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Town of Telluride
Annual Energy Audit

Energy Use & Carbon Footprint Summary (2016)

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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 reach the goal of decreasing its GHG emissions 20% from 2005 levels by 2020 in 2012. It reached the goal of becoming carbon neutral in 2014 and has remained there ever since.

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 2016, total estimated GHG emissions were approximately 60,500 metric tons of CO_{2e}

Efforts by Town Government and the Telluride Community will continue by looking for the new 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 amount of 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 in recognition 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 2016 summary will reflect where the Town Government and the Telluride Community are with respect to 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 particular challenge. Investing in renewable energy sources as a compliment to energy efficiency measures continues to be a winning strategy for Telluride Government.

The Town Government operating as a carbon neutral entity, however, is not enough. The goal of being carbon neutral encompasses the entire community, and government GHG emissions are estimated to be only 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 2016. Note that the Town Government has been operating as a carbon neutral entity since 2014. GHG generation by Telluride Government facilities and operations from 2005 through 2016 is shown by the red line. GHG emissions have remained relatively stable despite the addition of staff, facilities, and services.

Accounting for carbon sequestration by Town-owned open space lowers the Government's GHG emissions 0.1% below 2005 levels (gray line). Adding benefits for the renewable energy credits from power generated at the Bridal Veil Power Station and approximately 28% of the renewable energy credits from power generated during the summer at Ridgway Dam (i.e., Tri-County Water), and Green Power Blocks purchased directly through SMPA, reduces 2016 GHG emissions to zero (blue line).

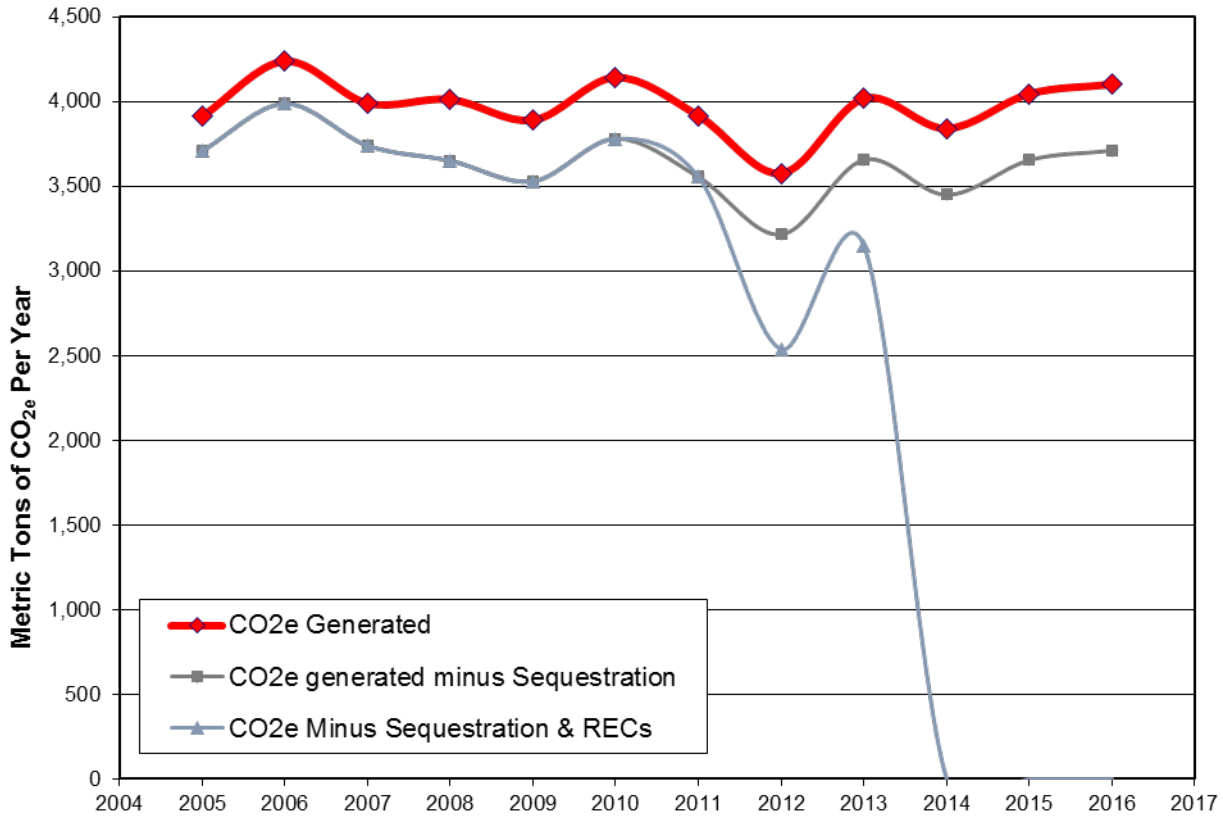


Figure 1. The amount of carbon dioxide equivalents (metric tons CO_{2e} or GHG) generated by Telluride Government facilities and operations from 2005 through 2016 (red line), with carbon sequestration on Town-owned open space (gray), and with REC purchases (blue).

Staff continued in 2016 the GHG accounting system that it implemented in 2014. First, staff adjusts GHG calculations for 2016 using the latest (i.e., 2015) Tri-State electricity multiplier, which is used to convert a kilowatt hour to pounds of CO_{2e}. 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) does—and therefore the Town Government cannot claim the environmental benefits (i.e., the GHG reductions).

Tri-State Power Generation, the energy wholesale company that sells power to SMPA, increased its multiplier in 2014 from 1.93 pounds of CO_2 per kilowatt hour to 1.99 pounds of CO_2 per kilowatt hour due to changes in the mix of renewables in their portfolio, making each kilowatt hour used more "expensive" in terms of GHG emissions generation, and each kWh of renewable electricity generated more "valuable". This value decreased to 1.87 in 2015, and for this report for 2016. Tri-State will not release their actual calculation for 2016 until later in 2017. The 2016 numbers will be adjusted in the 2017 Energy Audit.

Renewable Electricity Generation and GHG Mitigation Projects by Telluride Town Government

Table 1 presents all of the Telluride Government's 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), and the solar panels located on the Telluride Regional Wastewater Treatment Plant (WWTP). Figure 1 for 2016, also only shows credit for 28% of the RECs purchased from the Ridgway Dam Project. (The remainder of these 2016 credits were used to offset the Telluride Community's emissions, see Part 3 of this report.)

Table 1. 2015 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.

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). Electric use continues to be the largest type of energy consumed by Town operations and facilities in 2016. This has been true since 2005, which is why staff continues to focus on building energy use efficiency for lighting, appliances, water heaters, and weather proofing. Figure 2 also illustrates the change to energy use impact percentages when RECs are applied to electric usage by town-owned facilities. GHG emissions generated by electric and gas usage of town-owned facilities are almost equal, which is something staff and decision makers must be more mindful of when selecting energy use systems for new projects.

Counting in Carbon Sequestration by Town-Owned Green Space

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 2 was updated in 2014, incorporating 118.6 acres of additional open space acquired after the original table was created. There were no changes to this table in 2015 or 2016.

Carbon sequestration using open space, parks, and wild land, while controversial, 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. Note that acquisition of the Valley Floor acreage between 2007 and 2008 provided a net credit for this calculation. All Open Space Parcels have been included in the Town Government's 2016 Energy Audit. Table 1 presents the methodology for calculating the carbon sequestration credit for Telluride.

RENEWABLE ENERGY

Renewable Energy Credits Purchases for Locally Generated Power

Bridal Veil Powerhouse – Idarado

For the fourth year running, and hopefully forever into the future, power generated by the Bridal Veil Power Station—a hydroelectric system—at the head of the Telluride Valley was purchased by SMPA for use and sale in the Telluride region. A portion of that power is used directly by Idarado for its operations. The remaining portion is used by the next energy consumers down the line, which are Idarado Legacy and the Town of Telluride. To help facilitate this power purchase between SMPA and Idarado, SMPA and Telluride entered into an agreement allowing the Town to purchase 50% of the renewable energy credits generated by the Power Station. Table 3 shows the kilowatt-hours purchased, the renewable energy credits generated, and the costs for 2012 through 2016 for this local renewable energy credit program.

Ridgway Reservoir Power Station – Tri-County

2016 was the third 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 into the future. Table 4 shows the kilowatt-hours purchased, renewable energy credits, and cost for 2014, 2015, and 2016 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.

Table 2. Estimation of Carbon Sequestration by Open Space / Undeveloped Lands Owned and Managed by the Town of Telluride

Town-owned Open Space	Type	Acreage	CO_{2e} Sequestered (metric tons/ac/yr)	CO_{2e} 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	0.5	209	207.3
Bear Creek Other	Shrubland/meadow	100	0.2	20.1	
River Park	riparian	5	0.1	0.5	0.5
In-town park lands	meadow/grass	25	0.2	5	5
Cornet Gorge Wedge	forest	36.4	0.5	18.2	5
Valley Floor	forest	56	0.5	28	
	wetland	283	0.2	57	
	riparian	22	0.1	2.2	
	shrubland/meadow	205	0.2	41	129.2
Boomerang Lode	Forest	10.3	.5	5.2	
Wolverine Lode	Forest	5.7	.5	2.9	
North and East	Shrubland/meadow	4.2	.2	0.8	
TOTAL	**mixed**	**1,080.8**	**0.3**	**392**	

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)

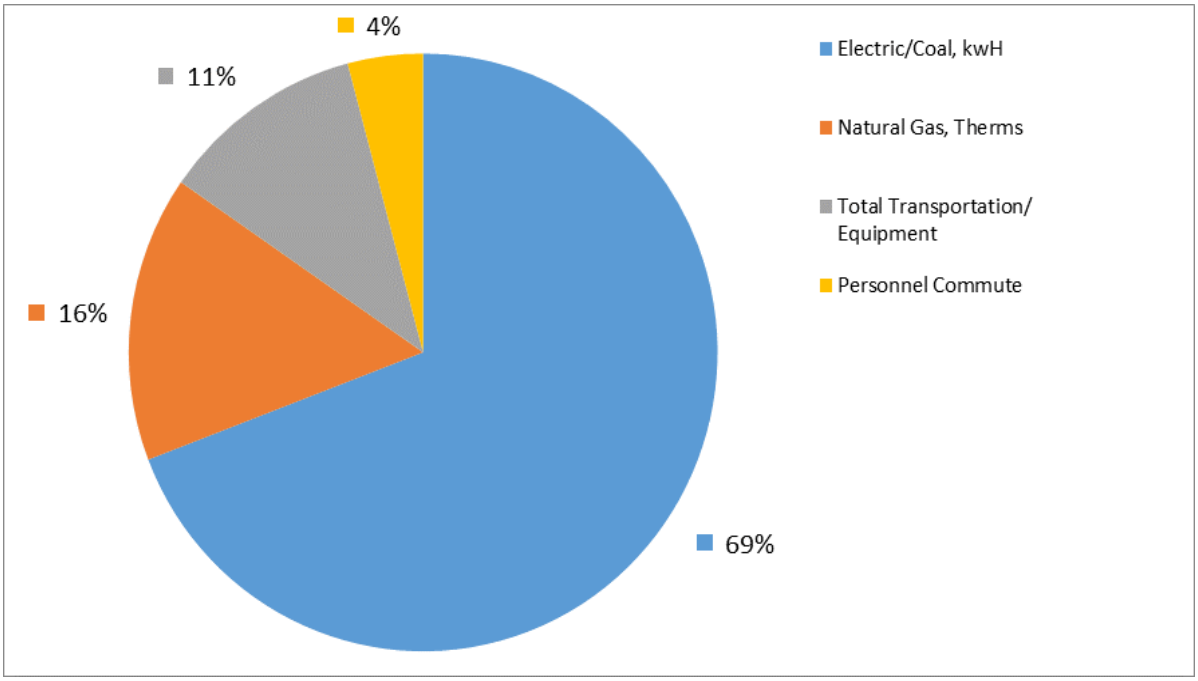
U.S. Department of Energy, Terrestrial Sequestration Research (http://www.fossel,energy.gov/sequestration/terrestrial/index.html, 3:03 pm)

Table 3. 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	394	$3,951.00
2013	144,090	126	$1,440.90
2014	40,410	36	$ 404.10
2015	652,410	589	$6,524.10
2016	190,440	172	$1,940.00
TOTAL	1,422,450	1,318	$14,224.50

Table 4. 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	14,333	$19,845.76
2016	14,684,700	13,255	$18,355.88
TOTAL	27,520,000	24,841	$34,395.76



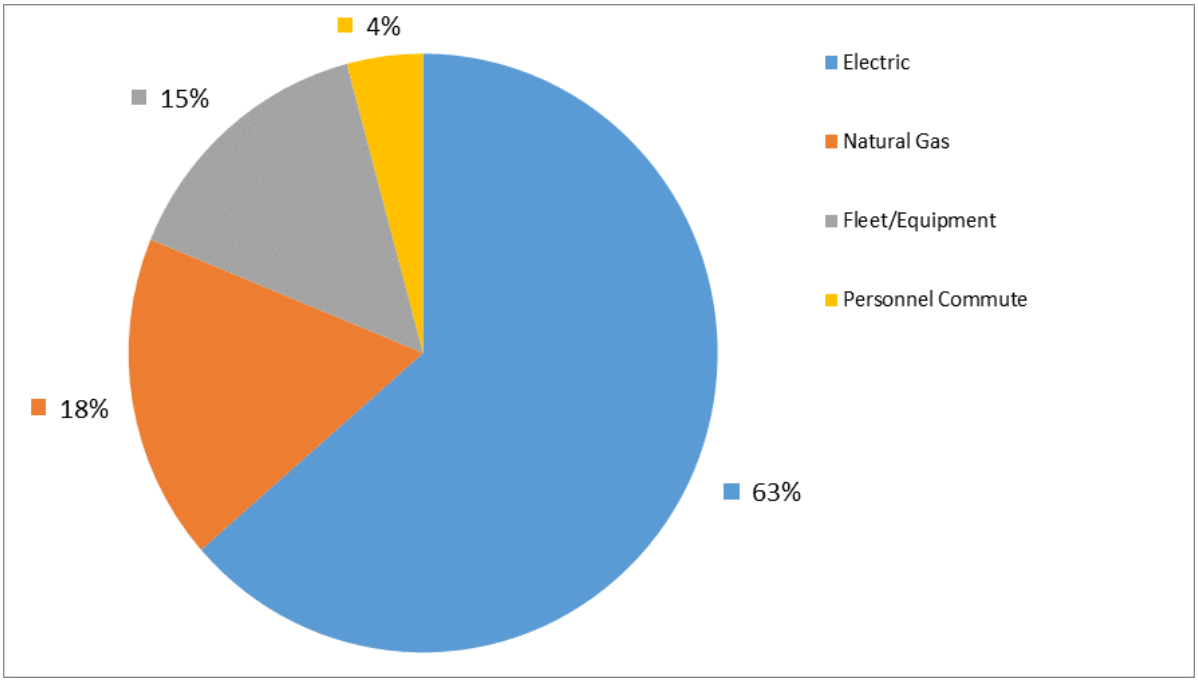


Figure 2. Telluride government facilities & operations breakdown of CO_{2e} generation for 2005 (top) and 2016 (bottom).

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 5 provides information on the production of electricity and revenue associated with the purchase of that power through 2016. The current estimated payback for investment in this equipment is 12 years.

Table 5. Annual Kilowatt-hours and payback generated by the Pandora Hydroelectric Facility

Year	kWh	Reduced Generation, Metric Tons CO_{2e}
2015	599,918	542
2016	551,920	498
TOTAL	1,151,838	1,040

Telluride Regional Wastewater Treatment Plant Solar Array Power Production

In its sixth year of operating, the solar array generated only 107,927 kWh, due to a ground short that stop electricity generation in late August. This short was not discovered until January 2017. Table 6 details the solar array production from 2010 through 2016. To date, this generated power has saved the Town of Telluride approximately $64,544 in electric costs and approximately $9,000 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 is approximately 35 years.

Table 6. Telluride Regional Wastewater Treatment Plant Solar Array Performance

Year	Time of Operation	Total Energy Produced (kWh)	Credits, Metric Tons CO_{2e}	Approx. Energy Dollars Saved, $
2011	Feb 28 – December 31	147,648	142	$ 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
	Total through 2016	957,617	851	$73,187
	Average Production	159,603	142	$12,198

*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 in 2016 was more than in 2005 by 13%, which includes the benefits of the solar panels on the wastewater treatment plant. Town Government, natural gas use in 2016 was greater than in 2005 by 21%. Use of fuels for transportation and various equipment in 2016 was higher than in 2005 by 7%.

GHGs generated by fuel use by personnel commutes for work increased substantially in 2016 to bring this statistic over 2005 levels by approximately 6%. The increase was caused by additional staff and the movement of residences and car types. Figure 2 shows that the proportion of GHGs generated by personnel commutes has remained steady as 4% of the total GHGs generated by Town Government facilities and operations.

Natural gas use appears to have leveled from 2013 through 2016 (i.e., for the last four years).

As electricity use remains significantly larger, the CO_{2e} produced by Town facility electric usage remains about 4 times greater than the CO_{2e} produced by Town facility natural gas usage. Town Government facility electric use generates approximately 4.5 times more CO_{2e} than Town Government transportation fuels use. For this reason, Staff continues to recommend focusing energy use improvements on electric use in Town Facilities.

Park Tennis Courts
Construction Waste Reduction Results

Total Change in GHG Emissions ($MTCO_{2E}$) = 5
This is equivalent to … conserving 563 gallons of gasoline

Total Change in Energy Use (million BTU) = 56
This is equivalent to … removing annual emissions from 1 passenger vehicle.

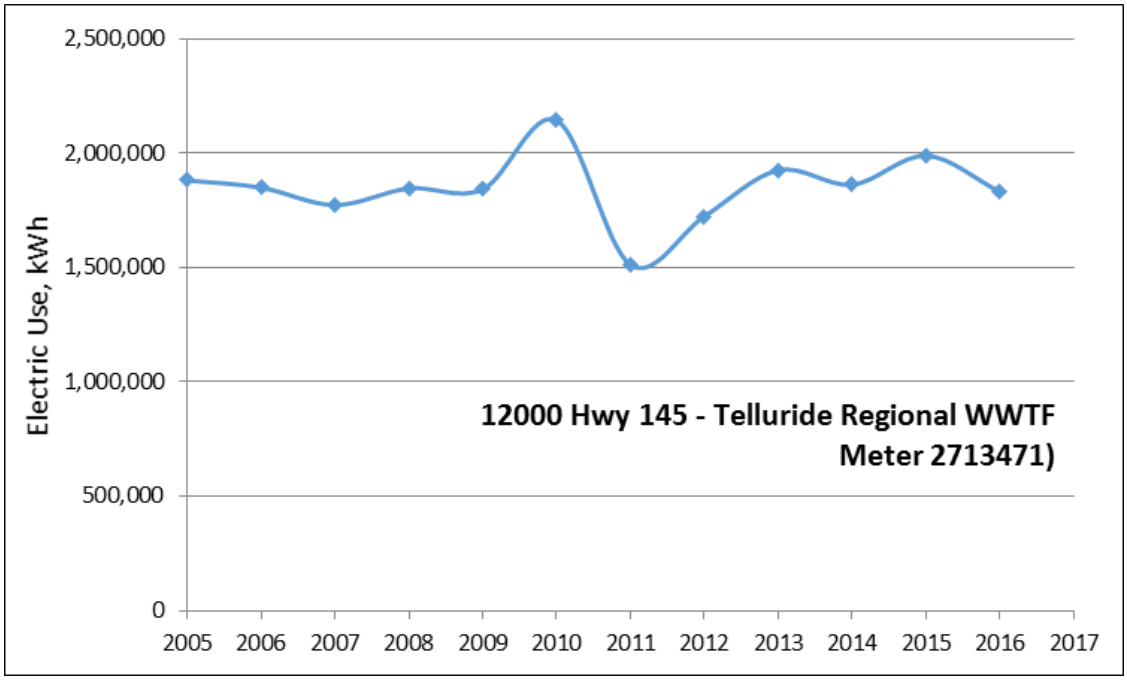
To help staff keep an eye on the energy use in facilities that they use and/or occupy, each quarter the Energy Action Coordinator provides graphics of energy use at each facility to Department Heads. Department Heads are expected to provide this information to their staff, discuss the results, and brainstorm 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 2016 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 over time. A Wastewater Facility Master Plan project in 2017 will seek ways that will enable the plant to meet increasingly stringent discharge limits, while also being more efficient with energy use.

Figure 6 shows energy use at the Hanley Pavilion, which clearly reflects increasingly intensive use. The addition of the Zamboni Room and the HVAC system are clear increases to natural gas use, which has increased nearly 200% over 2005 usage levels. An energy use audit of this facility may be warranted in the near future.

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.



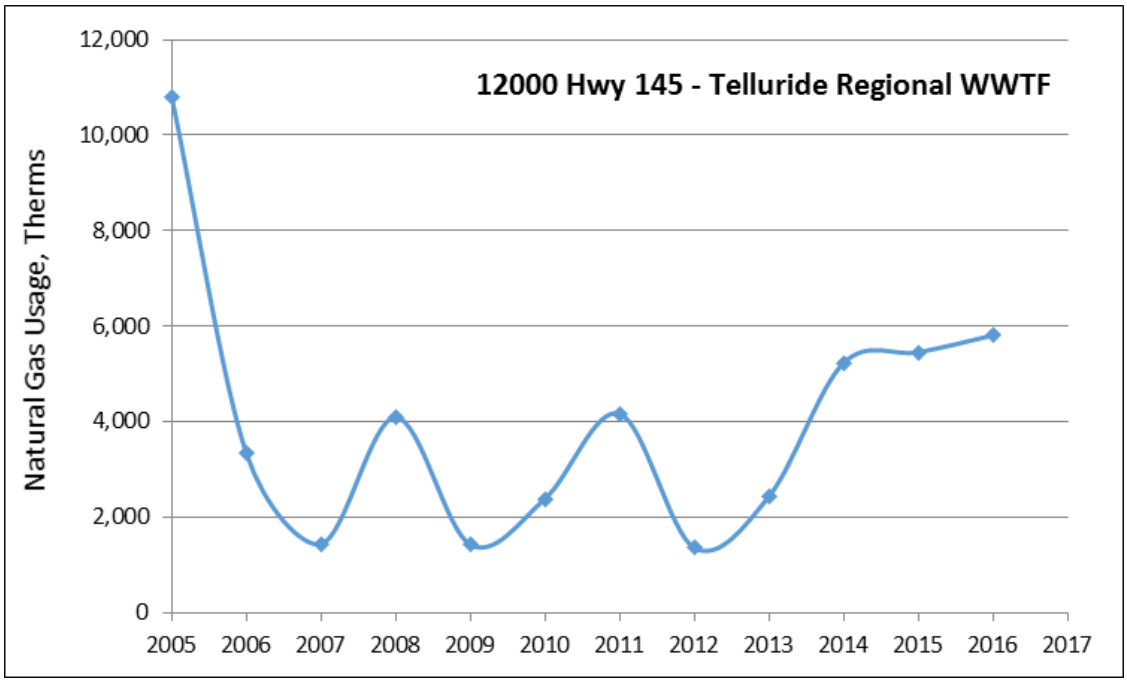
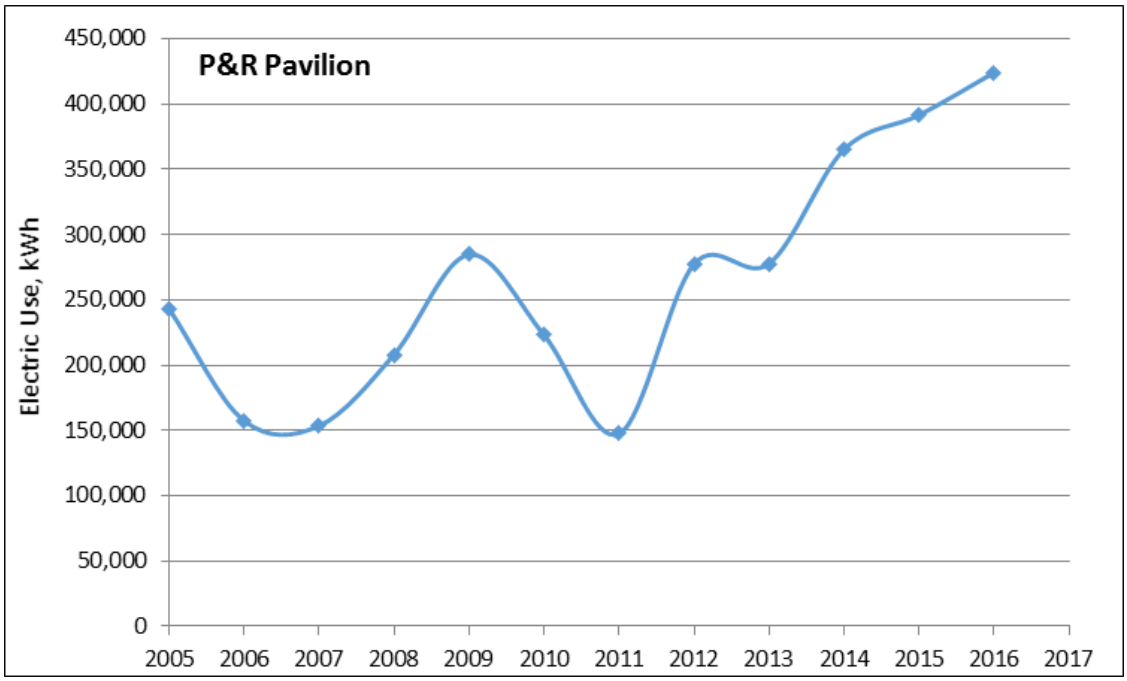


Figure 5. Annual average electric usage (top) and natural gas usage (bottom) for the Telluride Regional Wastewater Treatment Plant from 2005 through 2016



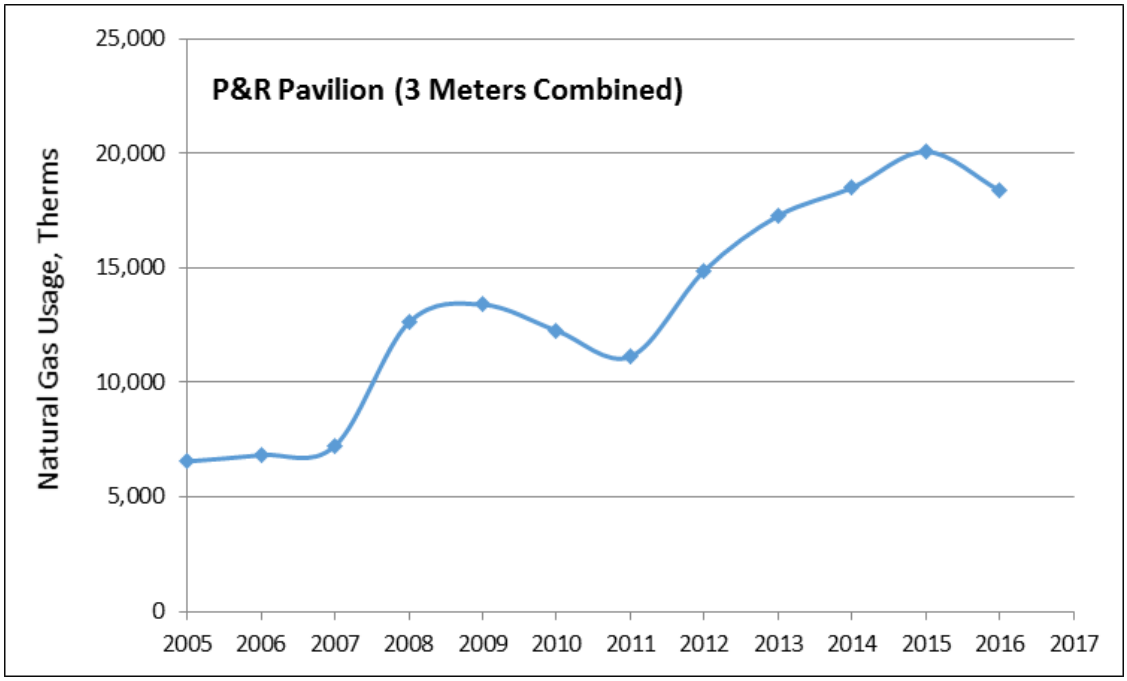
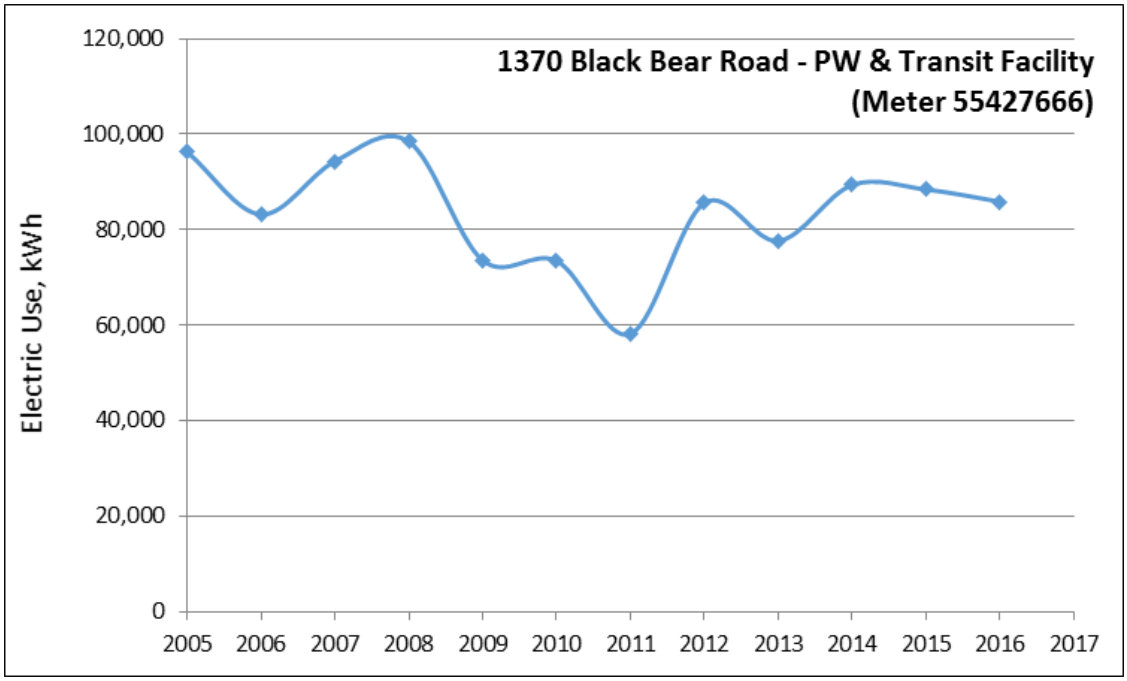


Figure 6. Annual average electric usage (top) and natural gas usage (bottom) for the Town Park Pavilion from 2005 through 2016



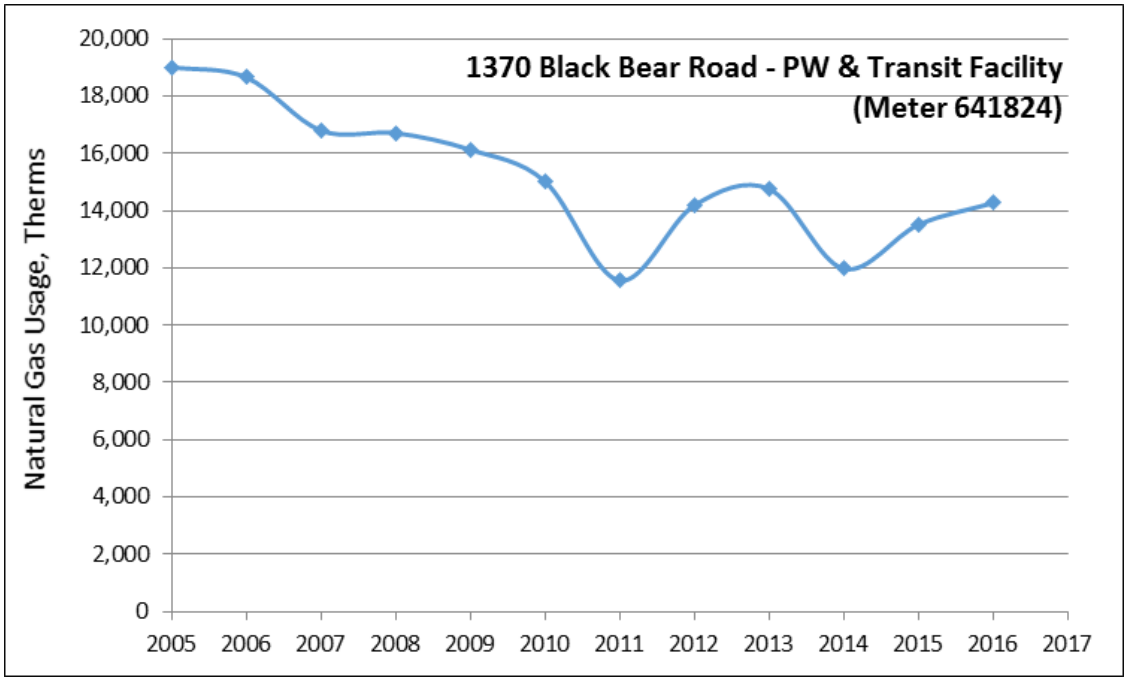


Figure 7. Annual average electric usage (top) and natural gas usage (bottom) for the Public Works & Transit Facility from 2005 through 2016

Public Transportation: The Galloping Goose

By providing regional public transportation as a public benefit, the Town of Telluride incurs significant increases to its carbon footprint. This report lists the benefits of decreased regional CO_{2e} generated under ***Part 3 - Sustainability Efforts Beyond Government in the Broader Community*** because without robust ridership (i.e., without people riding the bus instead of driving individually) there would be no 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.

Part 3 – Sustainability Efforts in the Broader Community

COMMUNITY GHG EMISSIONS SUMMARY FOR THE REGION

Figure 8 presents the regional GHG emissions data for 2016. Total 2016 GHG emissions were approximately 398,000 metric tons CO_{2e}. The basic picture of relative contributions to regional GHG emissions has not changed over time.

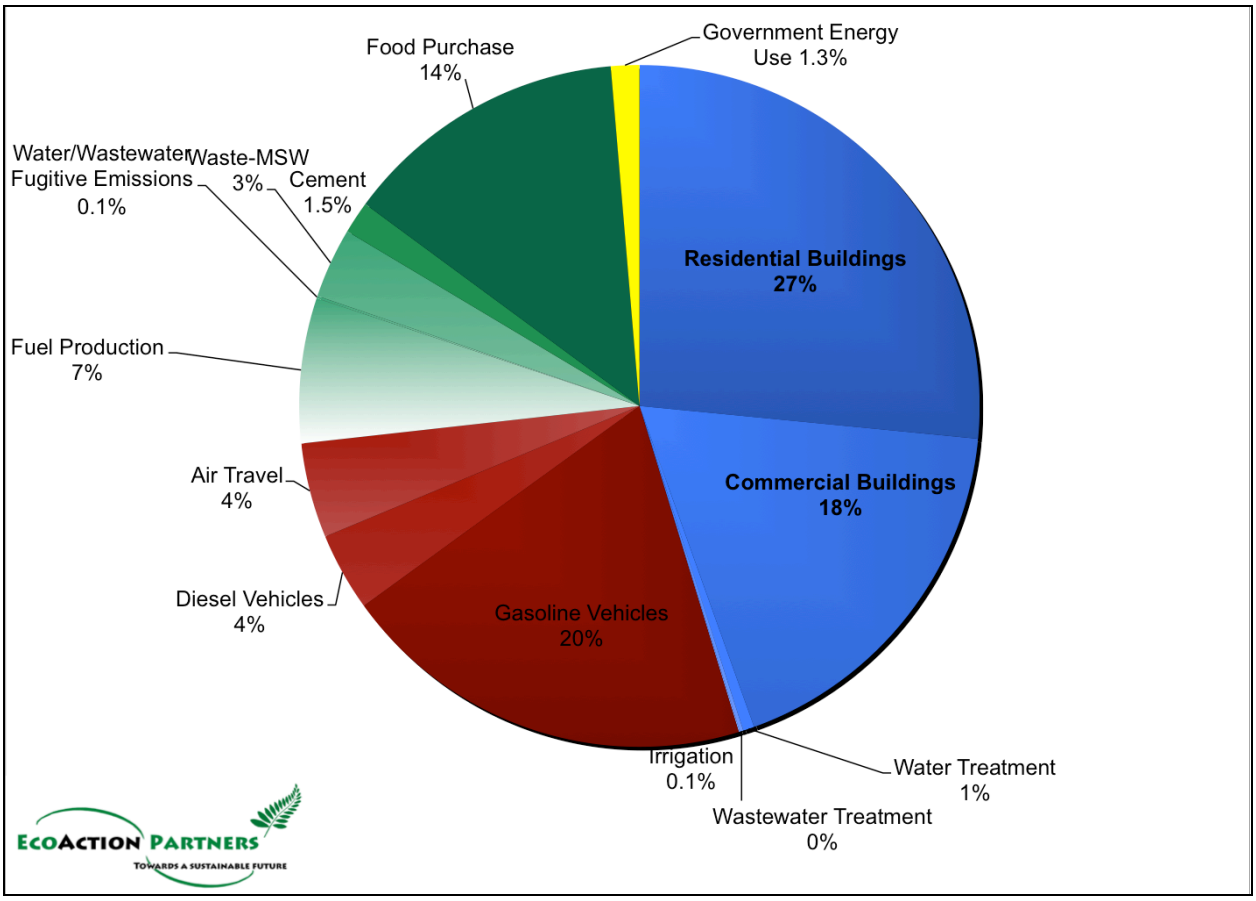


Figure 8. 2016 GHG emissions summary for Ouray & San Miguel counties (approximately 406,000 metric tons), illustrating that carbon emissions created by building energy use is the most significant factor.

Figure 9 presents the GHG emissions summary – approximately 60,500 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. This is typical for the region, as shown in Figure 8. Note that GHG emissions generation by Town Government before mitigation, which is shown as the bright yellow slice, are only 3% of the total.

Figure 10 presents the electric energy use by the Telluride Community from 2010 through 2016. Electric use has been increasing steadily since 2014. This figure breaks the data into renewable energy source types and non-renewable energy. An important observation to make when considering these data is that electricity use by the Telluride Community increased again in 2016, reflecting the continued increase in economic activity at all levels.

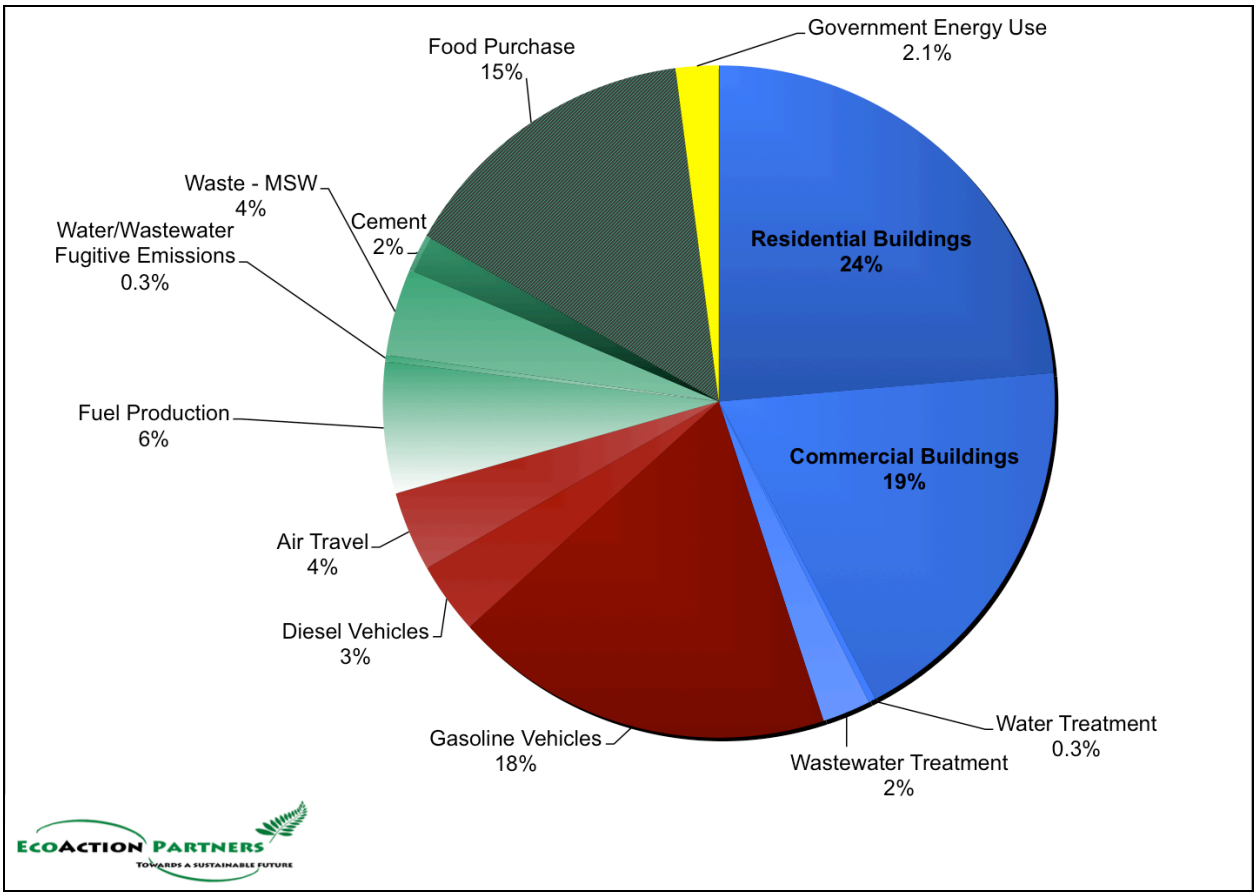


Figure 9. 2016 GHG emissions summary (approximately 60,500 metric tons) for the Telluride Government & Community, illustrating that energy use by buildings in the region remains the most significant factor.

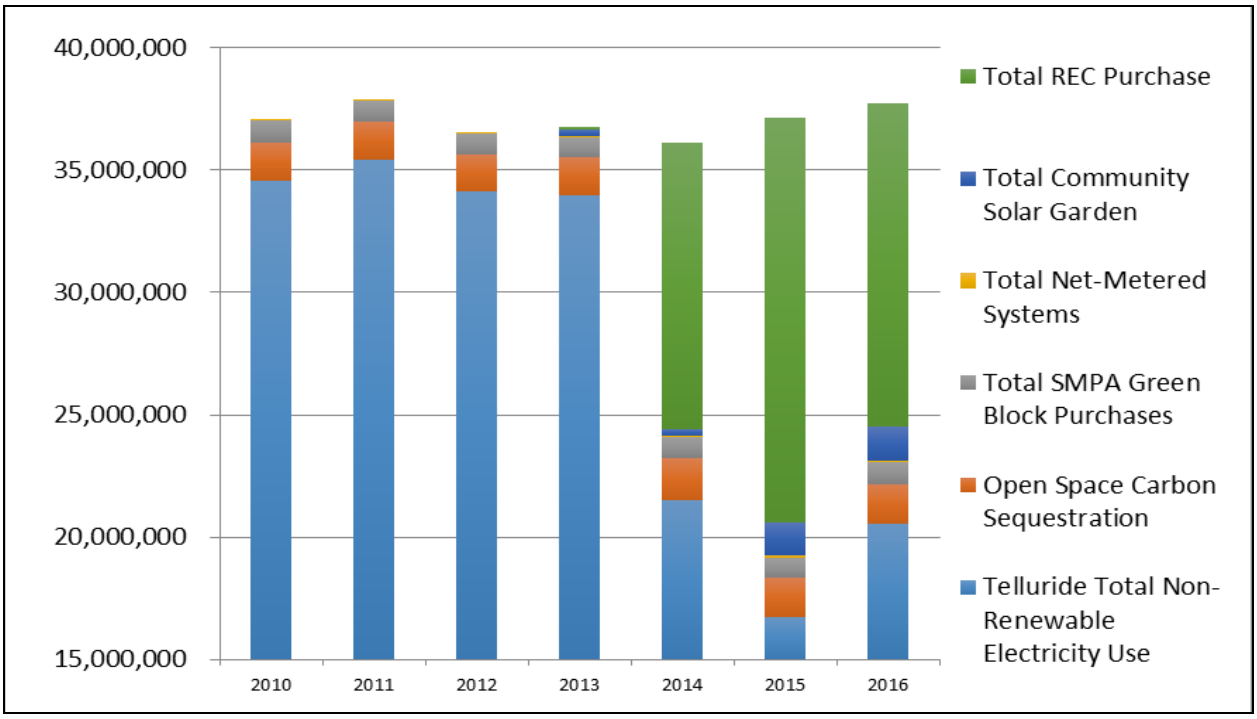


Figure 10. Electricity use by the Telluride Community (kWh), including government, from 2010 – 2016.

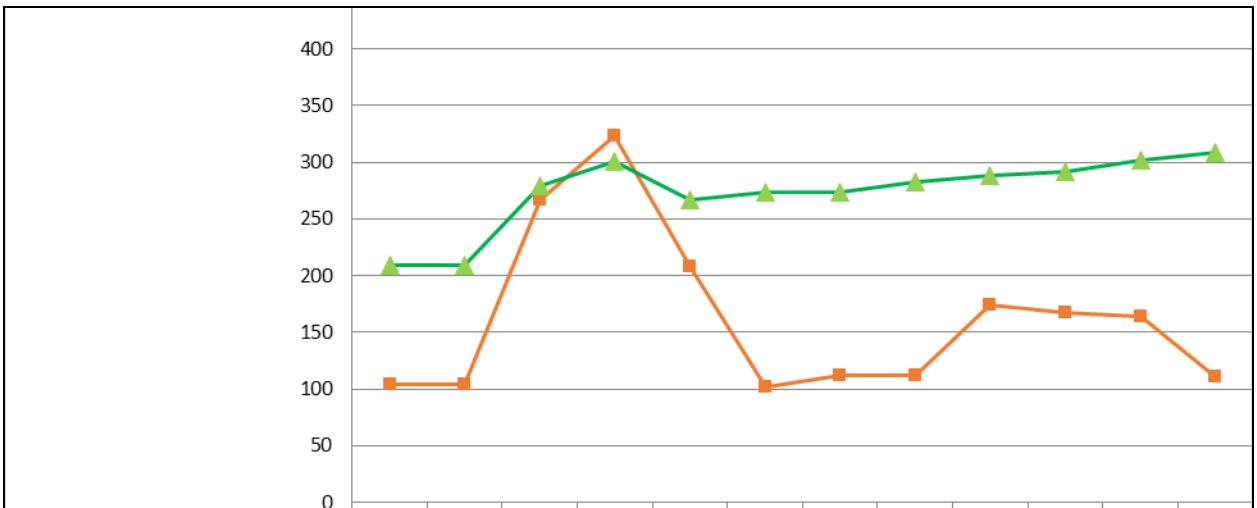
PUBLIC TRANSPORTATION: THE GALLOPING GOOSE

The value of riding public transit rather than driving a personal vehicle was shown clearly once again this past year. 2016 Galloping Goose ridership was at an all-time high, as shown in Figure 11. It was greater than in 2005 by 48%, which is equivalent to nearly 99,259 riders. 2016 fuel use by the Galloping Goose is also greater than in 2005 by 59%. A separate analysis of the CO_{2e} that would have been generated if each rider had driven separately to his/her destination in 2016 versus the CO_{2e} generated by the Goose indicates there is **an overall decrease of 110.8 metric tons of CO_{2e} generated in the Transit Region**. This means in 2016, although fuel efficiency of the fleet did not improve significantly, increased ridership alone lowered the community's potential CO_{2e} by 6% when compared to 2005 levels 104.3 metric tons CO_{2e} saved).

While overall ridership did increase in 2016, ridership to and from Norwood decreased. This is clearly reflected by the sharp decrease in CO_{2e} saved between 2015 and 2016, emphasizing the importance of having good ridership numbers for regional transit in the future in terms of carbon footprint for the region.

RENEWABLE ENERGY

For this 2016 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 389.8 kWh per panel. Table 5, Figure 12, and Figure 13 present these data. 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. In 2016, 37,690 square feet of new building area was constructed, increasing the total since 2010 to 31,248,788. Figure 11 clearly illustrates that the community support for renewable electricity generation is increasingly supported in a variety of forms, including SMPA Green Blocks, the Paradox Community Solar Garden, and net-metering. The large increase from 2014 to 2015 represents the Telluride School District's purchase of solar photovoltaic panels in the Community Solar Garden.



	1	2	3	4	5	6	7	8	9	10	11	12
Year	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
CO2e, Metric Tons Saved	104	104	267	324	208	102	111	113	174	167	164	111
Goose Ridership (x1000)	209	209	279	301	267	274	274	282	288	291	302	308

Figure 11. Goose Ridership versus CO_{2e} emissions saved as a result from 2005 – 2016.

ENERGY EFFICIENCY

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 in an effort to 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.

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.

EcoAction Partners spearheaded a single fall program in 2016. In the Town of Telluride, there were 5 separate participants who purchased a total of 438 LED bulbs, saving an estimated 4,558 kWh, and decreasing CO_{2e} by 4.1 metric tons.

Green Business Certification Program

EcoAction Partners continued its ***Green Business Certification*** program through 2016. Through this program, EcoAction Partners helps businesses save money by guiding them to make targeted capital investments to increase the energy efficiency of the space they occupy. A total of 14 businesses were certified in 2016, only 3 were located in the Town of Telluride. This is unfortunately a significant decrease from past years. This year's currently certified participants—businesses that are based in or provide services to the Town of Telluride community—included the following:

1. La Cocina de Luz (year 3)
2. Picaya (year 3)
3. Telluride Historical Museum (year 3)
4. Lotus Energy Solutions (year 1)
5. Reinhart Consulting (year 1)

Participants from previous years that were not officially re-certified in 2016 included the following:

1. Ah Haa School for the Arts (2 years)
2. Alpine Bank (2 years)
3. BootDoctors (2 years)
4. Jagged Edge (2 years)
5. Telluride Realty & Investment (2 years)
6. TMA Architects (2 years)
7. Wilkinson Public Library (2 years)

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

Table 5. 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	956
2011	49,224	0	866,538	0	915,762	914
2012	58,156	0	749,200	0	807,356	806
2013	57,749	146,064	637,600	0	841,413	737
2014	73,270	301,992	630,800	10,477,000	11,483,062	6,205
2015	67,297	1,352,207	827,372	14,291,100	16,537,976	12,358
2016	65,289	1,396,185	912,700	13,216,230	15,590,404	11,005
TOTAL	420,209	3,196,448	5,532,554	37,984,330	47,133,541	32,824

[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.

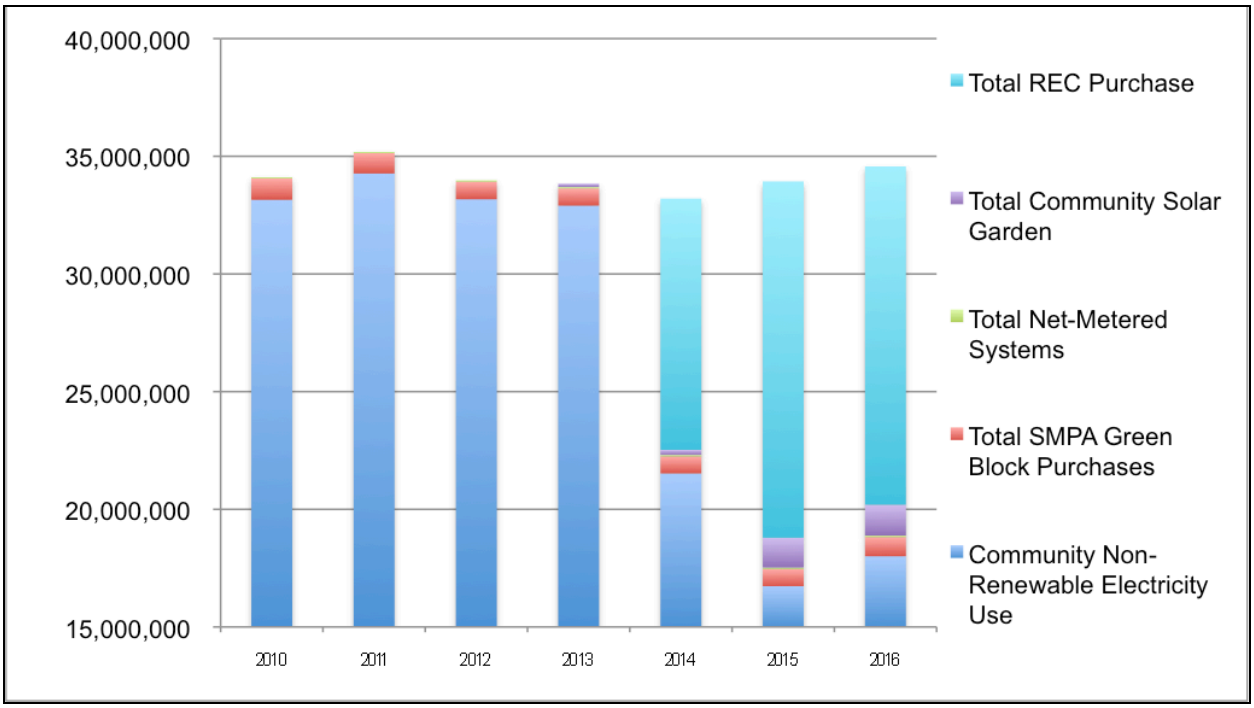
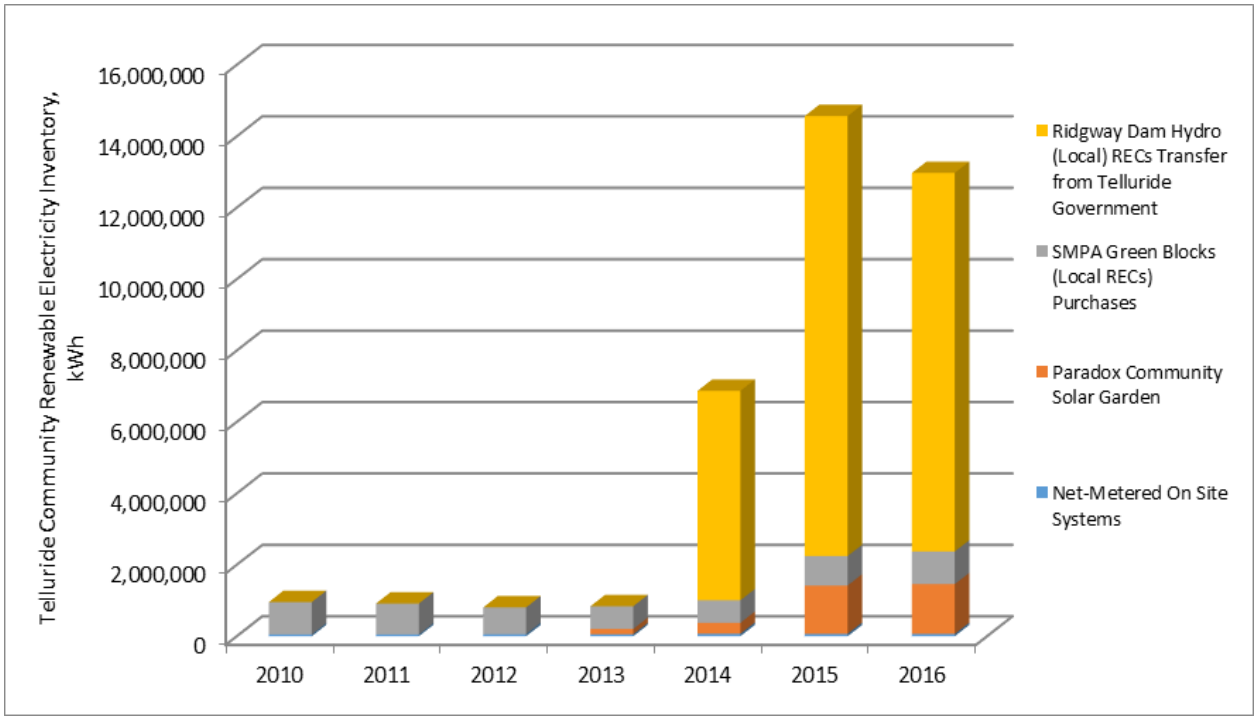


Figure 12. Telluride Community's total electricity use 2010 – 2016.



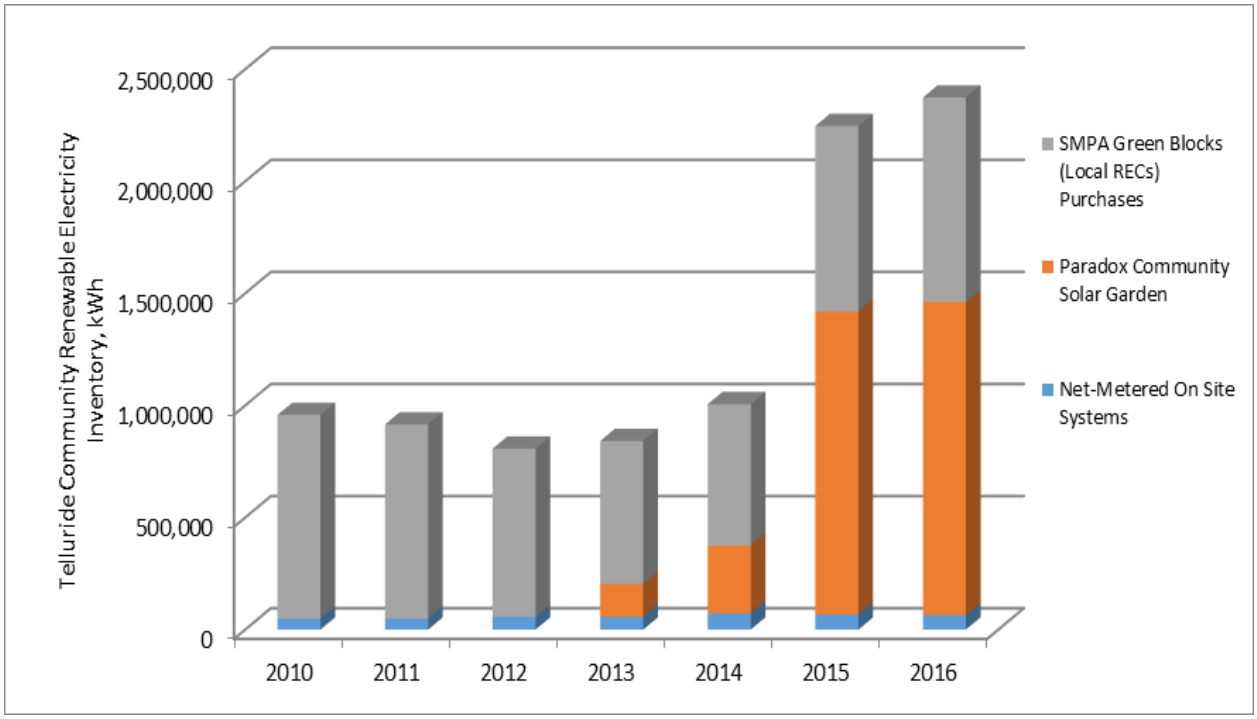


Figure 13. Telluride Community renewable electricity use 2010 – 2016. The top graph includes the Ridgway Dam Hydro RECs transferred by the Telluride Government. The bottom excludes the Ridgway Dam Hydro RECs to provide a more detailed picture of other efforts.

Part 4 – Recommendations

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

Status of Recommended Actions Made for 2016

Item IV.A of Town Council's 2015 Goals & Objectives listed the following objectives to reduce the town government's carbon footprint. In the 2015 Energy Audit, Staff recommended specific actions for each. The status of each recommended action is summarized.

1. **Continue to pursue Telluride renewed – secure 100 percent of Town of Telluride energy offset by renewable energy sources by the year 2020. Pursue Renewable Energy Options** (✓ complete)

   Town staff continues to look for ways to improve energy efficiency for all buildings and operations, while simultaneously providing additional services for the community. As well, the agreements to purchase RECs continued through 2016, helping with offsets to energy use.

2. **Adopt the 2015 International Energy Conservation Code (IECC) and Update the Green Building Code to improve HERS ratings requirements and apply the code to remodels, not just new construction.** (Not complete)

   Unfortunately, like in 2015, adoption of a more recent IECC was not accomplished in 2016 due to a variety of competing priorities. At this time, Planning & Building is working diligently to adopt the 2015 IECC instead.

3. **Improve Energy Efficiency in Town Facilities and activities using the Energy Mitigation Fund, which is supported by Green Building Fees.** (✓ complete)

   - ✓ Move forward on the Lighting Efficiency Program for Town facilities
   - ✓ Implement the LED lighting prototype in the Shandoka Parking Lot. Track energy use. Plan for 2017 Street Lighting Replacement, if the results of the Shandoka Project are good.

   Staff continues to identify and implement opportunities to improve energy use efficiencies at all facilities and operations be considered for adoption as those opportunities arise. In 2016, the focus has continued to be on implementation of a lighting efficiency program that installs LED fixtures and bulbs when and where it is appropriate.

4. **Continue to look for opportunities to invest in or support local micro-hydroelectric generation** (✓ complete)

   The Town of Telluride purchased the renewable energy credits created for 14,875,140 kWh of electricity that were generated at the Bridal Veil Powerhouse and the Ridgway Reservoir Power Station for $20,296.

5. **Continue to explore opportunities to invest in or support solar electric generation in town** (✓ complete)

   While the Town did not purchase or construct any additional solar capacity in 2016, it did support SMPAs construction of the Solar IQ Farm, which is targeted for low-income residents of their service area.

6. **Leverage community knowledge, experience, and resources – work with EcoAction Partners.** (✓ complete)

   EcoAction Partners has been essential to analyzing the energy use of the broader Telluride Community, and the region, to help staff understand where the Town Government stands when compared to the whole. In 2016, EcoAction Partners continued to spearhead Telluride's Green Lights Program, continued to implement the Green Business Certification Program, refined calculations of the Construction Waste Pilot Program, completed the Construction Waste Analysis for the Tennis Courts and Retaining Wall Projects in in the Town Park, and continue to assist the Planning Department with Green Building Code applications.

Recommended Actions for 2017

Item IV.A of Town Council's 2017 Goals & Objectives listed the following objectives to reduce the town government's carbon footprint.

1. Continue to pursue Telluride renewed – secure 100 percent of Town of Telluride energy offset by renewable energy sources by the year 2020. Pursue renewable Energy Options.

2. Adopt the 2015 International Energy Conservation Code (IECC) and Update the Green Building Code to improve HERS ratings requirements and apply the code to remodels, not just new construction.

3. Improve energy efficiency in Town facilities and activities using the Energy Mitigation Fund, which is supported by Green Building Fees.

   - Move forward on the Lighting Efficiency Program for Town facilities
   - Implement the LED lighting prototype along Butcher Creek Road. Track energy use. Plan for 2017 Street Lighting Replacement.

4. Continue to look into opportunities to invest in or support local micro-hydroelectric generation.

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

6. Promote community involvement by working with local resources.

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

Status of Recommended Actions Made for 2016

1. **Support EcoAction Partners with its Green Business Certification Program.** (✓ complete)

   By continuing to fund EcoAction Partners, by extension, the Town of Telluride facilitated the continuation of the Green Business Certification Program, which they developed and continue to manage and promote.

2. **Implement the updated Green Building Code** (not complete)

   While town staff continued to implement the existing Green Building Code, there were no updates to the Code.

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)

   SMPA had significant difficulty with providing the electricity data presented in this report in a timely manner.

4. **Increase ridership on the Galloping Goose while improving fleet efficiency.** (✓ complete)

   2016 Galloping Goose ridership was at an all-time high. It was greater than in 2005 by 48%, which is equivalent to nearly 99,259 riders. In 2016, although fuel efficiency of the fleet did not improve significantly, increased ridership alone lowered the community's potential CO_{2e} by 6% when compared to 2005 levels (-104.3 metric tons CO_{2e} saved).

5. **Work with EcoAction Partners to develop a REC resale program for the 90% portion of the Ridgway Dam RECs not be used by Town Government, and which in 2014 were assigned to the Community at large for GHG emissions accounting.** (Not complete)

Recommended Actions for 2017

1. Continue to support EcoAction Partners with its Green Business Certification Program.

2. Implement the updated Green Building Code.

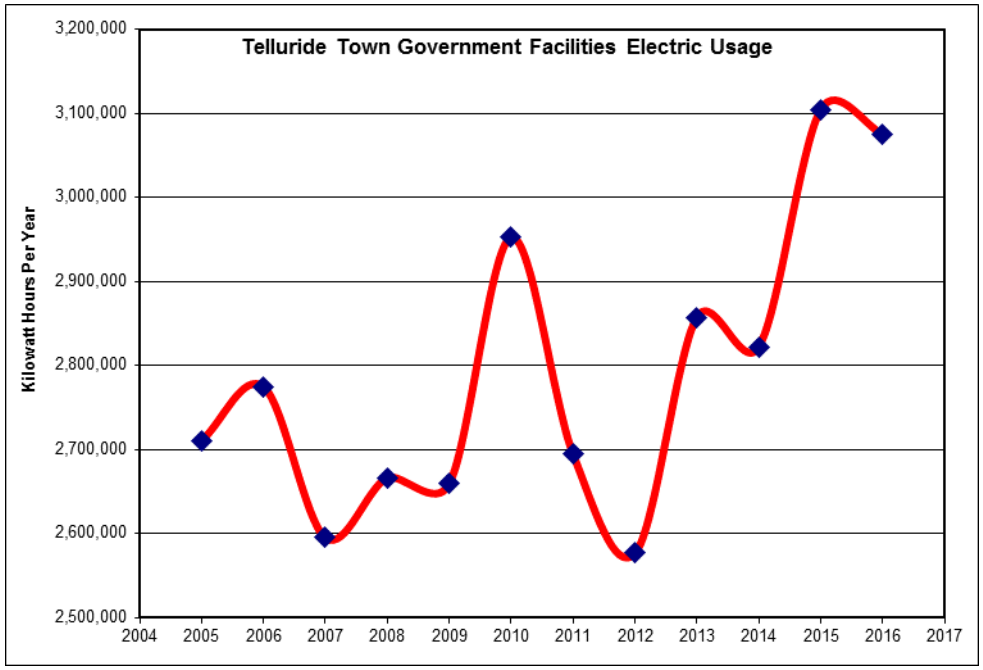
3. Continue to work with SMPA to track renewable energy generation, and green block and solar energy offsets by those living within the Town of Telluride.

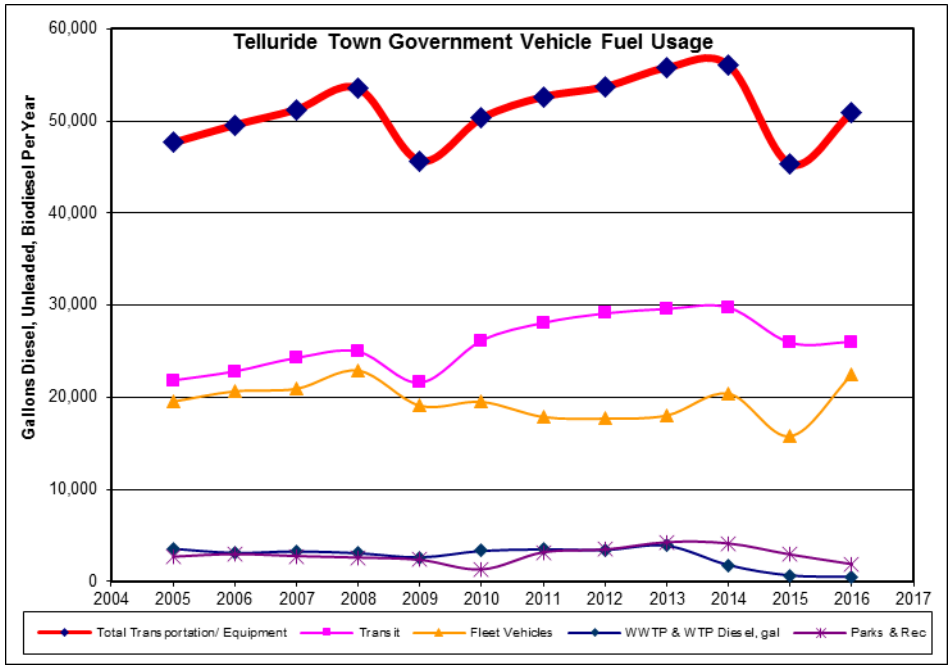
4. Continue to increase ridership on the Galloping Goose while improving fleet efficiency.

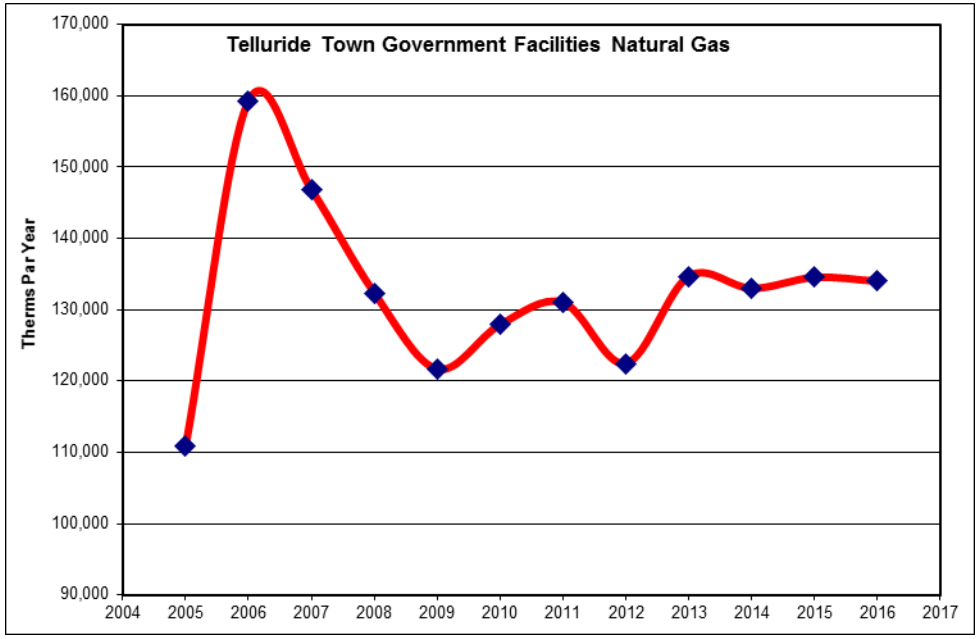
5. Work with EcoAction Partners and Mountain Film to invigorate and engage the community within "The New Normal" programming for this festival.

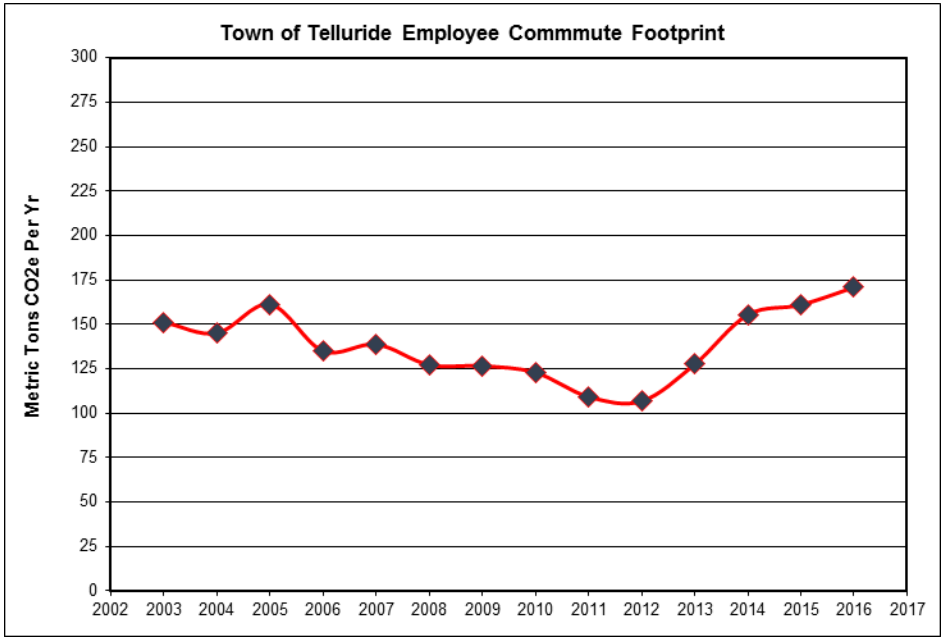
6. Work with the Pinhead Climate Institute to facilitate implementation of an agricultural carbon offset program for the Galloping Goose Transit System.

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


Telluride Town Government Facilities Electric Usage
Kilowatt Hours Per Year
3,200,000
3,100,000
3,000,000
2,900,000
2,800,000
2,700,000
2,600,000
2,500,000
2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017


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
2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017
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
2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017


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

Telluride Town Government Carbon Tracking

Fuel Breakdown	CO_2 lb/unit	2005 Usage	2005 CO_{2e} lb/yr	2005 CO2e MT/yr	2016 Usage	2016 CO_{2e} lb/yr	2016 CO2e MT/yr	% Change CO_2e from 2005
Facilities								
Electric/Coal, kwH	2.2	2,710,674	5,963,483	2,705.0	3,075,097	5,750,431	2,608.4	-3.6%
Natural Gas, Therms	12.05	110,824	1,335,429	605.7	133,994	1,591,849	722.1	19.2%
			7,298,912	**3,310.8**		**7,342,280**	**3,330.4**	0.6%
Transportation/Vehicles/Equipment								
Transit								
Gas-Unleaded, gal	19.59	11,952	234,136	106.2	15,434	387,095	175.6	
Diesel, gal	22.38	8,638	193,307	87.7	10,592	291,275	132.1	
Biodiesel, gal	0	1,256	0	0.0	0	0	0.0	
Transit Total		21,845	427,443	193.9	26,026	678,369	307.7	58.7%
Fleet Vehicles								
Gas-Unleaded, gal	19.59	10,582	207,307	94.0	14,155	354,995	161.0	
Diesel, gal	22.38	8,956	200,429	90.9	8,337	229,262	104.0	
Fleet Total		19,538	407,736	184.9	22,491	584,257	265.0	43.3%
WWTP & WTP Diesel, gal	22.38	3,562	79,718	36.2	536	14,740	6.7	-81.5%
Parks & Rec								
Gas-Unleaded, gal	19.59	2,344	45,927	20.8	155	3,410	1.5	
Diesel, gal	22.38	356	7,972	3.6	0	0	0.0	
Additional Diesel, gal	22.38				275	7,563		
Additional Unleaded, gal	19.59				1,460	36,573		
Kerosene	19.00				0	0		
Parks & Rec Total		2,701	53,899	24.4	1,890	47,546	21.6	-11.8%
Total Transportation/ Equipment		**47,646**	**968,795**	**439.4**	**50,944**	**1,324,912**	**601.0**	**36.8%**
Personnel Commute			355,797	161.4		376,803	170.9	5.9%
CO_{2e} Generated			**8,623,504**	**3,911.6**		**9,043,995**	**4,102.3**	**4.9%**
Open Space CO_{2e} sequestered			447,317	202.9		863,355	391.6	
CO_{2e} generated minus Sequestration			8,176,186	3,708.7		8,180,640	3,710.7	**0.1%**
Bridal Veil RECS		0	0	0	190,440	-356,123	-161.5	
Ridgway Dam RECS		0	0	0	4,084,696	-7,638,382	-3,464.7	
WWTP GreenPower Purchase		0	0	0	99,600	-186,252	-84.5	
WWTP PV Electric Generation		0	0	0	0	0	0.0	
CEC Solar Panels		0	0	0	0	0	0.0	
CO_{2e} Minus Sequestration & RECs			8,176,186	3,708.7		-116	-0.1	**-100.0%**

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

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 sky-lights, 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 begain 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 *ReaIIce®* 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.
- <u>Carhenge</u>
  - 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.]*
- <u>Residential Streetlights</u>
  - Replaced 13 of 24 SMPA-owned cobrahead (high pressure sodium) streetlights with dark-skies compliant fixtures with 26-watt CFLs.
- <u>Commercial Street Lights</u>
  - Completed conversion of all bulbs to 100 watt-equivalent CFLs.
  - All streetlights on photocells
- <u>Bike Path Tunnel</u>
  - 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**