Environmental and natural resource economics, development economics

EDUCATION

Ph.D.	Department of Applied Economics, University of Minnesota	2009-2014
B.A.	St. Olaf College	2001-2005

POSITIONS

Senior Scientist	The Natural Capital Project, Institute on the Environment, University of Minnesota	2016-present
Research Scientist	The Natural Capital Project, Institute on the Environment, University of Minnesota	2015-2016
Post-doctoral Research Fellow	The Natural Capital Project, Institute on the Environment, University of Minnesota	2014-2015
Visiting lecturer	St. Olaf College	2012-2013

SELECTED PEER-REVIEWED PUBLICATIONS

Smith, W. K., Nelson, E., **Johnson, J. A.**, Polasky, S., Milder, J. C., Gerber, J. S., ... & Arbuthnot, M. (2019). Voluntary sustainability standards could significantly reduce detrimental impacts of global agriculture. Proceedings of the National Academy of Sciences, 116(6), 2130-2137.

Keeler, B. L., Hamel, P., McPhearson, T., Hamann, M. H., Donahue, M. L., Prado, K. A. M., ... & Guerry, A. D. (2019). Social-ecological and technological factors moderate the value of urban nature. Nature Sustainability, 2(1), 29.

Boyd, J. W., Bagstad, K. J., Ingram, J. C., Shapiro, C. D., Adkins, J. E., Casey, C. F., ... & Hass, J. L. (2018). The Natural Capital Accounting Opportunity: Let's Really Do the Numbers. BioScience, 68(12), 940-943.

Kim, H., Rosa, I., Alkemade, R., Leadley, P., Hurtt, G., Popp, A., ... & Caton, E. (2018). A protocol for an intercomparison of biodiversity and ecosystem services models using harmonized land-use and climate scenarios. Geoscientific Model Development Discussions, 11(11), 4537-4562.

Wood, S. L., Jones, S. K., **Johnson, J. A.**, Brauman, K. A., Chaplin-Kramer, R., Fremier, A., ... & Mulligan, M. (2018). Distilling the role of ecosystem services in the Sustainable Development Goals. *Ecosystem services*, 29, 70-82.

Sonter, L. J., **Johnson, J. A.,** Nicholson, C. C., Richardson, L. L., Watson, K. B., & Ricketts, T. H. (2017). Multi-site interactions: Understanding the offsite impacts of land use change on the use and supply of ecosystem services. *Ecosystem Services*, 23, 158-164.

Johnson, J. A., Runge, C. F., Senauer, B., & Polasky, S. (2016). Global Food Demand and Carbon-Preserving Cropland Expansion under Varying Levels of Intensification. *Land Economics, 92(4),* 579-592.

Carlson, K., Gerber, J., Mueller, N., Herrero, M., MacDonald, G., Brauman, K., Havlik, P., O'Connell, C., **Johnson, J.A.,** Saatchi, S., West, P. (2016, in press). Greenhouse gas emissions intensity of global croplands. *Nature Climate Change*.

Vogl, A. L., Dennedy-Frank, P. J., Wolny, S., **Johnson, J. A.,** Hamel, P., Narain, U., & Vaidya, A. (2016). Managing forest ecosystem services for hydropower production. *Environmental Science & Policy, 61, 221-229.*

Polasky, S., Bryant, B., Hawthorne, P., **Johnson, J. A.,** Keeler, B., & Pennington, D. (2015). Inclusive wealth as a metric of sustainable development. *Annual Review of Environment and Resources, 40, 445-466.*

Chaplin-Kramer, R., Sharp, R.P., Mandle, L., Sim, S., **Johnson, J. A.,** Butnar, I., i Canals, L.M., Eichelberger, B.A., Ramler, I., Mueller, C. and McLachlan, N. (2015). Spatial patterns of agricultural expansion determine impacts on biodiversity and carbon storage. *Proceedings of the National Academy of Sciences, 112(24), 7402-7407.*

Johnson, J. A, Runge, C. F., Senauer, B., Foley, J., & Polasky, S. (2014). Global agriculture and carbon trade-offs. *Proceedings of the National Academy of Sciences, 111(34), 12342-12347.*

Runge, C. F., & **Johnson, J. A**. (2014*). Are we in this together? Risk bearing and collective action*. Journal of Natural Resources Policy Research, 6(1), 71-76.

Teaching Experience

Instructor	*Conservation Biology.* Co-taught course with Prof. Joseph Bump. Emphasized use of economic theory and models to inform conservation biology policy and analysis.	2017
Instructor	*Institute on the Environment, University of Minnesota.* Created and taught a short-course, "Python Programming and Big-Data for Sustainability Science." In process of proposing a semester-long version for the next academic year.	2016
Guest lecturer	*Applied Economics, University of Minnesota*. Lectured in several classes for professors C.F. Runge and S. Polasky, including for Ph.D. level "Welfare Economics" and master's level "Conservation Economics."	2015-present
Visiting lecturer	*St. Olaf College*. Successfully proposed and taught a new course, "Economics of Climate Change." Developed unique curriculum, including online materials and participatory "climate negotiations." Taught "Principles of Economics." See justinandrewjohnson.com/teaching for details and student evaluations.	2012-2013
Teaching assistant	*Applied Economics, University of Minnesota.* Developed class material and lectured weekly for "Managerial Economics" and "Principles of Microeconomics."	2012-2013

Research Funding and Grant Submissions

"Improving Dow-DuPont's Nature Scorecard." 2019. Lead PI on successful grant for $59,000 from The Nature Conservancy and Dow-DuPont.

"Enhancing Carbon Modeling to identify spatial configuration effects and temporal dynamics." 2019-2020. Lead PI on successful grant for $198,000 from Unilever Corporation.

"WWF Nature Futures: Identifying the impact of ecosystem services on economic indicators." 2018-2019. Lead PI on successful grant for $90,000 from WWF-UK.

"Environmental Health and Human Health of Peri-Urban Systems." Co-PI on grant to Wellcome Trust. Rejected.

"Strength and Attribution of Edge Effects in Forest Carbon Storage Detected Through Integration of Remote-Sensing and Social Data Synthesis." Rejected but resubmitted as successful grant to Unilever.

"Targeting agricultural innovation and ecosystem service management in the Northern Volta," 2014. Co-lead of the "Future Scenario Analysis" work package in the proposal. $1.9 million USD.

"Incorporating ecosystem services into the sustainable development goals," 2014) $80,000 USD funding from Science for Nature and People (SNAP).

Honors and Awards

University of Minnesota Graduate School Fellowship. Three years full funding plus stipend.

University of Minnesota Department of Applied Economics. Two years full funding plus stipend.

Fulbright Scholar at Tsinghua University, Beijing

Center for International Food and Agricultural Policy (CIFAP) Travel Grant to Sri Lanka

St. Olaf Regents Scholar

Non-Academic Professional Experience

Minnesota AIDS Project	Web Communications Coordinator	2006-2009

Board Service and Volunteer Work

Natural Capital Project	Many volunteer roles, including software designer	2010-present
Applied Economics Graduate Students Club	Technology Coordinator	2011-2012
M Flats Condominium Association	Owners Board	2010-2012
Children's Art Initiative	Board of Advisers	2006-2007
Young Non-Profit Professional Network	Board of Directors	2006-2009

Mark Reiner, PhD, PE, PG
ENV SP, EDGE Expert
Mark.Reiner@WISRD.com , phone 303-596-1401

Abbreviated Biography:
Mark began his over 20 years of experience as a professional engineer and geologist. Early in his career he served as an engineer on large-scale water infrastructure projects, primarily in the Front Range area of Colorado, but also internationally. In 2002, Mark joined the first chapter of Engineers Without Borders – USA and became the organizations first Projects Director in 2004. From 2004 to 2006, as an independent consultant, Mark co-led the infrastructure assessment and sustainability planning of Kigali, Rwanda. This led to similar engagements in Rwamagana, Rwanda and currently providing sustainable infrastructure consulting services to the Konza Tech City being built near Nairobi, Kenya. Since 2012, Mark's focus has been solely within the context of sustainable urban infrastructure – both nationally and internationally. Mark served as a Senior Research Faculty for a NSF PIRE grant at the University of Minnesota in 2015 and 2016 where he co-authored several journal articles (listed below) regarding sustainable infrastructure primarily in India. And, the intent of creating www.wisrd.com was to provide cities with an overall view of infrastructure vulnerabilities on a city-wide (campus or military base) scale.

Education:
Ph.D., Civil Engineering, Sustainable Infrastructure - University of Colorado Denver (2007)
M.S., Civil Engineering - University of Colorado Denver (2000)
B.S. Geological Engineering, Colorado School of Mines (1996)

Relevant Experience:
South Platte Reservoir Design and Construction Engineer. 1999 – 2001
Co-lead Sustainable Infrastructure. Kigali, Rwanda – Master Plan. 2004-2006
Co-lead Sustainable Infrastructure. Rwamagana, Rwanda – Master Plan. 2006-2007
Energy and water demand analyses for Anaheim, California. 2009-2010
GHG Inventory and interactive website for Denver, Colorado. 2018
Infrastructure vulnerabilities mapping for Manitou Springs, Colorado. 2018
Co-lead Sustainable Infrastructure. Konza Tech City, Kenya. 2013-present

Honors and Awards:
Wirth Chair Innovator in Sustainability Award: June 2013 honor, Uni. Colorado Denver
ASLA Award of Excellence in Analysis and Planning: June 2010, ASLA – Kigali MP

Key Presentations:
ASCE National Conference – October 2018 (Denver) – Aging infrastructure vulnerabilities
USGBC Greenbuild – November 2017 (Boston) – Konza Tech City sustainability
Esri Geodesign Keynote – January 2015 (Redlands, Ca) – Geospatial in planning
USGBC Greenbuild – November 2010 (Boston) – Kigali Masterplan

Registrations:
Colorado Registered Professional Engineer
Wyoming Registered Professional Geologist
Envision Sustainability Professional (ENV SP)
International Finance Corporation – Green Buildings (IFC EDGE Expert)

Mark Reiner, PhD, PE, PG
ENV SP, EDGE Expert
Mark.Reiner@WISRD.com , phone 303-596-1401

Associations/Awards:
Wirth Chair Innovator in Sustainability Award - University of Colorado Denver. June, 2013
Award of Excellence in Analysis and Planning – ASLA. June, 2010
Member American Society of Civil Engineers
Member American Planning Association
Social Values International, member

Relevant Vetted Publications – last several years

Reiner, M., Pelton, R., & Fang, A. (2018). Integrating a City's Existing Infrastructure Vulnerabilities and Carbon Footprint for Achieving City-Wide Sustainability and Resilience Goals. *Urban Science*, *2*(3), 53. doi: 10.3390/urbansci2030053

Reiner, M, and Cross, J., Addressing the Infrastructure Decay Rate in US Cities: the case for a Paradigm Shift in Information and Communication, in Gardoni, P. (2018). *Routledge handbook of sustainable and resilient infrastructure*. 1st ed. London and New York: Routledge, pp.791-807.

IRP (2018). United Nations. The Weight of Cities: Resource Requirements of Future Urbanization. Swilling, M., Hajer, M., Baynes, T., Bergesen, J., Labbé, F., Musango, J.K., Ramaswami, A., Robinson, B., Salat, S., Suh, S., Currie, P., Fang, A., Hanson, A. Kruit, K., Reiner, M., Smit, S., Tabory, S. A Report by the International Resource Panel. United Nations Environment Programme, Nairobi, Kenya.

Nagpure, A., Reiner, M., & Ramaswami, A. (2018). Resource requirements of inclusive urban development in India: insights from ten cities. *Environmental Research Letters*, *13*(2), 025010. doi: 10.1088/1748-9326/aaa4fc

Reiner, M., & Rouse, D. (2017). Dependency model: reliable infrastructure and the resilient, sustainable, and livable city. *Sustainable And Resilient Infrastructure*, *3*(3), 103-108. doi: 10.1080/23789689.2017.1386041

Reiner, M., & McElvaney, L. (2017). Foundational infrastructure framework for city resilience. *Sustainable And Resilient Infrastructure*, *2*(1), 1-7. doi: 10.1080/23789689.2017.1278994

Fisher, S., Reiner, M., & Sperling, J. (2017). Unreliable Sustainable Infrastructure: Three Transformations to Guide Cities towards Becoming Healthy "Smart Cities". *International Conference On Sustainable Infrastructure 2017*. doi: 10.1061/9780784481202.037

Reiner, M., & Ramaswami, A. (2016). What Is Remedial Secondary Infrastructure? Implications for Infrastructure Design, Policy for Sustainability, and Resilience. *Journal Of Infrastructure Systems*, *22*(2), 02516001. doi: 10.1061/(asce)is.1943-555x.0000285

Appendix C – Case Studies

City and County of Denver, CO

The city and county of Denver, CO contracted with the LEIF team to update their community-wide GHG inventory for 2015 to be compliant with the GPC BASIC+ method, consistent with the reporting requirements of the Global Covenant of Mayors for Climate and Energy. Working collaboratively with City and County Department of Environmental Health, LEIF identified the necessary data and calculation procedures required for compliance, adapting the procedures based on the local context and availability of data. In addition, to allow for benchmarking comparisons, LEIF harmonized Denver's initial baseline year inventory (2007) to be consistent with GPC BASIC reporting levels, allowing for better comparison and tracking of emissions over time relative to community-wide emission reduction targets. It was the City and County of Denver's hope that this work could be used as a springboard to assist with other Colorado communities seeking to transition to the internationally accepted GPC standard.

In addition, LEIF helped facilitate Denver's first annual emissions reporting to CDP, resulting in an Innovations Award and an 'A' grade Leadership rating. To increase internal and external stakeholder engagement with Denver sustainability efforts, LEIF developed a web-based platform to interactively display emissions, trends and benchmark comparisons, enabling Denver to both track climate action planning efforts and inform the public of the current emissions profile for the city. LEIF established server database environments to support the display of historical and future inventories, allowing Denver to visually track these trends over time. LEIF has provided on-going consultation, quality assurance and presentation of Denver's continued efforts to track and communicate emissions.

City of Arvada, CO

The city of Arvada worked with LEIF to calculate the 2015 community-wide inventory of greenhouse gas emissions, an update from a previous 2007 inventory. The City's goal was to understand the overall emissions trend and trajectory given the policies and intensity of resources used across homes and businesses over the last eight years. LEIF created a custom tool for Arvada that enabled the City to update their GHG inventory for future years, track their emissions over time and benchmark their energy and resource use intensity against other communities around the US of similar size and climate. The tool was built to be consistent with the GPC protocol to allow for greater comparison with other community inventories, since over 7,516 cities around the world have committed to the Global Covenant of Mayors for Climate & Energy and the corresponding GPC standard.

To communicate Arvada's community GHG profile and some potential pathways to reduce emissions in the city with both internal and external stakeholders, LEIF developed an interactive website, hosted by the City of Arvada. The website has been used by community stakeholders,

city staff, and the Sustain Arvada Committee to identify the drivers of GHG emissions in the community, and to set realistic targets for reducing the city's energy use and associated emissions over time. LEIF's server database environment supports the display of Arvada's historical and future inventories, allowing the City to visually track these trends over time for enhanced planning support. Check out the website at http://footprint.arvada.org.

City of Manitou Springs, CO

The City of Manitou Springs worked with LEIF to update past community-wide GHG assessments from 2005 and 2011 to GPC BASIC compliance (including energy, transport, waste, and materials), as well as provide an updated emissions inventory for 2017, ensuring comparability across years to help the city track its performance. LEIF built upon these standardized assessments by applying our novel framework that attributes emissions to the infrastructure assets that support and enable the activities of homes, businesses and industry across the city.

These same sectors are also assessed for their vulnerability and risks of failing using our Dr. Reiner's WISRD tool, which holistically assesses infrastructure risks of energy distribution, transportation, water and communication systems in cities, through consideration of material type and age, collocation with other vulnerable assets, and likelihood of external hazards (e.g. extreme weather events). This 'Greenhouse gas- Infrastructure Vulnerability' (GHG-IV) framework allows for proactive capital improvement planning that can improve both the reliability/resilience of infrastructure systems while reducing the GHG emissions of these same systems.

The GHG-IV framework was unveiled at the first International Panel on Climate Change (IPCC) Cities and Climate Change Science Conference in Edmonton, Canada.

September 10th, 2019

Valued Council Members:

I recently had the opportunity to attend a Green Team meeting and was instantly inspired by their vision.

Growing up in the comfort this magical box canyon, the natural world has been my guide and inspiration as far back as I can remember. Enthralled with the wonder and curiosity of this wild backyard, I found a deep and meaningful connection to nature that strongly shaped who I am today. The San Juan Mountains and our immense natural bounty are my teacher and home and I am devoted to the conservation of this treasure.

After graduating from THS, I obtained my teaching license through Fort Lewis College. Shortly into my teaching career, I began to feel uncertain about the approach of the conventional system. I recognized a new approach essential for the future of our planet and society. This realization led me on a transformational journey to South America where I co-founded and taught in an alternative school outside of Bogotà, Colombia. In this collaborative community, we worked together to break down old thinking systems and conventional structures in order to evoke a more holistic, cooperative, sustainable learning environment. I began to weave together my passion for our natural world and its conservation into an environmental education model for the school. After three inspirational years, I transitioned into a more collaborative role as a founder, stepping down as lead teacher to return to my rocky mountain roots.

Since returning to the states I have taken sabbatical from the classroom and devoted more time to my passion for conservation by volunteering with the Rise up Against Plastic Movement and Surfrider Foundation. I plan to study environmental education and sustainability this fall. Currently employed at Allred's Restaurant, I have come face-to-face with the often disheartening reality of our tourist-driven economy. I realize that systematic changes need to take place and feel a drive and commitment to get locally involved to ensure we protect and preserve this amazing place that draws in so many people from across the globe.

I would love to join the Green Team and help carry out their mission. With my passion, experience in team settings and strong connection to this place, I can bring a uniquely important voice and contribution to the committee. I look forward to working with the team to help protect this magical place we all call home.

Sincerely,

Inga Johansson

INGA K JOHANSSON

150 Edgewater Road **Phone: +1(727) 331-3738**

Telluride, CO. 81435 **Email***:* *ingamar20@gmail.com*

PROFILE

Passionate, hardworking individual with a keen ability to facilitate group dynamics and collaborate in a team setting. Committed to empowering youth and promoting environmental sustainability.

EDUCATION AND CREDENTIALS

Bachelor of Arts, Fort Lewis College, Durango CO May 2007
Major: Interdisciplinary Studies Minor: Spanish

CO Teaching License Dec 2007
Elementary Education K-6 ELL/TEFL Endorsement

EXPERIENCE

Waitress and Bartender, Allred's Restaurant, Telluride CO June 2019- present
- *Provide exceptional service to guests*
- *Knowledge of wine and spirits and fine-dining service points*

Extensive experience in hospitality and service industry since 2004

Founder and Teacher, Kalapa Comunidad de Aprendizaje, Bogotá Colombia July 2014- June 2017
- *Design alternative and environmental curriculum and methodologies*
- *Manage own classroom*
- *Train staff in social emotional teaching*
- *Collaborate with co-workers and founders in development of school*

Kindergarten English Teacher, El Gimnasio Moderno, Bogotá Colombia March 2014- Dec2014
- *Manage ELL classroom of 19 students ages 5-6*
- *Assist in the development of a bi-lingual curriculum*
- *Team teach with Spanish teacher*

Translator, Azembla, Bogotá Colombia August 2016- January 2016
- *Translate technical written and verbal documents*

Preschool Director and Lead Teacher, Telluride Early Childhood Center, Telluride CO Dec 2010- Aug 2013
- *Manage 2 classrooms and 30 children ages 3-5*
- *Direct and oversee 3 classroom teachers and program board*
- *Design, implement and oversee curriculum*
- *Manage and balance program budget, acquisition of program funding and grant writing*
- *Translate documents, meetings and daily teacher communications*
- *Design and implementation of parent trainings*

Teen Camp Counselor, City of St. Petersburg FL June 2005- Dec 2009
- *Supervise teens ages 10-15*
- *Design and implement daily camp activities*

IVOLVEMENT

Volunteer, Telluride Public Library Bilingual Story time	August 2019- current
Member, Rise up Against Plastic and Surf Rider	June 2016- present
Member, Environmental Voter Project	August 2018- present
Member, Fort Lewis College Rotaract Club, Durango, CO	Nov 2006- June 2007

SKILLS/ ABILITIES

Fluent Spanish (listening, speaking and writing) and experience with translating Spanish to English

Expertise in event planning and fundraising

PERSONAL REFERENCES

Trish Greenwood
Elementary Principal
Ridgway Elementary School, CO
Relationship: Supervisor at Telluride School District for 3 years
tgreenwood@ridgway.k12.co.us
+1(970)708-7404

Annie Johnson
Retired Social Services Case Worker
Telluride Resource Center
Relationship: Friend for 34 years
+1(970)864-2226

Diana Manrique
Co-founder and Coach
Kalapa Learning Community, Bogotá Colombia
Relationship: Co-worker for 4 years
diana@fish.com.co
+57(316)523-9749

Lorilei Hester
Retired Teacher
Azalea Elementary, Saint Petersburg, FL
Relationship: Supervising teacher and mentor for 10 years
+1(727)452-1132

Susan Johnston

From: Jackie Kennefick
Sent: Wednesday, September 11, 2019 9:27 AM
To: John Howe; mvclerk
Subject: RE: Green Committee showing of interest

Follow Up Flag: Follow up
Flag Status: Flagged

Thanks John!

From: John Howe <johnhowe@montrose.net>
Sent: Wednesday, September 11, 2019 7:00 AM
To: mvclerk <mvclerk@mtnvillage.org>
Subject: Green Committee showing of interest

Hello Jackie,
Please consider this as my showing of interest in being appointed to Town's Green Committee. I have been very interested in solar energy development and purchased panels when Clean Energy Collective first introduced their program. Two coops have moved to terminate their relationship with Tri State and I believe SMPA will be the next to terminate their agreement and free us to move forward with a renewable solar program. With the closing of Tri State power plant it provides us with serval opportunities to structure a program of energy independence.

Thank you for your consideration of my appointment to the Green Committee

John Howe, johnedwardhowe3@gmail.com 970 596 6254

Susan Johnston

From: Meghan Pittenger <meghan@exceptionalstays.com>
Sent: Monday, September 9, 2019 1:56 PM
To: mvclerk
Subject: At-Large Applicant for Green Team Committee - MEGHAN PITTENGER
Attachments: MeghanPittenger-Resume-GreenTeam.pdf

Dear Town Council Members,

I am writing you today to express my desire to be a member of Mountain Village's Green Team Committee. Sustainability is a core value for me and one that I'd like to bring to the forefront of Exceptional Stays (MVBL# 000078) and the thousands of guests that we host annually in our Mountain Village homes.

Having already introduced a sustainability plan within our company, speaking with Zoe Dohnal, your sustainability manager, regarding collaboration efforts with Town of Mountain Village and applying sustainability practices in my own life, I think I am an ideal fit for your committee. There is a huge opportunity to affect change in Mountain Village among second homeowners and vacationers alike, and I have the attention of both groups as an active member of the Mountain Village hospitality community to make this happen.

I am very creative and have a fresh perspective on sustainability, conservation and green initiatives. I'm also mother to two little girls and want nothing but the best for them - one key factor in this wish for them is that we keep this incredible place (which we all chose with great intention) clean, green and pristine.

Per your request in this application process, I have attached my resume here.

If you have any questions, please don't hesitate to contact me at meghan@exceptionalstays.com or call me at 970.708.7361.

Thank you in advance for your consideration.

Sincerely,
Meghan Pittenger

--

MEGHAN PITTENGER
Telluride General Manager
209 E. Colorado Ave, Suite A | PO Box 3318
Telluride, CO 81435 USA
800.970.7541 | 970.728.5262 x707 M +1 970.812.1642
meghan@exceptionalstays.com ExceptionalStays.com

Meghan Pittenger

893 Two Rivers Drive | Telluride, CO 81435 | 970.708.7361 | pittenger.meghan@gmail.com

With a passion for sustainability and people, my experience over the past 15 years has developed me into a strategic, creative marketer offering strong communication skills and an eye for detaiil.

Employment History

July 2013– Present

Director of Sales/Marketing (2013–2017), VP Sales & Marketing (2017-Present)– TELLURIDE RENTALS
Telluride, Colorado
- Develop and manage company brand, crafting taglines, building ads/e-blasts, maintaining consistency
- Market and maintain all properties, worldwide on two company websites as well as third party websites, utilizing unique descriptions, photos and amenity information
- Generate unique presentations aimed at channel partners, travel agents and new owners
- Craft content and cultivate overall appearance of telluride-rentals.com and exceptionalstays.com
- Train and manage team, offering goals, incentives and guidance to ensure overall success
- Increased gross revenue 10-15% year over year for four consecutive years
- Forge and Maintain relationships with guests to provide them with an exceptional, personalized product and experience, raising the rate of repeat guests from 25% to 40%

Nov 2012– May 2013

Buyer, Manager Swanky Buckle/Mountain Standard Time- TSG SKI & GOLF
Telluride, Colorado
- Create, maintain and execute editorial calendar for all social media marketing
- Manage employees and schedules for two boutiques (Mountain Standard Time & Swanky Buckle)
- Established profitability for the resort's boutique retail department for the first time in company history
- Plan tradeshow schedule, purchase inventory and merchandise for four unique boutiques
- Monitor and understand inventory levels to maintain a strategic product mix.
- Coordinate special events with vendors for private and public groups of clientele
- Cultivate relationships with clientele through personal shopping, and constant contact

Aug 2010– May 2013

Executive Assistant- TSG SKI & GOLF
Telluride, Colorado
- Manage schedule, filter calls and assist CEO/Owner with daily needs and requirements
- Process donations, hotel reservations, stage use and travel voucher requests companywide
- Research and aid in the creation of an updated Master Development Plan for the resort
- Map resort features and potential projects using ArcGIS and Mobile Mapper device
- Edit press releases, brochures, letters and advertisements prior to release/production
- Develop concept, design, product mix for four unique boutiques
- Construct and maintain websites, blogs and social media for four boutiques and two restaurants

July 2008- Aug 2010

Manager- SCARPE
Telluride, Colorado
- Generate marketing campaign including advertisements, email blasts and internet media
- Update the company website with pictures, merchandise, descriptions and blog entries
- Cultivate and maintain relationships with both clients and vendors
- Coordinate sales, events and trunk shows
- Assist with buying, merchandising and the opening of Next Door

Nov 2006- July 2008

Account Executive- DITTOE PUBLIC RELATIONS
Indianapolis, Indiana
- Enhance and energize relationships with clients through constant communication and honest feedback
- Write press releases, bylines, pitches for the launch of new products, events, announcements
- Acquire national/local media attention through TV, magazines, blogs, trade publications, newspapers
- Travel to conferences with clients and prepare them for interviews/product demonstrations with local, national, international media

Academic Background

Butler University- Indianapolis, Indiana
Major: Journalism with a concentration in Integrated Communications: Public Relations, Marketing and Advertising
Minors: Mathematics and Business
Scholarship NCAA Division I Student Athlete: Softball, Team Captain

Skills + Personal

Microsoft Office (Word, Excel, PowerPoint, Publisher, Outlook)
Desktop publishing/graphic design (Adobe Suite)
ArcGIS & Mobile Mapper Software
Shopify & Culini Website Builders

Eco-Conscious
Creative
Detail-Oriented
Team Player

Susan Johnston

From: Richard Child <richard@childmail.net>
Sent: Wednesday, September 11, 2019 5:04 PM
To: mvclerk
Subject: Green Committee
Attachments: Richard Child Resume 2018.pdf; ATT00001.txt

With reference to the open position on the referenced committee, I would like to express my interest in volunteering my time by serving on such committee.

Although I do not have a background or experience with environmental issues, I have served on numerous committees as well as organized and run various groups.

Environmental issues are very much a top of mind topic for me.

Cordially,
Richard

RICHARD CHILD

970-519-1303 - rchild@mattrixgroup.com ~ https://www.linkedin.com/in/childrichard

PROFILE

Driven, dynamic and accomplished global financial products and services executive with years of distinguished contributions to market expansion, revenue growth and profitability in Latin America, the Caribbean, and Asia Pacific, who is a strong leader, manager and change agent with a history of developing key personnel and high-performing teams.

COMPETENCIES

- Advertising, Marketing & Branding
- Board Leadership
- Business Model Design
- Business Strategy
- Change Management
- Clear Communication
- Customer Service
- Franchise Management
- Global Business Development
- Market Assessment & Studies
- Member Relations
- Multi-Cultural Competence
- New Product Development
- Operations & Technology
- Product Management
- Public Relations
- Resource Management
- Revenue Generation
- Risk Management
- Sales & Distribution
- Strategic Planning
- Team Leadership & Development
- Trilingual: English, Spanish & Portuguese

PROFESSIONAL EXPERIENCE

Mattrix Group 2000-Present

Founder & Principal

- Founded a consulting firm focused on assisting financial services companies with strategic planning, business development and resource management.
- Directed numerous projects ranging from restructuring banks' payment divisions, identifying business efficiencies, developing new products, designing marketing plans, conducting market assessment and studies, crafting international business development strategies, undertaking operational reviews, and risk management analysis.
- Assisted and supported companies with market analysis and reviews to determine the financial and operational viability of acquisitions and identifying appropriate partners, distribution and sales channels.
- Supported companies with business and product growth initiatives including development of debit strategies, rewards programs, e-banking and internet sites, co-branding programs, and customer service.
- Developed several co-branded programs including one of the first programs targeting the youth segment.
- Facilitated strategy design, which led a bank client to grow their credit card portfolio four fold in three years.
- Designed and implemented a debit strategy for a bank client that included sales channels, enhanced ATM usage and functionality, as well as a debit card rewards program.
- Negotiated licensing and marketing agreements with American Express, MasterCard and Visa.
- Developed and launched the first non-bank owned ATM network in Brazil.
- Clients include: *American Express, Banco del Progreso, BBG Communications, Capital One, CardNet, DAI Brasil, Exxel Group, First Caribbean Bank, FIS Global, Global Live, Global Payments, Maduro & Curiel's Bank, NetSpend, Oasis Technologies, Recaudo Bogotá, Scotiabank, and Total Systems.*

MPOWER Labs / Rêv Worldwide 2008-2009

Executive Chair of International Strategy & Corporate Development

- Responsible for leading MPOWER Labs' international business development and strategy focused on providing financial services to the under-banked.
- Directed projects reviewing the payments industry in Latin American markets, undertaking macroeconomic overviews analyzing historical trends, market share, consumer preferences, the banking and department store sectors, and brand investment by, and acceptance levels for**,** global payment brands and processing alternatives.
- Performed market reviews, recommended appropriate set-up, and negotiated sales and distribution agreements.

- Directed business analysis and investment in a leading Australian pre-paid company.

ZonaFinanciera.com 1999-2000
Executive Vice President
- Led all business development, marketing, sales, advertising and planning activities for a seven country network, with an annual budget of $16 million and staff of 29.
- Revised and re-launched the corporate identity and positioning of online financial services product offerings targeted to serve Hispanic consumers globally.
- Restructured the sales and marketing functions resulting in more than $500,000 in annualized savings.
- Acted as a key participant in the initiative to secure private placement funding.

MasterCard International 1983-1999
Executive Vice President & President for Latin America 1996-1999
- Reported to the CEO and participated as an Executive Committee member for the corporation with accountability for company-wide management, strategy, policies and resource allocation.
- Directed and managed regional operations in collaboration with 120 professional and support staff; oversaw a budget of $95 million.
- Responsible for strategic planning, business development, product management, member relations, advertising, marketing, research, operations, finance, budgeting, public relations, and franchise management.
- Generated divisional pre-tax profit of $9.6 million in 1997 and $10.8 million in 1998, representing 10% of company profit on 5 % of company sales.
- Led negotiations for an equity investment in Redecard, one of two payment systems acquiring processors in Brazil and in Argencard in Argentina.

EARLIER MASTERCARD EXPERIENCE

MasterCard International, *Senior Vice President & General Manager for Latin America* 1990-1995
MasterCard International, *Senior Vice President Global Advertising and Marketing* 1990-1992
MasterCard International, *Vice President for Latin America* 1983-1990

EDUCATION

Universidad Argentina de la Empresa (UADE)
Master of Science in International Business & Bachelor of Arts in International Business

ASSOCIATIONS & BOARD MEMBERSHIPS

- **Telluride Regional Airport Authority, *Alternate Board Member*** 2016-Present
- **BaseTek, *Board Member*** 2013-2014
- **Telluride Venture Accelerator, *Mentor*** 2012-Present
- **Paguemob, *Advisor*** 2012-2014
- **Mountain Village Town Council, *Elected Official, Mayor Pro-tem*** 2008-2013
- **AllClearID, *Advisor*** 2011-2013
- **RêvAsia Pacific, *Chairman of the Board*** 2008-2009
- **RêvLatin America, *Vice Chairman of the Board*** 2007-2009
- **MPOWER Mobile, *Board Member*** 2007-2009
- **CheckSmart Financial Holdings, *Board Member & Audit Committee Chairman*** 2007
- **Telluride Tourism Board, *Board Member*** 2006-2007
- **NetSpend, Inc., *Board Member & Audit Committee Chairman*** 2004-2007
- **Certegy (NYSE:CEY), *Board Member & Audit Committee Member*** 2002-2006
- **CardNet, *Board Member & Strategic Committee Chairman*** 2001-2006
- **Redecard, *Board Member*** 1997-1999
- **Argencard, *Board Member*** 1996-1999