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Town of Telluride
Annual Energy Audit

Energy Use & Carbon Footprint Summary (2019)

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Executive Summary

The Town of Telluride government has been tracking and trying to mitigate its greenhouse gas emissions since 2003, hovering around 4000 metric tons of carbon dioxide equivalents (CO_{2e}) over time while the level of service has increased considerably. In 2009, Town officials adopted by resolution the Colorado Climate Action Plan 2020 Goal of reducing GHG emissions 20% from 2005 levels by 2020 for the Town Government and the Telluride Community as a whole. In 2017, Town officials agreed to change the goal to becoming "carbon neutral".

Town Government reached the goal of decreasing its GHG emissions 20% from 2005 levels by 2020 in 2012. It announced that it reached the goal of becoming carbon neutral in 2014 and has remained there ever since. However, in the future the Town will not likely be making this claim as it works to move its GHG emissions accounting to be consistent with updated globally accepted accounting methods in 2020.

Town Government has used a variety of methods to decrease its GHG emissions. These include:

1. Changing day-to-day operations, making efficiency improvements to facilities, and tracking energy usage each month to determine whether facilities are operating as expected.

2. Investing in local renewable electric generation in cooperation with the San Miguel Power Association and Tri-State.

    a. Town Government owns and operates a 100kW solar array on its wastewater treatment facility, and a small hydropower generation facility at one of its water treatment plants.
    b. Town Government owns a significant number of solar panels in the Community Solar Garden.
    c. Town Government purchases the renewable energy credits (RECs) that are available from hydropower generation at the Bridal Veil Powerhouse, which is at the head of the valley above town.
    d. Town Government purchases the summer RECs that are available from hydropower generation at the Ridgway Dam, which is operated by Tri-County Water.

3. Preserving and caring for parks and open space, which provide opportunities for carbon sequestration.

While the Telluride Community, as a whole, has not yet reached either goal, it has been steadily increasing the portion of electricity usage that comes from renewable sources and there have been ongoing efforts through the Town's Green Building Code and through EcoAction and other partners to improve the energy efficiency of buildings, increase ridership on transit, and offer incentives for improvements. In 2019, total estimated GHG emissions for the Telluride Community, including government, were approximately 71,800 metric tons of CO_{2e}.

Efforts by Town Government and the Telluride Community continue as they have for over 15 years—by looking for opportunities brought about by new technologies, new ideas, and renewed enthusiasm within the community to enact change.

Part 1 – Introduction & History

Town of Telluride staff first started tracking the greenhouse gases (GHGs) generated by its operations in 2003 after engaging professional consultants to perform an energy audit of Town facilities. The consultant report recommended many actions to improve energy efficiency, most of which were implemented over the following year. Each year thereafter, the scope of the analysis became more inclusive and sophisticated. In a memorandum to Town Council dated August 27, 2006, the Town Manager's Office wrote:

> *"Progress has been made in the Town's energy conservation efforts, but analysis shows that we need to make an even more intensive effort throughout our departments and facilities in order to meet the goal set forth in the Mayor's Climate Protection Agreement, signed by the Town of Telluride, and in the Aspen Canary Initiative, supported through a 2005 Town Council Resolution. These programs direct the Town to strive to meet the Kyoto Protocol target of a 7% reduction in overall greenhouse gas [GHG] emissions by the year 2012."*

In 2009, Town officials raised the bar by formally adopting by resolution the Colorado Climate Action Plan 2020 Goal of reducing GHGs emissions 20% from 2005 levels by 2020. The Town took this step to recognize that global warming poses ongoing, significant environmental and economic risks to San Miguel County, the Town of Telluride, and the American West, as a whole. This resolution officially expanded the goal of lowering GHGs from Town Government facilities and operations to lowering GHGs from the broader community, as well. At its May 8, 2017, meeting, Town Council raised the bar once again, changing the goal for Town Government facilities and operations and the Telluride Community to become "carbon neutral." This 2019 summary will reflect where the Town Government and the Telluride Community are two years after this new, tougher mandate.

Part 2 of this document is intended to inform the Manager's Office, Telluride Town Council, and the general public about the Town Government's ongoing efforts at its facilities and operations to remain carbon neutral. It reached this goal in 2014. This goal is absolute and is not based on population or level of service, which makes it a significant challenge. Investing in renewable energy sources as a complement to energy efficiency measures continues to be a winning strategy for Telluride Government. However, in the future the Town government may not be making the claim that it is "carbon neutral" as it works to move its GHG emissions accounting to be consistent with updated globally accepted accounting methods in 2020.

Focusing only on Town Government operations, however, is not enough. The goal of being carbon neutral encompasses the entire community, and government GHG emissions are estimated to be less than 3 percent of the total emissions generated by the Telluride Community. It is obvious that a much broader and more difficult to implement community-based effort is needed. To help ensure this broader effort gains momentum, Telluride Government has first set the example by dedicating funding and staff time to improve the long-term sustainability of its operations. Second, it works with EcoAction Partners to develop a GHG emissions inventory and reduction plan for the Telluride Community that establishes short and long-term GHG reduction targets and policies and programs to achieve those targets. In addition, San Miguel Power Association (SMPA) is an important partner and source of technical expertise, promoting regional energy efficiency and creating opportunities for our region to create renewable sources of electricity. Likewise, Black Hills Energy is working on creating similar opportunities for efficiency for natural gas.

Part 3 of this document is intended to summarize accomplishments of the Telluride Community in terms of energy efficiency, on-site and off-site generation of renewable energy, purchase of renewable energy credits, and Green Building requirements. While it is by no means comprehensive, it does provide an understanding of current trends and individual efforts within the Telluride Community. Hopefully, community members will look at this section and be inspired to take additional actions to become carbon neutral.

Part 2 – Telluride Government Facilities & Operations Annual Performance

TOWN GOVERNMENT GHG EMISSIONS SUMMARY

Meeting the Goal with Efficiency & Investment in Renewables

Telluride's Town Government has been operating as a carbon neutral entity since 2014.*

Figure 1 below summarizes the amount of carbon dioxide equivalents (CO_{2e} or GHG) generated and offset by Telluride Government facilities and operations from 2005 through 2019. Note that the Town Government has been operating as a carbon neutral entity since 2014 according to the Town's accounting practices*. GHG generation by Telluride Government facilities and operations from 2005 through 2019 is shown by the red line. GHG emissions in 2019 were approximately 2% less than GHG emissions in 2005.

**NOTE: It is important to clarify that more recent, globally accepted GHG accounting practices differ from the Town's longstanding accounting practices in some regards, and it is not likely that under the new rules that Telluride Government is operating as a carbon neutral entity. The Town's accounting will be updated for its 2020 Energy Audit.*

Accounting for carbon sequestration by Town-owned open space lowers the Government's GHG emissions approximately 8.2% below 2005 levels (green line). Adding benefits for the renewable energy credits from power generated at during the summer at Ridgway Dam (i.e., Tri-County Water), and Green Power Blocks purchased directly through SMPA, drops 2019 GHG emissions below zero (-107% blue line).

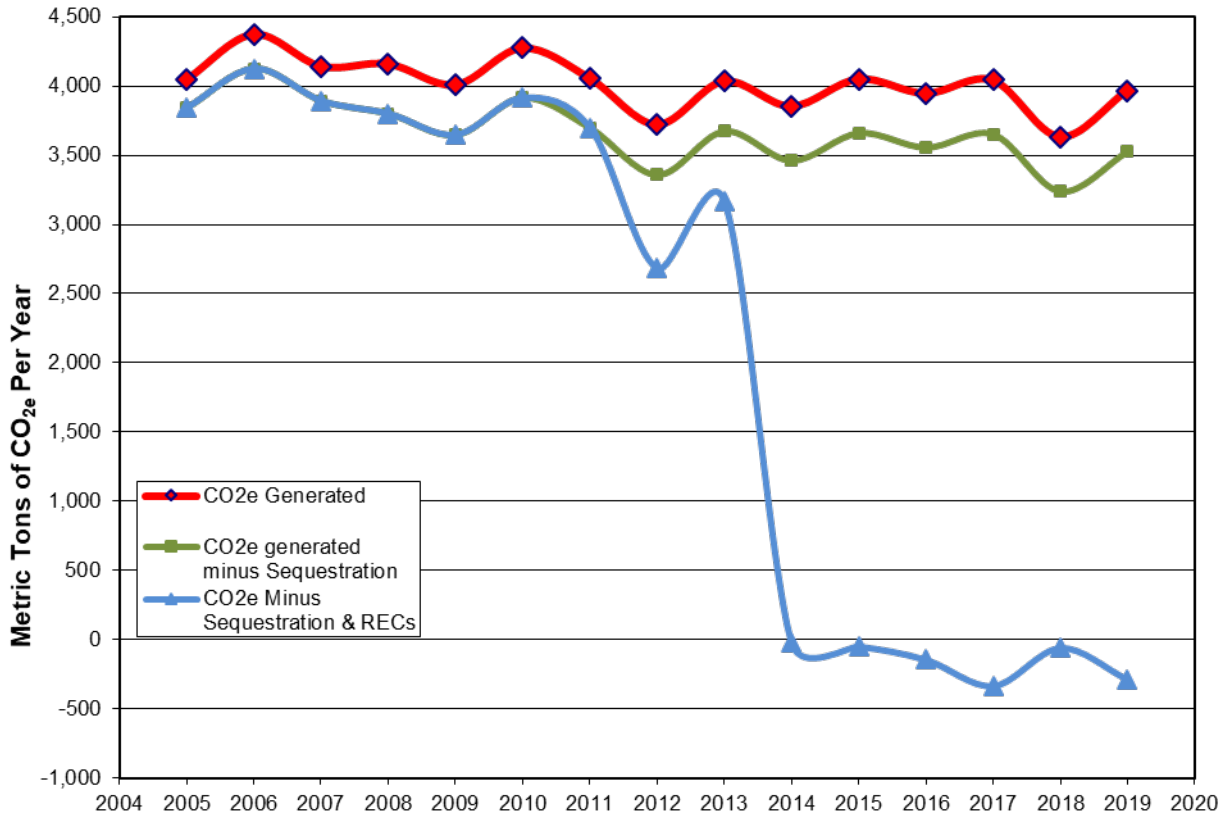


Figure 1. The carbon dioxide equivalents (metric tons CO_{2e} or GHG) generated by Telluride Government facilities and operations from 2005 through 2019 (red), with carbon sequestration on Town-owned open space (green), and with REC purchases (blue).

In 2019, staff continued the GHG accounting system that it implemented in 2014. First, staff adjusts GHG calculations for 2019 using the latest Tri-State electricity multiplier, which is used to convert a kilowatt hour to pounds of CO_{2e}. Sometimes, staff does not receive this information until approximately September of any given year after Tri-State officially releases its official value. Second, staff recognizes the Telluride Government's generation and use of local renewable electricity but does not use this as a credit in the accounting. This is because the Town Government does not own the renewable energy credits generated by these projects—San Miguel Power Association (SMPA) owns them—and therefore the Town Government cannot claim the environmental benefits (i.e., the GHG reductions).

The table below presents the multipliers used for each year for various energy sources. It is important to note that the gasoline and diesel multipliers reflect the total emissions generated from creating and using these fuels, which is inconsistent with the new "government accounting protocol." Multipliers for the new protocol only account for the GHGs generated when the fuel is used.

Table 1. Multipliers used for various energy sources for each year of accounting

Year	Natural Gas, per therm	Electricity, per kWh	Diesel, per gallon	Unleaded Gasoline, per gallon	Biodiesel	Kerosene
2005-2009	12.05	2.2	27.81	26.22	17.90	19.00
2010-2011	12.05	2.12	27.81	26.22	na	na
2012	12.05	1.96	27.81	26.22	na	na
2013	11.88	1.93	27.81	26.22	na	na
2014	11.88	1.99	27.81	26.22	na	na
2015	11.88	1.87	27.81	26.22	na	na
2016	11.88	1.78	27.81	26.22	na	na
2017	11.88	1.746	27.81	26.22	na	na
2018	11.88	1.404*	27.81	26.22	na	na
2019	11.88	1.706	27.81	26.22	na	na

*This value is unusually low because the coal-fired plant at Craig, CO, was temporarily off line.

Renewable Electricity Generation and GHG Mitigation Projects by Telluride Town Government

Table 2 presents all Telluride Government renewable energy generation and GHG mitigation projects since 2005. Figure 1 shows the Telluride Government's current GHG emissions picture eliminating all renewable energy projects that the Telluride Government has participated in, but for which it does not own the renewable energy credits. These projects include solar panels purchased for town-owned facilities at the Clean Energy Collective's Paradox Solar Array (e.g., Public Works & Transit Facility, the Marshals Building, and Shandoka Affordable Rental Housing), and the solar panels located on the Telluride Regional Wastewater Treatment Plant (WWTP). Figure 1 for 2019, also shows credit for 25% of the RECs purchased from the Ridgway Dam Project. The remainder of these 2019 credits were used to offset the Telluride Community's emissions, see Part 3 of this report.

Energy Use by Sector

Figure 2 illustrates the breakdown of absolute energy use by sector (i.e., electricity, natural gas, transportation/fleet, and personnel commute). Electricity continues to be the largest type of energy consumed by Town operations and facilities. This has been true since 2005, which is why staff focus is on building energy use efficiency for lighting, appliances, water heaters, and weather proofing. Figure 2 illustrates the success of these efforts. However, at the same time, use of natural gas has increased, and fuel use for the government fleet and personnel commutes has increased, essentially erasing all gains since 2005.

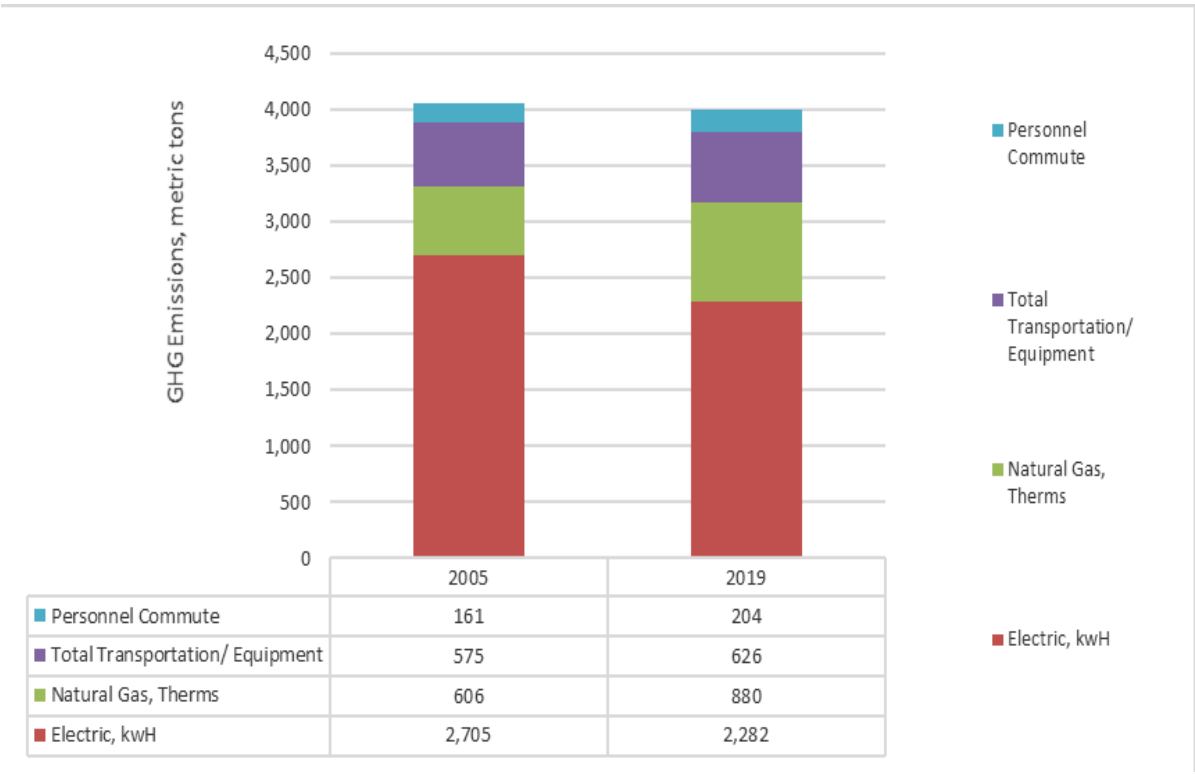


Figure 2. Telluride government facilities & operations breakdown of CO_{2e} generation for 2005 and 2019.

Table 2. List of All Town Government Renewable Electricity Generation and GHG Mitigation Projects

#	Project	Year On Line	Cost	Potential kWh renewables generated per year[a]	Potential GHG Reduction (metric tons CO_{2e} /yr)[a,b]	Renewable Energy Credits Ownership
1	Carhenge Bus Stop Solar Panel	2005	$5,500			Telluride
2	Telluride Regional WWTP Solar Array	2010	$305,945[b]	172,000	151	SMPA
3	CEC Solar Panels to Offset Public Works & Transit Facility and Marshals Building Electric Use	2012	$187,074	85,660	75	SMPA
4	CEC Solar Panels to Offset Shandoka House Meters and the Pre-School	2014		90,338	90	SMPA
5	Pandora Hydro Facility	2015	$600,000	1,530,000	1,339	SMPA
6	Telluride Regional WWTP Green Blocks Purchase	2012	$996 annually	99,600	87	Telluride
7	Bridal Veil Hydro Facility REC Purchase	2011	$3,951 annually	395,100	346	Telluride
8	Ridgway Dam Hydro Facility REC Purchase[d]	2014	$16,250 2013-2016	13,000,000	11,381	Telluride
			TOTAL	15,372,698	13,469	

[a] Each year the actual value will change based on electrical generation.
[b] GHG reduction is calculated using the Tri-State conversion value of 1.93
[c] The total cost was $620,685; however, this includes $150,000 contributed through a Governor's Energy Office Grant and $164,740 contributed as 35% cost share by Mountain Village.
[d] The cost is for the full amount of RECs, which is for 13,000,000 kWh per year. However, the Town Government has elected to grant a majority of these RECs to the community at large while using enough to offset to carbon neutrality for its own facilities and operations.

Counting in Carbon Sequestration by Town-Owned Green Space

Carbon sequestration using open space, parks, and wild land, while controversial for some people, is an accepted approach to calculating whether the Town is reaching its GHG reduction goals. This approach recognizes the importance of Telluride's commitment to park lands, open space, and wild lands as not just ecological and recreational amenities, but also as one component of the government's strategy to meet its broader obligations to mitigate global warming.

Figure 1 illustrates the change in GHG emissions by Town Government facilities and operations when the carbon sequestered by Town-owned green space (e.g., parks, open space) is counted as a credit in the GHG emissions equation. Table 3 presents the methodology for calculating the carbon sequestration credit for Telluride. This table is updated when new acreage is added into the Town government's Open Space Program. In 2019, new Open Space acreage from the Windhorse Subdivision on the north hillside was included. Future acreage estimates will adjust for improvements to Valley Floor habitat by restoration of the San Miguel River channel and increased wetland acreage created by beaver activity. As well, the $CO2_e$.sequestration values for each ecotype will be updated with more recent scientific values.

Table 3. Estimation of Carbon Sequestration by Open Space / Undeveloped Lands Owned and Managed by the Town of Telluride

Town-owned Open Space	Type	Acreage	CO2e Sequestered (metric tons/ac/yr)	CO2e Sequestered (metric tons/yr)	
Pearl Property	meadow	3	0.2	0.6	
	grass wetland	6	0.2	1.2	1.8
Bear Creek Preserve	forest	419	0.6	242.9	
Bear Creek Other	shrubland/meadow	100	0.2	20.1	
River Park	riparian	5	0.1	0.5	
In-town park lands	meadow/grass	25	0.2	5.0	
Cornet Gorge Wedge	forest	36.4	0.5	18.2	
Valley Floor	forest	56	0.5	28.0	
	wetland	283	0.2	56.6	
	riparian	22	0.1	2.2	
	shrubland/meadow	205	0.2	41.0	127.8
Boomerang Lode	forest	10.3	0.5	5.2	
Wolverine Lode	forest	5.7	0.5	2.9	
North and East	shrubland/meadow	4.2	0.2	0.8	
Beaver Park	shrubland/meadow	40.0	0.2	8.0	
Mill Creek Road	forest	9.0	0.5	4.5	
La Junta Basin	high alpine meadow	6.0	0.2	1.2	
Windhorse	shrubland/meadow	3.8	0.2	0.8	
TOTAL	mixed	1,239.6	0.3	439.6	

References:

- U.S. Environmental Protection Agency, Carbon Sequestration in Agriculture and Forestry (http://www.epa.gov/sequestrationj/local_scale.html, 9/6/2006 3:58 pm)
- U.S. Geological Survey, International Program. Carbon Sequestration (http://www.edcintl.cr.usgs.gov/carboneoverview.html, 9/6/2006 3:15 pm)
- U.S. Department of Energy, Terrestrial Sequestration Research (http://www.fossel,energy.gov/sequestration/terrestrial/index.html, 3:03 pm)
- Open Space Program Inventory, Provided by Lance McDonald, 2019

RENEWABLE ENERGY

Renewable Energy Credits Purchases for Locally Generated Power

Bridal Veil Powerhouse – Idarado

Table 4 shows the kilowatt-hours purchased, renewable energy credits, and cost for one half of the power generated at the Bridal Veil Powerhouse from 2012 through 2016. The Bridal Veil Powerhouse has not generated power since August 2016, because it is undergoing repairs and renovations that will improve on its reliability into the future. It is expected to be generating power once again in 2021.

Ridgway Reservoir Power Station – Tri-County

2019 was the sixth year that the Telluride Government purchased renewable energy credits from the summertime power generated by Ridgway Reservoir Power Station—a hydroelectric system. The purchase agreement was extended in May 2017 to continue indefinitely. Table 5 shows the kilowatt-hours purchased, renewable energy credits, and cost for 2014 through 2019 for this local renewable energy credit program. The Town assigns only enough of these renewable energy credits to Town Government to offset for carbon neutrality. Each year this varies. The remaining renewable energy credits are assigned to the Telluride Community. While in 2018, due to severe regional drought (D4 rating), the Ridgway Reservoir Project generated far less power than in previous years, power generation was up again in 2019.

Table 4. Price, Kilowatt-hours, and Renewable Energy Credits from the Bridal Veil Powerhouse Purchase Agreement

Year	kWh	Credits, Metric Tons CO_{2e}	Cost
2012	395,100	351	$ 3,951.00
2013	144,090	126	$ 1,440.90
2014	40,410	36	$ 404.10
2015	652,410	553	$ 6,524.10
2016	190,440	154	$ 1,904.40
2017	0	0	$ -
2018	0	0	$ -
2019	0	0	$ -
TOTAL	1,422,450	1,221	$ 14,224.50

Table 5. Price, Kilowatt-hours, and Renewable Energy Credits from the Ridgway Reservoir Power Station Purchase Agreement

Year	kWh	Credits, Metric Tons CO_{2e}	Cost
2014	11,641,000	10,508	$ 14,550.00
2015	15,879,000	13,469	$ 19,845.76
2016	14,684,700	11,856	$ 18,355.88
2017	16,730,300	14,191	$ 20,912.89
2018	5,655,900	3,602	$ 7,069.88
2019	18,363,800	11,695	$ 22,954.76
TOTAL	82,954,700	65,321	$ 103,689.17

Pandora Hydroelectric Facility Power Production

The Pandora Hydroelectric Facility officially began producing power for purchase in 2015, through a Power Purchase Agreement with San Miguel Power Association. Table 6 provides information on the production of electricity and revenue associated with the purchase of that power through 2019. The current estimated payback for investment in this equipment is 8 more years.

Table 6. Annual Kilowatt-hours and payback generated by the Pandora Hydroelectric Facility

Year	kWh	Reduced CO_{2e} Generation, Metric Tons	Revenue
2015	599,918	509	$ 51,235.00
2016	551,920	446	$ 28,293.42
2017	220,392	175	$ 1,689.08
2018	564,552	360	$ 26,084.49
2019	983,680	626	$ 66,284.40
TOTAL	2,920,462	2,115	$ 173,586.39

Telluride Regional Wastewater Treatment Plant Solar Array Power Production

The TRWWTP solar array has been operating for 9 years. Table 7 details the solar array production from 2010 through 2019. To date, this generated power has saved the Town of Telluride approximately $114,480 in electric costs and approximately $30,000 in demand charges (calculated based on a comparison with 2010 demand charges). The Solar Array cost approximately $621,000 dollars total: $150,000 came from a GEO grant; the remaining funds were provided by Telluride and Mountain Village. The estimated payback for the investment in this equipment remains at approximately 35 years.

Table 7. Telluride Regional Wastewater Treatment Plant Solar Array Performance

Year	Time of Operations	Total Energy Produced (kWh)	Credits, Metric Tons CO_{2e}	Approx. Energy Dollars Saved, $
2011	Feb 28 – December 31	155,948	150	$ 9,146
2012	January 1 – December 31	182,609	162	$ 13,845
2013	January 1 – December 31	175,459	154	$ 14,005
2014	January 1 – December 31	171,685	155	$ 13,765
2015	January 1 – December 31	172,289	146	$ 13,783
2016	January 1 – August 24	107,927	92	$ 8,643
2017	February 15 – December 31	166,321	141	$ 13,285
2018	January 1 – December 31	186,347	158	$ 14,885
2019	January 1 – December 31	164,000	139	$ 13,120
	Total through 2019	1,482,585	1,297	$ 114,477
	Averages	164,732	144	$ 12,720

*A ground short that stopped power production in August 24, 2016, at 3:30 pm was not discovered until end of year data retrieval in January. A contractor was hired to locate and repair the problem. Electricity was once again being generated in February 2017.

Carhenge Bus Stop & Restrooms Solar "Array"

It may not be evident, but the electricity provided at the Carhenge bus stop and restrooms is provided entirely by a single solar panel located behind the building. The Town has never calculated the energy

savings this provides each year because it was not contributing to the government facilities' carbon footprint in 2005, or ever. It is an example of how everyday construction and operations decisions by staff has helped in meeting and maintaining the goal of operating as a carbon neutral entity.

Gondola River Gage & WWTP River Gage Solar Panels

The electricity provided to the Town's river discharge recorder on the San Miguel River at the Gondola at the end of Oak Street is powered by a small solar panel. The Town has never calculated the energy savings this provides each year—it is likely quite small—but this facility has never contributed to the town government's carbon footprint through energy use. In 2015, Town installed a second flow recorder on the San Miguel River just above the Telluride Regional Wastewater Treatment Plant to help with state discharge permitting. This gage also is powered by a solar panel.

ENERGY EFFICIENCY

Town Government Facilities & Operations

Appendix A provides generalized graphs of electricity and natural gas use for government facilities and operations, as well as transportation fuel use and commuting fuel use for employees.

Town Government, electric use increased in 2019, reflecting a substantial increase in services and the delayed sale of affordable housing units at the end of year. Electric use in 2019 was more than in 2005 by 32%, which includes the benefits of the solar panels on the wastewater treatment plant. Because a greater proportion of the Tri-State electricity mix is coming from renewables, the GHG emissions created by this increased electric use remained below 2005 GHG emissions levels by approximately 15%.

Town Government, natural gas use in 2019 was greater than in 2005 by 50%.

Use of fuels for transportation and various equipment in 2019 was higher than in 2005 by 45%. This includes fuel use by the Town Government fleet. GHG emissions created by this energy use was also greater than in 2005 by 45%.

A 32% decrease of fuel use by transit resulted from decreased service levels, because San Miguel Area Regional Transit (SMART) took over all routes outside of the town proper. This decrease was counterbalanced, however, as more staff were provided with more vehicles that are being driven farther and more often.

GHGs generated by fuel use by personnel commutes for work in 2019 continued to climb and were greater than 2005 levels by nearly 27%. Figure 2 shows that the proportion of GHGs generated by personnel commutes has increased to 5% of the total GHGs generated by Town Government facilities and operations.

As electricity use remains significantly larger, the CO_{2e} produced by Town facility electric usage has dropped from 3 times greater than the CO_{2e} produced by Town facility natural gas usage to 2.6 times greater. In 2019, Town Government facility electric use generated approximately 3.8 times more CO_{2e} than Town Government transportation fuels use. While staff continues to recommend focusing energy use improvements on electric use in Town Facilities, the upward trends of use of transportation fuels and natural gas will have to be examined more closely and addressed, if possible, within the next several years.

To help staff keep an eye on the energy use in facilities that they use and/or occupy, each quarter the Energy Action Coordinator provides graphics of energy use at each facility to Department Heads. Department Heads are expected to provide this information to their staff, discuss the results, and brainstorm ways to continue to improve results, or understand why the long-term trend is heading in the wrong direction and work on ways to mitigate.

Figures 5, 6, and 7 show the Town facilities with the highest energy use over time to date: Telluride Regional Wastewater Treatment Plant, Hanley Pavilion, and the Public Works & Transit Facility. Each of these facilities is being used much more intensively in 2019 than in 2005.

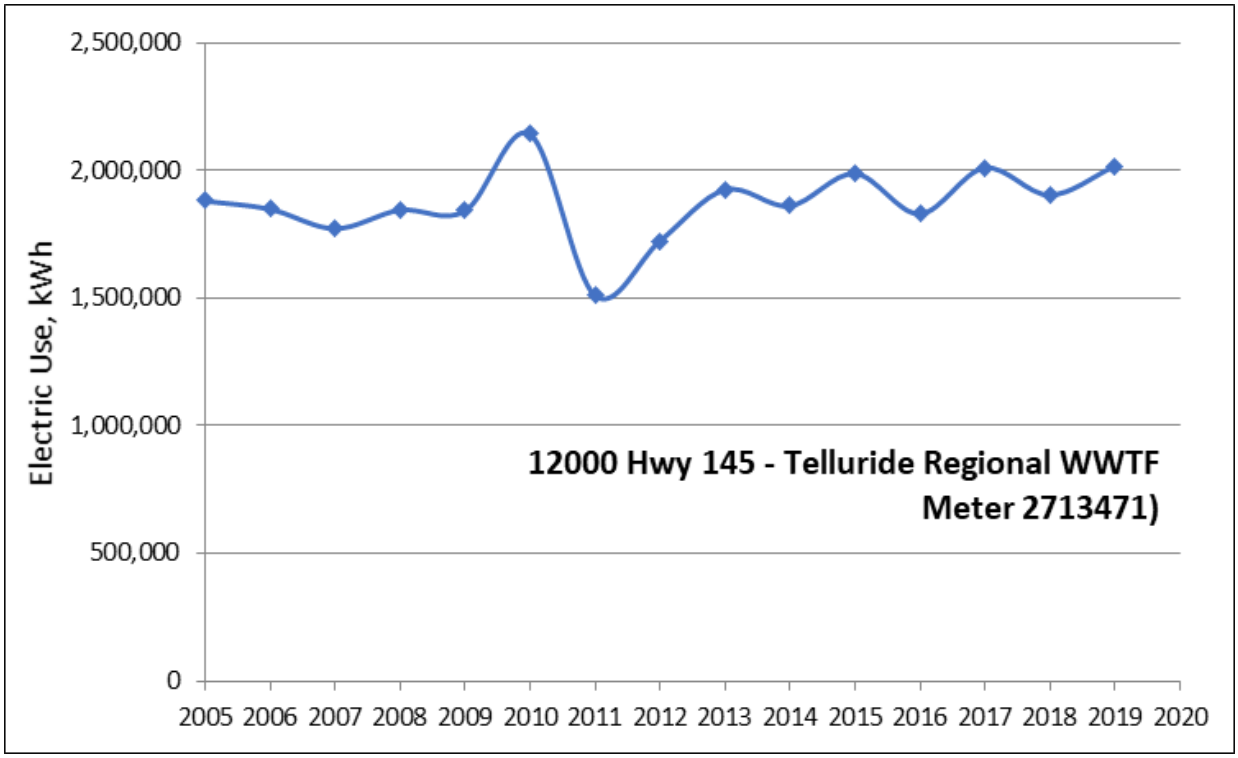
Figure 5, which shows long term electric and natural gas use at the Telluride Regional Wastewater Treatment Plant, clearly shows the results of efforts to make that facility more efficient with electricity use over time. Part of implementing the new Wastewater Master Plan (2017) includes seeking ways that will enable the plant to meet increasingly stringent discharge limits, while also being more efficient with all energy use.

Figure 6 shows energy use at the Hanley Pavilion, which clearly reflects increasingly intensive use. It also shows that the Parks & Recreation Department are taking more care with energy use by managing the building more closely. The addition of the Zamboni Room and the HVAC system are clear increases to natural gas use, which has increased approximately 300% over 2005 usage levels. An energy use audit of this facility continues to be warranted. This facility is being expanded by 3,300 square feet in 2020.

Figure 7 shows energy use at the Public Works and Transit Facility. The Public Works and Transit Facility has decreased electric use over time, and the physical modifications to this facility that expanded interior garage and office space have resulted in no significant energy use changes. This emphasizes that wise building practices can indeed allow Town to do more, while using less, in some cases. It is important to note that the electricity that is used by the facility "comes from" the Paradox Community Solar Array.

Public Transportation: The Galloping Goose

By providing regional public transportation as a public benefit, the Town of Telluride has historically suffered significant increases to its government footprint. In 2019, all GHG emissions created by operating the Galloping Goose were offset with a purchase of offsets by the Pinhead Climate Institute using a grant from The Telluride Foundation. This report assigns the benefit of these RECs and the benefits of decreased regional CO_{2e} generated under ***Part 3 - Sustainability Efforts Beyond Government in the Broader Community***. Without robust ridership (i.e., without people riding the bus instead of driving individually) there would be no initial benefit regarding energy use and carbon generation for the region. The Transit Department is taking its job of minimizing the operational costs of running the Galloping Goose seriously. Improving the bus fleet's efficiency is a top priority, as is taking "right-sized" vehicles whenever possible on specific circuits. Unfortunately, bus manufacturers have not been engineering fuel efficiency improvements to the type of buses best used for town.



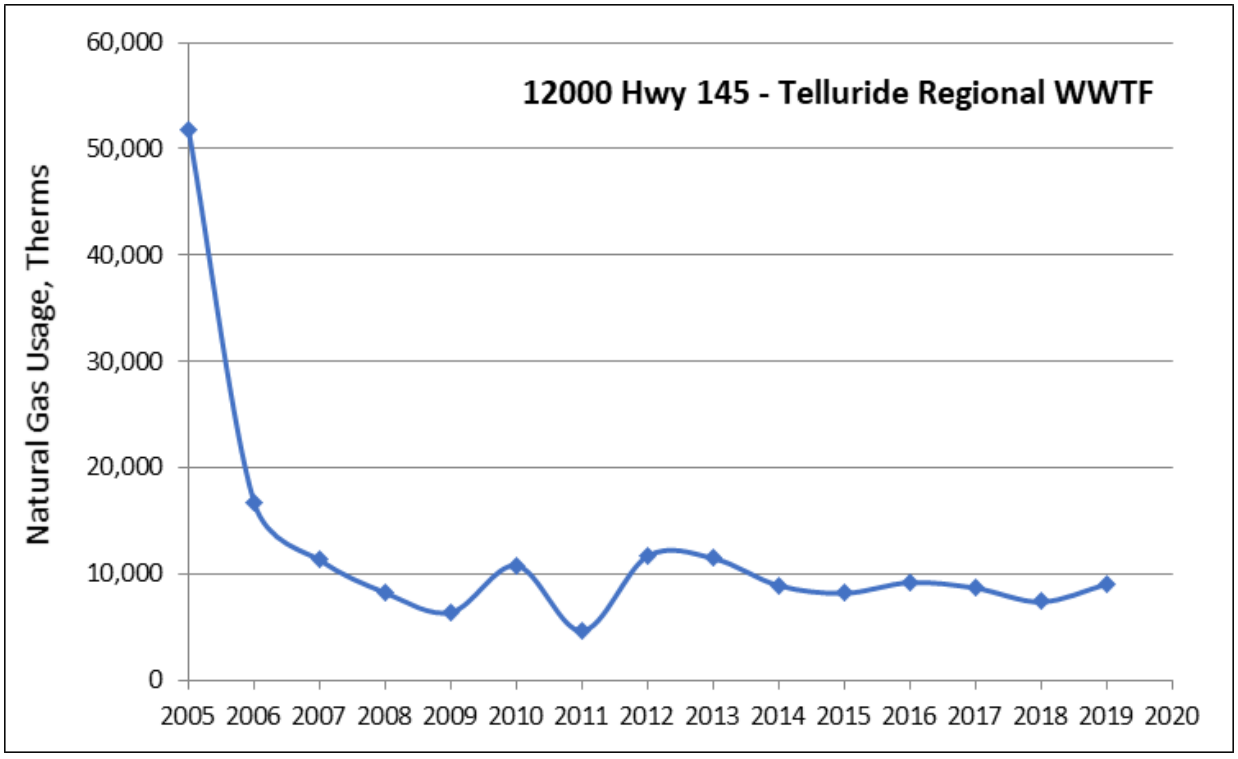


Figure 5. Annual average electric usage (top) and natural gas usage (bottom) for the Telluride Regional Wastewater Treatment Plant from 2005 through 2019

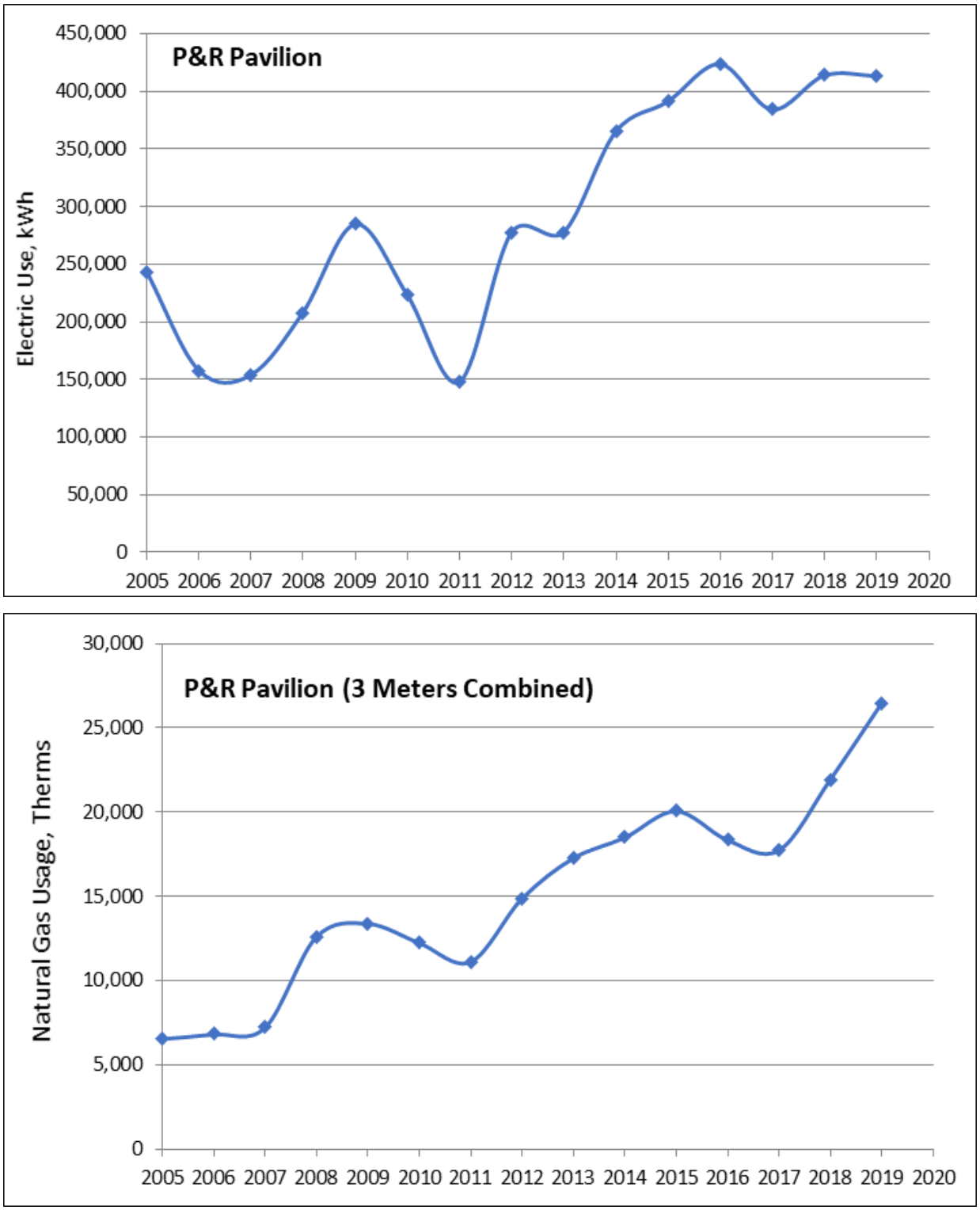


Figure 6. Annual average electric usage (top) and natural gas usage (bottom) for the Town Park Pavilion from 2005 through 2019

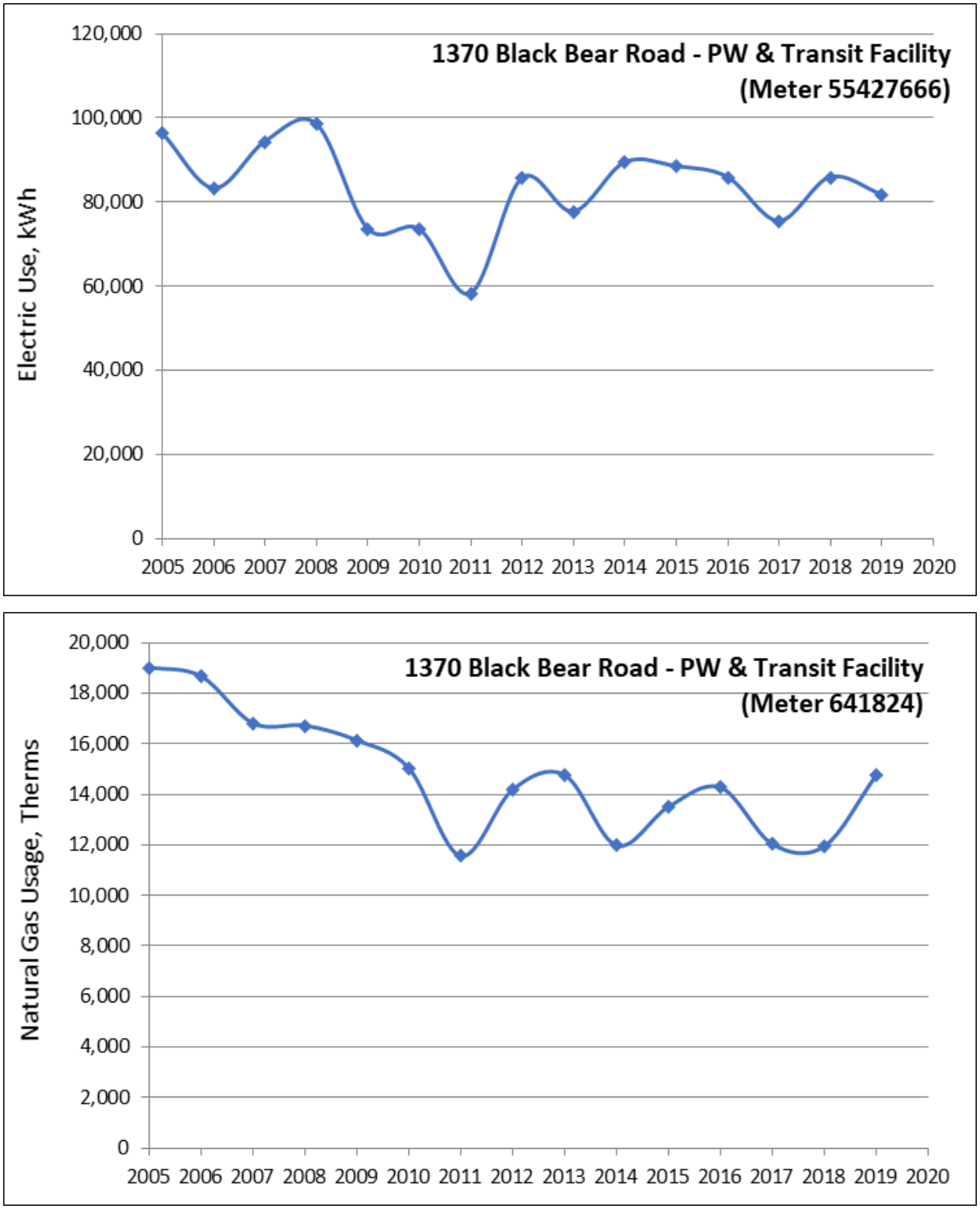


Figure 7. Annual average electric usage (top) and natural gas usage (bottom) for the Public Works & Transit Facility from 2005 through 2019

Part 3 – Sustainability Efforts in the Broader Community

REGIONAL COMMUNITY GHG EMISSIONS SUMMARY

Figure 8 presents the regional GHG emissions data for San Miguel County and Ouray counties in 2019. Total 2019 GHG emissions were approximately 364,000 metric tons CO_{2e}. The basic picture of relative contributions to regional GHG emissions has not changed over time.

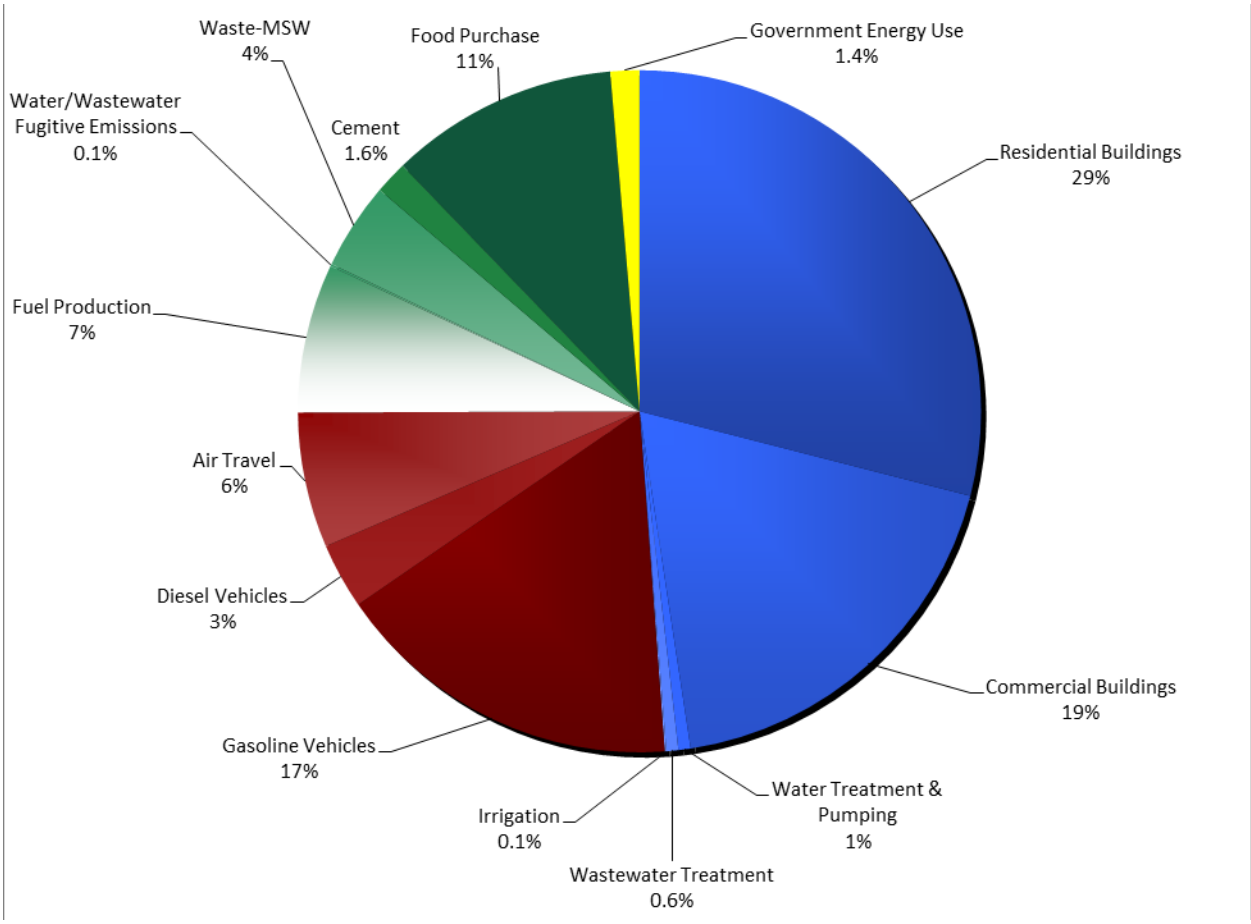


Figure 8. 2019 regional GHG emissions summary for Ouray and San Miguel counties (364,000 metric tons), illustrating that carbon emissions created by building energy use remains the most significant factor.

COMMUNITY GHG EMISSIONS SUMMARY FOR TELLURIDE

Figure 9 presents the 2018 GHG emissions summary – approximately 71,800 metric tons CO_{2e} – generated by the Telluride Community, including the government. Note that energy use by buildings, whether commercial or residential, remains the most significant contributor to GHG emissions, when compared to other emissions sources, but the margin for this is narrowing. Note that GHG emissions generation by Town Government before mitigation, which is shown as the bright yellow slice, is only 1.6% of the total.

Figure 10 presents the electric energy use by the Telluride Community, including government, from 2010 through 2019. Electric use has remained between 33 million kilowatt-hours and 38 million kilowatt-hours since 2014. This figure breaks the data into renewable energy source types and non-renewable energy. An important observation when considering these data is that electricity use by the Telluride Community has remained consistent despite the continued steady increase in economic activity at all levels. This can be attributed to implementation of efficiency measures.

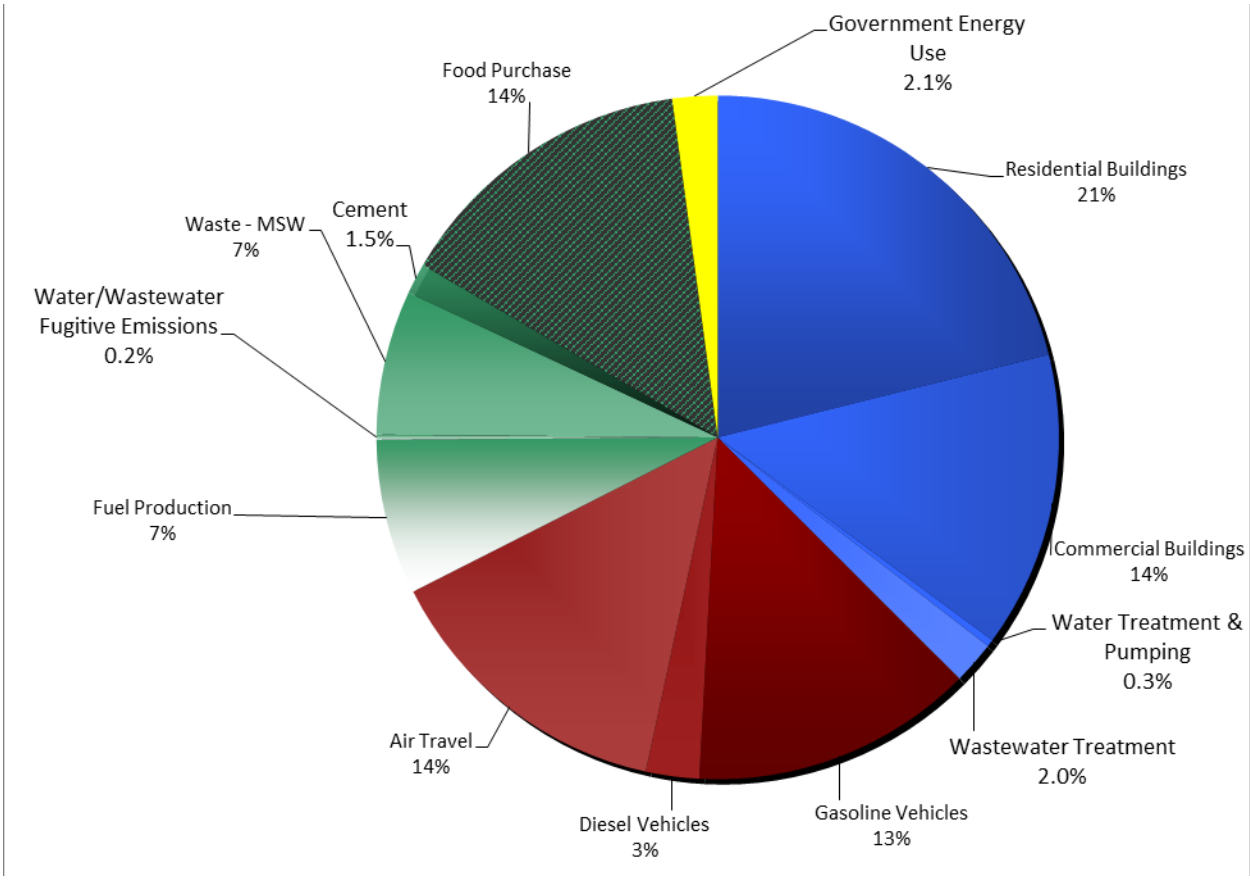


Figure 9. 2019 GHG emissions summary (approximately 71,800 metric tons) for the Telluride Government & Community, illustrating that energy use by buildings in the region remains the most significant factor (source: EcoAction Partners).

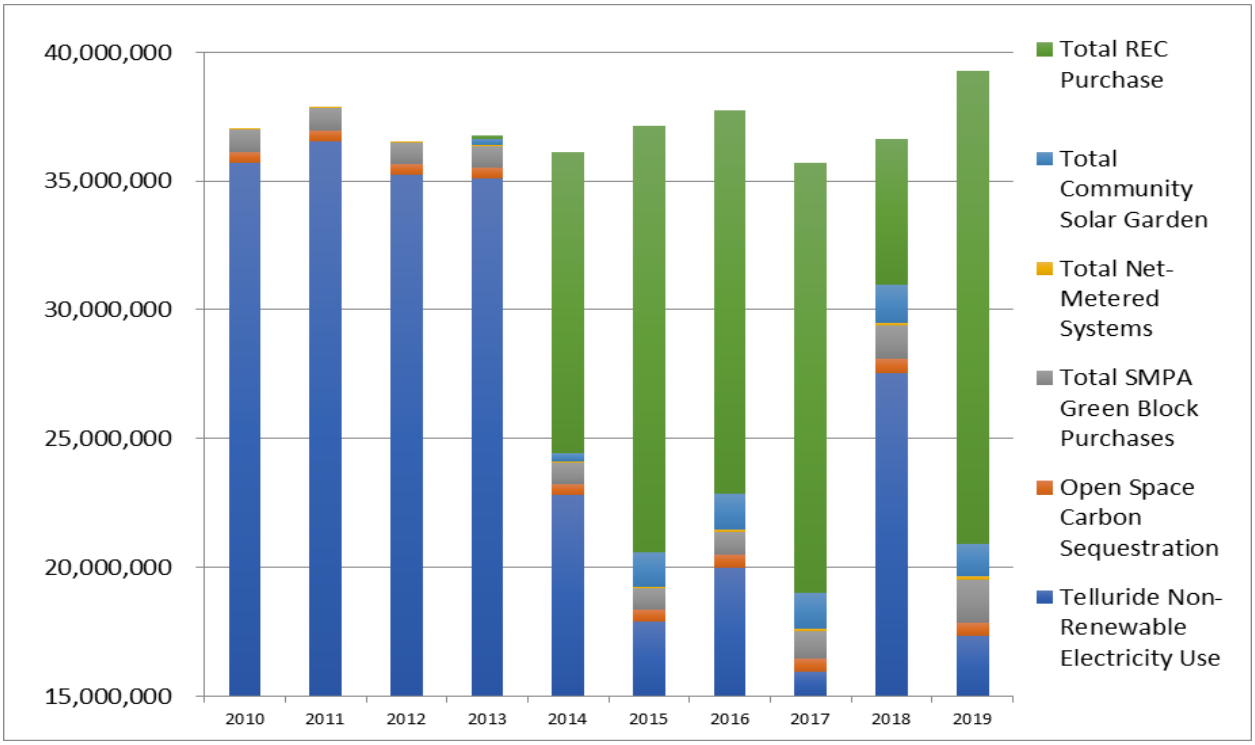


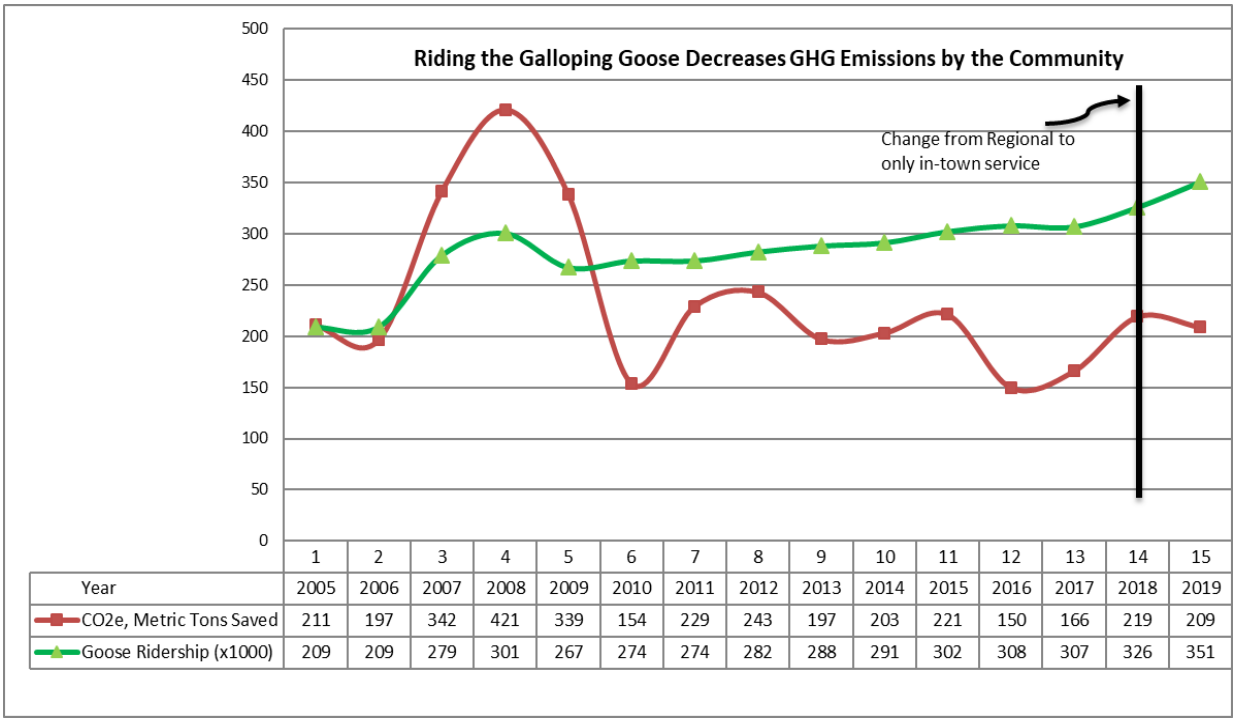
Figure 10. Electricity use by the Telluride Community (kWh), including government, from 2010 – 2019.

PUBLIC TRANSPORTATION: THE GALLOPING GOOSE

Galloping Goose operations changed dramatically in November 2018 with commencement of San Miguel Authority for Regional Transit (SMART). SMART took over routes outside of Telluride, including Norwood, Down Valley, and Lawson Hill. While SMART did contract the Goose to service Lawson Hill from January through October in 2019, the Lawson route footprint was excluded from this calculation and assigned to SMART.

Servicing the Town of Telluride with 3 buses running a loop and providing a ski PE bus for the young kids during part of the winter resulting in 2019 Galloping Goose ridership greater than in 2005 by 68%, which is equivalent to about 142,268 riders. 2019 fuel use by the Galloping Goose was less than in 2005 by 32%. A separate analysis of the greenhouse gas emissions (i.e., CO_{2e}) that would have been generated if each rider had driven separately to his/her destination in 2019 versus the CO_{2e} generated by the Goose indicates there was **an overall decrease of 209 metric tons of CO_{2e} generated in the Transit Region**. This is not very different than in 2005. This is because the passenger trips are much shorter and fuel economy on the much shorter, urban bus routes is not as good. Fuel efficiency of the modified fleet is much lower now.

Continuing with the carbon offsets that were initiated in 2017 and 2018, in 2019 the 81.4 metric tons of GHGs generated by operating the Galloping Goose was offset by purchasing third party verified agricultural-based carbon offsets through an innovative partnership between the Telluride Foundation and The Pinhead Climate Institute. These carbon offsets were generated by a Colorado farm. Remember that riding the Goose has numerous benefits beyond just decreasing GHG emissions. These include reducing traffic congestion, reducing air pollution, and now assisting a Colorado farmer to place his land in a conservation easement.



	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Year	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
CO2e, Metric Tons Saved	211	197	342	421	339	154	229	243	197	203	221	150	166	219	209
Goose Ridership (x1000)	209	209	279	301	267	274	274	282	288	291	302	308	307	326	351

Figure 11. Goose Ridership versus CO_{2e} emissions saved as a result from 2005 – 2019.

RENEWABLE ENERGY

All data show that the community supports renewable electricity generation in a variety of forms, including SMPA Green Blocks, the Paradox Community Solar Garden, and net-metering. For this 2019 report, SMPA tracked the kWh produced by the Telluride Community (non-government) based on net-metered systems, SMPA Green Block purchases, and through the Paradox Community Solar Garden. The Telluride Community owns 3582 panels at the Solar Garden, which produced approximately 348 kWh per panel. The large in generation from the Paradox Community Solar Garden from 2014 to 2015 reflects the Telluride School District's purchase of solar photovoltaic panels in the Garden.

Table 8, Figure 12, and Figure 13 present the community renewables data to date. These numbers are important to help us more fully understand the Community's progress toward greater sustainability. The Town of Telluride's Green Building Code, which was adopted in 2010 requires 100% offset of electricity use for new construction using one of these three methods. Between 2010 January 1 and 2015 December 31,211,098 square feet of new building space was constructed. New building area constructed in 2016 (including additions) was 37,690 square feet; in 2017 was 76,879 square feet; in 2018 was 85,910 square feet; and in 2019 was 60,004 square feet. These last three years have brought the total square footage of buildings to 31,471,581.

Table 8. Renewable Energy Generation and Purchases (kWh) by the Telluride Community (non-government), and Ridgway Dam Hydro RECs Transferred from Telluride Government

Year	Net-Metered On Site Systems (Projected On-site Generation Based on Capacity)	Paradox Community Solar Garden	SMPA Green Blocks (Local RECs) Purchases	Ridgway Dam Hydro (Local) RECs Transfer from Telluride Government	Total, kWh	Total GHG Emissions Reduced, Metric Tons
2010	49,224	0	908,344	0	957,568	921
2011	49,224	0	866,538	0	915,762	881
2012	58,156	0	749,200	0	807,356	718
2013	57,749	146,064	637,600	0	841,413	737
2014	73,270	301,992	630,800	5,867,616	6,873,678	6,205
2015	67,297	1,352,207	827,372	12,322,660	14,569,536	12,358
2016	65,289	1,396,185	912,700	13,216,230	15,590,404	13,224
2017	96,233	1,367,823	958,800	10,596,480	13,019,336	11,043
2018	98,020	1,482,932	1,292,070	1,131,180	4,004,202	3,396
2019	122,541	1,247,909	1,666,338	13,130,117	16,166,905	13,713
TOTALs	737,003	7,295,112	9,449,762	56,264,283	73,746,160	63,196

a In 2014, 90% of RECs purchased by Telluride Government were assigned to the Community for GHG Emissions accounting purposes. This is equivalent to a $13,095.00 grant.

b This is equivalent to 373 panels purchased by the Community at large

c This is an estimated value that includes the CEC solar panels purchased by the R-1 School District in 2015, and the 464 CEC solar panels purchase by the Telluride Government on behalf of owners and occupants of affordable housing throughout Telluride and in Shandoka in 2014. This is equivalent to a $320,160.00 grant in late 2013.

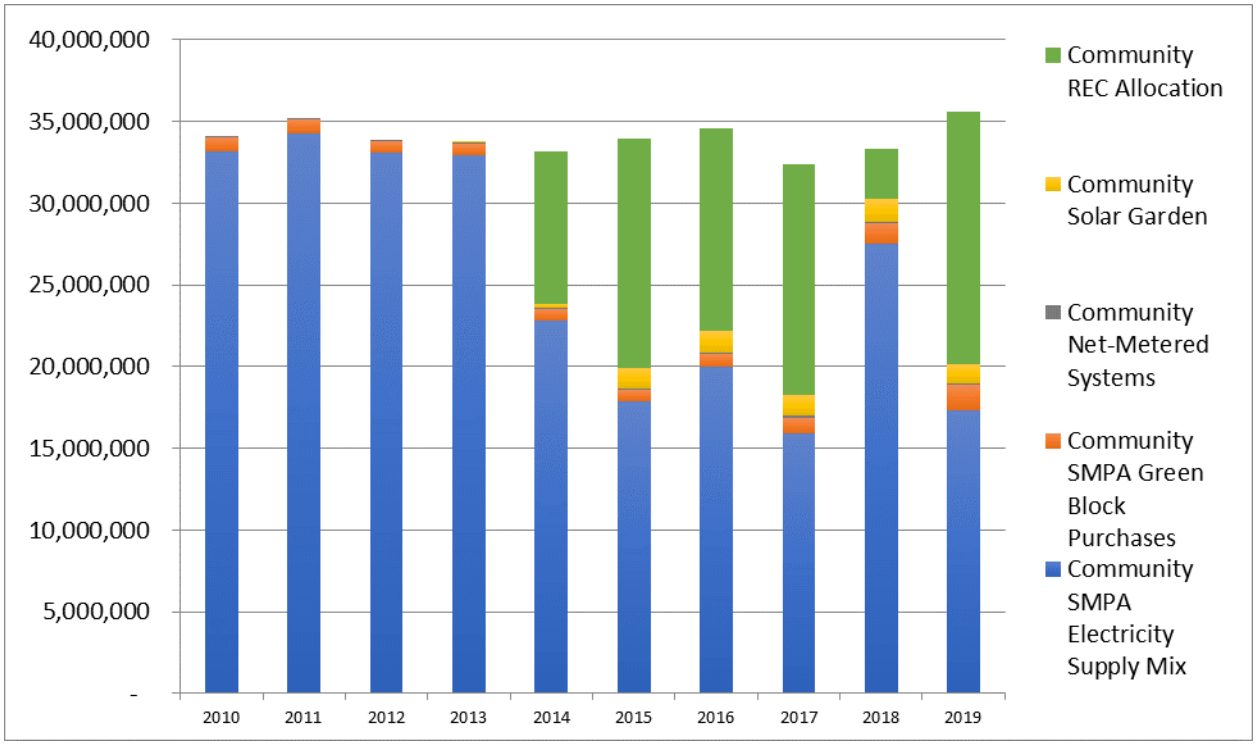


Figure 12. Telluride Community's total electricity use 2010 – 2019, excluding the government.

ENERGY EFFICIENCY

Green Lights Program

EcoAction Partners' Greenlights Program is a partnership program between San Miguel Power Association and regional governments to assist residents and businesses with converting their lighting to LED bulbs. Through selected on-line LED vendors, the San Miguel Power Association (SMPA) rebate of up to fifty percent (50%) per LED bulb is rebated prior to the purchase (a pre-bate) for SMPA members. Each government's contribution goes directly towards off setting an additional twenty-five percent (25%) of the cost of the bulbs, for a total "pre-bate" of 75%, for its citizens and businesses to make the switch to LED lighting. Table 9 details the success of this program to date.

Table 9. The Greenlights Program in Telluride

Year	# LED Bulbs Purchased	Estimated kWh Saved	Reduced CO_{2e} Generation, Metric Tons
2016	438	23,000	20.1
2017	314	16,800	14.3
2018	311	17,100	13.8
2019	903	51,600	37.3
TOTAL	1,966	108,500	85.5

Note: The values in Table 9 are very different than in previous reports. This is because EcoAction Partner's calculation methodology was based on extremely conservative assumptions and there was less accuracy with tracking the specific types of bulbs replaced and thus the exact wattage reduced per bulb. The values in this 2019 Table 9 reflect much more accurate calculations.

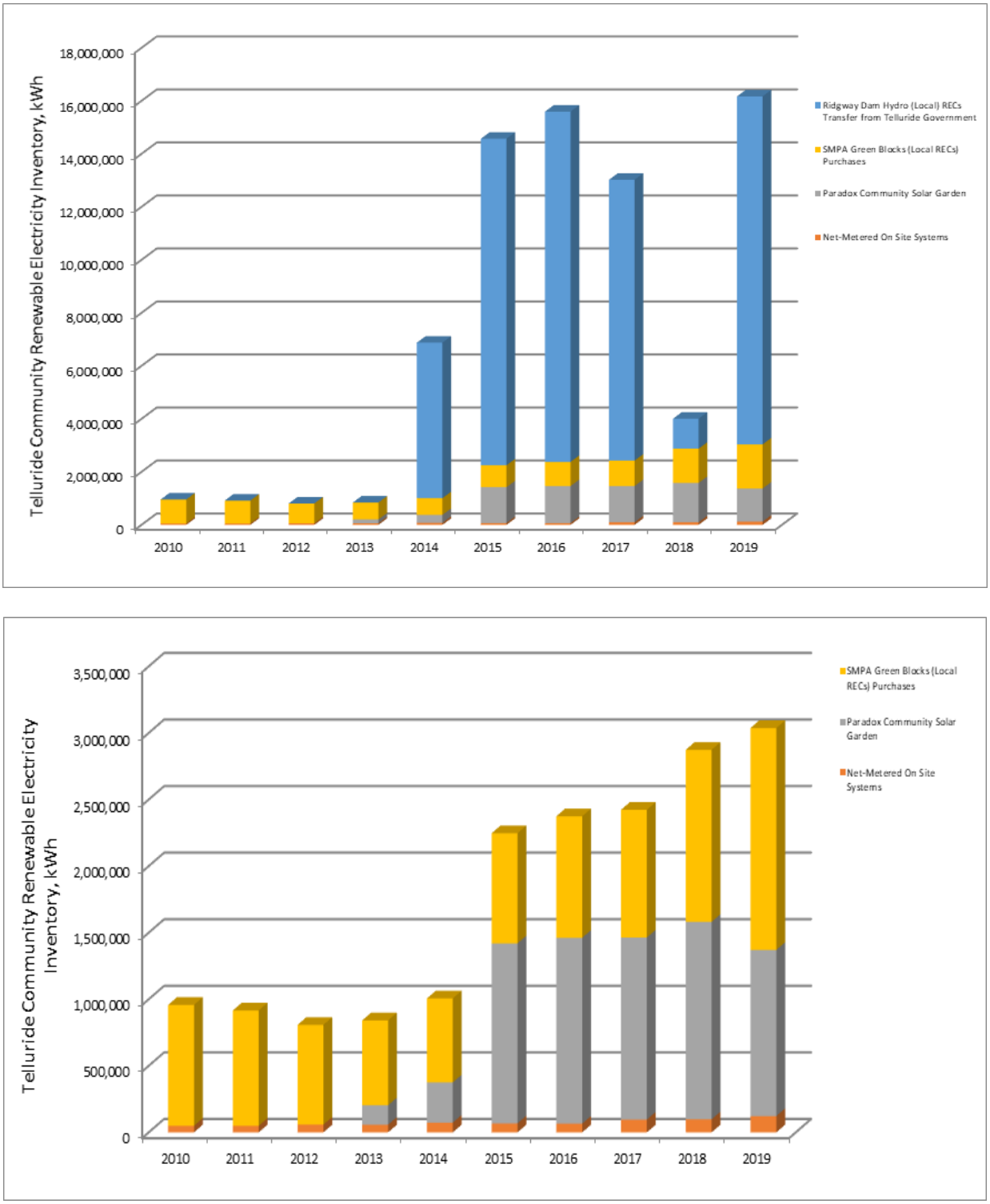


Figure 13. Telluride Community renewable electricity use 2010 – 2019. The top graph includes the Ridgway Dam Hydro RECs transferred by the Telluride Government. The bottom excludes the Ridgway Dam Hydro RECs to provide a more detailed picture of other efforts.

Green Business Certification Program

EcoAction Partners continued its Green Business Certification program through 2019. Through this program, EcoAction Partners helps businesses save money by guiding them to make targeted capital investments to decrease energy use of the space they occupy and their overall carbon footprint. The Telluride businesses that participated in the program in 2019 are listed below. It is important to note that the Town of Telluride provides an incentive for businesses to renew their participation in the program by paying for the recertification fee.

Telluride's 2019 participating businesses that are based in or provide services to the Town of Telluride community, include the following:

1. Alpine Bank (year 4)
2. BootDoctors & Paragon Outdoors (year 5)
3. La Cocina de Luz (year 6)
5. Jagged Edge Mountain Gear (year 6)
6. Mountain Film (year 2)
7. Ethos (formerly Picaya, year 6)
8. Patagonia (year 1)
9. San Miguel Resource Center (year 1)

More information about Green Building Certification in Telluride is provided at the following URL: http://www.ecoactionpartners.org/certified-green-businesses/

Energy Audit Pilot Program

During the summer of 2016, the Town and Lotus Energy Solutions worked with two local realtors who have homes within the Town of Telluride. The goal was to have them go through the process of a Home Energy Audit, discuss the benefits and drawbacks of going through a Home Energy Audit with the Town and EcoAction Partners, to agree to a meeting after a year to determine whether they implemented the recommended actions to improve energy efficiency in their homes, and then to perhaps pass on their experiences to other realtors. Ultimately, the goal is to have more existing housing go through a Home Energy Audit and to implement energy efficiency measures that make the town's and the region's existing housing stock more energy efficient over time. SMPA provided rebates for a portion of the cost of each audit. There has been no follow up to this program to date.

Part 4 – Recommendations

TO DECREASE CO_{2e} GENERATED BY TOWN GOVERNMENT OPERATIONS & FACILITIES

Status of Recommended Actions Made for 2019

Item IV.A of Town Council's 2018 Goals & Objectives listed the following objectives to reduce the town government's carbon footprint. In the 2017 Energy Audit, Staff recommended specific actions for each. The status of each recommended action is summarized.

1. Work with Local Resources re Environmental Data, Outreach and Education.
   (✓ complete)

   EcoAction Partners analyzes energy use by the broader Telluride Community, and the region, to help staff understand where the Town Government stands when compared to the whole. In 2019, EcoAction Partners continued to spearhead Telluride's Green Lights Program, continued to implement the Green Business Certification Program, and continued to assist the Planning Department with Green Building Code applications. As well, EcoAction Partners represented Town staff at Carbon Neutral Coalition meetings.

   Pinhead Climate Institute. Telluride-based Pinhead Institute, a Smithsonian Affiliate, whose charter has involved promoting STEM education locally and globally, continued to provide certified agricultural offsets for the Galloping Goose GHG emissions.

2. Engage in Advocacy for Climate Action at Local, State, and Federal Levels.

   - *CC4CA (✓ complete)*
   - *Compact of Colorado Communities (✓ complete)*
   - *CML (✓ complete)*
   - *Sneffels Energy Board (✓ complete)*
   - *The Carbon Neutral Coalition (✓ complete)*

3. Continue to Pursue Renewable Energy Options.
   (✓ complete)

   - *Continue to explore opportunities to invest in or support local micro-hydroelectric generation.*

   - *Continue to explore opportunities to invest in or support solar electric generation in town and the region.*

     A new solar array was brought onto the SMPA system near the Telluride Regional Airport.

4. Complete Update to Green Building Code and Implement - *Adopt the 2018 International Energy Conservation Code (IECC) with appropriate amendments to retain progressive energy codes that are appropriate for the town and improve HERS ratings requirements. Apply the code to remodels (even historic) and additions, not just new construction.*
   (✓ complete)

5. Improve energy efficiency in Town facilities and Activities.
   (✓ complete)

   - *Moved forward on the Lighting Efficiency Program for Town facilities*
   - *Implemented the LED lighting prototype along West Pacific Avenue. Track energy use. Plan for 2019 Street Lighting Replacement.*

Recommended Actions for 2020

The following continue to be objectives to reduce the town government's carbon footprint.

1. Work with Local Resources re Environmental Data, Outreach and Education.

2. Engage in Advocacy for Climate Action at Local, State, and Federal Levels.

    - o CC4CA
    - o Compact of Colorado Communities
    - o CML
    - o Sneffels Energy Board

3. Continue to Pursue Renewable Energy Options.

    - o Continue to explore opportunities to invest in or support local micro-hydroelectric generation.

    - o Continue to explore opportunities to invest in or support solar electric generation in town and the region.

4. Improve energy efficiency in Town facilities and Activities.

    - o Move forward on the Lighting Efficiency Program for Town facilities
    - o Install another 10 LED new-style commercial lights in the Town core. Track energy use. Plan for 2020 Street Lighting Replacement.

TO HELP DECREASE CO_{2e} GENERATED BY THE BROADER COMMUNITY

Status of Recommended Actions Made for 2019

1. Work with EcoAction Partners to
(mostly complete)

    - ✓ Expand the Green Business Certification Program in Telluride
    - ✓ Manage and promote the Green Lights Program in Telluride
    - ✓ Develop a Green Grants Program for Telluride residents and businesses
    - ✓ Quantify Telluride-specific community GHG emissions
    - e. Assist with calculating Construction Waste Diversion benefits for Town projects

2. Implement an updated Green Building Code.
(✓ complete)

3. Continue to work with SMPA to track renewable energy generation, and green block and solar energy offsets by those living within the Town of Telluride.
(✓ complete)

4. Continue to increase ridership on the Galloping Goose while improving fleet efficiency. Discuss moving the free REC offset program to SMART and the Town using its Ridgway RECs or buying certified agricultural RECs itself.
(✓ complete)

5. Build additional affordable housing within the Town-limits and develop a methodology to calculate the estimated GHG emissions reductions. New affordable housing was completed at Lot B (Longwill 19) and Mixed Use (Silverjack). However, a methodology to calculate the estimated GHG emissions reductions has not yet been established.
(mostly complete)

Recommended Actions for 2020

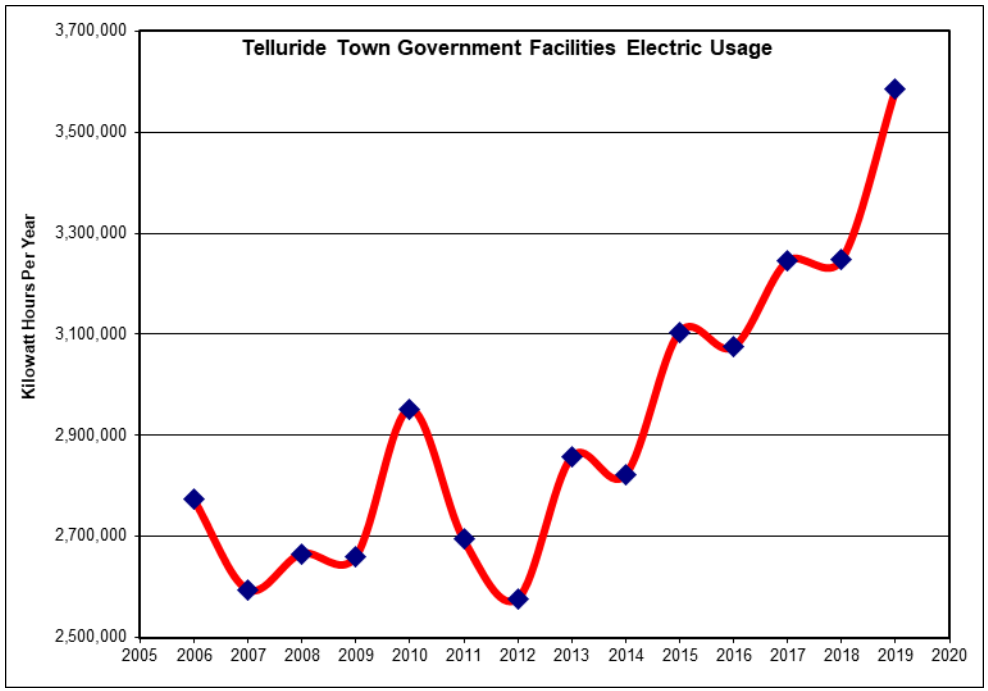
1. Work with EcoAction Partners to

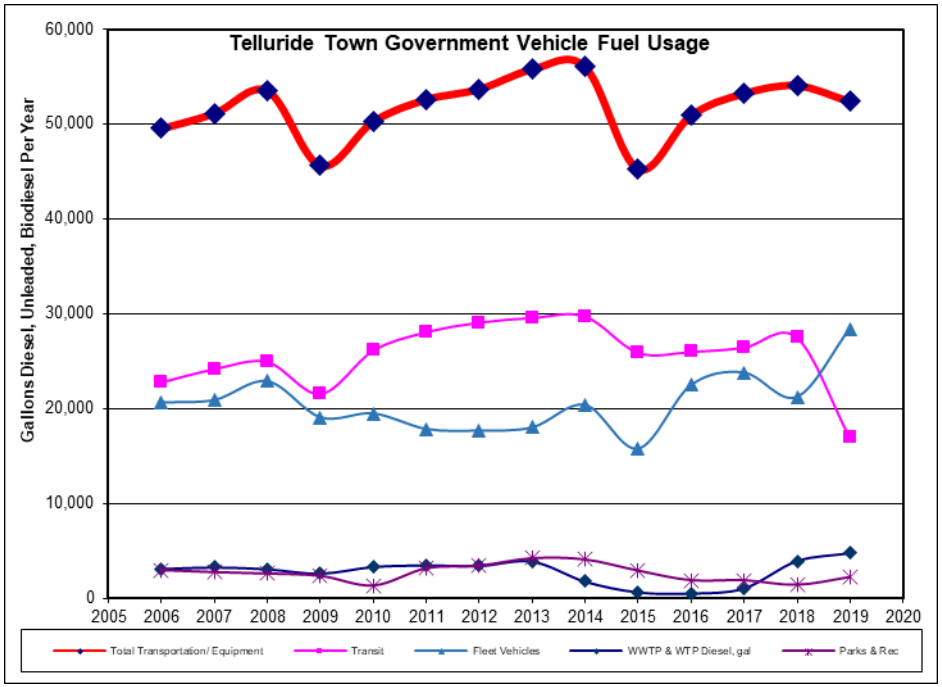
    - Expand the Green Business Certification Program in Telluride
    - Manage and promote the Green Lights Program in Telluride
    - Assist with launch of 2021 Green Grants Program for Telluride residents and businesses
    - Quantify Telluride-specific community GHG emissions

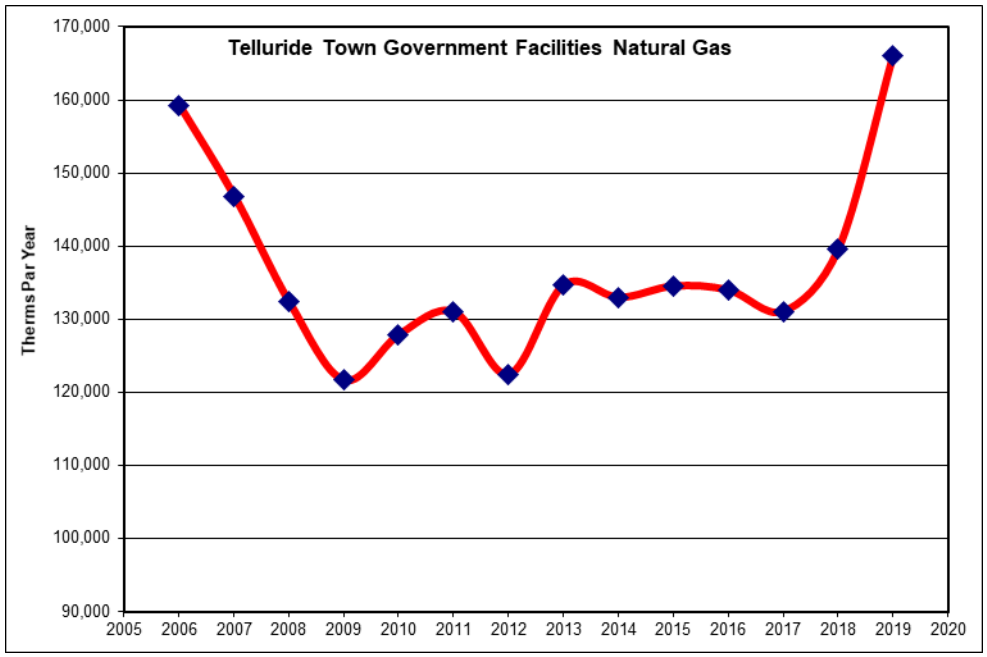
2. Continue to work with SMPA to track renewable energy generation, and green block and solar energy offsets by those living within the Town of Telluride.

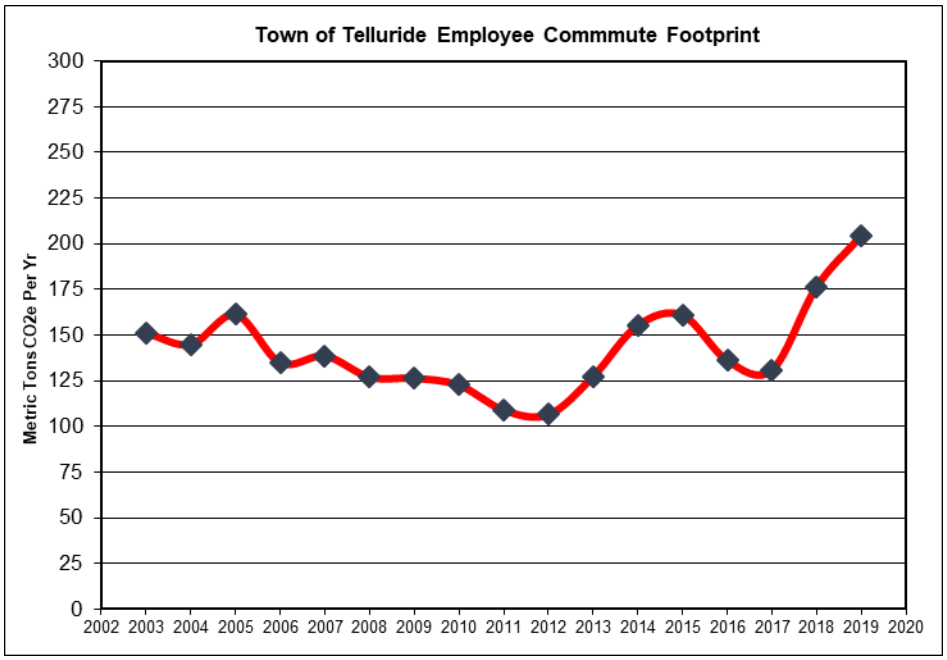
3. Build additional affordable housing within the Town-limits and/or Region and develop a methodology to calculate the estimated GHG emissions reductions.

APPENDIX A - Long-term Energy Use Trends for Telluride Government Facilities & Operation


Telluride Town Government Facilities Electric Usage
Kilowatt Hours Per Year
3,700,000
3,500,000
3,300,000
3,100,000
2,900,000
2,700,000
2,500,000
2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020


Telluride Town Government Vehicle Fuel Usage
Gallons Diesel, Unleaded, Biodiesel Per Year
60,000
50,000
40,000
30,000
20,000
10,000
0
2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Total Transportation/ Equipment
Transit
Fleet Vehicles
WWTP & WTP Diesel, gal
Parks & Rec


Telluride Town Government Facilities Natural Gas
Therms Par Year
170,000
160,000
150,000
140,000
130,000
120,000
110,000
100,000
90,000
2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020


Town of Telluride Employee Commmute Footprint
Metric Tons CO2e Per Yr
300
275
250
225
200
175
150
125
100
75
50
25
0
2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020

Telluride Town Government Carbon Tracking

	2005				2019			
Fuel Breakdown	**Usage**	**CO_{2e} lb/yr**	**CO2e MT/yr**	**CO_2 lb/unit**	**Usage**	**CO_{2e} lb/yr**	**CO2e MT/yr**	**% Change CO_2e from 2005**
Facilities								
Electric, kwH	2,710,674	5,963,483	2,705.0	1.706	3,583,940	5,031,852	2,282.4	-15.6%
Natural Gas, Therms	110,824	1,335,429	605.7	11.68	166,061	1,939,592	879.8	45.2%
		7,298,912	**3,310.8**			**6,971,444**	**3,162.2**	-4.5%
Transportation/Vehicles/Equipment								
Transit								
Gas-Unleaded, gal	11,952	313,376	142.1	26.22	14,120	370,272	168.0	
Diesel, gal	8,638	240,209	109.0	27.81	656	18,248	8.3	
Biodiesel, gal	1,256	22,477	10.2	0	0	0	0.0	
Transit Total	21,845	576,062	261.3		14,776	388,520	176.2	-32.6%
Fleet Vehicles								
Gas-Unleaded, gal	10,582	277,468	125.9	26.22	15,021	393,916	178.7	
Diesel, gal	8,956	249,058	113.0	27.81	13,401	372,647	169.0	
Fleet Total	19,538	526,526	238.8		28,422	766,563	347.7	45.6%
WWTP & WTP Diesel, gal	3,562	93,396	42.4	22.44	4,769	107,010	48.5	14.6%
Parks & Rec								
Gas-Unleaded, gal	2,344	61,470	27.9	26.22	0	0	0.0	
Diesel, gal	356	9,906	4.5	27.81	0	0	0.0	
Additional Diesel, gal				27.81	1,377	38,292	17.4	
Additional Unleaded, gal				26.22	857	22,474	10.2	
Kerosene				19.00		0	0.0	
Parks & Rec Total	2,701	71,376	32.4		2,234	60,766	27.6	-14.9%
Total Transportation/ Equipment	**47,646**	**1,267,360**	**574.9**		**50,200**	**1,322,858**	**600.0**	**4.4%**
Personnel Commute		355,797	161.4			450,390	204.3	26.6%
CO_{2e} Generated		**8,922,068**	**4,047.0**			**8,744,693**	**3,966.6**	**-2.0%**
Open Space CO_{2e} sequestered		447,317	202.9			969,093	439.6	
CO_{2e} generated minus Sequestration		8,474,751	3,844.1			7,775,599	3,527.0	**-8.2%**
Bridal Veil RECS					0	0	0.0	
Ridgway Dam RECS					4,590,950	-7,832,161	-3,552.6	
Pinhead Goose RECs						-388,520	-176.2	
WWTP GreenPower Purchase					99,600	-186,252	-84.5	
WWTP PV Electric Generation					0	0	0.0	
CEC Solar Panels					0	0	0.0	
CO_{2e} Minus Sequestration & RECs		8,474,751	3,844.1			-631,333	-286	**-107.4%**

APPENDIX B - Specific Actions to Decrease Energy Use in Town Government Facilities & Operations

2019 – Town Government Actions to Lower CO_{2e} Generation by Energy Use

- 10 streetlights along West Pacific Avenue were changed to LED in summer 2019.
- ***New For-purchase Affordable Housing Projects (Longwill 19, Silverjack)*** *built to be* energy efficient and sustainable and providing qualified locals with in-town housing.

2018 – Town Government Actions to Lower CO_{2e} Generation by Energy Use

- 10 streetlights along West Pacific Avenue were changed to LED in summer 2018.
- September/October Elks Building Restroom remodel replaced heating system with more efficient system and replaced an exhaust unit with an air recirculation unit to the back.
- Used Precision Concrete Cutting to grind down trip hazards on sidewalks throughout Town.
- ***New For-rent Affordable Housing Projects (Virginia Placer, Boarding House, 3 tiny homes)*** *built to be* energy efficient and sustainable and providing 88 qualified locals with in-town housing.

2017 – Town Government Actions to Lower CO_{2e} Generation by Energy Use

- 9 streetlights along Butcher Creek Drive were changed to LED in summer 2017.
- Used Precision Concrete Cutting to grind down trip hazards on sidewalks throughout Town, rather than ripping up older concrete and replacing it, saving on equipment costs and concrete costs.
- Replaced numerous lighting throughout town-owned facilities with LEDs.
- EcoAction Partners calculated that good construction practices for the Town Park Backstop Replacement Project resulted in 32.9 metric tons of GHG emissions reductions.
- ***Special Note on Affordable Housing Projects (Spruce House) –***
  While affordable housing units are built by the Town, they are not town-owned facilities once they are sold. Nevertheless, it is important to document the efforts to make housing in Telluride, in general, more energy efficient and sustainable. The following was provided by Lance McDonald. Program Manager, as a summary:
  - *The Project was designed to meet the "Town of Telluride Energy Efficient and Environmentally Responsible Building Code." Following is a listing of "green" or sustainable products and practices incorporated into the Project.*
  - *Energy Efficiency: building product installation techniques for a properly sealed envelope: high efficiency natural gas boiler systems (95% efficient) with in-floor and baseboard radiant heat; Energy Star rated appliances and lighting fixtures (~90%); mostly compact fluorescent light fixtures; insulation of hat water pipes at specified locations, R-50 roofs, R-24 wall.*
  - *Materials: recycled-content or certified wood deck material; aluminum-clad wood, low-E glazed windows; fiber cement siding; natural linoleum, tile, concrete, or wood in lieu of vinyl for flooring; and recycled-content carpet with recycled-content carpet pads.*
  - *Indoor Air Quality: formaldehyde-free insulation; low-toxic, solvent-free adhesives; and low VOC paints and stains.*
  - *Resource Conservation: construction recycling area and practices; energy saving water fixtures/fittings.*

2016 – Town Government Actions to Lower CO_{2e} Generation by Energy Use

- Used Precision Concrete Cutting to grind down trip hazards on sidewalks throughout Town.
- LED lighting exchange program. Over time, the Facilities Management Division is working to decrease electric usage by changing to LED lighting as old bulbs and fixtures wear out. In 2016, 48 light bulbs and/or fixtures were changed to LEDs.
- Shandoka Parking Lot lighting change to LED was completed in spring 2016.
- EcoAction Partners calculated that good construction practices for the Town Park Tennis Courts Rehabilitation Project resulted in 5 metric tons of GHG emissions reductions.

2015 – Town Government Actions to Lower CO_{2e} Generation by Energy Use

- Used Precision Concrete Cutting to grind down trip hazards on sidewalks throughout Town.
- LED lighting exchange program. Over time, the Facilities Management Division is working to decrease electric usage by changing to LED lighting as old bulbs and fixtures wear out.
- Shandoka Parking Lot lighting change to LED. This project has not yet been implemented fully; although, the fixtures were purchased in 2015. The fixtures will be installed in spring 2016.

- With funding for materials from the Colorado Water Conservation Board's small grants program, 134 toilets in the Shandoka Affordable Rental Housing Complex were changed out for 1.2 gallon per flush toilets. Let potable water use results in less need for electricity to produce potable water over time. The water savings will be tracked in the annual Water Audit report.
- Town Park Pool and Restroom Improvement projects tracked construction waste mitigation progress. EcoAction Partners calculated that good construction practices resulted in 12 metric tons of GHG emissions reductions.

2014 – Town Government Actions to Lower CO_{2e} Generation by Energy Use

- On March 4, a programmable thermostat was installed in Old Town Hall.
- On March 4, window shades were installed on all windows in Old Town Hall to control excessive heating from sunlight
- Used Precision Concrete Cutting to grind down trip hazards on sidewalks throughout Town. A total of 75 cuts were made, as well as a driveway cut section for the Ace Hardware Store. This saved literally tons of concrete from being excavated and replaced.
- November 24 replaced 24 high pressure sodium yard lights at the Public Works Facility with 12 LEDs.
- Shandoka Management purchased solar panels in the CEC-SMPA Community Solar Array to offset energy use of all Shandoka electric meters.
- The Affordable Housing Fund purchased solar panels for Town deed-restricted housing that expressed interest in exchange for specific energy use information.
- The Planning Director developed a Climate Action Plan that encompasses the entire community, which will be adopted by the Telluride Town Council.

2013 – Town Government Actions to Lower CO_{2e} Generation by Energy Use

- In February, the office paper used by Town government offices switched from 30% post-consumer content recycled to 50% and then to 100%.
- In March, changed all lights at the Historical Museum to LEDs. (Note: This building is not counted in the Town's Carbon Footprint to date.)
- In July, at Rebekah Hall skylights, applied an exterior coating "film" that is chemically applied. It is reflective therefore, in addition to UV protection it is anticipated to reduce the amount of heat passing through, thereby reducing the energy needed for cooling in the summer.
- On November 11, switched the water heater at the Hanley Pavilion in Town Park from a 150-gallon electric tank to a 93% efficient 50-gallon electric tank.
- In late December, installed window inserts to better seal the building envelope of Rebekah Hall and Old Town Hall.

2012 – Town Government Actions to Lower CO_{2e} Generation by Energy Use

General

- Purchased all available Renewable Energy Credits from SMPA that are available through their power purchase of energy generated at the Bridal Veil Power Station, which is owned and operated by Idarado.
- The Personnel Board amended the Personnel handbook to lay out expectation for all employees regarding recycling and energy use minimization.
- Much of staff continues to use public transit, carpooling, or human-power to get to work.
- Parks Management continues to attend Rebekah Hall meetings on foot or using bicycles.
- Public Works staff continues to carpool to do errands in Town from the Facility, when possible.
- All Town facilities are recycling #1-7 plastics, corrugated cardboard, aluminum, glass, and paper.
- Public Works recycles all batteries, tires, fluorescent bulbs, metal, and computers for the Town facilities.

Public Works

Water/Wastewater

- In June Financial Energy Management (FEM) conducted a lighting Audit of the Telluride Regional Wastewater Treatment Plant.
- On October 16 and 17 for $14, 260 (this leaves $7,740 on our table) FEM completed a Lighting Upgrade at the WWTP. The estimated direct annual energy savings is about $2,100 per year, making the estimated net payback period about 6 years (ROI 16%). Those are the financial perspective. From the environmental perspective, anticipated environmental impacts of this project as detailed by FEM are as follows:

  Energy Saved = 18,837 kWh per year
  KW reduced by = 14 kW
  CO2 reduction = 5 tons per year

SO2 reduction = 13 lbs per year
NOX reduction = 15 lbs per year

Public Works & Transit Facility –

- In June Financial Energy Management (FEM) conducted a lighting Audit of the Public Works & Transit Facility. No lighting upgrade was completed as no funds were available.

Public Works Projects –

- Sidewalk Trip Hazard Repair. By repairing rather than replacing concrete panels, reduced estimated generation of CO2 created by project by 1.3 metric tons.
- Carhenge resurfacing experiment using local materials and no hauling.
- Water heater replacement.

Rebekah Hall

- Green Meeting Room lighting was upgraded to dimmable LEDs.
- All electric Exit signs were upgraded to LEDs.
- Water heater replacement.
- HVAC system replacement.

Museum

- Installed Ecogreen 1-gallon power flush toilet at the Museum on October 22, 2012.

Shandoka

- April - Completed an energy audit on all of the buildings.
- Shandoka staff began implementing recommendations of the audit. E.g., increasing/replacing insulation, replacing windows, sealing cracks and leaks, etc.

2011 – Town Government Actions to Lower CO_{2e} Generation by Energy Use

Much of staff is using public transit, carpooling, or human power to get to work.
Parks Management continues to attend Rebekah Hall meetings on foot or using bicycles.
Public Works staff continues to carpool to do errands in Town from the Facility, when possible.
All Town facilities are recycling #1-6 plastics, corrugated cardboard, aluminum, glass, and paper.
Public Works recycles all batteries, tires, fluorescent bulbs, metal, and computers for the Town facilities.

General –

- As an experiment, Staff replaced 10 cfl tube lights with 10 LED tube lights in buildings where emergency lights are required 24/7.
- All outdoor spot safety lights on all buildings were changed out to LED spotlights.
- The Personnel Board considered a request to put wording in the Personnel Handbook regarding expectations for all employees regarding recycling and energy use minimization (i.e., resource use).

Water/Wastewater –

- Electricity – Completed installation of a 100-kW solar system on the Telluride Regional WWTP. Electric generation started up in late January 2011.

Shandoka –

- Insulated the hot water pipes in the crawl spaces under A and B buildings, December 2011. (This should show up as a 2012 reduction in natural gas use on the building B meter (the A building meter is only the laundry room). Building F was completed in January. Building C, D & E are schedule for summer 2012. G & H were insulated at original construction.

2010 – Town Government Actions to Lower CO_{2e} Generation by Energy Use

Much of staff is using public transit, carpooling, or human-power to get to work.
Parks Management continues to attend Rebekah Hall meetings on foot or using bicycles.
Public Works staff continues to carpool to do errands in Town from the Facility, when possible.
All Town facilities are recycling #1-6 plastics, corrugated cardboard, aluminum, glass, and paper.
Public Works recycles all batteries, tires, fluorescent bulbs, metal, and computers for the Town facilities.

Town Park **Electricity –**

- In May, the Parks & Recreation Department reworked the plumbing on the Town Park Pool, which has increased the efficiency and effectiveness of the filter pumps.
- ***Hanley Pavilion*** – In October, the Parks & Recreation Department worked with TNCC to install the *Reallce*® System to make ice more efficiently.
- ***Hanley Pavilion*** – In October, the Parks & Recreation Department replaced the lights in the rink area with more efficient bulbs that can be dimmed and will require less maintenance/replacement.

Shandoka –

- Installed fiberglass jackets on water heaters for buildings C, D, E, and F.
- Routinely install compact fluorescents at Unit Turns
- Energy Star appliances used for all replacements.
- Laundry Room upgrades – washers and dryers.

Water/Wastewater –

- Electricity – Moved forward on installation of a 112.8 kW solar system on the Telluride Regional WWTP. Electric generation started up in late January 2011.

Special Note on Affordable Housing Projects (Entrada and Gold Run) –

While affordable housing units are built by the Town, they are not town-owned facilities once they are sold. Nevertheless, it is important to document the efforts to make housing in Telluride, in general, more energy efficient and sustainable. The following was provided by Lance McDonald. Program Manager, as a summary:

The Project was designed to meet the "Town of Telluride Energy Efficient and Environmentally Responsible Building Code." Following is a listing of "green" or sustainable products and practices incorporated into the Project.

Energy Efficiency: building product installation techniques for a properly sealed envelope: high efficiency natural gas boiler systems (95% efficient) with in-floor and baseboard radiant heat; Energy Star rated appliances and lighting fixtures (~90%); mostly compact fluorescent light fixtures; insulation of hat water pipes at specified locations, R-50 roofs, R-24 wall.

Materials: recycled-content or certified wood deck material; aluminum-clad wood, low-E glazed windows; fiber cement siding; natural linoleum, tile, concrete, or wood in lieu of vinyl for flooring; and recycled-content carpet with recycled-content carpet pads.

Indoor Air Quality: formaldehyde-free insulation; low-toxic, solvent-free adhesives; and low VOC paints and stains.

Resource Conservation: construction recycling area and practices; energy saving water fixtures/fittings.

2009 – Town Government Actions to Lower CO_{2e} Generation by Energy Use

All staff appeared to increase use of public transit, carpooling, or human power to get to work.
Parks Management attended Rebekah Hall meetings on foot or using bicycles.
When possible, Public Works staff carpooled to do errands in Town from the Facility.
Transit shift changes used the Electric Vehicles as often as possible.
Less paper use: 2-sided copying and printing are the norm for Town operations, as is heavier reliance on email.
Public Works has instituted a cloth towel option in the kitchen and ladies room to cut down on paper towel use.
Public Works has instituted #5 plastics recycling campaign.
Public Works has instituted a coffee grounds composting campaign.
Carhenge Parking Lot

- Electricity – In late December, the current was changed from 220V to 110V. Then, all High Pressure Sodium light ballasts were removed and 130 watt equivalent CFLs were installed. It is the intent of Public Works to replace the CFLs with LEDs when the CFLs wear out (about 2 years) and appropriately colored LEDs become available.

2008 – Town Government Actions to Lower CO_{2e} Generation by Energy Use

All staff appeared to increase use of public transit, carpooling, or human power to get to work.
Parks Management attended Rebekah Hall meetings on foot or using bicycles.
When possible, Public Works staff carpooled to do errands in Town from the Facility.
Transit shift changes used the Electric Vehicles as often as possible.

Telluride Regional Wastewater Treatment Facility –

- Electricity
  - In December, removed a water fountain with an electric cooling system that was not used but operated continuously.
- Heat
  - Installed a heat recovery system at the effluent stream to heat the offices in July. Expanded the system to heat all of the areas except the Dog Pound in November.

Old Town Hall –

- Electricity
  - Replaced the old computer server with a more efficient system.
  - All staff systematically turns off lights when leaving office for lunch or meetings.
  - Copy machine turned from "sleep" mode to "off" mode each night.
  - All computers and monitors turns to "off" mode each night.

2007 – Town Government Actions to Lower CO_{2e} Generation by Energy Use

All dead fluorescent and CFL bulbs are sent to a state-of-the-art recycling/recovery facility.
All dead computers and peripherals are sent to a state-of-the-art recycling/recovery facility.
Use 2-sided copying.

When possible, copy on the clean side of used paper.
When possible, send intra-office mail in a way to enable the reuse of the envelope.
When possible, use email in lieu of paper copies.

Rebekah Hall –

- Lights
  - Changed all lights in Council Chambers
    - T12s to T8s
    - Canned lights from a mix to a standard Green Bulb
  - Changed all lights in Computer Room from T12s to T8s
  - Changed lights in Green Room to CFLs w/dimmer
  - Changed all lights on 1st Floor from T12s to T8s
- Water Heaters
  - Put water heater on a timer to run 4 hours per day. (7 am – 11 am) *[Recommend to replace with a smaller tank electric heater or an on demand heater, depending on available technology.]*
  - Lowered water heater temperature from 140º F to 110º F
- Building Heating/Cooling
  - Scheduled maintenance of furnaces (filter changes, oiling motors)
  - Set building heating at 68º F daytime and 65º F at night.
  - Disconnected redundant electric floorboard heaters in Council Chambers.
  - Opened all dampers in all offices to ensure more even heating throughout building.
  - Cleared obstructions from in front of all heating vents in building. Louvers can be manually shut, if desired.
- Added an electric vehicle for the Manager's Office use.

Old Town Hall –

- Lights
  - Changed most lights from T12s to T8s
- Building Heating/Cooling
  - Scheduled maintenance of furnaces (filter changes, oiling motors)
  - Set building heating at 68º F daytime and 65º F at night.
  - Disconnected redundant electric floorboard heaters
  - Cleared obstructions from in front of all heating vents in building. Louvers can be manually shut, if desired.
  - Sealed and caulked leaks prior to repainting and replacement of damaged siding.
  - Installed new seal plate between crawl space and floor of building.
- Appliances
  - Replaced 1 old refrigerator with a smaller volume EnergyStar refrigerator.
- Computers
  - Started turning off computer electronics when not in use
- Water Heaters
  - Put water heater on a timer to run 6 hours per day.
  - Lowered water heater temperature from 140º F to 110º F

Public Works & Transit

- <u>Facility</u>
  - Computers
    - New Policy: All computers, monitors, and printers turned off each night.
  - Lights
    - Put all restroom lights on motion detectors
    - Installed a 20-minute maximum timer on the gas pump lights
    - Office lights used only when necessary; not turned on automatically, taking advantage of natural light through windows.
  - Appliances
    - Replaced the office refrigerator with an EnergyStar refrigerator when the old one broke down.
  - Vehicles
    - Retired Ford Ranger Pick Up (estimated EPA mileage 20 mpg) and replaced it with an all-electric vehicle
  - Water Heaters
    - Lowered water heater temperature from 140º F to 110º F
  - Building Heating/Cooling
    - Cleaned vents.
    - Cleaned furnace.
    - Replaced thermostat in Old Bus Barn to not exceed 70º F

- Turned off 2 of 4 hanging gas heaters in the Old Bus Barn. Heaters are turned off completely from May until October.
- Turned off 2 of 4 hanging gas heaters in the New Bus Facility during winter. Heaters are turned off completely from May until October.
- Installed timer for the wash pad heating system. Minimizing use of wash pad heating system.

  - Disconnected electric baseboard heater at Shandoka Bus Stop.
- Carhenge
  - Restroom heaters can be turned completely off after winter.
  - Restroom fixtures are all water saving.
  - Restroom lighting is solar LED.
  - Restroom insulation is spray on foam.
  - Parking Lot lighting switched to a timer from a photocell, which decreases hours of lighting to conform with hours of operation.
  - Parking Lot light bulbs switched to 70-watt low pressure sodium. Unfortunately, the ballasts will not support this change and the bulbs must be changed back to 100 watts. *[Recommend changing out the ballasts to support a 70-watt lps.]*
- Residential Streetlights
  - Replaced 13 of 24 SMPA-owned cobrahead (high pressure sodium) streetlights with dark-skies compliant fixtures with 26-watt CFLs.
- Commercial Street Lights
  - Completed conversion of all bulbs to 100-watt equivalent CFLs.
  - All streetlights on photocells
- Bike Path Tunnel
  - Put lighting on solar (underway).

Shandoka

- Changed all lights from incandescent to 60-watt equivalent CFLs outside and 40 watt equivalent inside. Will change all lights within 2 years to ensure efficiency remains high, as recommended. (And instituted a policy that requires all light bulb purchases to be CFLs & made at the front desk at the special low price of $1.80 each.
- Began recycling computers, TVs and appliances.
- All appliances installed are EnergyStar.
- Heating boiler system for each building was inspected. The older systems were completely overhauled.
- Replaced all laundry room facilities with EnergyStar washers (24) and dryers (12).

Parks & Recreation Department

- Water Heaters
  - Lowered temperature from 140º F to 110º F on all water heaters: (1) Pavilion, (2) Office, (3) Shower Rooms, (4) Nordic Center Office, (5) Warming Hut.
- Building Heating/Cooling
  - Scheduled furnaces servicing.

Youth Link

- None

Marshals Department (New remodel starting 2007 January)

- All lights are T8s
- All appliances EnergyStar

Old Marshals Building

- Kept heat at 70º F.
- Completely turned off hot water heater, unless building is occupied.
- Disconnected flag spotlight.

2003 - 2006 – Town Government Actions to Lower CO_{2e} Generation by Energy Use

Recycling at all facilities.
Low water usage fixtures at all facilities.
Rebekah Hall –

- Began to replace T12s with T8s.
- Insulated water heater pipes in crawl space.

Old Town Hall –

- Changed some lights from T12s to T8s

Public Works & Transit

- Facility
  - Installed programmable thermostats.
  - Put the soda machine on the VendingMiser so that it does not run 24/7.

- Residential Streetlights
  - Nothing
- Commercial Street Lights
  - Started conversion of all bulbs to 100 watt equivalent CFLs. (2005)
  - All streetlights on photocells (when installed)

Wastewater and Water Division of Public Works

- Some T12 lights converted to T8s.

Shandoka

- Was not under Town Management prior to 2007.

Parks & Recreation Department

- None

Marshals Department

- None

Youth Link

- None

"Green" Purchasing Specifications (implemented starting 2008)

As a result of the Ecology Commission's recommendation to develop more specific purchasing specifications for commonly used office materials, Town Council directed staff to develop a list of typical products with the desired specifications, and to complete a budget analysis comparing the more sustainable products with the traditional products. The table that is provided on the next page and the subsequent product sheets satisfies this task. After a cursory analysis of available web sites, it is obvious that products with recycled content and chlorine-free and low-chemical processing are readily available—sometimes at a lower price than their traditional counterparts. The Office Depot website is easiest to use when looking for more sustainable alternatives to traditional products. However, Quill and OfficeMax both have recycled products available. They are just more difficult to find, at times. The bottom line is that given the assumptions of use, it would be possible to adopt the specifications in the second column of the table for less than $500 more over the course of 2008. This seems imminently reasonable and therefore I would recommend that these minimum specifications be adopted as soon as possible.

Cost analysis of more sustainable purchasing of commonly used office supplies with more traditional products

Item	Specification	Potential Supplier	Cost Analysis			
			Preferred Product	Traditional Product	Per Unit Cost Difference	Annual Cost Difference
Copy paper	1. Minimum 35% post-consumer recycled content 2. Process chlorine free (PCF)	Office Depot www.officedepot.com	$35.99/case	$32.99/case, for 10% recycled content	$3.00/case	$300.00/yr, assumes 100 cases/yr
3-M Post It Notes, 3"X3"	1. Minimum 30% post-consumer recycled content 2. Minimum 100% total recycled content	Office Depot www.officedepot.com	$10.99/dozen	$9.99/dozen	$1.00/dozen	$10.00/yr, assumes 10 packs of a dozen pads/yr
Clasp Envelopes, 6"x9"	Minimum 20% post-consumer recycled content	Office Depot www.officedepot.com	$8.99/box	$7.39/box	$1.60/box	$16.00/yr, assumes 10 boxes/yr
Clasp Envelopes, 9"x12"	Minimum 20% post-consumer recycled content	Office Depot www.officedepot.com	$5.99/box of 100	$6.99/box of 100	-$1.00/box	(-$10.00/yr), assumes 10 boxes/yr
Standard Blank, white envelopes	Minimum 30% post-consumer recycled content	Office Depot www.officedepot.com	$7.99/box of 250	$9.99/box of 250	-$2.00/box	(-$4.00/yr), assumes 2 boxes/yr
Markers & highlighters	Water-based inks	Office Depot www.officedepot.com	$6.29/pack of 12	$7.29/pack of 12	-$1.00/pack	(-$5.00/yr), assumes 5 packs/yr
Writing pads	Minimum 50% total recycled content	Office Depot www.officedepot.com	$9.99/dozen for 8.5"x11"**	$9.99/dozen for 8.5"x11"*	$0.00	$0.00
File folders	1. Minimum 50% post-consumer recycled content 2. Minimum 100% recycled content	Office Depot* www.officedepot.com Quill** www.quill.com	$16.49/box of 100**	$9.99/box of 100 with 10% recycled content *	$6.50/box	$58.50/yr, assumes 9 boxes/yr or 1 box/department
Hanging file folders	Minimum 10% post-consumer recycled content	Office Depot www.officedepot.com	$10.99/box of 25	Could not find a comparable product without 10% recycled content		$0.00
					TOTAL ESTIMATE COST DIFFERENCE PER YEAR	**$ 335.50**