MIDPENINSULA REGIONAL OPEN SPACE DISTRICT

2020 Greenhouse Gas Inventory Report

July 2021

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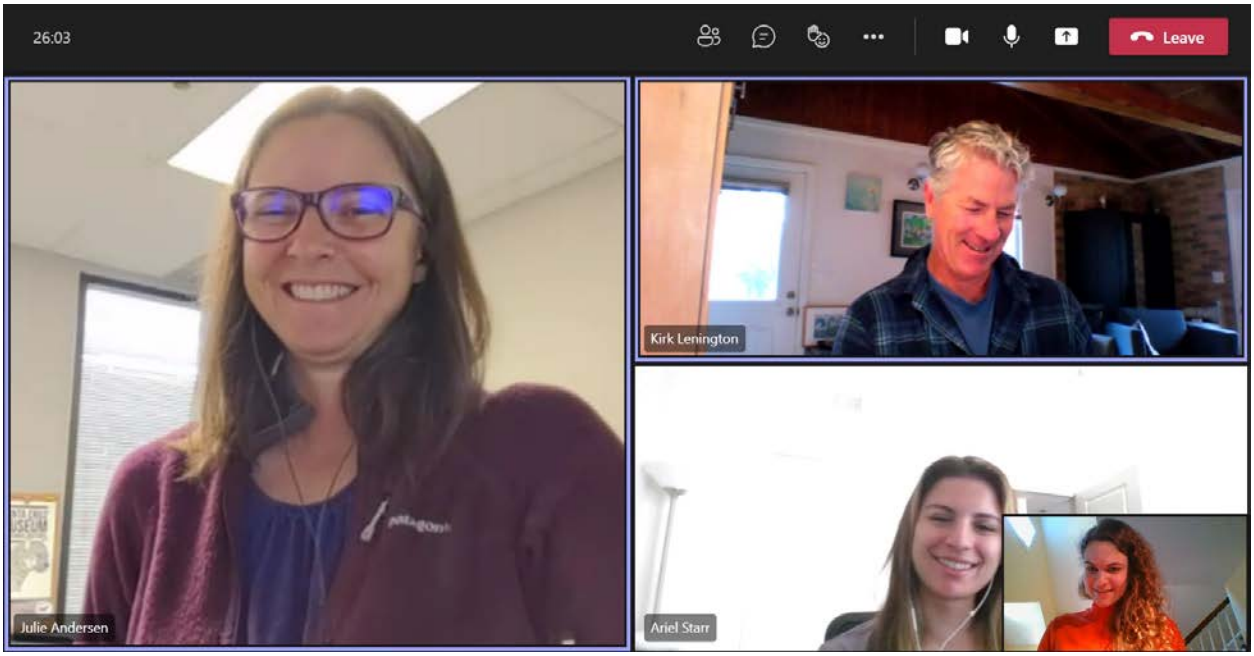


Natural Resources staff meet virtually while telecommuting during the COVID-19 pandemic.

Summary

This report summarizes the Midpeninsula Regional Open Space District's (Midpen) administrative greenhouse gas emissions (GHG) for calendar year 2020.

Key Findings

- Since the last inventory in 2018, Midpen has reduced administrative emissions a further 9%, for a 2020 total reduction of 24% from 2016 baseline levels. This exceeds the 2022 Policy reduction goal of 20%.
- The COVID-19 pandemic was a major contributor to 2020 reductions, mainly in the commute and facilities sectors. Compared to a no-pandemic scenario, telecommuting by Administrative Office (AO) staff reduced commute emissions by 30%. Heating emissions for the main AO were 53% below a no-pandemic scenario.

Key Terms/Acronyms

GREENHOUSE GASES (GHG): Gases that cause climate change, such as carbon dioxide, methane, and nitrous oxide, named for their warming "greenhouse effect" on the atmosphere

METRIC TON OF CARBON DIOXIDE EQUIVALENT ($MTCO_2E$): Standard unit of measurement for greenhouse gases

ADMINISTRATIVE EMISSIONS: GHG emissions from administration/operations (vehicles, commuting, facilities, residences) for which GHG reduction goals are set

EMISSION FACTOR: A constant used to convert directly measurable data (e.g. gallons of fuel burned) into GHG emissions

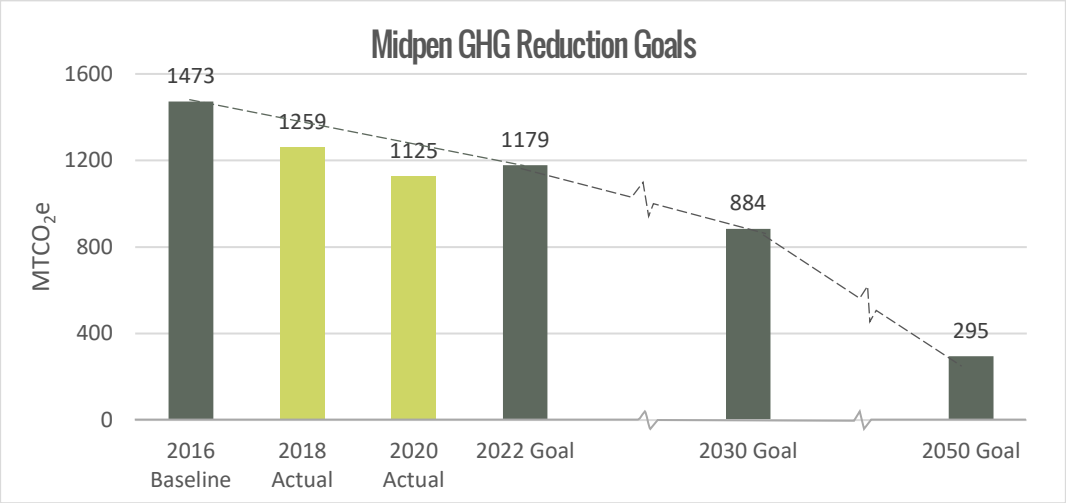
- Facilities emissions overall increased to 35% above baseline because of the addition of the 5050 El Camino Real building that doubled Midpen's office space. This sector should decrease significantly once staff move out of the old offices (330 Distel Circle plus four rented office suites) and into 5050 El Camino Real in early 2022.
- This was the first inventory requiring a recalculation of the baseline due to improved data and new science about the GHG footprint of certain activities. Such adjustments will occur periodically as new science emerges and data on Midpen activities and facilities improves.

Next Steps and Key Recommendations

- Midpen is on track to maintain or exceed current levels of emission reductions in the next inventory based on ongoing and planned actions in 2021 and 2022.
- The expansion of telecommuting/flexible work schedules and the move into the new office at 5050 El Camino will be large contributors to emission reductions in 2022.
- Fleet electrification and use of low-carbon fuels could provide significant reductions in the next few years. Hybrid and fully electric vehicles are increasingly available, and where electrification is not feasible, renewable diesel is a good alternative. Renewable diesel has already eliminated 51% of emissions from the existing diesel-engine fleet, and Midpen will achieve further reductions in the near term by replacing retiring gasoline trucks with diesel models.
- Replacing woodstoves in tenant residences with electric and/or propane heaters could be another opportunity for significant reductions. In heating an average home, wood produces more than double the emissions of propane. Electric heating would produce virtually no emissions thanks to Midpen's enrollment in zero-carbon electricity plans, but would realistically require propane backup systems given the potential for winter power outages.
- Currently, Midpen does not track emissions associated with consultant or contractor work. However, it could be informative to informally track them for a limited pilot period to more fully understand these emissions. Midpen is constrained in how it awards public works contracts (required to accept the low bid) but may have more flexibility to include emissions as a consideration when entering into vendor agreements, and for purchases of materials, equipment, and supplies.
- Midpen is expanding its climate program to include climate change adaptation. Recent partnership work with the Santa Cruz Mountain Stewardship Network has produced a framework for adaptation action and Midpen is committed to continued collaboration with regional partners to enhance ecosystem resilience to climate change impacts.
- Emission reductions are likely to become increasingly difficult and expensive as time goes on. Continued support from Midpen leadership and clear communication with staff will be instrumental to ensure that climate change remains a priority for action.

Introduction

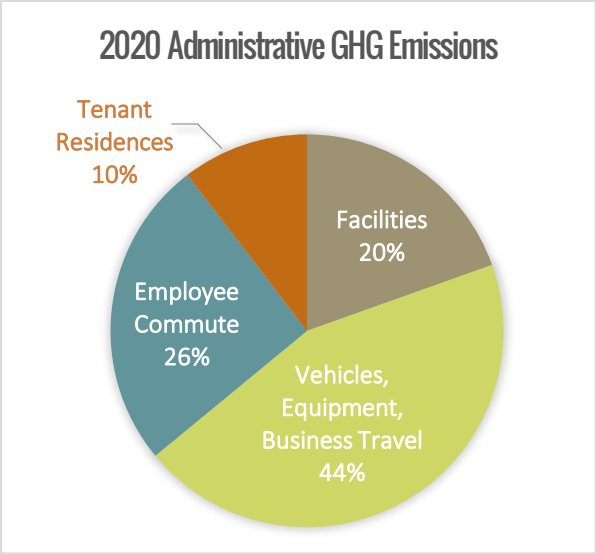
Midpen's Board of Directors adopted the Climate Action Plan in October 2018 to reduce the agency's greenhouse gas (GHG) emissions and ensure that, in line with Midpen's mission to protect the environment in perpetuity, Midpen is doing its part to act on climate change. The Climate Action Plan commits to reducing administrative emissions **20% below 2016 baseline by 2022, 40% by 2030, and 80% by 2050**, in line with California's climate change goals set by Senate Bill 32 (2016) and the 2018 Paris Climate Agreement[1]. The Climate Action Plan lists dozens of changes Midpen can make across sectors to reduce GHG emissions.



Midpen conducts a GHG Inventory every two years to measure progress towards the GHG reduction goals and assess the effectiveness of Climate Action Plan items that are implemented. The data collection process and resulting report are presented to the Board of Directors and the public. This report summarizes Midpen's GHG Inventory for the year 2020 and includes adjustments to the 2016 and 2018 inventories based on improved data and GHG models.

ADMINISTRATIVE GHG EMISSIONS ($MTCO_2e$)	2016	2018	2020	Change from 2016
Vehicles, Equipment, Business Travel	676	608	500	-26%
Employee Commute	463	389	287	-38%
Facilities	163	136	220	+35%
Tenant Residences	170	129	117	-31%
TOTAL	**1,473**	**1,263**	**1,125**	**-24%**

[1] Following the passage of Senate Bill 100 in 2018, Governor Newsom issued an Executive Order setting a statewide goal of carbon neutrality by 2045. The goal is to be achieved through a combination of emission reductions and increased sequestration. While Midpen seeks to reduce its administrative emissions, annual sequestration on Midpen land is approximately 50 times the annual administrative emissions, meaning Midpen on the whole is already carbon-negative.



Midpen analyzes GHG emissions in six sectors: 1) vehicles, equipment and business travel, 2) employee commute, 3) facilities, 4) tenant residences, 5) livestock, and 6) visitor transportation. The first four sectors are considered "administrative emissions" – emissions resulting directly from Midpen administration and operations and over which Midpen has significant influence. The GHG reduction goals focus on these sectors. Vehicles, equipment, and business travel is the largest administrative emissions sector, making up nearly half of Midpen's GHG footprint. Employee commute remains the second largest administrative emissions sector, followed closely by facilities and finally tenant residences. Livestock and visitor transportation are defined as "non-administrative emissions" – emissions that are related to Midpen activities and over which Midpen has less control. Non-administrative emissions are not included in the GHG reduction goals, but Midpen tracks these emissions in the GHG Inventory and works to reduce them as well. They are addressed in Appendix 1: Non-Administrative Emissions.

COVID-19 and the 2020 Inventory

The 2020 GHG inventory represents Midpen's emissions in an extraordinary year during which the COVID-19 pandemic altered operations in unexpected and unprecedented ways. Operational changes due to COVID-19 resulted in a net decrease in emissions, but it is important to remember that these actions, as taken in 2020, will typically not be ongoing and were not driven by climate goals but by health and safety needs. Certain operational changes necessitated adjustments to the inventory methods, precluding an "apples-to-apples" comparison of the 2020 data to previous inventories. While not precipitated by COVID, the addition of the new office building at 5050 El Camino also led to a short-term increase in emissions that will be reversed once staff move out of the old offices in early 2022. For these reasons, the 2020 inventory may be best considered as an outlier snapshot of Midpen's GHG emissions, rather than a reliable marker of trends toward the 2022 goal of 20% reductions.

If COVID-19 had not happened and Midpen had taken no additional actions, emissions would have increased slightly from 2018, putting Midpen at 13% reductions from baseline. This underscores the need for continued support, effort and investment in climate actions. There is hard work ahead, but Midpen is well-positioned to come out of the pandemic strong with high-impact actions such as increased telecommuting for Administrative Office (AO) staff and the move into the newly remodeled, energy-efficient 5050 El Camino office.

Overview - Administrative Emissions

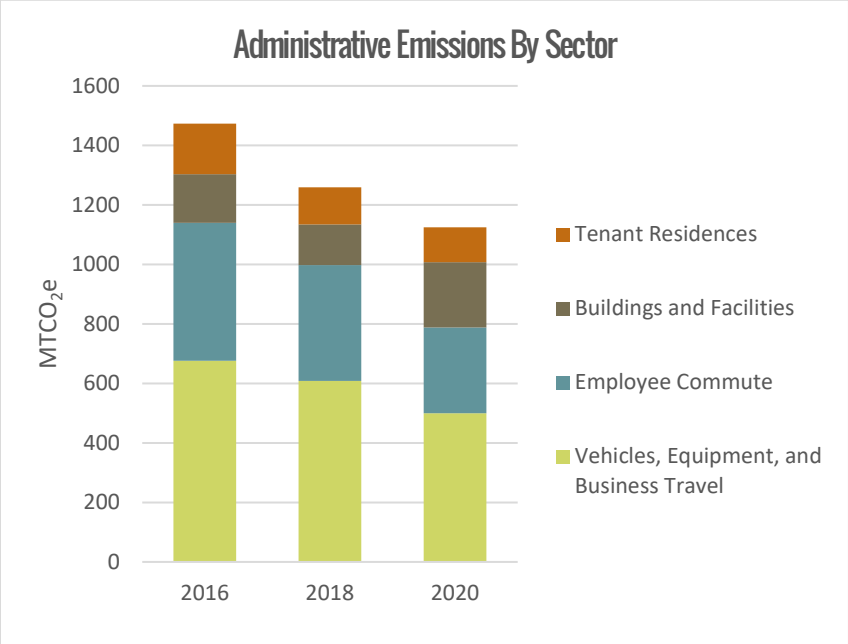
Overall: 24% Reduction Since 2016

Administrative emissions decreased in 2020 to 24% below the 2016 baseline, an additional 10% decrease since the previous inventory in 2018. Total administrative emissions in 2020 were 1,128 metric tons carbon dioxide equivalent ($MTCO_2e$). Since 2016, employee commute emissions decreased 38%, tenant residence electricity and heating emissions decreased 31%, and emissions from vehicles, equipment and business travel decreased by 26%. The Buildings and Facilities sector increased by 35%, primarily from heating the new office at 5050 El Camino. However, this increase will not last into 2022 once administrative staff and functions are relocated to the new building and other office sites are no longer in use by Midpen.

Progress Toward Climate Action Plan Goals

Midpen has exceeded the 2022 goal of 20% in reductions. The rate of decrease has slowed since the previous inventory (14% decrease from 2016-2018, versus 10% decrease from 2018-2020). This is not unexpected since most actions taken between the 2016 baseline and 2018 inventory were the "low hanging fruit" – high-impact, low-cost actions that could quickly and easily reduce emissions. Since 2018 and going forward, it is normal for the rate of reductions to slow down.

2020 was a highly unusual year due to the pandemic. Some planned climate actions were deprioritized to focus on maintaining health and safety while continuing to deliver on Midpen's broader mission.



Recalculating Baselines

Midpen's previous Greenhouse Gas Inventories reported different numbers for 2016 and 2018 than appear in this report. This is because in 2020, the inventory recalculated the 2016 baseline and 2018 emissions using new, more accurate, and more reliable information.

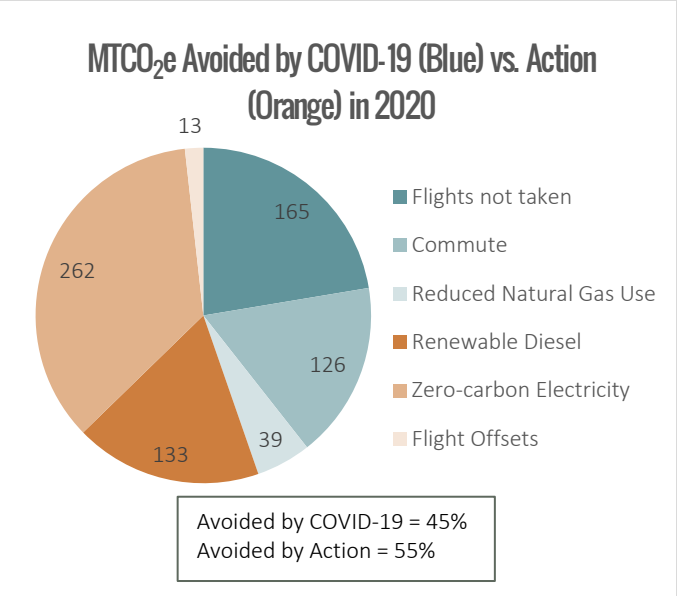
It is important to keep methods consistent between inventories to enable apples-to-apples comparisons in tracking progress. If new science suggests a different way to calculate emissions or Midpen develops a better way to track its GHG-emitting activities, to take advantage of the improved methods they must be applied to *all* past and current inventories.

While the reported baseline and 2018 emissions changed in 2020, Midpen's goals remain the same: 20% reductions by 2022, 40% by 2030, and 80% by 2050.

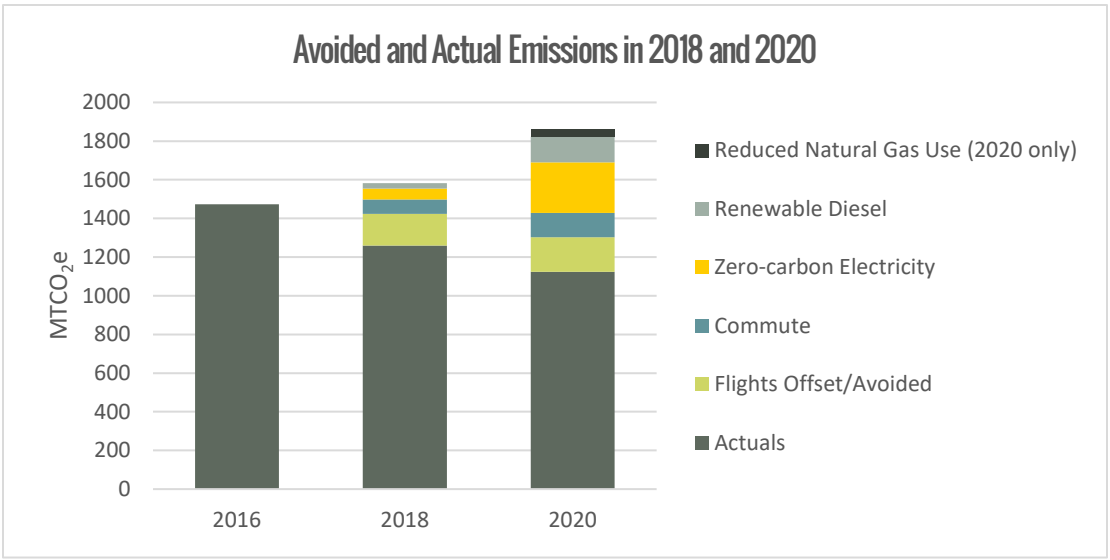
Others were simply impossible to undertake given the shelter-in-place and social distancing restrictions on staff. On the other hand, while COVID-19 stymied some climate actions, it ultimately led to an overall decrease in emissions, primarily due to telecommuting by AO staff and using less heat at the AO**. Without COVID-related reductions, overall emissions would likely have increased in 2020, moving backward to 12% below baseline.** This emphasizes the need for strong climate action coming out of the pandemic and going into 2022 to avoid losing progress.

Avoided GHG Emissions

Combatting climate change is an uphill battle. As Midpen grows – in terms of staff, assets, and land – administrative emissions are expected to increase if no intentional actions are taken to reduce GHG emissions. The emissions that would have occurred had no reduction actions been taken since 2016 is called the "business as usual" (BAU) scenario. Actual emission reductions can be compared to this hypothetical BAU to derive an estimate of "avoided emissions." **In 2020, Midpen avoided 738 $MTCO_2e$ of GHG emissions. Without those reductions, administrative emissions would have increased 26.4% from baseline.** Emissions avoided in 2020 can be attributed to climate actions (55% of avoided emissions) and COVID-19 circumstances (45%), as shown in the pie chart.



The category of "flights not taken" is of note because while COVID-19 avoided 165 $MTCO_2e$ associated with plane trips by drastically limiting business travel, in a normal year Midpen would still purchase offsets for those emissions, as was done for the emissions generated from flights taken in 2020 (offset emissions were reported as "avoided" in the 2018 GHG Inventory). "Flights not taken" and "flight offsets" have been combined in the bar chart below, which illustrates the BAU scenario as avoided emissions plus actual emissions.

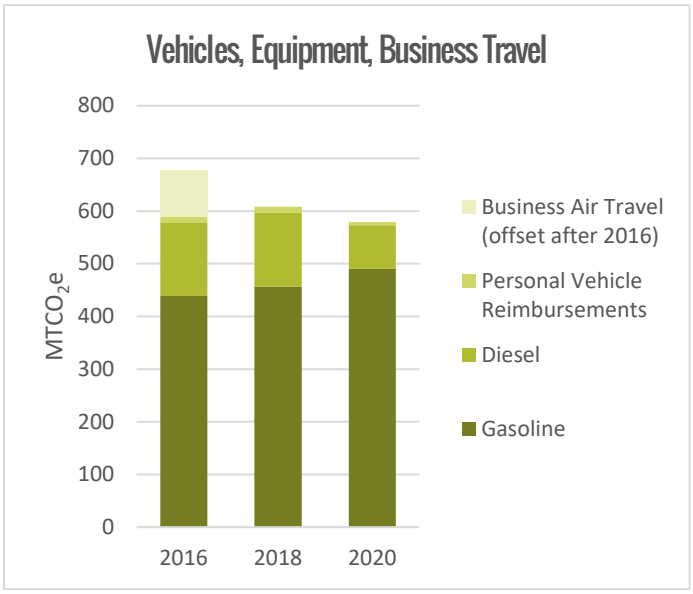


COVID-19 also required AO staff to mainly work from home since March 2020, avoiding 165 $MTCO_2e$ in 2020 from staff commutes (126 $MTCO_2e$) and natural gas used to heat the office building (39 $MTCO_2e$). Actions specifically taken for GHG reduction since 2016 avoided 406 $MTCO_2e$ in 2020. Emissions were avoided due to the continued use of renewable diesel for some equipment and vehicles (133 $MTCO_2e$), flight offsets for flights taken before the pandemic (13 $MTCO_2e$), and switching to zero-carbon electricity (262 $MTCO_2e$) for all residences and offices except the Skyline Field Office, which remains on PG&E standard electricity.

2020 Greenhouse Gas Inventory by Sector - Administrative Emissions

Vehicles, Equipment, Business Travel: 26% Decrease from 2016 Baseline Emissions

The Vehicles, Equipment and Business Travel sector remains the largest portion of Midpen's administrative emissions, accounting for 44% of the total in 2020. Since 2016, emissions in this sector have decreased by 26% (18% additional reductions since 2018). Reductions in 2020 were driven primarily by the use of renewable diesel for fueling select equipment and vehicles. Midpen purchased an electric Chevy Bolt as an administrative vehicle in late 2019; however, because of COVID-19, it was used very little and had no discernable impact on emissions in 2020.



Business Air Travel: All Emissions Offset

Business flights resulted in 13 $MTCO_2e$ in 2020, all of which were offset. Midpen purchases offsets for air travel as there is no other way to avoid these emissions except to not attend long-distance conferences, trainings, or special meetings (e.g. with the congressional delegation if needed).

Personal Vehicle Use for District Activities: 36% Decrease Since 2016

Midpen reimburses work-related travel in personal vehicles in accordance with per-mile rates issued by the Internal Revenue Service. Reimbursed personal vehicle use amounted to 7 $MTCO_2e$ in 2020, down 30% from baseline. COVID-19 overall limited local business travel, although more staff drove directly to field sites from their homes in personal vehicles with most requesting reimbursements for those miles. Staff who did not request reimbursement provided information on the distance and frequency of their trips and the extra mileage was added to the fleet gasoline emissions calculation.

Diesel: 51% Decrease Since 2016

Midpen switched the field office diesel tanks to renewable diesel in late summer of 2018. Renewable diesel is made from agricultural byproducts and has a 67% lower carbon footprint than fossil diesel. 2020 was the first full inventory year with renewable diesel in use. While diesel use has increased 39% since 2016, 90% of the diesel used by Midpen's fleet in 2020 was renewable, decreasing diesel emissions

by 73 $MTCO_2e$ or 51% below baseline. Compared to a BAU scenario, the use of renewable diesel avoided 133 $MTCO_2e$.

Gasoline: 3% Decrease Since 2016

Gasoline makes up the majority of Vehicles, Equipment and Business Travel emissions. Though this category increased in 2018, gasoline use was substantially lower in 2020, resulting in a 31 $MTCO_2e$ decrease (3%) from 2016 baseline. This is in spite of COVID-19 restrictions that required staff to drive individually to worksites instead of carpooling; however, some of the decrease may be due to overestimates in the accounting for commutes in District vehicles. This does not affect overall emissions totals. Some decrease may also be attributable to field staff using more electric equipment (e.g. ATVs, blowers, and power tools).

Performance Indicators

VEHICLES, EQUIPMENT, & BUSINESS TRAVEL INDICATORS	2016	2018	2020
Vehicle fleet average miles per gallon (excluding service/commercial trucks)	15.8	16.5	16.4
Number of EVs in fleet	0	0	1
Portion of annual fuel used that is renewable	0%	6%	31%
Annual miles flown for business travel	50,000	93,000	7,500

Employee Commute: 38% Decrease From 2016 Baseline Emissions

Employee Commute remains the second-largest emissions sector, accounting for 25% of 2020 emissions. It was also the sector most heavily influenced by the pandemic; AO staff, mainly telecommuting, commuted 64% fewer miles while field staff commute miles increased 8%. The established methods for calculating commute emissions were inapplicable in 2020, so new methods were developed for this inventory only. Because of the inconsistency in methods and the uniqueness of the pandemic year, comparing commute emissions in 2020 to previous years is not especially meaningful except as a demonstration of telecommuting as a highly effective method of GHG reductions.

In 2020, AO staff commute emissions dropped to 71% below baseline due to the need to shift office work to telecommuting during the pandemic. Field staff commute emissions increased to 1% above baseline, climbing 12% from 2018. This may be due to several factors, including staff growth, longer average commutes, staff taking home District trucks that are less fuel efficient than their personal vehicles, the inability to carpool to work, and inaccuracy in accounting for commutes in District vehicles.

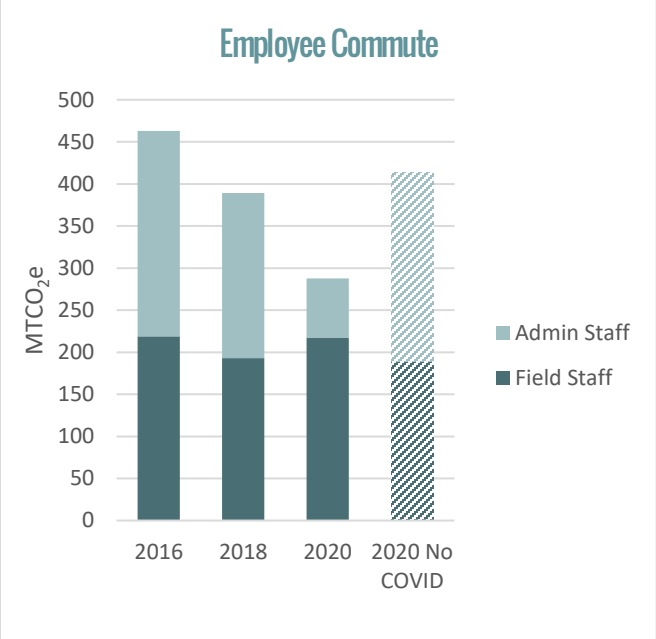
Accounting for Commutes in District Vehicles

During the pandemic, more staff were assigned District vehicles to take home and commute in as a social distancing measure to avoid large congregations of staff deploying out of field offices. In a typical year, few staff take vehicles home, primarily resident rangers with virtually no commute. To avoid inflated totals for the Vehicles, Equipment and Business Travel sector, estimated emissions from home-to-work/work-to-home commutes in District vehicles were subtracted from the sector total. These “take-home vehicle” commute estimates relied on imperfect distance and fuel efficiency data and therefore may be an overestimate. However, the emissions subtracted from this sector were added back to the Employee Commute sector so any error does not affect overall emissions totals.

"No COVID" Comparisons

In addition to the inventory of actual commute emissions, a hypothetical "No COVID" scenario was calculated using the original methods. This hypothetical is helpful for understanding the impact of COVID-19 on commutes while still accounting for staff growth, use of non-motorized and transit options, use of electric vehicles, and changes in average commute distance.

In the "No COVID" scenario, AO commute emissions would have increased, causing overall commute emissions to lose ground from 14% below baseline in 2018 to 11% below in 2020. This increase would reflect staff growth, longer average commutes for AO staff and a high percentage of employees who drive alone to work.



Commute Incentives

In 2019, Midpen rolled out a suite of incentives to support the use of alternative commute modes. These included a small stipend for frequently biking or carpooling to work, Caltrain GoPasses for AO employees, discounted EV charging at the AO, and an emergency ride home guarantee, adding to the prior benefit of pre-tax funds for commuter expenses such as VTA or Caltrain parking fares. The 2020 inventory was intended to include an analysis of how effective these incentives were, but the program was suspended due to COVID-19. This year's AO commute survey asked if staff found the incentives helpful prior to the pandemic, and 24% of AO employees said they helped "a little" or "a lot" while 32% said they considered an alternative commute but ultimately did not find the incentives helpful. The GoPass was the most popular incentive, followed by bike and carpool stipends. Reasons for not finding the incentives helpful mainly focused on inconvenient transit, family needs and a desire for flexibility.

Performance Indicators

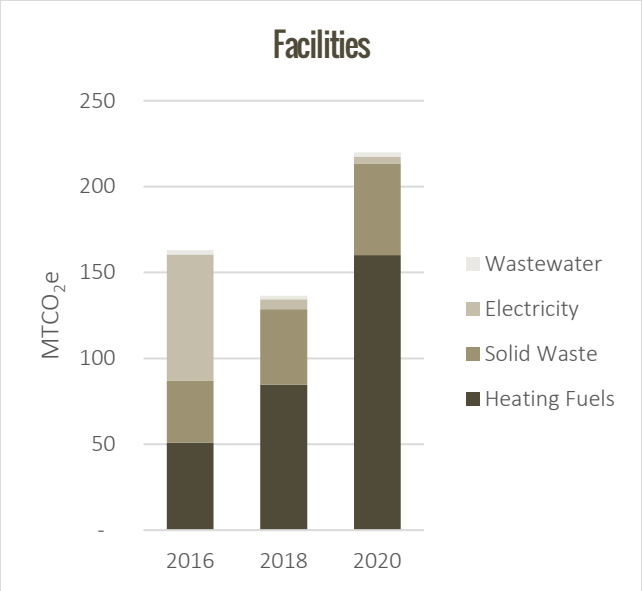
EMPLOYEE COMMUTE INDICATORS	2016	2018	2020
Average AO commute distance (miles round trip)	36	39	43
Average field office commute distance (miles round trip)	41	37	40
Percentage of employees who drive alone to work	83%	82%	88%
Percentage of AO staff interested in continued telecommuting	-	-	90%

Facilities: 35% Increase From (Updated) 2016 Baseline Emissions

The Facilities sector made up 20% of Midpen's administrative emissions in 2020 and was the only sector to have an increase in emissions. Facilities emissions are GHGs associated with Midpen's administrative buildings, including electricity and heating, landfilled solid waste, and wastewater. Midpen's facilities emissions have increased 35% from the 2016 baseline after a decline in 2018. This spike should be short lived, however, because it is mainly due to acquiring the office building at 5050 El Camino Real (5050)

while staff still occupy the current administrative buildings through spring 2022. Once AO staff are relocated, Midpen will release the 330 Distel Circle building and four separate rented office suites from continued operations. Moreover, the new office space will have high energy efficiency in comparison to the older office spaces, which should also support a drop in emissions.

The Enviromental Proection Agency (EPA) released new models for landfill emissions in 2020, and this year's inventory uses the updated methods and emissions factors. The solid waste emissions for the 2016 baseline and 2018 inventory were also recalculated according to the updated model.



Heating Fuels: 214% Increase Since 2016

Heating fuel emissions more than doubled from 2016 because of the purchase of 5050, which doubled Midpen's office space and accounted for 113 $MTCO_2e$, or 76%, of Facilities heating fuel emissions in 2020. As previously discussed, the office building is being remodeled with energy efficiency upgrades and beginning in spring of 2022 will house all of Midpen's AO staff. The spike in heating emissions should be temporary because Midpen will not retain the old offices once staff move into 5050. The 2020 inventory will provide a baseline against which to compare 5050's heating emissions after energy efficiency retrofits.

Natural gas emissions from heating the 330 Distel Circle building were 39 $MTCO_2e$ (53%) below the BAU scenario and 1.4% below the 2016 baseline because the pandemic and resulting telecommuting environment resulted in much lower use of the building's HVAC. Since the building was largely unoccupied due to shelter-in-place requirements during the coldest months of the year, it was kept at a much cooler ambient temperature, reducing natural gas use substantially. It is important to note that the building's boiler is losing efficiency as it nears end of life, resulting in much higher natural gas use in recent years as compared to 2016; without the pandemic, use in 2020 would likely have been similarly high.

Emissions from propane use at the field offices increased by 1.5 $MTCO_2e$ (1.5%). Such small fluctuations are expected year to year as winter weather varies.

Electricity: 94% Decrease Since 2016

Midpen's facilities were automatically enrolled in 50% renewable electricity in 2017, and in 2019 Midpen shifted to 100% renewable electricity for all facilities except the Skyline Field Office. This change has reduced electricity emissions to 94% below baseline. Switching to 100% renewable electricity only reduced emissions slightly, by 2 $MTCO_2e$, compared to 50% renewable. This is because the non-renewable portion of the 50% renewable electricity mix comes from sources that, while not considered renewable, are zero-carbon, e.g. large hydroelectric dams and nuclear power. The Skyline Field Office remains on PG&E's standard electricity mix; the property straddles the county line between Santa Clara and San Mateo Counties and thus it is not eligible for either county's community-choice renewable

program. In 2020, 35% of PG&E's standard mix was renewable, 53% came from non-renewable, zero-carbon sources, and the remainder was from fossil fuels.

Electricity use per square foot of office space dropped by half for all the AOs and increased slightly for the field offices. In 2019 and 2020, lighting at all offices was upgraded to energy-efficient LEDs. It is not possible to fully determine at this time how this affected electricity consumption because COVID-19 disrupted typical office occupation and lighting use. Emissions implications of this change are expected to be minimal since 97% of Midpen's electricity comes from renewable and zero-carbon sources.

Solid Waste: 48% Increase Since 2016 (With Updated Baseline)

Solid waste emissions result from the transportation of waste to landfills and from GHGs released slowly over time as materials decay. Midpen counts all these emissions in the year the waste is disposed of rather than distributing them over time. The inventory includes waste from Midpen's offices and some project-related construction debris and scrap generated by Midpen crews (not projects implemented by contractors). Project-related waste fluctuates from year to year depending on what projects Midpen crews are executing. In the future, Midpen may consider tracking contractor waste, though because there is no baseline from 2016, it would be best reported separately, possibly as a non-administrative emissions sector.

Waste emissions are derived from tonnage. Project-related waste is collected in dumpsters, which are weighed upon delivery to landfill. Office waste is collected in standard "curbside" bins that are emptied on a regular schedule; for these, tonnage is estimated based on container volume. These estimations assume the bins are completely full upon each pickup. This is likely inaccurate (especially during 2020 when low office occupancy would have been expected to reduce waste) but it is standard practice for GHG inventories. Recycling and compost are assumed to produce no GHG emissions; though not entirely accurate, this is also standard practice for GHG inventories. In 2018 staff added compost bins to the AOs and issued all AO staff desk-side recycling bins with reduced-sized trash bins, in an effort to divert more waste from trash to recycling and compost. In the future, annual or biannual waste audits could provide a clearer sense of how waste diversion rates change over time.

Midpen landfilled 23.4 tons more waste in 2020 than in 2016, resulting in a 48% increase in emissions. The increase in 2020 is due to a project-related waste. The main source was a large dump site clean-up in Sierra Azul Open Space Preserve. Midpen contracted the San Jose Conservation Corps for the clean-up work and provided dumpsters on-site. Fuel reduction efforts at Rancho San Antonio could also have contributed to the increase, but small (less than 24 inch diameter) woody material is processed as compost and thus would not impact the emission inventory. Waste records are not detailed enough to determine the amount of large woody material Midpen crews disposed of in 2020. In the future, improved tracking could provide a clearer picture of this type of project-related waste.

The solid waste baseline and 2018 emissions were adjusted this year according to updated models for waste emissions released by the EPA. These models recommend lower emission factors than previously used and also allow for a distinction between landfills that do and do not implement gas capture and flaring (which converts methane to CO_2 and thus decreases the potency of the released GHGs). Midpen's waste haulers deliver trash to three landfills, two of which have gas capture and flaring and one of which does not. This year's waste emissions were calculated, and previous years' recalculated, using the updated emission factors and accounting for the tonnage of waste delivered to each type of landfill.

Wastewater: 1% Decrease since 2016

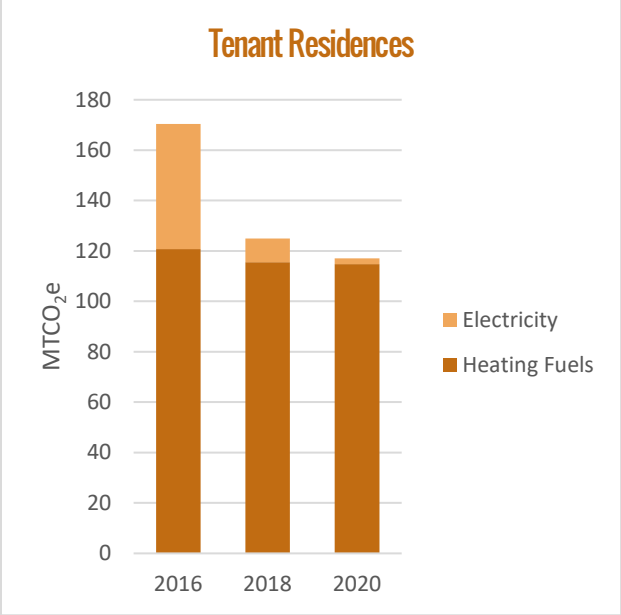
Emissions from the treatment of wastewater produced at Midpen offices have not changed since the previous inventory. They remain at 1% below the 2016 baseline.

Performance Indicators

FACILITIES INDICATORS	2016	2018	2020
AO1-AO4 electricity use per square foot (annual kWh/Sqft)	11.3	16.9	8.5
5050 El Camino Real electricity use per square foot (annual kWh/Sqft)	-	-	12.9
Field office electricity use per square foot (annual kWh/Sqft)	5.4	5.1	5.6
Portion of electricity from renewable sources	33%	50%	97%
AO1 natural gas use per square foot (annual Therm/Sqft)	0.3	0.6	0.3
5050 El Camino Real natural gas use per square foot (annual Therm/Sqft)	-	-	0.5
Field office propane use per square foot (annual gallons/sqft)	0.08	0.08	0.09
Solid waste diversion rate (% diverted from landfill)	34%	37%	43%

Tenant Residences: 31% Decrease From (Updated) Baseline

Midpen leases residences located on its land to staff, agricultural leaseholders, and some members of the public. Emissions from electricity and heating fuel for these residences decreased 31% since 2016. In 2020, tenant residences accounted for 10% of Midpen's GHG emissions.



Electricity: 96% Decrease Since 2016

Electricity emissions have decreased 88%, mainly due to automatic enrollment in 50% renewable electricity in 2017. Further reductions since the 2018 inventory resulted from a decrease in the emission factors reported by the clean energy providers. Although the inventory assumes no tenants have opted up to 100% renewable electricity, the difference in emissions would likely be negligible since the 50% renewable electricity also comes from 100% zero-carbon sources.

Heating Fuel: 5% Decrease since 2016

Heating fuel emissions have decreased 5% due to fluctuations in vacancies that have skewed toward residences with woodstoves in 2020. The Energy Information Administration estimates that each wood-burning residence emits nearly 6 $MTCO_2e$ annually. In 2020, 13 of the 28 occupied residences used wood for heat, though some of the homes do also have gas and/or electric heating. Midpen could reduce emissions from tenants substantially by encouraging the use of gas or electric heat and installing alternative heating in residences where wood is currently the only option. A typical Midpen residence heated with wood produces 5.7 $MTCO_2e$ annually, but would produce only 2.2 $MTCO_2e$ using propane and virtually zero GHG emissions if heated with electricity. A combination of electric and propane

heating would likely be the best option since the frequency of winter power outages would make a fully electric system impractical.

Data Improvements and Updates

Because Midpen does not pay the utility bills for most of the rental residences, residence emissions are estimated using regional averages for household energy use that vary with a home's square footage. These data are published by the US Energy Information Administration (EIA), which updates their estimates periodically. The data lag a few years, so when the EIA releases updates, any inventories conducted after the most recently published data year must be adjusted. In 2020, the EIA published data from 2015, so both the 2016 baseline and 2018 inventory were updated using the 2015 EIA data. More accurate square footages for the residences were also obtained this year and were factored into the 2020 analysis and the recalculations for 2016 and 2018. Midpen's property management staff are in the process of conducting audits of all the residences so further updates to square footage data are likely in the next inventory or two.

The emission factor used for heating fuels was also changed this year. Previous inventories assumed the residences use either wood or natural gas heating. However, this year the Property Management Specialist confirmed that residences not using wood use liquid propane rather than natural gas, and the emission factor was changed accordingly (including for 2016 and 2018).

Performance Indicators

TENANT RESIDENCES INDICATORS	2016	2018	2020
Number of tenant residences vacant for > 6 months of inventory year	6	6	3
Portion of occupied tenant residences using wood for heating	52%	48%	46%

Moving Forward

The biggest takeaway from the 2020 inventory is the impact that the COVID-19 pandemic had on Midpen's operations and consequently on GHG emissions. In order to meet the 2022 goal of 20% reductions, or better yet, maintain or exceed the current level of 23% reductions, Midpen will need to invest in continued climate action. Fortunately, there are several actions that have already been implemented in 2021, or are planned in the next two years that should lead to sufficient emission reductions to keep Midpen on track for the 2022 goal.

The following climate action items that are ongoing or included in the budget for Fiscal Year 2022 (June 30, 2021 - July 1, 2022) could result in reductions of an additional 8-12%, which would be sufficient to keep overall reductions at 23-27% below baseline.

CLIMATE ACTION PLAN ITEM	ESTIMATED REDUCTIONS	BUDGET	DEPARTMENT
Commute-3/Facilities-5: Expand telecommuting options for AO staff	4-8%	$0 (Staff time only)	Administrative Services, Human Resources
Commute-4: Continue incentives for employees commuting via carpool, public transit, bike, or walking	1.5%	$50,000	Administrative Services

Vehicles-X: As patrol vehicles are up for replacement, replace with diesel or lower emissions options whenever possible	2%	$215,000	Land and Facilities
Vehicles-14: Purchase carbon offsets for business flights	N/A (ongoing)	$1,000	Natural Resources
Vehicles-X: Develop a transition plan to decarbonize Midpen's fleet	N/A (planning phase)	$50,000	Land and Facilities
CLIMATE-RELEVANT ACTIONS NOT RESULTING IN ADMINISTRATIVE EMISSION REDUCTIONS			
Livestock-2: Implement San Mateo County Resource Conservation District plan to increase carbon sequestration on rangeland	TBD	$15,000	Natural Resources, Land and Facilities
(No number): Ecosystem Carbon Study for San Gregorio Watershed	N/A (planning phase)	$50,000	Natural Resources

In addition to the items included in the Fiscal Year 2022 budget, reductions are expected from the following actions:

- The move to 5050 El Camino Real in 2022 is expected to reduce total emissions to ~1% below baseline, or more if heating costs are reduced after the remodel and energy efficiency upgrades.
- The opening of the new South Area Office could reduce commutes for field staff who live closer to that office.
- The recent purchase of two diesel patrol vehicles in 2021 will enable additional use of renewable diesel, replacing some gasoline use.
- The increased use of two electric motorcycles purchased for patrol staff in 2019; COVID-19 disrupted the training process for rangers, resulting in very little usage in 2020. Since then, more staff have received training and the e-motorcycles are expected to be used more frequently. Emission reductions will depend on how many truck patrols are replaced with patrols on the e-motorcycles.

Climate Change Adaptation and Resiliency

The 2018 Climate Action Plan focused on goals and measures to reduce Midpen's administrative emissions. Reducing emissions is essential to slow and eventually reverse climate change, and yet more needs to occur at a regional level to address climate change for two reasons: 1) greenhouse gas pollution is a global problem and 2) climate change is not a future scenario to avoid – it is happening now, and both human and natural systems will need to adapt to survive and thrive. Therefore, Midpen is adding climate change adaptation and resilience to the work supported by the climate program.

Climate change impacts habitats and species throughout the Santa Cruz Mountain Bioregion, which includes all Midpen preserves. In 2019 through 2021, Midpen worked with the Santa Cruz Mountain Stewardship Network, a network of more than 20 land managers, to model climate impacts and develop a list of actions that promote resilience for key habitats and species. Midpen is well-positioned to take a leadership role in continued collaborative efforts toward adaptation and resiliency. Going forward, Midpen will coordinate with other members of the Santa Cruz Mountain Stewardship Network in prioritizing and implementing adaptation and resiliency actions, as well as monitoring to assess ecosystem response.

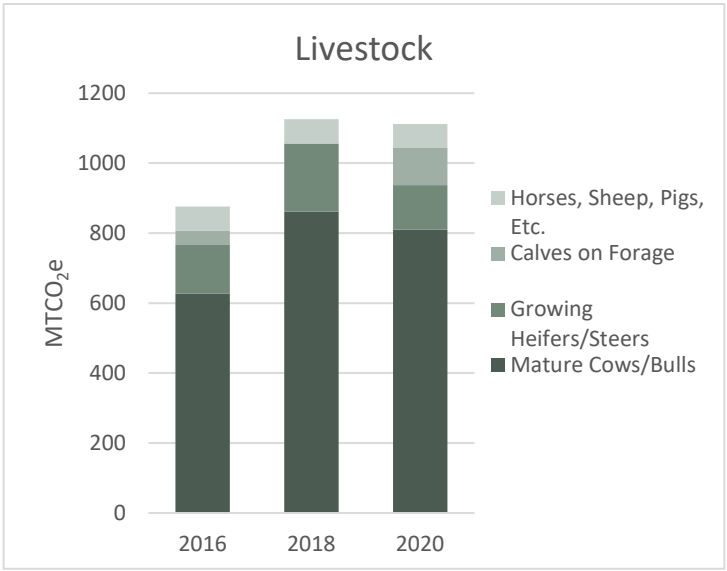
Appendix 1: 2020 GHG Inventory by Sector - Non-Administrative Emissions

NON-ADMINISTRATIVE GHG EMISSIONS ($MTCO_2E$)	2016	2018	2020	Change from 2016
Livestock	939	1,118	1,112	+18%
Visitor Transportation – 6 Preserves	-	3,803	7350	+193% (from 2018)

In addition to administrative emissions, Midpen also tracks non-administrative emissions that are related to Midpen activities but over which Midpen has less control. This category represents opportunities to reduce emissions above and beyond the administrative emission goals and includes livestock that belong to ranching tenants and transportation emissions from visitors to the preserves. Visitor emissions are not a comprehensive inventory, but rather a rough estimate for a subset of visitation emissions calculated for six preserves for which Midpen has car counters and visitor zipcode data from the 2017 Visitor Use Survey.

Livestock: 18% Increase Since 2016

Livestock on Midpen lands include cattle, horses, pigs, and a handful of other animals managed by leaseholders. The majority of livestock emissions come from cattle, which graze on approximately 9,000 acres in San Mateo County. Conservation grazing with a low density of cattle (~0.05 animals per acre) enables Midpen to reduce fuel loads, preserve unique grassland biodiversity, and uphold the Coastside Mission to "preserve rural character [and] encourage viable agricultural use of land resources." These benefits come with the tradeoff of methane emissions, which Midpen is actively seeking methods to reduce where possible. Livestock emissions are not included in the administrative scope because livestock provide other environmental benefits and exist within a complex biological system in which they both produce emissions and, under the right management, contribute to sequestration by stimulating root growth and increasing soil carbon. Livestock offer an alternative to mechanical vegetation management, which has its own tradeoffs (e.g. soil compaction, particulate and GHG emissions, noise, fire risk, cost, staff time for operation and terrain limitations).



Emissions from livestock have increased 18% since 2016; grazed acreage has increased 5%. Improved analysis methods were used for this year's calculations and to recalculate the previous years', resulting in a slight increase in the 2016 baseline and a decrease in 2018 emissions. Previous analyses totaled all livestock on Midpen land during the inventory year and calculated emissions for that total. The new method accounts for seasonal variation by using monthly stocking rates (the number of cattle in

pasture) to calculate an average for the whole year. It also better differentiates between calves that are nursing, which do not produce a significant amount of methane and therefore do not count toward emissions, and older calves that are grazing, which do count toward emissions.

In general, as Midpen acquires more rangeland properties, the number of cattle and the associated emissions will increase, with some variability due to environmental factors such as drought that influence stocking rates. Midpen is following the best available science to inform conservation grazing practices and seeking ways to offset livestock emissions through increased carbon sequestration on the land. Midpen is currently collaborating with the San Mateo Resource Conservation District to develop a pilot Conservation Carbon Farming Plan for a grazed property in Purisima Creek Redwoods. The plan will make recommendations for where and how to implement measures such as hedgerows, silviculture, biochar application, or adjustments to grazing practices that can increase carbon sequestration and storage while maintaining conservation grazing on the property.

Performance Indicators

LIVESTOCK INDICATORS	2016	2018	2020
Number of animals with high enteric emissions (cattle, not counting calves on milk)	383	494	486
Number of animals with low enteric emissions (horses, sheep, pigs, etc.)	182	182	182
Number of acres grazed	8,092	8,092	8,490

Visitor Transportation: 193% Increase Since 2016

Visitor transportation emissions for the six preserves in the analysis nearly doubled from baseline in 2020 due to a massive increase in visitation during the pandemic. Midpen preserves saw unprecedented visitation rates in 2020 as shelter in place orders severely limited opportunities to socialize and exercise indoors. As of June 2021, visitation rates have largely returned to normal levels across the District.

Rancho San Antonio remained by far the most popular preserve in 2020 with visitors traveling an estimated 11.8 million miles to and from the preserve, more than the estimated visitor miles for all preserves in 2018. The Rancho San Antonio Multimodal Access Study, completed in spring 2021, offers a range of options to reduce congestion and transportation emissions by encouraging visitors to travel to the preserve in ways other than driving alone. Recommendations include improved bike facilities and access, a subsidy for ride hail services, carpool-only parking, and a free or low-cost shuttle service.

2020 Visitor Mileage and Emissions Estimates for Preserves with Car Counters

PRESERVE/PARKING LOT	VISITOR MILES DRIVEN		EMISSIONS ($MTCO_2E$)		
	2018	2020	2018	2020	%CHANGE
Rancho San Antonio	6,630,736	11,806,161	2,275	4,051	78%
Russian Ridge – Mindego Hill	563,108	2,671,941	193	917	375%
El Corte de Madera	880,552	2,438,472	302	837	177%
Purisima Creek Redwoods – North Ridge	1,429,864	2,051,875	491	704	43%
Windy Hill	972,004	1,177,786	334	404	21%
Monte Bello	607,856	1,086,721	209	368	76%
TOTAL	11,084,120	22,841,445	3,803	6,876	193%

Appendix 2: Detailed Table of Greenhouse Gas Emissions Changes 2016-2020

ADMINISTRATIVE GHG EMISSIONS ($MTCO_2E$)	2016	2018	2020	CHANGE FROM 2016
Vehicles, Equipment, Business Travel	**676**	**608**	**500**	**-26%**
Gasoline	439	457	426	-3%
Diesel	140	141	68	-51%
Personal Vehicle Reimbursements	10	11	7	-36%
Business Air Travel*	88	0	0	-100%
Employee Commute	**463**	**389**	**287**	**-38%**
Administrative Staff	244	196	71	-71%
Field Staff	219	193	217	-1%
Facilities	**197**	**170**	**220**	**+35%**
Electricity	74	6	4	-94%
Heating Fuels	51	85	160	+214%
Solid Waste	36	44	53	+48%
Wastewater	2.5	2.0	2.0	-1%
Tenant Residences	**185**	**139**	**121**	**-31%**
Electricity	50	14	2	-96%
Heating Fuels	121	116	115	-3%
Administrative GHG Emissions Total	**1,473**	**1,263**	**1,128**	**-24%**
NON-ADMINISTRATIVE GHG EMISSIONS ($MTCO_2E$)	2016	2018	2020	CHANGE FROM FIRST RECORDED YEAR
Livestock	**939**	**1,118**	**1,112**	**+18%**
Mature Cows/Bulls	787	812	799	+2%
Growing Heifers/Steers	0	41	127	N/A
Calves on Forage	71	184	106	+49%
Horses	53	52	52	-2%
Other Livestock	17	18	18	+4%
Visitor Transportation – 6 Preserves	-	**3,803**	**6,876**	**193%**

**Midpen has purchased carbon offsets for business flight emissions since 2018.*

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