To: Mountain Village Town Council

Date: October 9, 2019

From: Kim Wheels, EcoAction Partners

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

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

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

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

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

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

BACKGROUND

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

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

2018 TMV GOVERNMENT ENERGY USE AND GHG EMISSIONS SUMMARY

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

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

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

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

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

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

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

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

  The category of **Street Lights** shows an increase in electricity of approximately 15,700 kWh. This use was analyzed monthly (see chart below) and discussed with MV staff, who determined the following:

  - When the snowmelt system at Sunset Plaza was increased in size, a heater was installed in the snowmelt system vault to control the temperature. This heater is tied into the nearby street light meter, accounting for 11,500 kWh of additional use.
  - At the North Village Center parking lot, a solar parking meter was removed from the solar grid due to not having enough power for the system. It was instead tied into the nearby street light meter and the associated photo eye for the lights was covered, in order to keep the meter working properly. Thus, until the situation was resolved,

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

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

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

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

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

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

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

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

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

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

RECOMMENDATIONS:

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

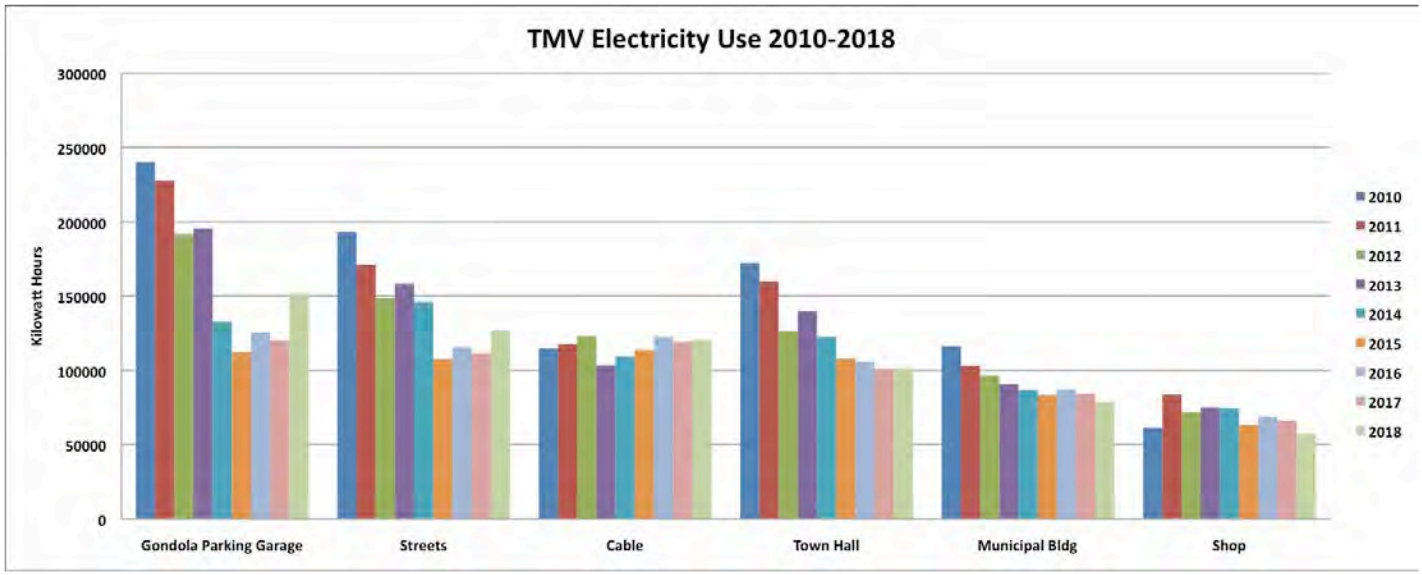
In general, the Green Team recognizes a need to develop a culture among Mountain Village staff that would engage all staff in sustainability initiatives. In order to gauge current engagement of staff, the Green Team recommends developing and sending out a survey to all staff. Following receiving and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

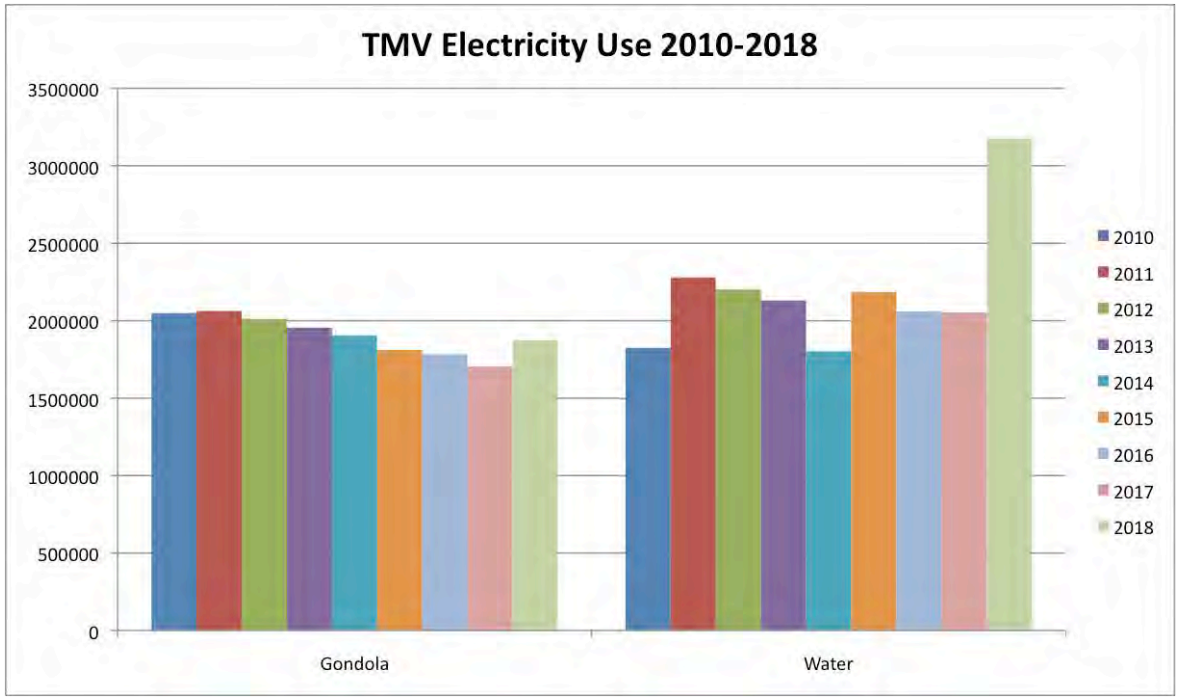
Mountain Village town staff who are responsible for managing buildings, snowmelt systems and other facilities do not currently review town energy use on a regular basis, so there is a disconnect between management of these systems and actual utility use. The number one first step in reducing energy use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

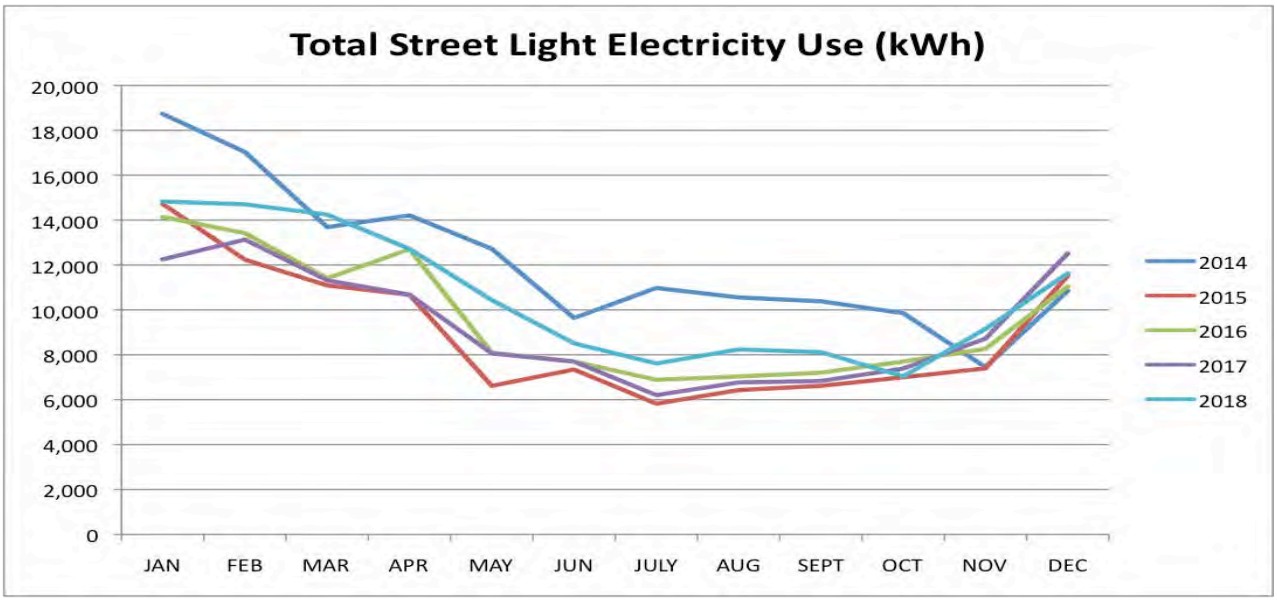
the future, it is recommended that utility usage be regularly reviewed by town staff on at least a quarterly basis, in order to identify anomalies in usage quickly and thus be able to address abnormal increases in energy use in a timely fashion. MV Town staff could also be engaged to provide and implement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

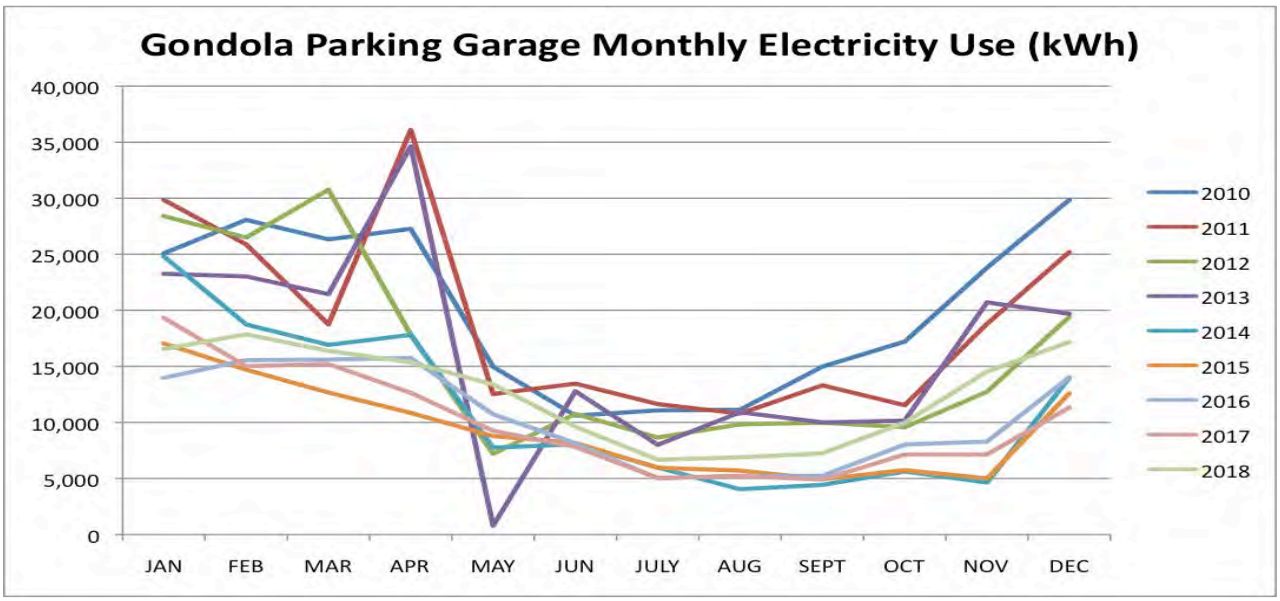
Mountain Village energy use is recorded monthly by town staff in spreadsheets and reviewed annually for GHG emissions accounting for this report, however it is not set up for monthly charting of data per account or category of usage. Electricity data per account is now available online at SMPA's SmartHub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

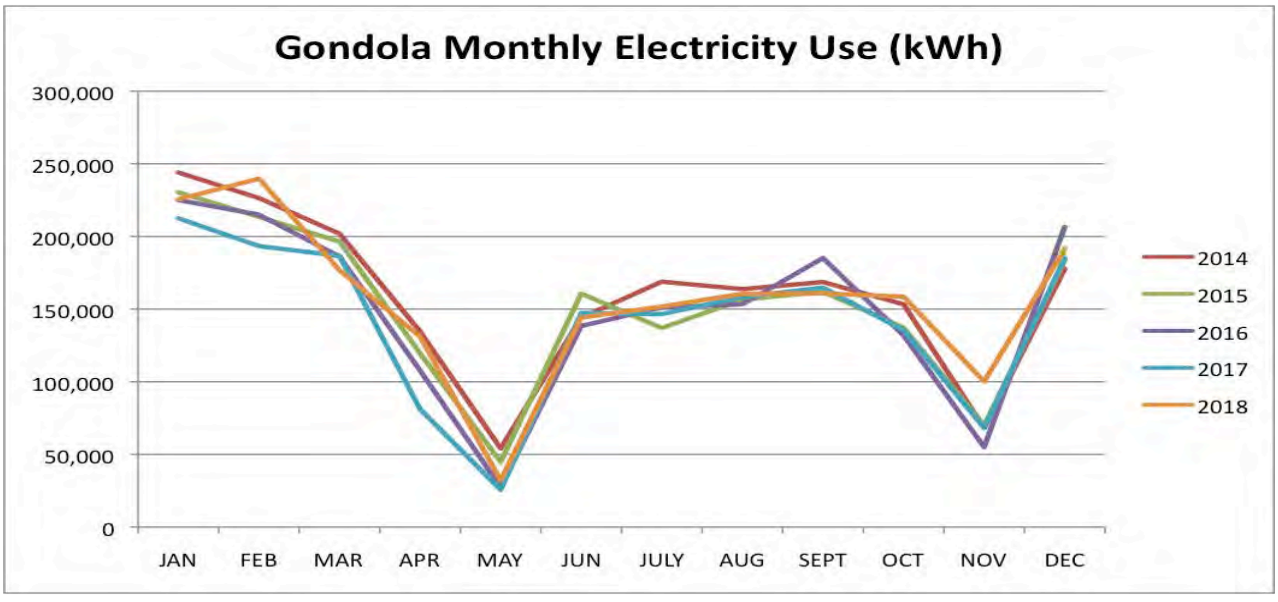
Snowmaking water and associated electricity use are currently incorporated into Mountain Village town government's utility usage. The Green Team suggests considering reallocating snowmaking usage to Telluride Ski & Golf, so that this water use and associated carbon emissions are accounted for in TSG's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

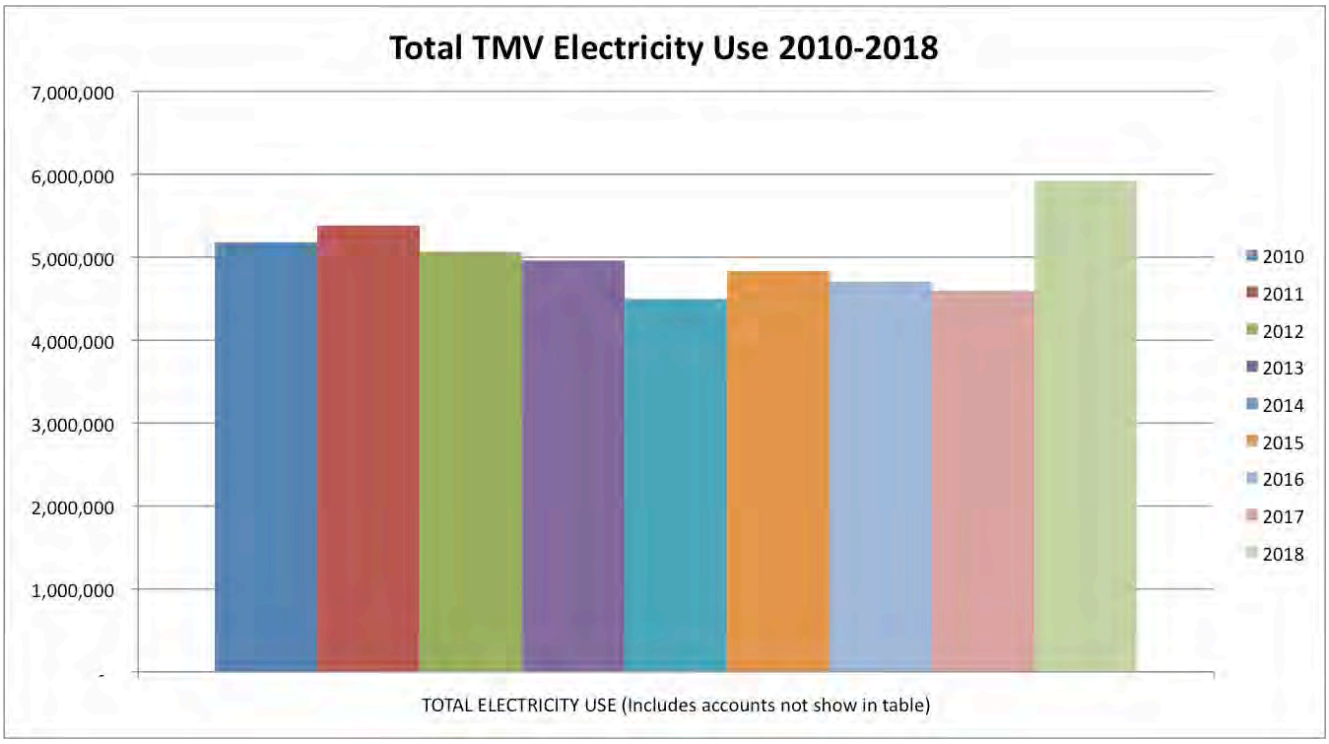

TMV Electricity Use 2010-2018
Kilowatt Hours
300000
250000
200000
150000
100000
50000
0
Gondola Parking Garage
Streets
Cable
Town Hall
Municipal Bldg
Shop
2010
2011
2012
2013
2014
2015
2016
2017
2018

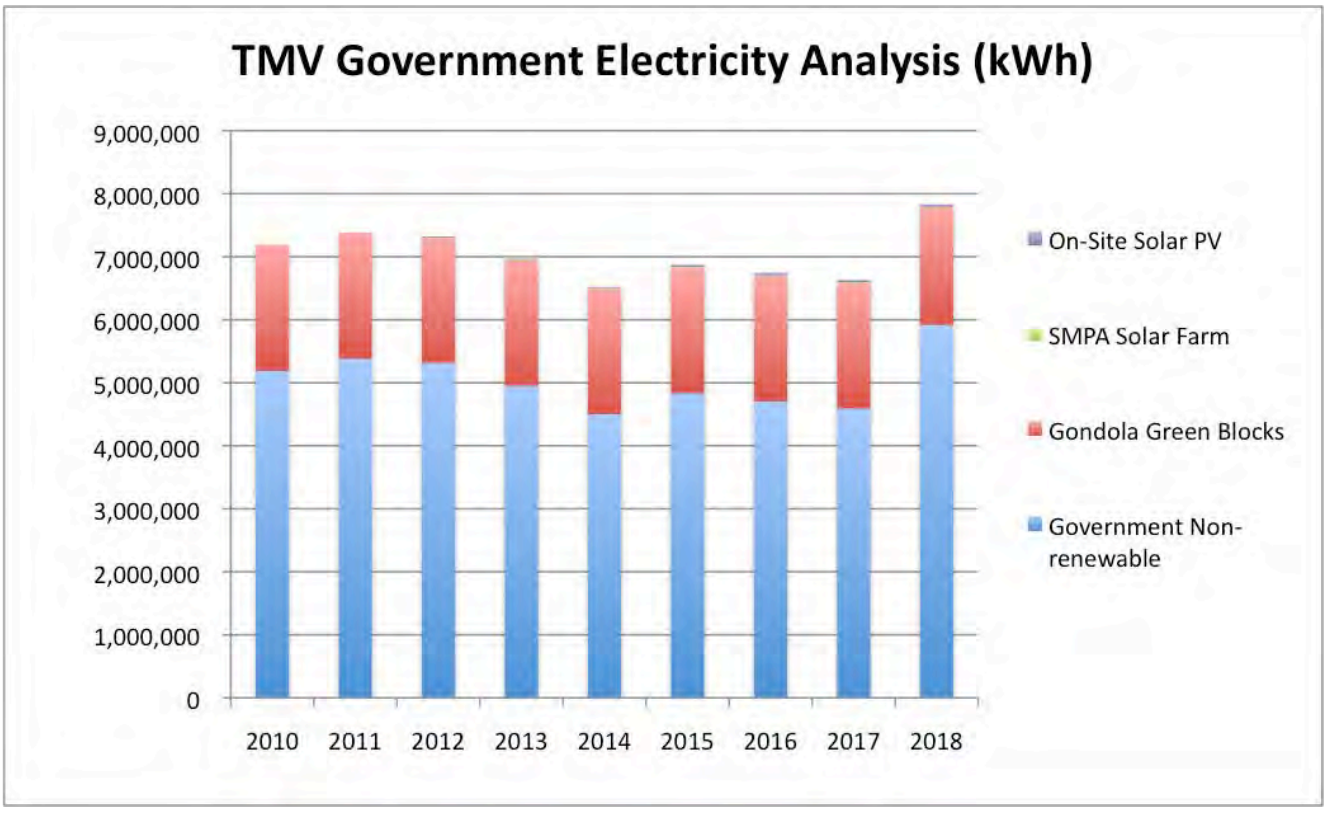

TMV Electricity Use 2010-2018
3500000
3000000
2500000
2000000
1500000
1000000
500000
0
Gondola
Water
2010
2011
2012
2013
2014
2015
2016
2017
2018

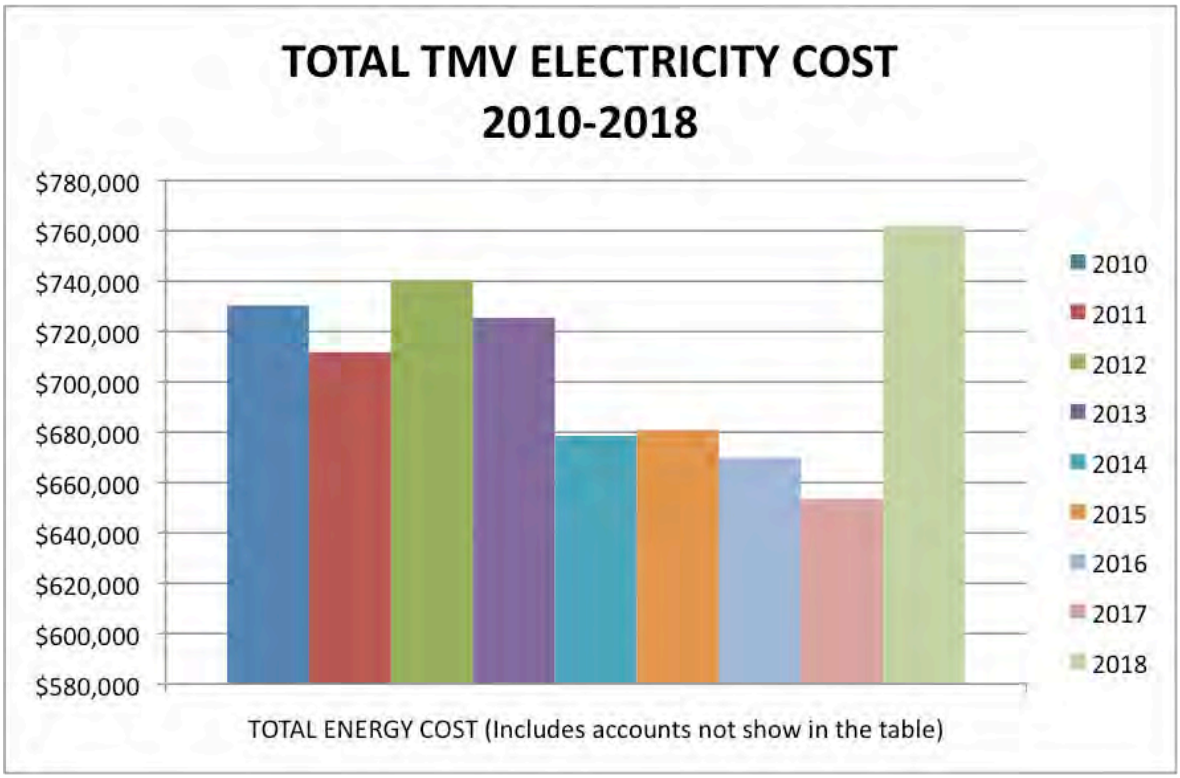

Total Street Light Electricity Use (kWh)
20,000
18,000
16,000
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
JAN
FEB
MAR
APR
MAY
JUN
JULY
AUG
SEPT
OCT
NOV
DEC
2014
2015
2016
2017
2018

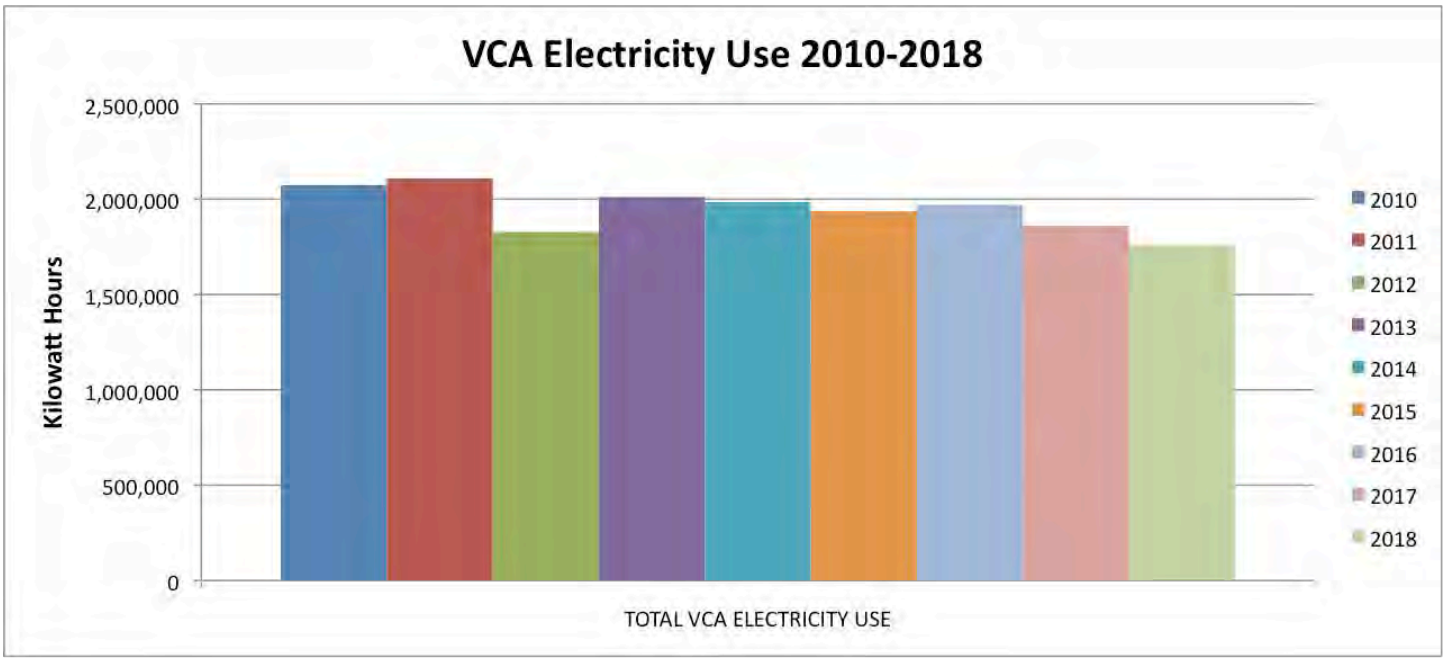

Gondola Parking Garage Monthly Electricity Use (kWh)
40,000
35,000
30,000
25,000
20,000
15,000
10,000
5,000
0
JAN
FEB
MAR
APR
MAY
JUN
JULY
AUG
SEPT
OCT
NOV
DEC
2010
2011
2012
2013
2014
2015
2016
2017
2018

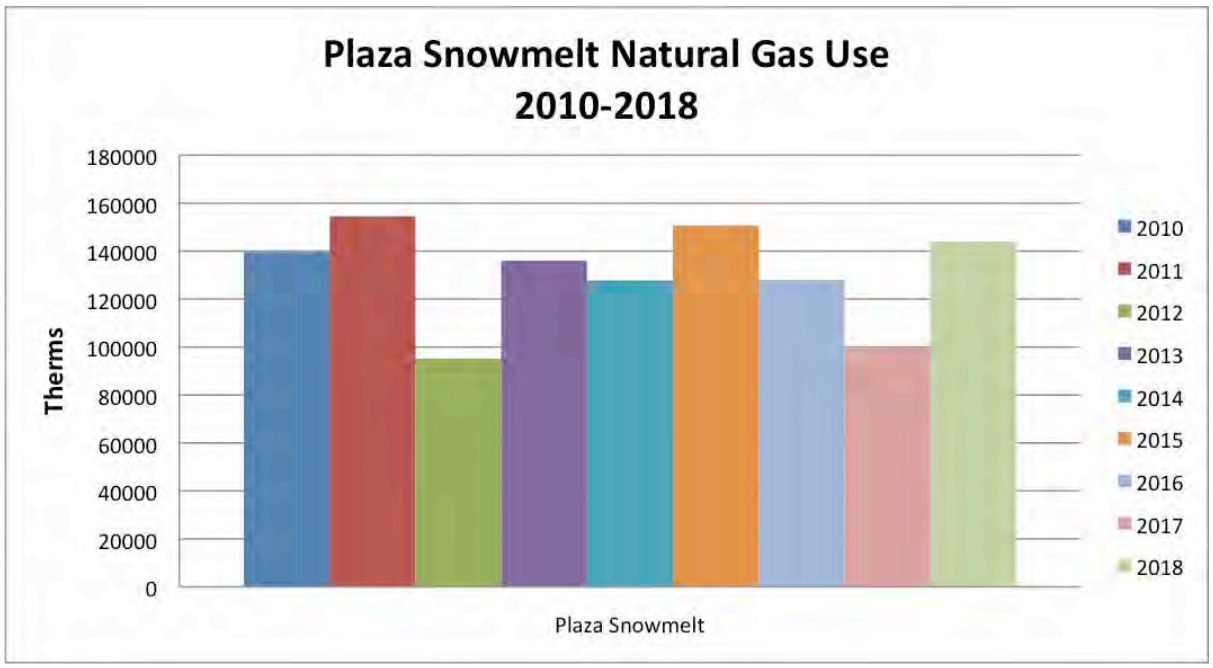

Gondola Monthly Electricity Use (kWh)
300,000
250,000
200,000
150,000
100,000
50,000
0
JAN
FEB
MAR
APR
MAY
JUN
JULY
AUG
SEPT
OCT
NOV
DEC
2014
2015
2016
2017
2018

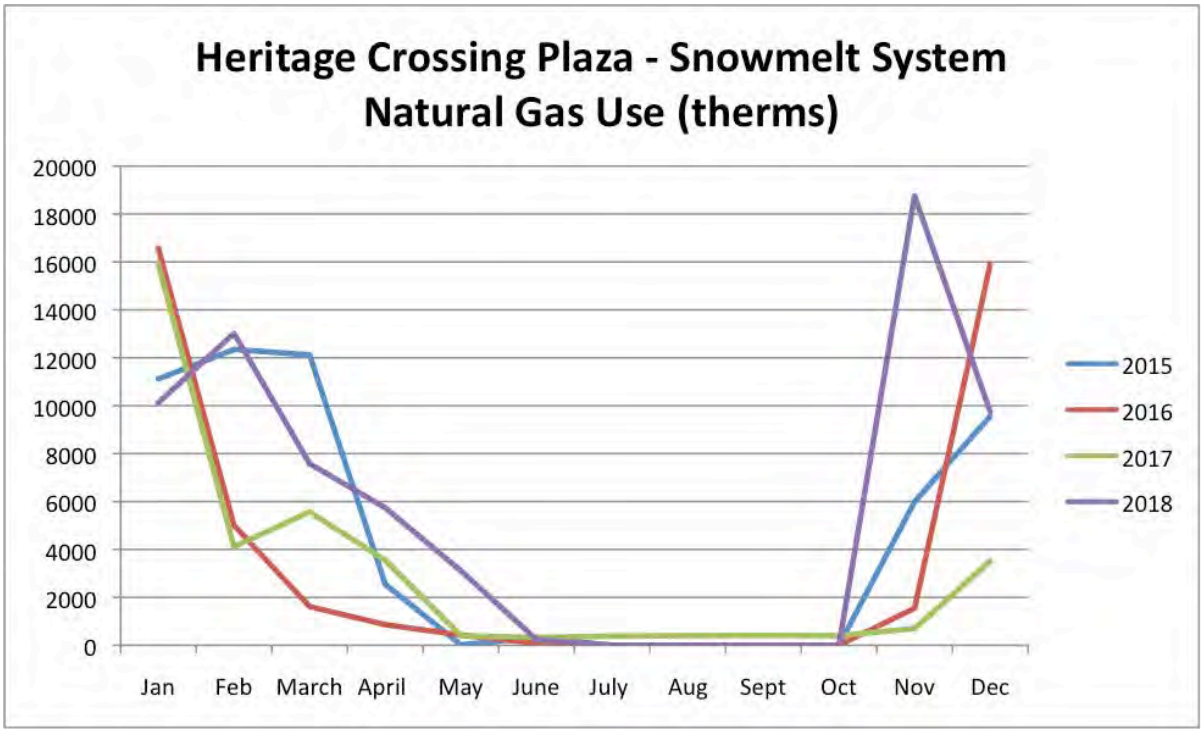

Total TMV Electricity Use 2010-2018
7,000,000
6,000,000
5,000,000
4,000,000
3,000,000
2,000,000
1,000,000
-
2010
2011
2012
2013
2014
2015
2016
2017
2018
TOTAL ELECTRICITY USE (Includes accounts not show in table)

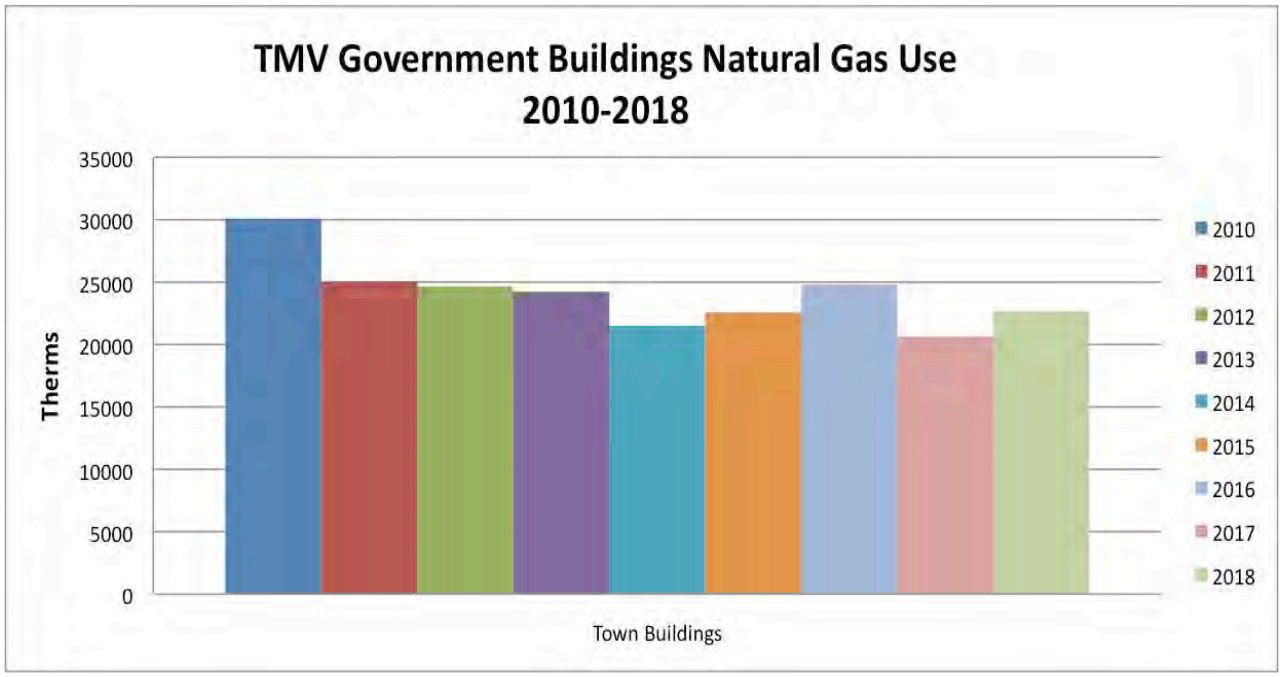

TMV Government Electricity Analysis (kWh)
9,000,000
8,000,000
7,000,000
6,000,000
5,000,000
4,000,000
3,000,000
2,000,000
1,000,000
0
2010
2011
2012
2013
2014
2015
2016
2017
2018
On-Site Solar PV
SMPA Solar Farm
Gondola Green Blocks
Government Non-renewable

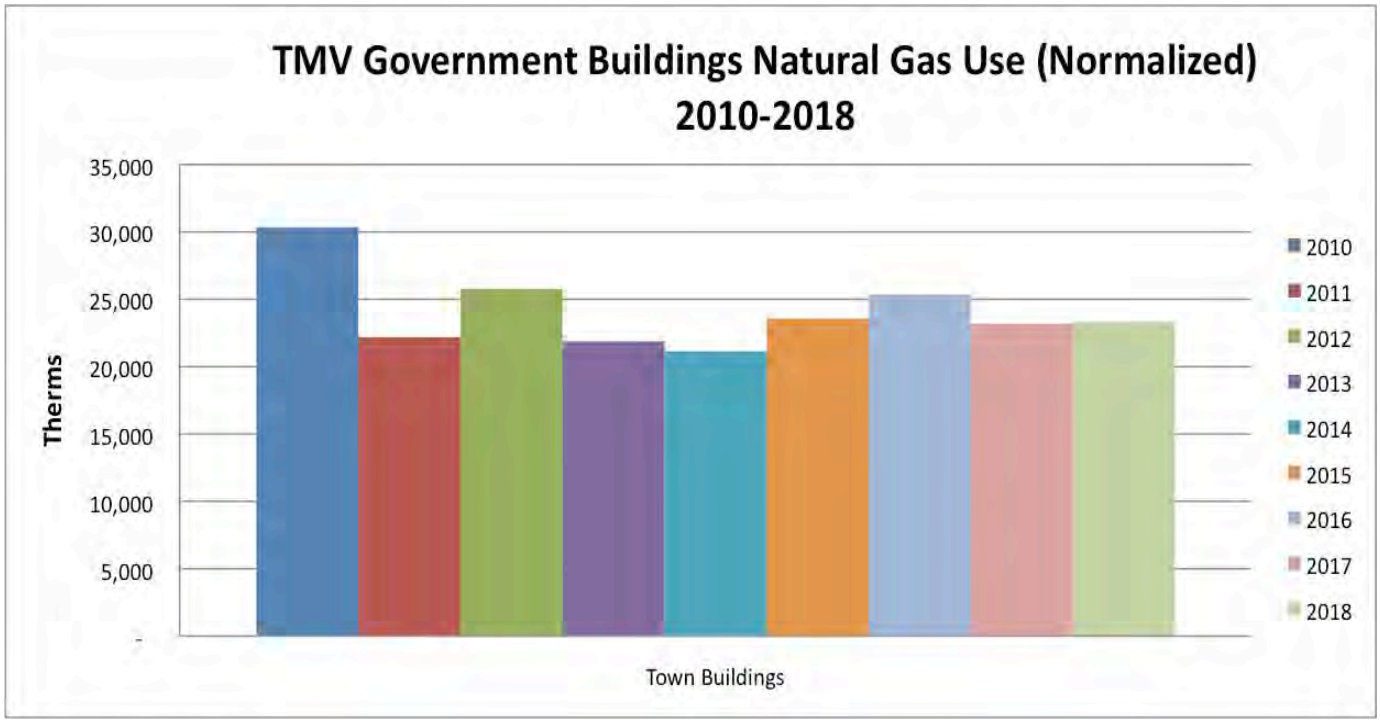

TOTAL TMV ELECTRICITY COST
2010-2018
$780,000
$760,000
$740,000
$720,000
$700,000
$680,000
$660,000
$640,000
$620,000
$600,000
$580,000
2010
2011
2012
2013
2014
2015
2016
2017
2018
TOTAL ENERGY COST (Includes accounts not show in the table)

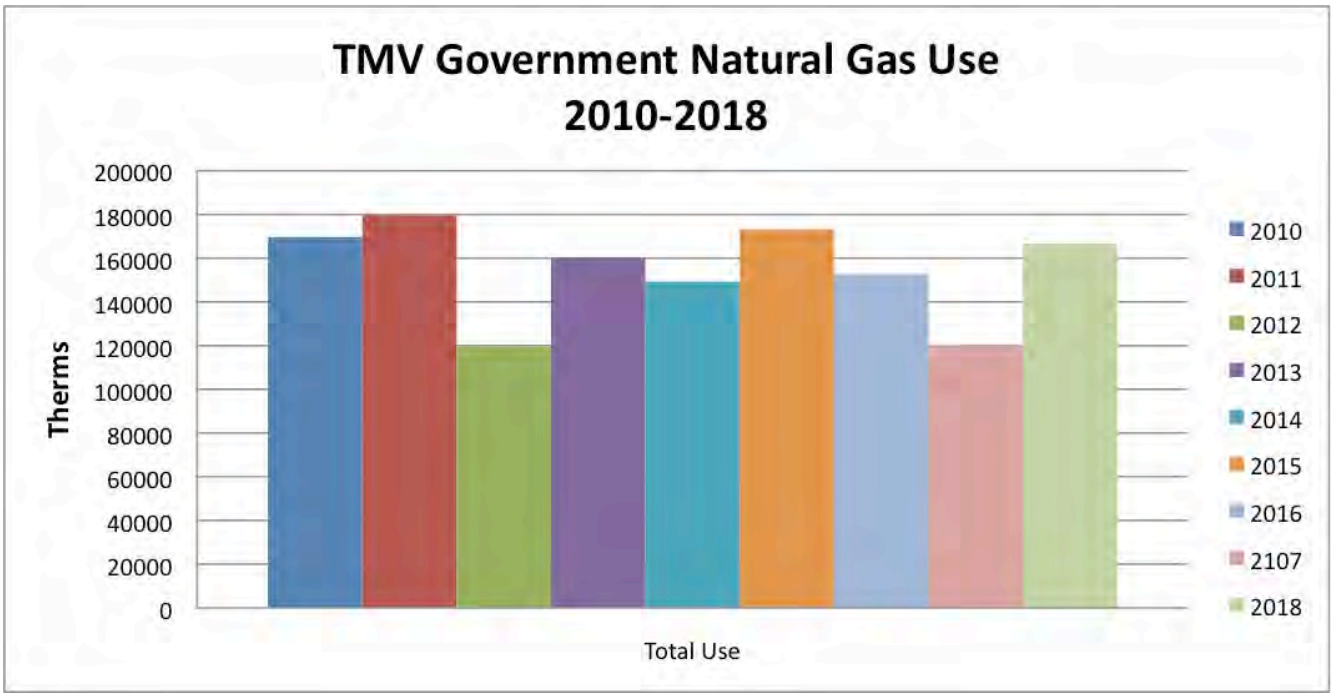

VCA Electricity Use 2010-2018
Kilowatt Hours
2,500,000
2,000,000
1,500,000
1,000,000
500,000
0
2010
2011
2012
2013
2014
2015
2016
2017
2018
TOTAL VCA ELECTRICITY USE

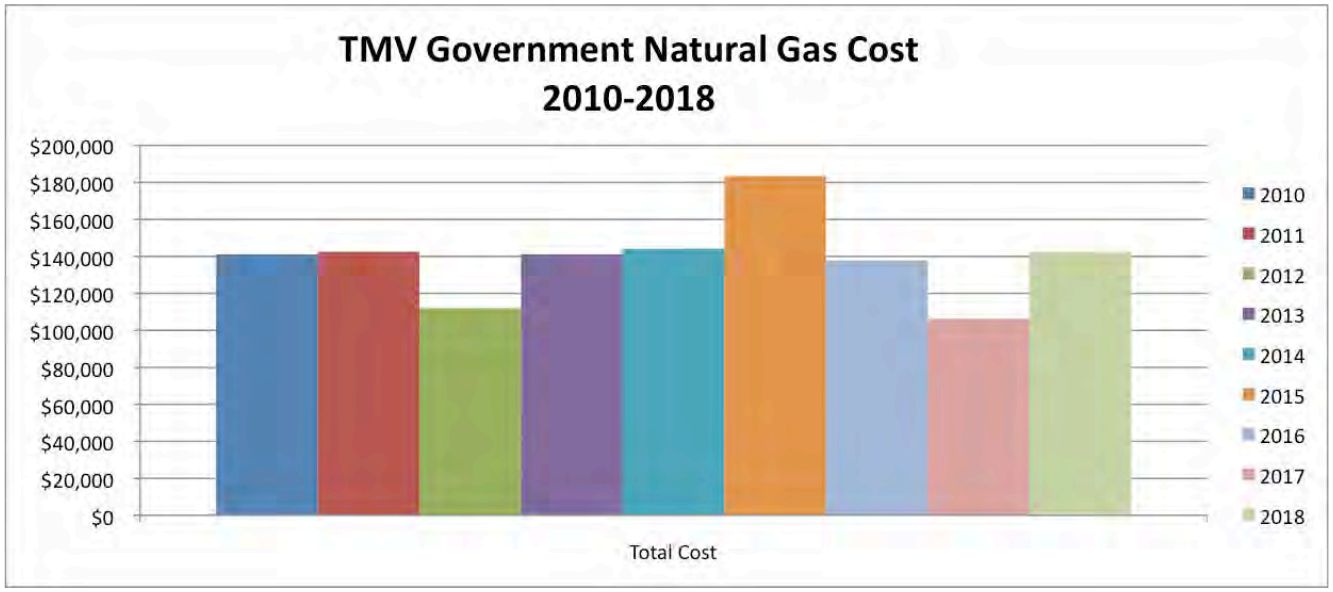

Plaza Snowmelt Natural Gas Use
2010-2018
Therms
180000
160000
140000
120000
100000
80000
60000
40000
20000
0
Plaza Snowmelt
2010
2011
2012
2013
2014
2015
2016
2017
2018

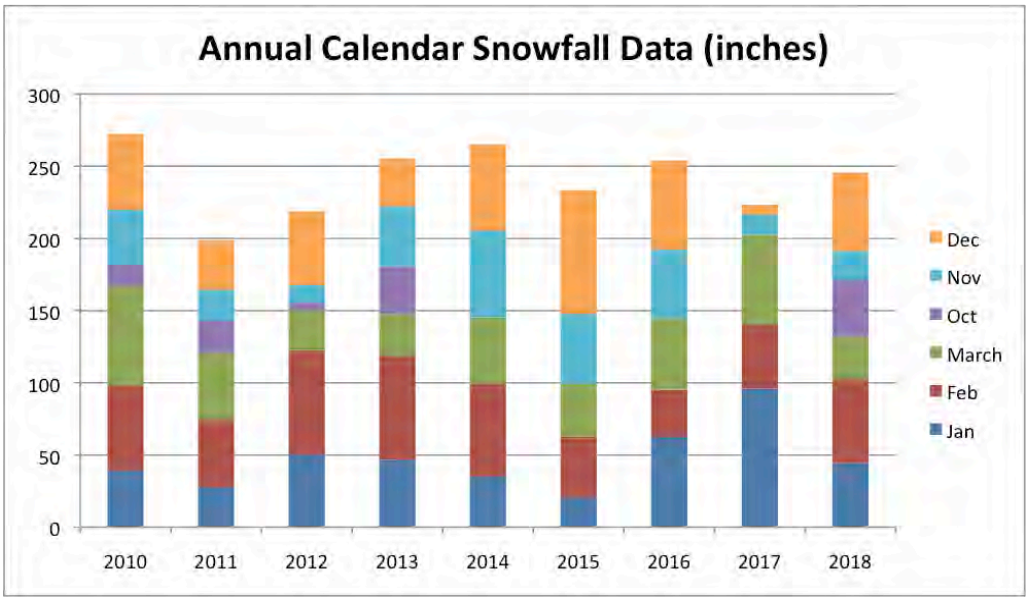

Heritage Crossing Plaza - Snowmelt System
Natural Gas Use (therms)
20000
18000
16000
14000
12000
10000
8000
6000
4000
2000
0
Jan
Feb
March
April
May
June
July
Aug
Sept
Oct
Nov
Dec
2015
2016
2017
2018

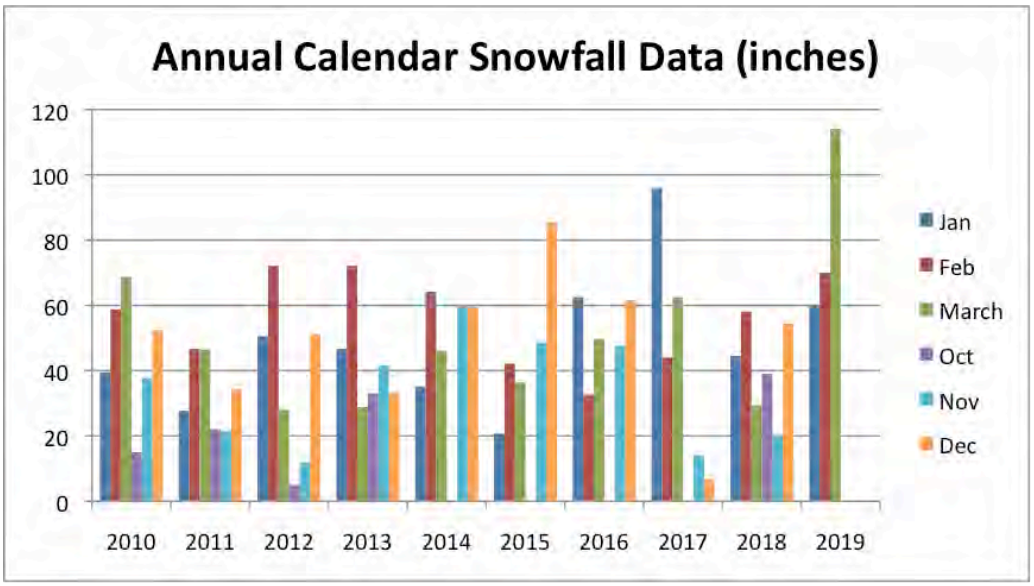

TMV Government Buildings Natural Gas Use
2010-2018
35000
30000
25000
20000
15000
10000
5000
0
Therms
Town Buildings
2010
2011
2012
2013
2014
2015
2016
2017
2018

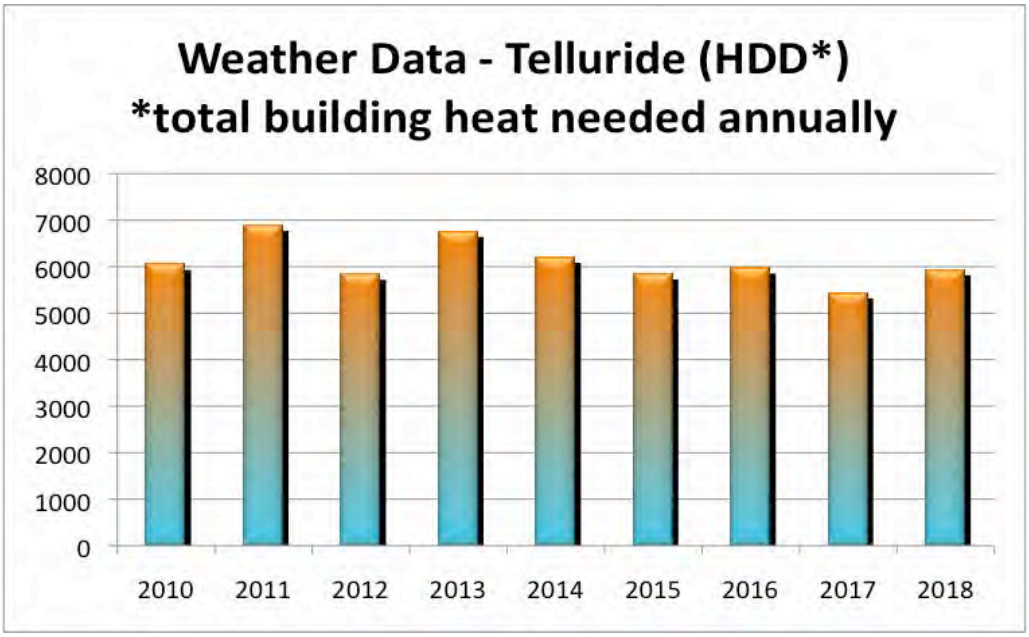

TMV Government Buildings Natural Gas Use (Normalized)
2010-2018
35,000
30,000
25,000
20,000
15,000
10,000
5,000
-
Therms
Town Buildings
2010
2011
2012
2013
2014
2015
2016
2017
2018

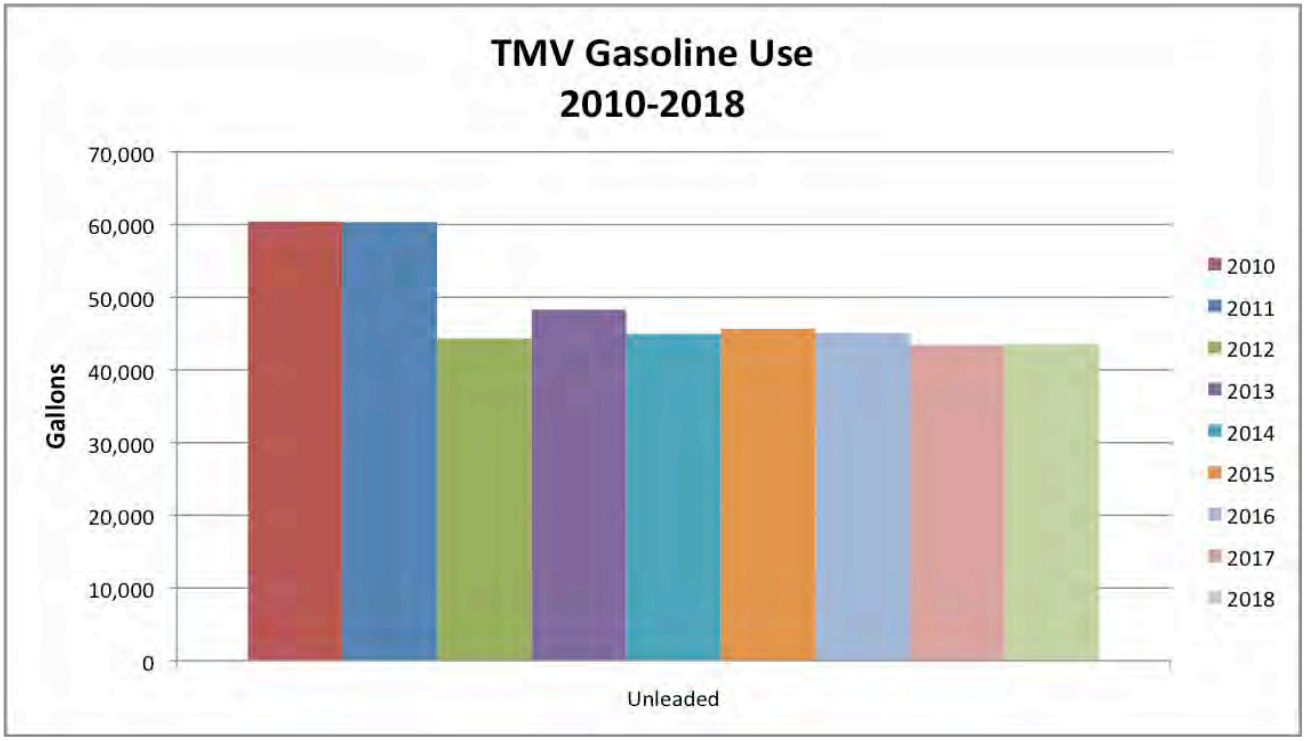

TMV Government Natural Gas Use
2010-2018
Therms
200000
180000
160000
140000
120000
100000
80000
60000
40000
20000
0
Total Use
2010
2011
2012
2013
2014
2015
2016
2107
2018

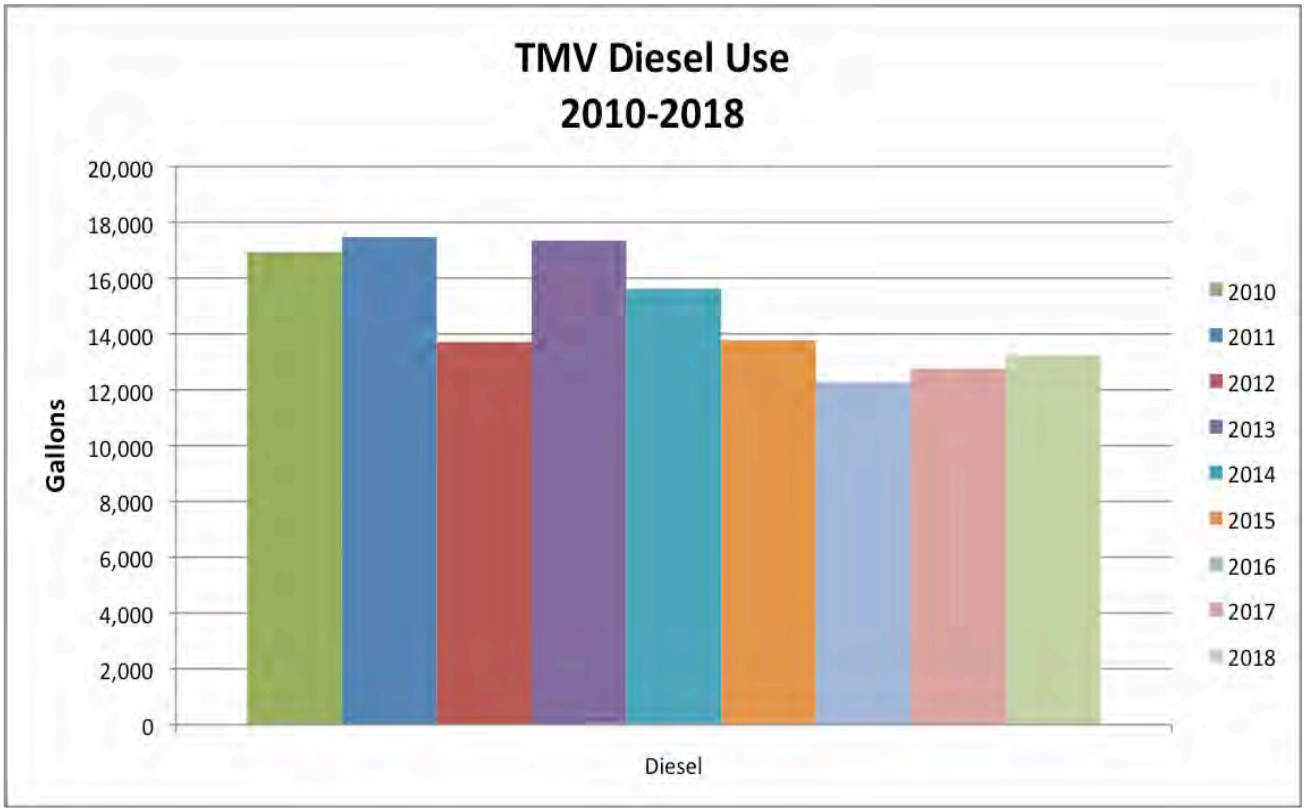

TMV Government Natural Gas Cost
2010-2018
$200,000
$180,000
$160,000
$140,000
$120,000
$100,000
$80,000
$60,000
$40,000
$20,000
$0
Total Cost
2010
2011
2012
2013
2014
2015
2016
2017
2018

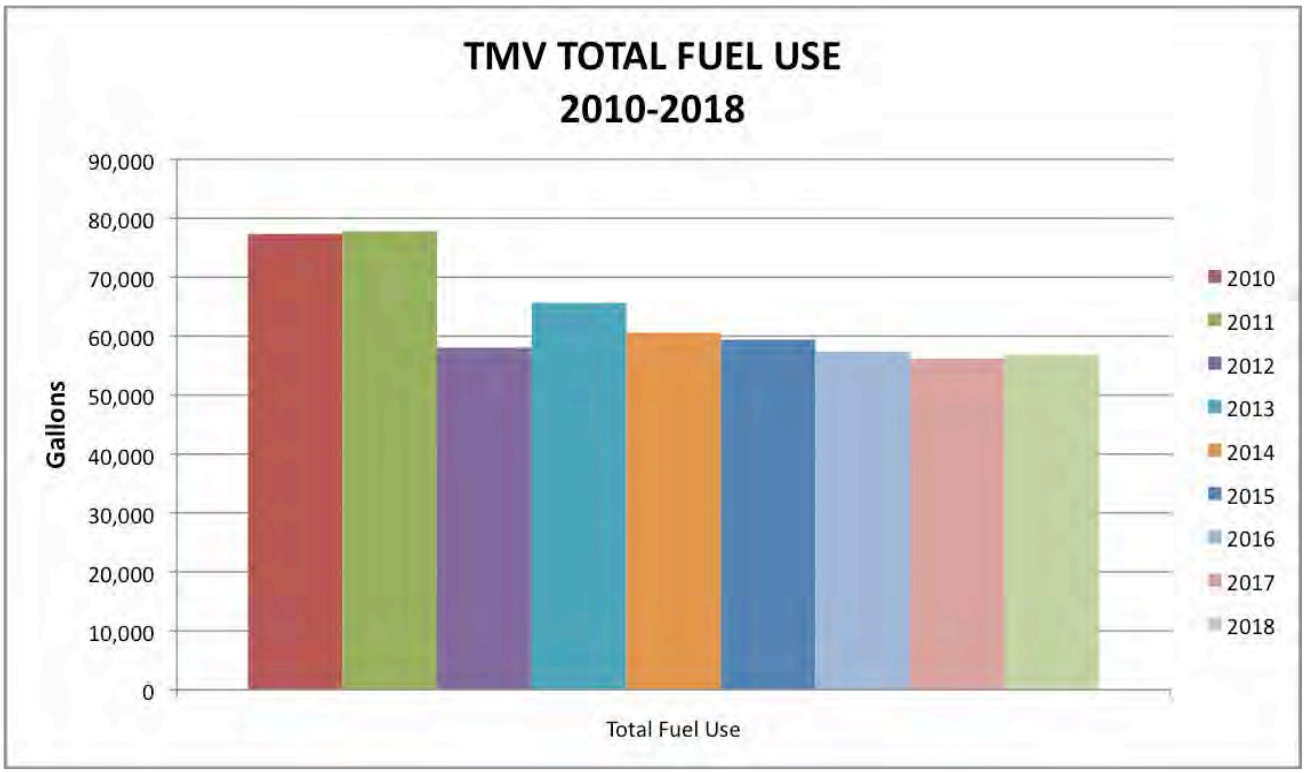

Annual Calendar Snowfall Data (inches)
300
250
200
150
100
50
0
2010
2011
2012
2013
2014
2015
2016
2017
2018
Dec
Nov
Oct
March
Feb
Jan

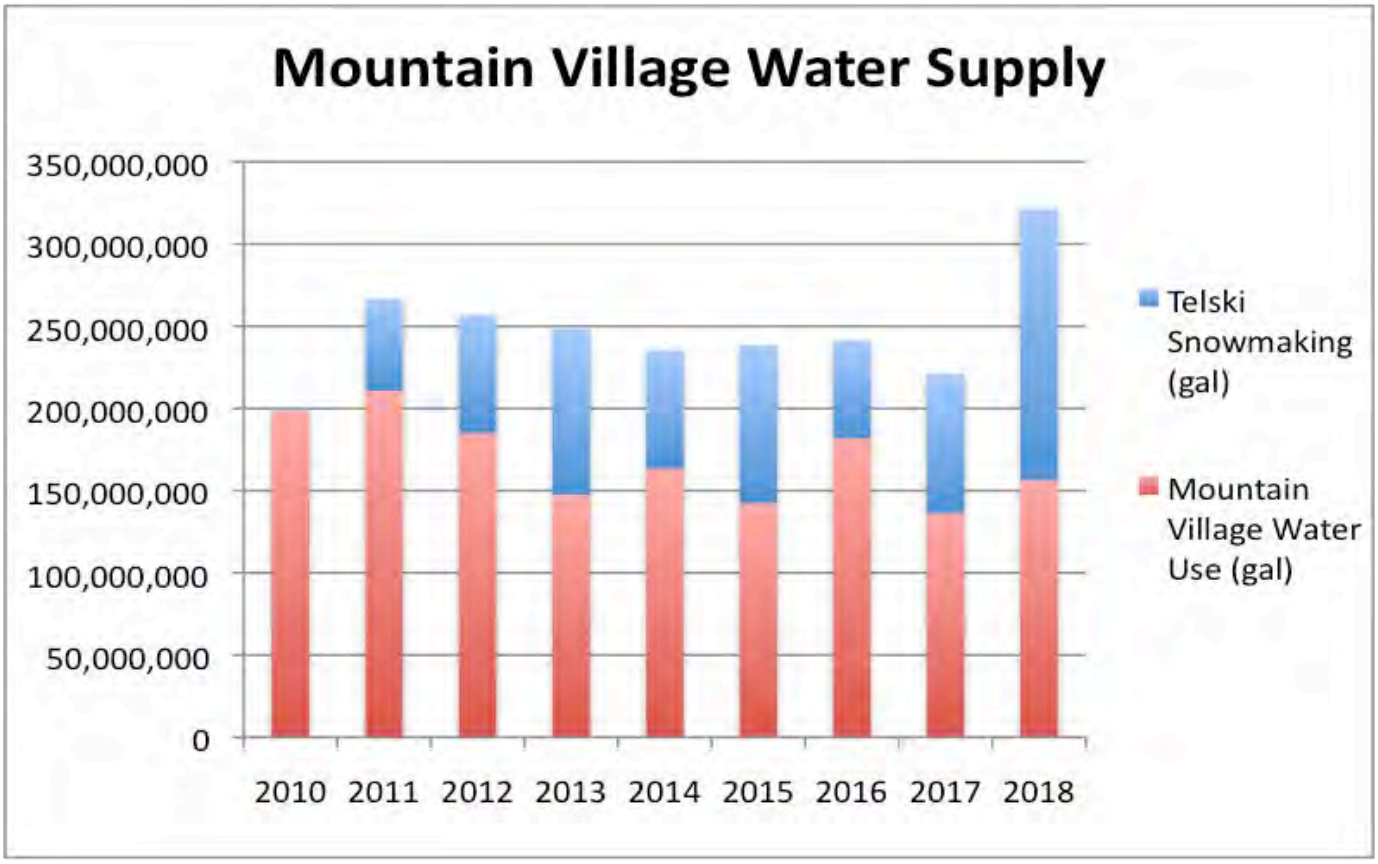

Annual Calendar Snowfall Data (inches)
120
100
80
60
40
20
0
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
Jan
Feb
March
Oct
Nov
Dec


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

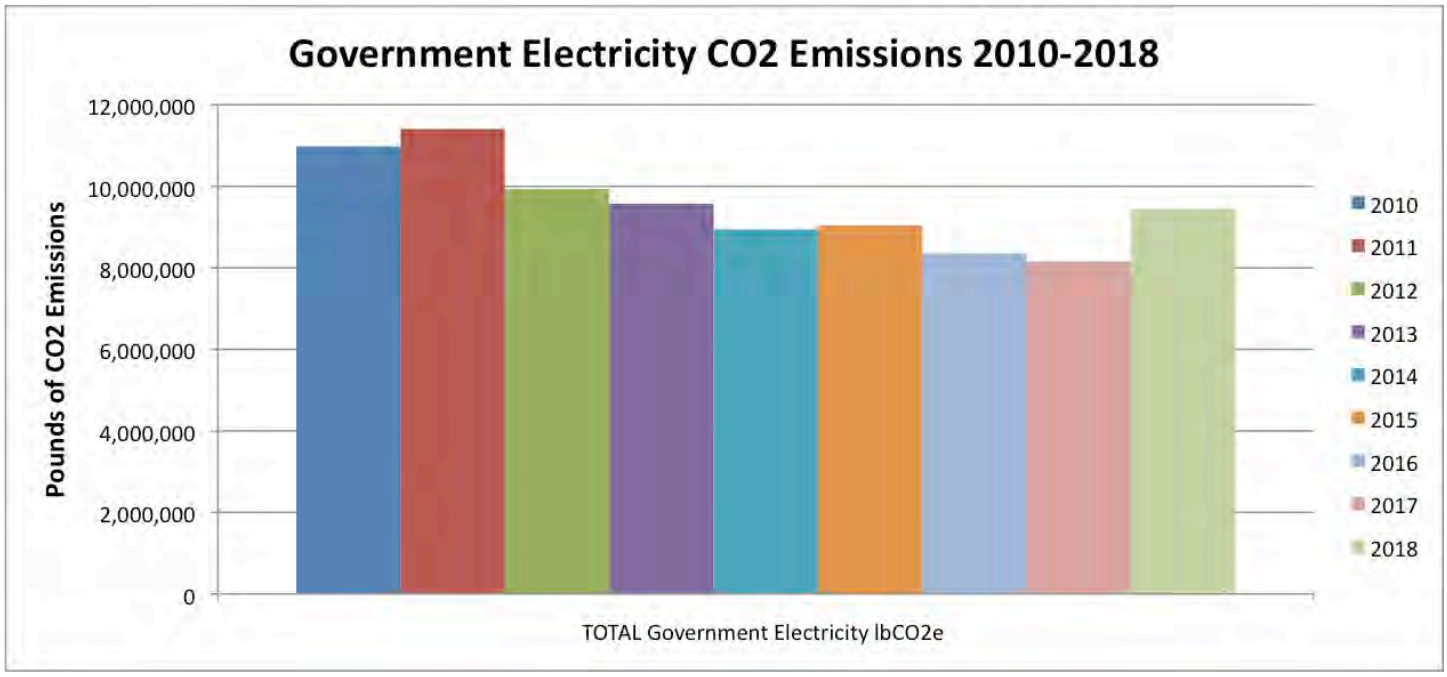

TMV Gasoline Use
2010-2018
70,000
60,000
50,000
40,000
30,000
20,000
10,000
0
Gallons
Unleaded
2010
2011
2012
2013
2014
2015
2016
2017
2018

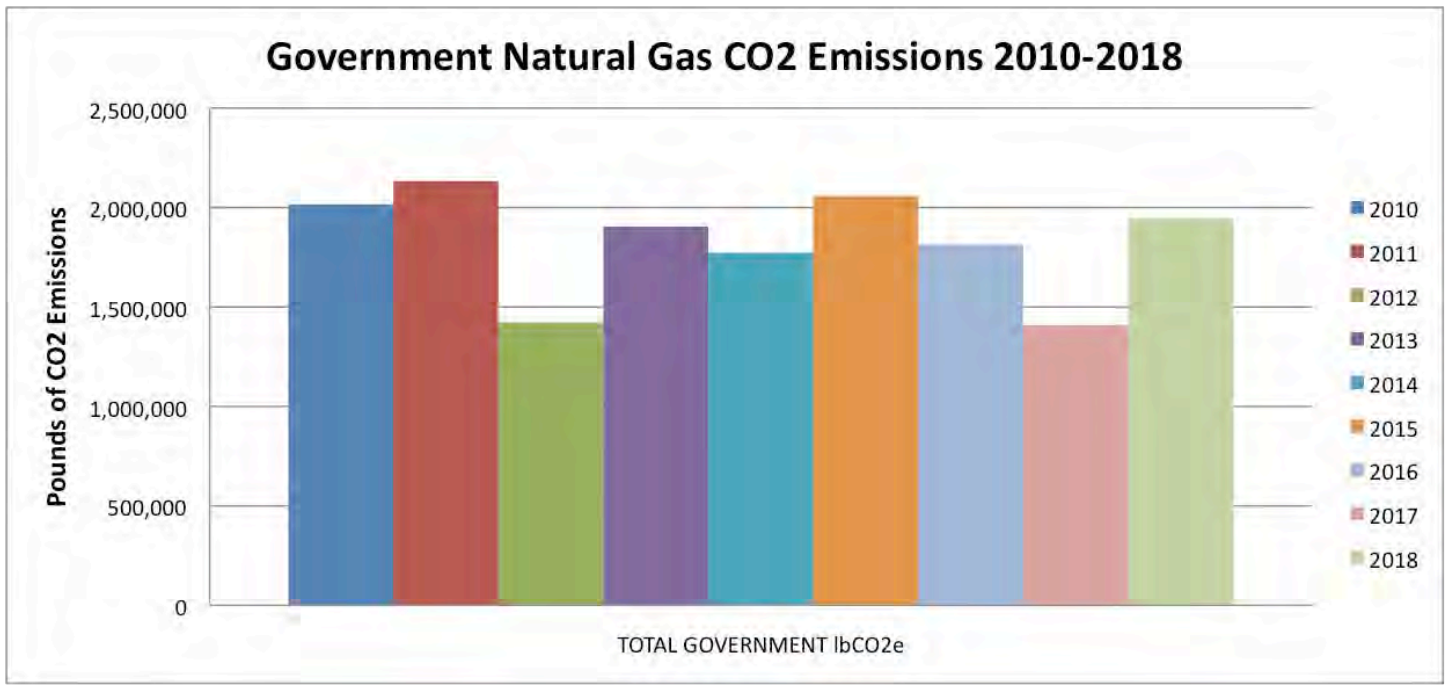

TMV Diesel Use
2010-2018
20,000
18,000
16,000
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
Gallons
Diesel
2010
2011
2012
2013
2014
2015
2016
2017
2018

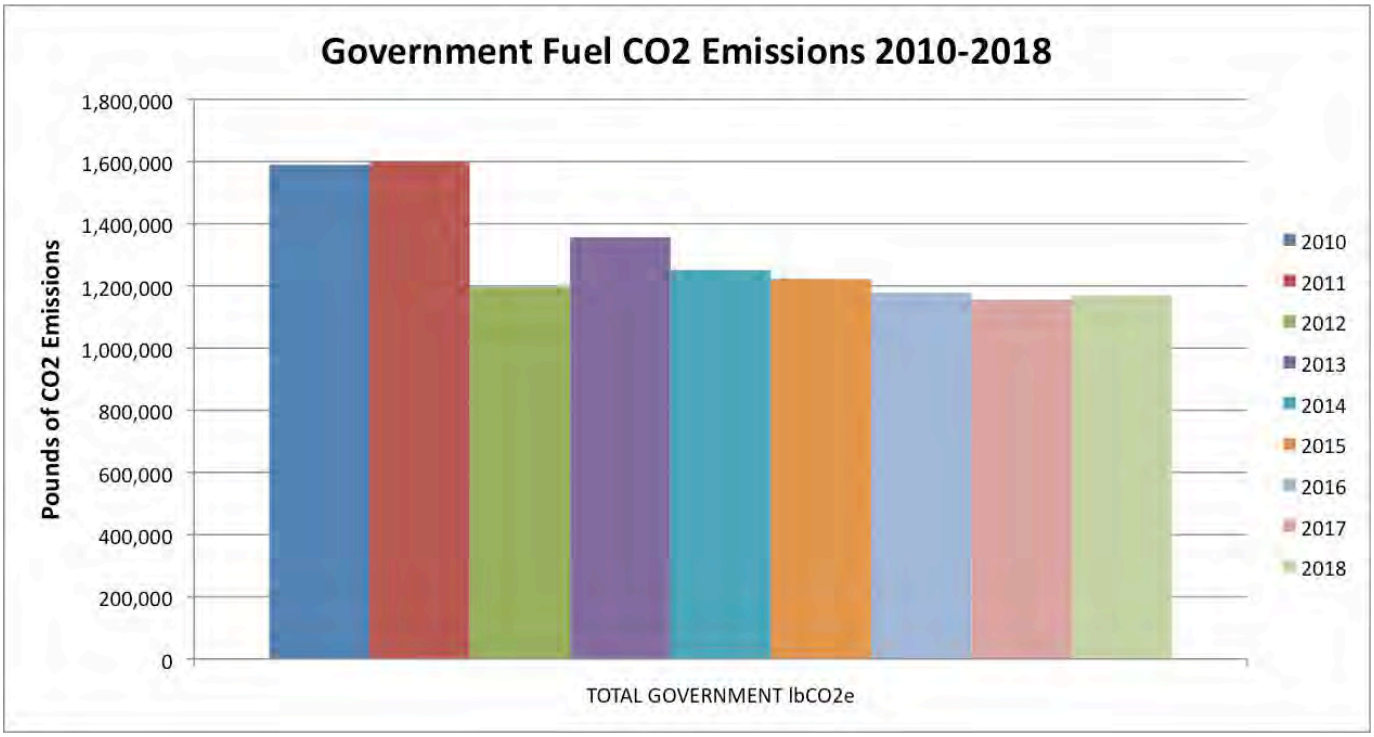


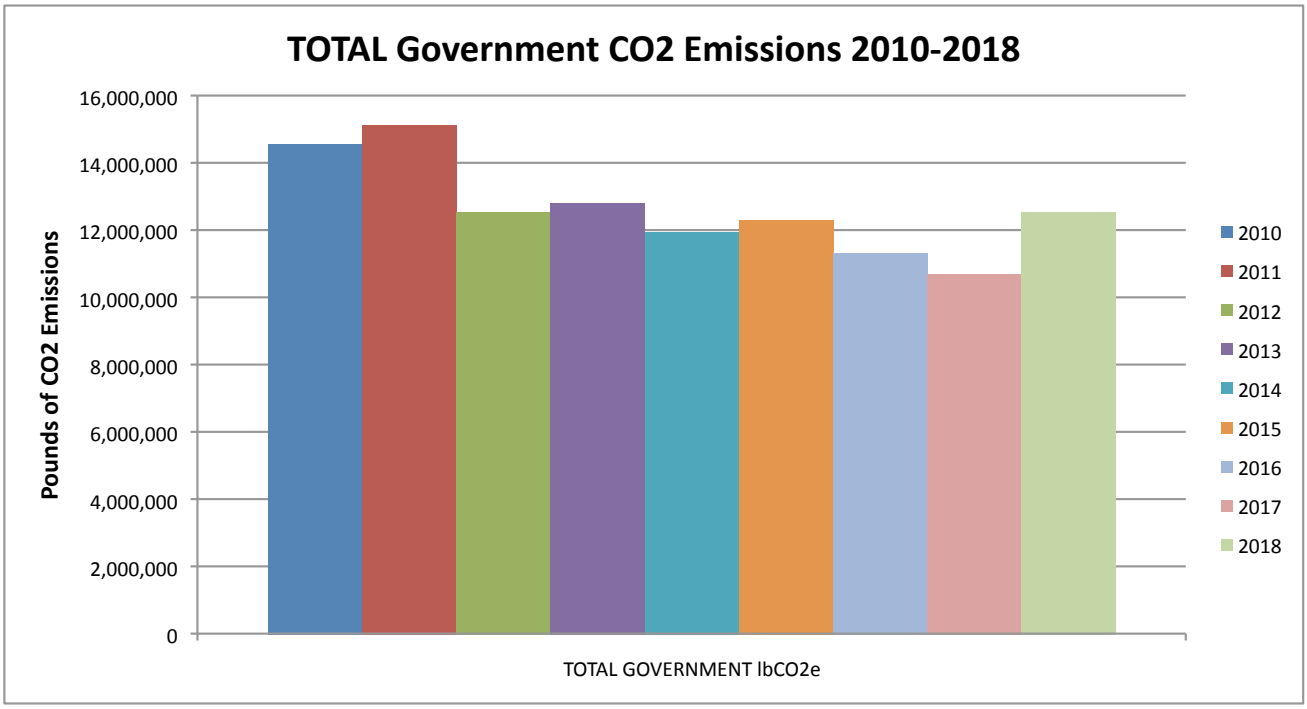


*2010 Snowmaking water data not available


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


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





Conversion Factors Used:

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

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

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

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