



Midpeninsula Regional  
Open Space District

R-25-169  
Meeting 25-32  
December 10, 2025

**AGENDA ITEM 13**

**AGENDA ITEM**

2024 Greenhouse Gas Inventory Report and Climate Program Update

**GENERAL MANAGER'S RECOMMENDATION**

Receive a report on the Greenhouse Gas Emissions of the Midpeninsula Regional Open Space District for calendar year 2024 and a summary of progress and upcoming actions under the Climate Change Program. No Board action is required.

**SUMMARY**

This report outlines reductions in the Midpeninsula Regional Open Space District's (District) administrative greenhouse gas (GHG) emissions compared to the 2016 baseline. In 2024, administrative emissions totaled 865 metric tons of carbon dioxide equivalent (MTCO<sub>2</sub>e), a reduction of 37% from the 2016 baseline. The District measures reductions against this baseline every two years by looking at one calendar year of emissions. The next goal set by the District's Climate Change Policy is 40% reductions by 2030. Actions contributing to emissions reductions in 2024 included continued use of renewable electricity, increased use of renewable diesel, additional electric vehicles to the District fleet, and high energy efficiency at the 5050 El Camino Real office building. In the other branches of the District's climate program, staff are developing a strategic plan for climate resilience and implementing projects to reduce the risk of carbon loss from high-intensity fire, studying a novel method for enhancing carbon sequestration in grasslands, and increasing sequestration and summer shade in rangelands.

**DISCUSSION**

**Inventory of 2024 Greenhouse Gas Emissions**

The Board of Directors (Board) adopted the Climate Action Plan (CAP) in October 2018 (R-18-114). The CAP and associated Climate Change Policy (part of the Resource Management Policies) set goals for reducing emissions below the District's baseline emissions (defined as 2016 emissions) by 20% by 2022, 40% by 2030, and 80% by 2050. To track progress, the District conducts a GHG inventory every two years (Attachment 1).

The District analyzes administrative GHG emissions in four sectors: Vehicles, Equipment and Business Travel; Employee Commute; Facilities; and Tenant Residences. Emissions for two additional sectors, Biogenic Emissions (added this year) and Visitor Transportation, are also estimated but are not subject to the Climate Policy's reduction goals. The District still seeks to reduce these emissions where feasible.

Table 1 below summarizes the reductions in the District’s administrative GHG emissions from 2016 through 2024. The numbers in this table reflect retroactive method adjustments made in the 2024 inventory (such adjustments are made routinely to follow evolving best practices, improved calculation methods, and changes to standardized emission factors) and may not match numbers previously reported.

**TABLE 1. ADMINISTRATIVE GHG EMISSIONS (MTCO<sub>2</sub>E)**

	2016	2018	2020	2022	2024	CHANGE 2016-2024
<i>Vehicles, Equipment, Business Travel</i>	676	595	440	441	430	-36%
<i>Employee Commute</i>	463	389	287	267	278	-40%
<i>Facilities</i>	163	139	220	165	107	-34%
<i>Tenant Residences</i>	73	49	40	36	51	-31%
<b><i>Administrative Emissions Total</i></b>	<b>1377</b>	<b>1172</b>	<b>987</b>	<b>909</b>	<b>865</b>	<b>-37%</b>

The 2024 inventory shows that annual administrative emissions have decreased 37% since 2016. Details of these reductions are provided below:

- **Vehicles, Equipment, and Business Travel emissions decreased by 36%.** Primary reduction actions relate to the expanded use of renewable diesel made from agricultural byproducts (which in 2024 accounted for 99% of the District’s diesel use and a third of all fuel), and a sustained shrinking reduction in ground business travel due to virtual options that became commonplace during the COVID-19 pandemic. Air travel emissions are offset annually with carbon offsets from a third-party verified supplier, Terrapass. Offsets totaling 101 MTCO<sub>2</sub>e were purchased for 2024.
- **Employee Commute emissions decreased by 40%.** This is largely due to the hybrid work policy allowing administrative office employees to work from home up to three days per week. The average commute distance for administrative employees has increased slightly but has decreased for field employees.
- **Facilities emissions decreased by 34%.** The refurbished office at 5050 El Camino Real is much more energy-efficient than the old office, which was last inventoried in 2022, using 59% less electricity and 87% less natural gas per square foot of floor area. Additionally, PG&E drastically reduced the carbon intensity of its default electricity mix, which is still used for the Skyline Field Office (all other facilities are enrolled in 100% renewable plans).
- **Tenant Residence emissions decreased by 31%.** Since the default electricity plans for tenant residences changed to 50% renewable electricity in 2017, fluctuations in residence emissions have been driven by an increase in the number of homes that come under District ownership as part of larger open space parcel purchases, how many are occupied, and whether tenants use propane or wood for heating. Property management staff continue to replace glazing with double-paned windows and replace propane heating/wood stoves with electric heat pumps for improved insulation and cleaner heating.

### **Revised Reporting: Biogenic Emissions**

One major change to the District's GHG reporting practices was made in the 2024 inventory. This was the creation of the Biogenic Emissions sector, a non-administrative sector, which was prompted by changes in the California Air Resources Board's GHG inventory protocols for the state. To remain in step with California's practices, all biogenic (i.e. from biological sources) emissions were grouped in a new non-administrative sector. This includes livestock (always considered non-administrative), renewable diesel (moved from the administrative Vehicles, Equipment, and Business Travel sector), and wood (moved from the administrative Tenant Residences sector).

Renewable diesel is considered biogenic because it is derived from agricultural byproducts rather than fossil fuels. Though it still has tailpipe emissions, its contribution to climate change is not akin to fossil diesel because of the biological feedstock. Biogenic emissions release carbon that is cycling in and out of the atmosphere on a short time scale, compared to fossil fuels which emit carbon that was sequestered for millions of years, effectively out of the active carbon cycle. The release of this fossil carbon is the underlying driver of increasing atmospheric carbon and climate change. This distinction is also what drove the state's change to reporting biogenic emissions in their own category. To ensure consistent comparisons in the 2024 Greenhouse Gas Inventory Report, numbers for previous inventories, when referenced, were also updated to reflect the change to biogenic emissions reporting. The Biogenic Emissions and Visitor Transportation sectors are summarized in Table 2.

**TABLE 2. NON-ADMINISTRATIVE GHG EMISSIONS (MTCO<sub>2</sub>E)**

	2016	2018	2020	2022	2024	PERCENT CHANGE
<i>Biogenic Emissions</i>	1,026	1,239	1,373	1,206	1,361	33% (from 2016)
<i>Visitor Transportation</i>	<i>Not Measured</i>	3,803	7,350	6,240	5,681	49% (from 2018)
<b><i>Non-Administrative Emissions Total</i></b>	<b><i>Incomplete</i></b>	<b>5,042</b>	<b>8,723</b>	<b>7,446</b>	<b>7,042</b>	<b>N/A</b>

The increase in Biogenic Emissions is primarily driven by an increasing use of renewable diesel. Visitor Transportation is an estimate for a subset of preserves where data is available and not representative of visitation throughout the District. Visitation spiked in 2020 during the COVID-19 pandemic and has since declined.

Percent change in total non-administrative emissions is not calculated because Biogenic Emissions and Visitor Transportation have different baseline years since data used to estimate visitor transportation emissions were not available in 2016.

### **Other Climate Program Work**

In addition to efforts for reducing emissions, staff are undertaking multiple projects related to climate change resilience and adaptation, and carbon sequestration and storage. Current work in these areas is outlined in Table 3 below.

*TABLE 3. CURRENT CLIMATE PROGRAM WORK*

<i>PROGRAM ITEM</i>	<i>LEAD DEPARTMENT</i>	<i>CLIMATE PROGRAM AREA</i>
Develop agency-wide adaptation and resilience plan (SPARCC)	Natural Resources	Resilience & Adaptation
Oak woodland restoration at Long Ridge OSP to reduce susceptibility to drought and disease, and improve fire resilience	Natural Resources	Resilience & Adaptation
Forest health work in La Honda OSP	Natural Resources	Resilience & Adaptation, Carbon Storage & Sequestration
Districtwide fuel management	Land Stewardship & Trails	Resilience & Adaptation, Carbon Storage & Sequestration
Carbon sequestration projects identified in carbon farming plan for Bluebrush Ranch (Purisima Creek Redwoods OSP)	Natural Resources	Carbon Storage & Sequestration
Study effects of biochar as a soil amendment in grasslands	Natural Resources	Carbon Storage & Sequestration

## FISCAL IMPACT

None

## PRIOR BOARD AND COMMITTEE REVIEW

The 2024 GHG Inventory is being presented to the full Board given full Board interest. Previous Board items regarding the Climate Change Program are listed below:

- Final Climate Change Policy and Action Plan, October 10, 2018
  - [Board Report](#) (R-18-114), [Minutes](#)
- 2018 Greenhouse Gas Emissions Inventory, June 26, 2019
  - [Board Report](#) (R-19-81), [Minutes](#)
- Findings from the Santa Cruz Mountains Climate Resilience Project, June 9, 2021
  - [Board Report](#) (R-21-81), [Minutes](#)
- 2020 Greenhouse Gas Emissions Inventory, July 14, 2021
  - [Board Report](#) (R-21-99), [Minutes](#)
- 2022 Greenhouse Gas Emissions Inventory, June 14, 2023
  - [Board Report](#) (R-23-68), [Minutes](#)

## PUBLIC NOTICE

Public notice was provided as required by the Brown Act.

## CEQA COMPLIANCE

The GHG Inventory itself is not a project subject to the CEQA. Additional CEQA review for specific CAP implementation items, if warranted, would be conducted prior to project implementation.

## NEXT STEPS

The District continues to make great strides in reducing its administrative emissions and will exceed the 2030 goal of 40% reductions from baseline if current trends continue. One anticipated source of further reductions is in the Vehicles, Equipment, and Business Travel sector, where emissions have stagnated since 2020. As the Fleet Transition Plan, completed in 2024, is implemented, gas vehicles will be retired from the fleet and new vehicles will be primarily electric, diesel (using renewable diesel), or hybrid. This will result in a rapid decline as older vehicles retire.

The next inventory, which will analyze emissions from calendar year 2026, will mark the 10-year anniversary of the District's GHG inventory. This milestone presents an opportunity to reassess the Climate Action Plan's goals, action items, and inventory practices to bring them into better alignment with the many other climate action plans being developed and implemented regionally and statewide. This evaluation would be conducted by a consultant with expertise in climate planning and GHG inventory protocols, as was the case during the original development of the CAP. Given the shrinking carbon footprint of the District's operations and the growing need for response to impacts of climate change already being felt in the region, a review of the CAP will seek to simplify and streamline inventory practices for future years to shift more resources and time on projects addressing resilience, adaptation, and carbon storage and sequestration.

Attachment

1. 2024 Greenhouse Gas Inventory

Responsible Department Head:

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Prepared by/Contact person:

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# MIDPENINSULA REGIONAL OPEN SPACE DISTRICT

## 2024 Greenhouse Gas Inventory Report

December 2025



Photo: Midpen Staff

*Land and Trails staff show off one of the electric Ford 150 Lightnings recently added to the fleet.*

### Executive Summary

This report describes Midpen's operational greenhouse gas emissions for the year 2025, climate actions that have been taken to reduce emissions, and future work to be done under Midpen's climate program.

### Key findings

Administrative emissions in 2024 totaled 865 MTCO<sub>2</sub>e. Midpen has reduced operational emissions 37% from the 2016 baseline, remaining on track to meet the upcoming 2030 goal of 40% reductions from baseline. This progress includes a 36% decrease in Fleet, Equipment and Business Travel, 40% decrease in Employee Commute, 34% decrease in Facilities, and 31% decrease in Tenant Residences. Compared to the prior 2022 inventory, total emissions decreased by an

### Key Terms

**GREENHOUSE GAS (GHG):** Gases that cause climate change, such as carbon dioxide (CO<sub>2</sub>) and methane

**METRIC TON OF CARBON DIOXIDE EQUIVALENT (MTCO<sub>2</sub>e):** Standard unit of measurement for greenhouse gases

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

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

additional 44 MTCO<sub>2</sub>e (5%). Emissions specific to Fleet, Equipment, and Business Travel decreased by 11 MTCO<sub>2</sub>e (3%), and Facilities decreased by 58 MTCO<sub>2</sub>e (35%), while there were increases of 11 MTCO<sub>2</sub>e (4%) in Employee Commute and 15 MTCO<sub>2</sub>e (39%) in Tenant Residences.

### Inventory Highlights

- Fleet and equipment emissions have stabilized over the last three inventories (since 2020) despite adding 46 on-road vehicles and rolling equipment (e.g. tractors, mowers, and ATVs) to Midpen's fleet during that period. This is due to a static use of gasoline in the existing fleet, while diesel equipment and new vehicles are using renewable diesel and electric power. Further reductions in fleet emissions will be realized as older gasoline vehicles are retired.
- The refurbished administrative office at 5050 El Camino Real shows greatly improved energy efficiency compared to the previous administrative office at 330 Distel (when last inventoried, in 2022). The new office uses 57% less electricity and 82% less natural gas per square foot of office space.
- Solar panels installed at the new administrative office were operating intermittently during 2024, during which they generated 9300 kWh of electricity. An issue with the building's circuit breaker has prevented the solar panels from working consistently, but a fix has been identified. Once fixed, additional emission reductions should be realized.
- Staff commute emissions have decreased since the 2016 baseline primarily due to work from home policies. Emissions increased slightly against the 2022 levels as the average commute has gotten longer and Midpen's staff continues to grow.
- Tenant residence emissions also have increased slightly year to year as Midpen acquires additional residences as part of open space land purchases and makes these available for renting.
- Methods and reporting were updated in 2024 to align with California Air Resources Board inventory methods that report biogenic (biologically derived) emissions separately from the main inventory. This change affected the reporting for fleet emissions and tenant residences, as renewable diesel and woodstove emissions were removed from the Administrative Emissions inventory and are now reported separately along with livestock emissions in a new sector called Biogenic Emissions. References to prior inventories in this report also use updated numbers that reflect this change.

### Next Steps and Recommendations

- Implementation of the Fleet Transition Plan, completed in 2024, is underway. Additional EV chargers have been installed at the Foothills Field Office and Skyline Field Office, and more are planned for the main Administrative Office. Most new vehicle purchases have been electric or use renewable diesel. Continued implementation of this plan, including further expanding EV charging and eventually retiring older, gasoline-powered vehicles, will support substantial reductions to Fleet and Business Travel emissions in coming years.
- Plug-in hybrid fleet vehicles have been underutilized for their EV capabilities due to a shortage of charging infrastructure at the Administrative Office. With limited charging stations (which are also available for staff to charge personal vehicles) plug-in hybrid fleet vehicles are not charged

reliably and so frequently operate as regular gas vehicles. Plans to install additional chargers at the Administrative Office are underway.

- Grants for replacing woodstoves with energy-efficient heat pumps are readily available and could be used to reduce the biogenic emissions from tenant residences. However, staff capacity has limited our ability to take advantage of these grants. Proactively identifying homes that would benefit from cleaner heating could streamline grant applications. Facilities and Fleet staff have opportunistically made energy efficiency improvements to some homes, such as double-pane windows and insulation, and are undertaking an audit of residences to identify those most in need of such improvements. Residences prioritized to receive energy efficiency improvements could also be prioritized for clean heat grants.
- Plans are in development for a new Skyline Field Office to be constructed in Monte Bello Open Space Preserve. The new office will have energy-efficient construction and utilities, including all-electric heating, battery backups, and rooftop solar. In contrast, the existing office is heated with propane. At the new office, propane would be used only for emergency generators.
- The commute incentives for transit, biking, and carpooling remain popular, but survey respondents suggest updating the carpool and bike stipend amounts to keep pace with the cost of living and better motivate green commutes. The stipends (\$20 per pay period for carpooling and \$15 for biking) were last updated in 2019. Some also recommend that the bike stipend be matched to the carpool stipend, since biking is a cleaner way to commute than carpooling and should therefore be more strongly incentivized. Another consideration is to adjust the qualifying number of biking or carpooling days per pay period, which was originally 5 days (half an employee's commute) and was reduced to 4 days when hybrid work (requiring a minimum of 4 days in office per pay period) was instated. Reducing the threshold further to 2 days per pay period would be in keeping with the original policy.
- While reducing emissions remains a climate action priority, Midpen is expanding its climate program work by adding emphasis on adaptation and resilience, from bolstering ecological function in climate-vulnerable habitats, to improving the resilience of infrastructure for better withstanding extreme weather, to building staff resources and internal systems for strengthening a coordinated response during climate-driven emergencies. Staff are working with a consultant to develop a Strategic Plan for Adaptation and Resilience to Climate Change (SPARCC) that will support holistic climate action across Midpen lands and operations. The plan will be complete in Fiscal year 2027.
- Carbon sequestration is another important area under the climate program. Several projects are planned or underway that will add to sequestration capacity and improve the stability of the existing carbon stocks. These include forest health projects that will safeguard carbon stored in forests from stand-replacing fire, a pilot project studying the impacts of amending grassland soils with carbon-sequestering biochar, and multiple projects to create patches of oak savannah, where sparse trees in a grassy landscape provide shade, habitat, and soil stabilization while sequestering carbon.

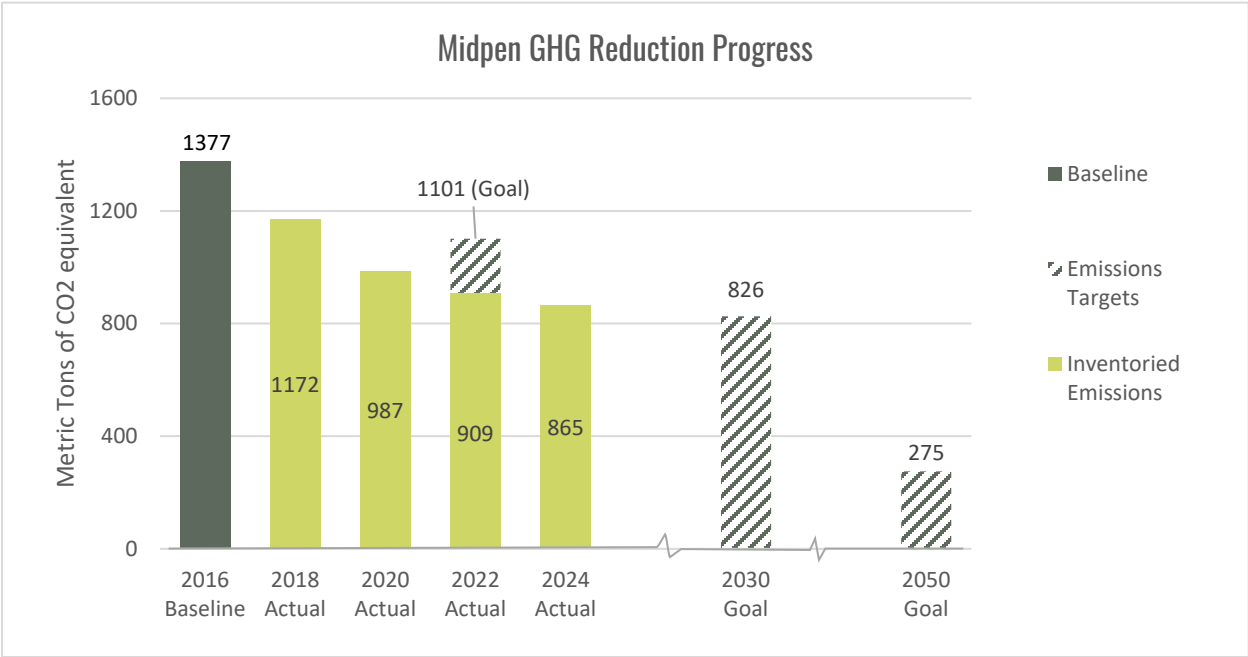


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Introduction

Midpen’s Board adopted the Climate Action Plan in October 2018 to reduce the agency’s greenhouse gas (GHG) emissions and ensure that, in line with our 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 greenhouse gas (GHG) emissions **20% below a 2016 baseline by 2022, 40% by 2030, and 80% by 2050**, in line with California’s climate change goals set in 2016 by AB 32 and the Paris Climate Agreement<sup>1</sup>. The Climate Action Plan lists dozens of changes Midpen can make to reduce 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 2024. It also discusses two other growing areas of Midpen’s climate program: adaptation and resilience, and carbon sequestration and storage.

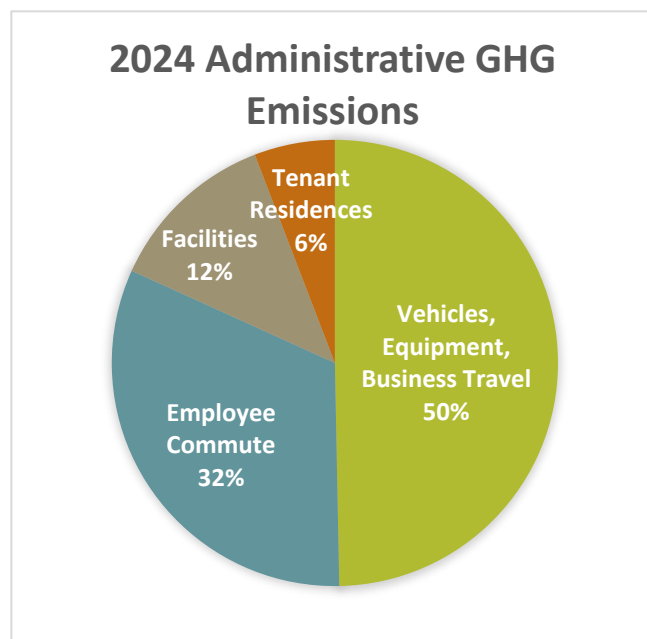
Table 1 below summarizes the reductions in Midpen’s administrative GHG emissions from 2016 through 2024. The numbers in this table reflect retroactive method adjustments made in the 2024 inventory (such adjustments are made routinely to follow evolving standard practice, improved calculation methods, and changes to standardized emission factors) and may not match numbers previously reported.

<sup>1</sup> 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. Annual sequestration on Midpen land is approximately 81 times the 2024 administrative emissions. Even with the addition of visitor emissions and biogenic emissions, sequestration still outweighs emissions by 8 times.

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	2016	2018	2020	2022	2024	CHANGE FROM 2016
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<b>Administrative GHG Emissions Total</b>	<b>1377</b>	<b>1172</b>	<b>987</b>	<b>909</b>	<b>865</b>	<b>-37%</b>

Midpen analyzes GHG emissions in six sectors: 1) Vehicles, Equipment and Business Travel, 2) Employee Commute, 3) Facilities, 4) Tenant Residences, 5) Biogenic Emissions, and 6) Visitor Transportation. The first four sectors are considered “administrative emissions” – emissions resulting directly from Midpen operations and over which Midpen has significant influence. The Climate Policy’s GHG reduction goals apply to these sectors. Biogenic Emissions and Visitor Transportation are “non-administrative emissions.” Biogenic Emissions includes livestock, renewable diesel, and wood combustion emissions, which are from biological sources and therefore counted separately from other emissions in standard inventory protocols<sup>2</sup>. Visitor Transportation

emissions are counted separately because they are related to, but not directly resulting from, Midpen’s staff, facilities or land management activities. Though non-administrative emissions are not part of the policy’s GHG reduction goals, Midpen tracks them and seeks to reduce them where feasible. They are addressed in Appendix 1: Non-Administrative Emissions.



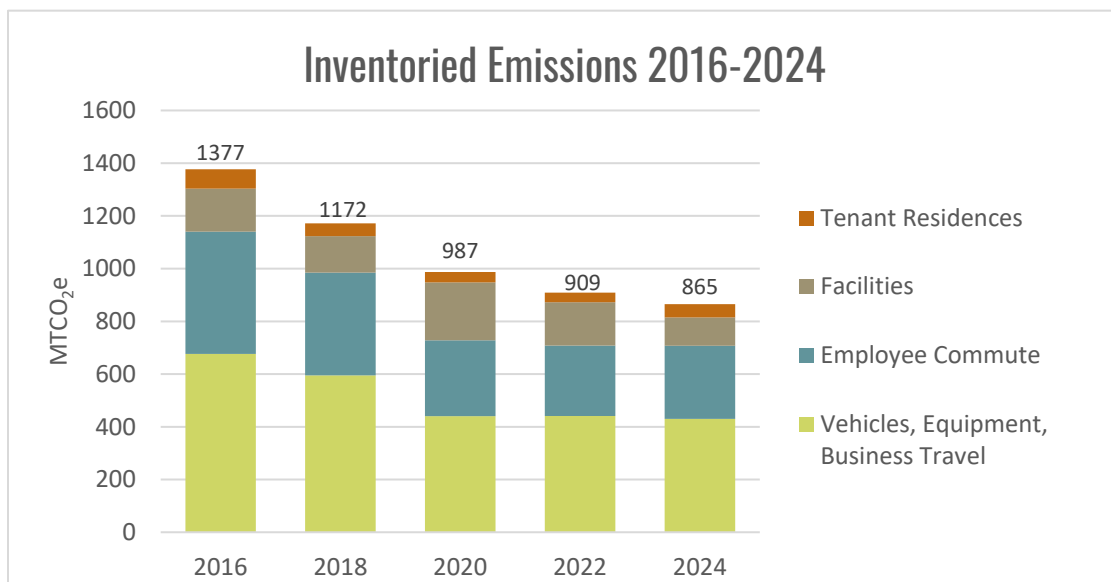
In 2024, as in past years, Vehicles, Equipment, and Business Travel is the largest administrative emissions sector, making up half of Midpen’s GHG footprint. Employee Commute remains the second largest sector at nearly a third of administrative emissions. Facilities remains the second smallest and Tenant Residences the smallest sector.

<sup>2</sup> This is a new sector as of this inventory. Previously, renewable diesel and wood emissions were reported with administrative emissions, but changes to the California Air Resources Board’s inventory practices prompted an update to reporting practices this year.

## 2024 Overview – Administrative Emissions

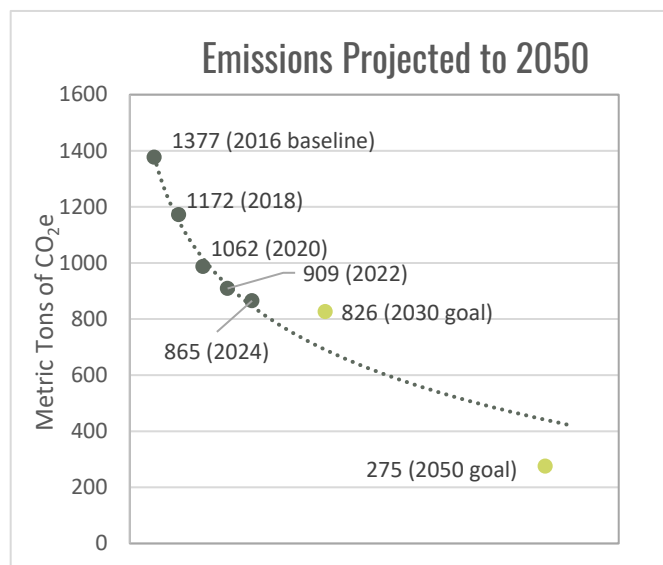
### Overall: 37% Decrease Since 2016

The 2024 GHG Inventory found that **administrative GHG emissions decreased 37% from 2016 to 2024 and 4% from the previous inventory in 2020**. Administrative GHG emissions for 2024 totaled 940 metric tons of carbon dioxide equivalent (MTCO<sub>2</sub>e). Since 2016, Vehicles, Equipment and Business Travel emissions have decreased 36%, Employee Commute emissions have decreased 40%, Facilities emissions have decreased 34%, and Tenant Residences emissions have decreased 31%. Key actions resulting in these decreases since the last inventory in 2022 were the continued use of renewable diesel fuel and zero-carbon electricity, the sale of the old office at 330 Distel Circle which eliminated a large source of emissions, an anomalously low quantity of debris sent to landfills, and improved energy efficiency of both the Administrative Office at 5050 El Camino Real and South Area Office at 240 Cristich Lane.



### Progress Towards Climate Policy Goals

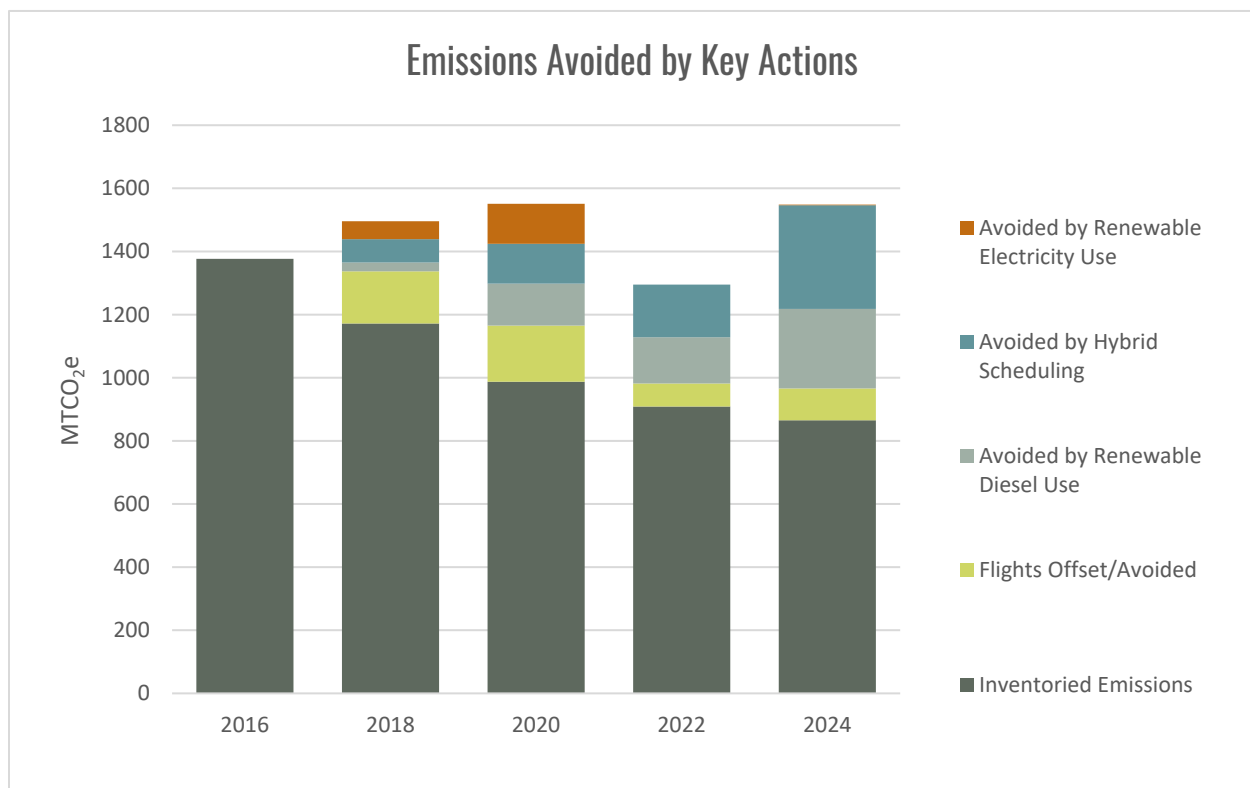
**Midpen is on track to meet the 2030 goal of 40% reductions from baseline.** However, the rate of reduction has decreased annually, following a logarithmic trend. If this trend continues, Midpen is likely to meet the 2030 goal of 40% reductions but miss the 2050 goal of 80% reductions. Importantly, this mathematical projection may not reflect the reality of future reductions. For example, fleet emission reductions over the last three inventories have slowed, but once older, less-efficient vehicles and equipment begin to be retired (and replaced with low- and zero-



emission models), reductions for the Vehicles, Equipment, and Business Travel sector should accelerate. Other changes might be driven by the evolving local and state-wide policy landscape. New building code requirements for electrification, for example, could spur action to reduce emissions from the combustion of propane and natural gas as sources of heat. Meanwhile stricter policies regarding methane capture in landfills could passively reduce Midpen's solid waste emissions, as has occurred with the steadily decreasing carbon intensity of grid electricity driving down energy-related emissions. On the other hand, there is no guarantee of these external influences, so Midpen must continue to actively reduce emissions.

## Greenhouse Gas Emissions Avoided

**In 2024, Midpen avoided 436 MTCO<sub>2</sub>e through emissions-reducing actions, without which administrative emissions would have been equal to the 2016 baseline.** Avoided emissions are a second way to quantify the effectiveness of emission reduction actions. Rather than comparing to the 2016 baseline, it compares to a hypothetical "business as usual" (BAU) scenario for the same year as the inventory, i.e., what *would* emissions have been in 2024 if Midpen had taken no emissions-reducing actions. As Midpen grows, the BAU scenario is generally expected to increase year to year. However, external factors (e.g. incorporation of more renewables into the default energy mix) are applied as appropriate when calculating the BAU.



Note: Emissions avoided by use of renewable electricity were minimal in 2022 and 2024, due to the BAU (PG&E) electricity in those years having a carbon intensity similar to the renewable electricity plans Midpen uses.

KEY ACTIONS TAKEN OR CONTINUED IN 2024, BY SECTOR*	MTCO <sub>2</sub> e AVOIDED
<b>Vehicles, Equipment, Business Travel</b>	<b>353</b>
Renewable Diesel	252
Flights Offset/Avoided	101
<b>Employee Commute – Hybrid Schedules</b>	<b>328</b>
<b>Facilities – Renewable Electricity Plan Enrollment</b>	<b>3.4</b>
<b>Tenant Residences - Renewable Electricity Plan Enrollment</b>	<b>-1.1</b>
<b>TOTAL AVOIDED EMISSIONS</b>	
*This table enumerates key actions for which avoided emissions can be calculated. It is not possible to calculate the precise impact of all actions taken due to limitations in data collection.	

**The continued use of renewable diesel avoided 252 MTCO<sub>2</sub>e.** This represents diesel fuel used for both on-road and off-road equipment, including vehicles where the diesel model was selected instead of the gasoline model to take advantage of this renewable fuel.

**Midpen avoided 101 MTCO<sub>2</sub>e from air travel by purchasing carbon offsets from a third party verified provider.** Midpen has purchased offsets for air travel emissions annually since 2016. Travel by plane has rebounded since the COVID-19 pandemic and now surpasses the baseline level.

**Midpen’s hybrid work policy, which allows most administrative employees to work from home up to three days each week, avoided 358 MTCO<sub>2</sub>e from staff commutes.** This surpasses the amount avoided by the shelter-in-place orders during the COVID-10 pandemic, due to an increase in average commute distance and significant growth in staffing, both of which drive up the emissions for the BAU scenario. Respondents to the 2024 commute survey (110 total responses) generally expressed gratitude for the continued hybrid work policy. Some (3) respondents felt they would be as effective working entirely remotely. Others (16) commented on the duration or distance of their commutes to the office, stating that they sit in traffic, often for multiple hours each office day. Several (4) pointed out that they cannot afford to live closer to the office. Some (13) also noted that while they would theoretically prefer transit, biking, or carpooling to driving alone, parental duties and/or long and inconvenient transit routes precluded that option. Some non-resident rangers (4) noted that they could eliminate significant mileage and time from their days if they could bring their District vehicle home and start patrol from their private residence.

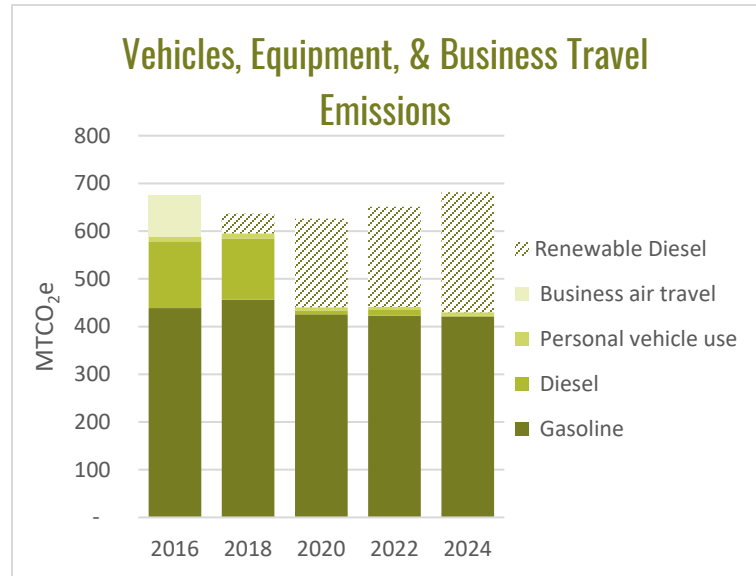
**The continued use of renewable alternatives to PG&E electricity avoided 2.3 MTCO<sub>2</sub>e.** While enrollment in 100% renewable plans for Midpen facilities avoided 4 MTCO<sub>2</sub>e, the Silicon Valley Clean Energy 50% renewable plan in which many tenant residences are enrolled had a higher emissions factor than PG&E (the BAU option) in 2024. Tenant residences contributed 1.1 MTCO<sub>2</sub>e more than the BAU for that sector. This is the first year that PG&E’s default energy mix surpassed the 50% renewable option in its carbon efficiency. The 50% renewable mix does not include fossil fuels. The higher emissions factor resulted from much of the non-renewable portion of this mix coming from large hydropower, which is not considered renewable and which has associated methane emissions from the decomposition of organic matter that occurs in large reservoirs.

## 2024 Greenhouse Gas Inventory by Sector – Administrative Emissions

### Vehicles, Equipment, Business Travel: 36% Decrease Since 2016

Vehicles, maintenance equipment, and business travel continue to be the largest source of Midpen’s administrative emissions, making up 50% of 2024 emissions. Emissions in this sector decreased by 36% from 2016 to 2024. This decrease has been driven by several factors:

- Ongoing transition of vehicles and equipment to electric per the Fleet Transition Plan for decarbonizing Midpen’s fleet;
- Installation of EV charging infrastructure;
- The use of renewable diesel made from agricultural byproducts, including preferentially purchasing diesel-engine vehicles when appropriate electric models are not available;
- Opening the new South Area Office in 2021, which shortened patrol and maintenance routes for staff servicing preserves in the southern part of the District,
- Purchasing carbon offsets for business flights; and
- Increased availability of virtual options for meetings, trainings, and conferences, allowing staff to travel less while still participating in professional development opportunities.



### Gasoline: 4% Decrease Since 2016

Gasoline is the largest contributor to Midpen’s vehicle and equipment emissions, and emissions from gasoline have stabilized around 425 MTCO<sub>2</sub>e since 2020. While reductions have stagnated, it is important to note that this has occurred while both the fleet and land base have grown substantially. Cloverdale Ranch, a preserve spanning over 6,000 acres, was acquired in late 2023, and since 2020, the fleet has grown by 29 road-use vehicles and 16 pieces of other heavy equipment. Of these, 24 were hybrid, electric, or diesel and 14 were gasoline-only. Even with the addition of 8 new gasoline vehicles (and 3 plug-in hybrids, which also use gasoline when not in EV mode), the stable emissions demonstrate improvements in efficiency – both fuel efficiency as older gasoline vehicles are replaced with newer models, and operational efficiency, as the South Area Office has enabled shorter routes for staff working in that area.

Hybrid, electric, and diesel models that suit the specialized needs of the District – particularly for patrol staff and for heavy equipment – are limited in availability, though options are improving. The number of electric vehicles in the fleet each year is steadily growing, with three on-road EVs purchased in 2018, 7 in 2024, and 4 as of October 2025. As older vehicles continue to retire and new vehicles are predominantly

low- and zero-emission models, the fraction of the fleet that uses gasoline will shrink, and the emissions from gasoline will shrink as well.

### Diesel: 98% Decrease Since 2016

The use of fossil diesel has all but ceased since 2016, with emissions from this fuel dropping 99% from 2016 to 2024. This is thanks to a transition to renewable diesel, which was first made available at the Skyline and Foothills field offices in late 2018, and in 2024, became available at a gas station near the South Area Office. 2024 was the first inventory year when all staff driving diesel-powered District vehicles had easy access to renewable diesel. Overall diesel consumption (fossil and renewable) has increased by 10,104 gallons compared to 2016 but in 2024, less than 200 gallons were fossil diesel. The increase in gallons is the result of preferentially purchasing diesel vehicles for a growing fleet when electric models are not available or suitable, since it is cleaner to use renewable diesel than gasoline.

### Renewable Diesel: Biogenic Emissions

Tailpipe emissions for renewable diesel totaled 252 MTCO<sub>2</sub>e in 2024; these emissions are not included in the Vehicles, Equipment, and Business Travel total. Beginning in 2024, to remain in step with practices used by the California Air Resources Board (CARB), renewable diesel emissions are reported separately from administrative emissions (see Appendix 1. Non-administrative Emissions). CARB reports biogenic (non-fossil, from biological sources) carbon emissions separately from fossil fuel emissions, and does not count them in the state's overall GHG trends. Renewable diesel is distilled from agricultural byproducts including vegetable oils, grain wastes and beef tallow.

### Business Ground Travel: 34% Decrease Since 2016

Personal vehicle reimbursements and other business-related ground travel (e.g. ride-share or taxi) have increased slightly from the 2022 inventory, from 5 to 7 MTCO<sub>2</sub>e. This is still a decrease from pre-COVID levels, as staff travel less for local meetings, conferences and trainings, and other business needs, thanks to readily-available virtual options. However, some conferences and meetings have returned to in-person only gatherings, and the staff has grown, so a small uptick in emissions in this sector is expected. Data is collected for this sector through self-reporting on the HR conference and travel form, to which a travel miles section was added in 2023 with the goal of improving accuracy. However, the HR conference and travel form is not consistently used, so despite cross-checking with records of credit card charges for ride-share and rental cars, there is a high likelihood this sector is underreported.

### Business Air Travel: All Emissions Offset

In 2024, emissions from business air travel totaled 101 MTCO<sub>2</sub>e, an increase from the 2016 baseline of 88 MTCO<sub>2</sub>e. These emissions are not counted in the inventory because they are offset. Since 2018, Midpen has purchased carbon offsets for business air travel from Terrapass, a third party verified offset provider.

Flights are the only emissions source for which the Climate Action Plan recommends purchasing carbon offsets. Originally, this was because there was no viable alternative to reduce emissions from flights other than staff not attending certain conferences. Flight emissions fell dramatically during the height of the COVID pandemic, but in years since, have rebounded and actually increased. While a few



conferences still offer virtual options, staff are increasingly opting to travel again to conferences for the added benefits of in-person networking. Additionally, the staff has grown from 145 employees in 2016 to 214 in 2024 (an increase of 67%), which means more people seeking training, professional development, and networking. While there are some instances in which virtual attendance would not reduce the value of these experiences, it would not make sense to require virtual attendance in all cases. Therefore, Midpen will continue to offset air travel emissions, though it is likely that these emissions will remain lower than pre-pandemic levels going forward.

### Performance Indicators

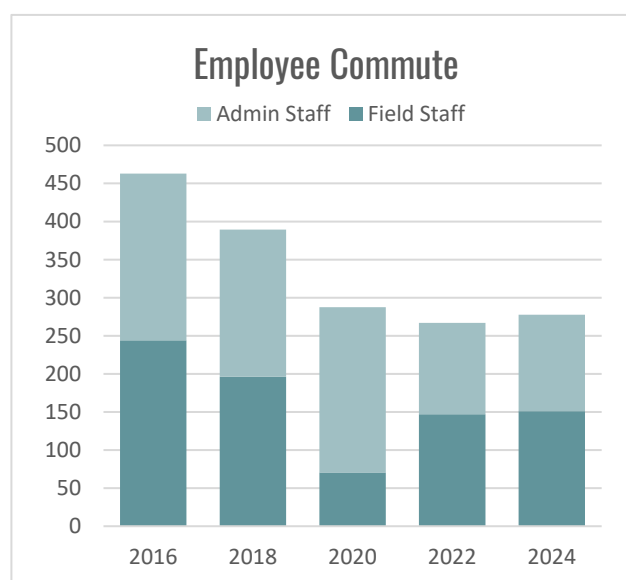
VEHICLES, EQUIPMENT, BUSINESS TRAVEL INDICATORS	2016	2018	2020	2022	2024
On-road fleet, % EV or renewable diesel*	0%	0%	30%	31%	35%
On-road fleet, % EV, hybrid, plug-in hybrid, or renewable diesel (low-emission)	4%	4%	34%	35%	41%
Annual miles flown for business travel	50,000	93,000	7,500	44,000	63,000
*Renewable diesel became available at field offices in December 2018					

### Employee Commute: 40% Decrease Since 2016

Employee commuting remains Midpen's second-largest sector, making up 32% of administrative emissions in 2024. Employee commute emissions decreased by 40% from 2016 to 2024. Contributing actions were:

- Implementation of a hybrid work policy;
- Monetary incentives and safeguards for choosing a non-driving commute; and
- Opening the new South Area Office (SAO).

No major new actions to reduce commute emissions have been taken since the SAO opened in 2021. Emissions in 2024 were 4% higher than in 2022, while staffing grew 11%.



### Administrative Staff Commute: 42% Decrease Since 2016

Commute emissions from administrative staff have decreased by close to half since 2016, though they increased by 6% (11 MTCO<sub>2e</sub>) from 2022. This latter change is most likely due to a growing staff, as well as an increase in the average round-trip commute distance for administrative staff from 38 to 43 miles. The number of staff who reported driving EVs increased slightly, from 15 to 20. A small number of staff have extraordinary commutes and travel by plane (not counted as business travel, and therefore not offset). These staff either work remotely out of state most of the time, and travel to the office a few times a year, or have a distant secondary residence from which they occasionally commute. These individuals' commutes contributed 9 MTCO<sub>2e</sub> to the sector in 2024.

Commute incentives continue to enable some staff to choose non-driving commutes, though the overall effect may be small. In the 2024 survey of staff commute habits, 26% of responding administrative staff (69% response rate) said that they use at least one of the commute incentives regularly, with the most-used incentive being the stipends for carpooling or biking (17% of respondents). However, 35% were unaware of at least one of the incentives offered. The least-known incentive was the emergency ride home, which is a reimbursement of up to \$50 for taxi or rideshare to get home if an employee is stranded at the office, for example, if their bicycle is broken or the trains are not running. 31% of respondents were not aware that this was available.

When asked for feedback on the incentives, common sentiments included suggesting that the bicycle and carpool stipends should be equal, that they should be increased to reflect increased costs of living since being introduced in 2019, and that reduced-price EV charging is not low-cost enough to effectively incentivize EV use. Several people also commented that they were not informed of the commute incentives during onboarding. Some offered creative ideas for new ways to facilitate alternative commutes. These included hosting a bike-share station to facilitate last-mile travel to transit, a Sharepoint page or other platform for coordinating carpools, and allowing administrative staff to work some of their office days from field offices closer to their homes.

### Field Staff Commute: 38% Decrease Since 2016

Commute emissions for field staff have decreased by 38% since 2016. Similar to administrative staff commutes, field staff commute emissions increased from 2022, albeit by a smaller 3% (4 MTCO<sub>2</sub>e) amount. The small increase in emissions is attributable to the growth in the number of field staff. While the average reported commute distance for field staff decreased from 39 miles in 2022 to 35 in 2024, the number of staff increased enough to outweigh this decrease.

Of field staff responding to the commute survey (39% response rate), only 14% said they use a commute incentive, while 46% were not aware of one or more of the commute incentives. The only incentive used by field staff respondents was the carpool/bicycle stipend. By and large, transit is not an option for field staff, as the field offices are too remote. Carpooling is also a challenge due to staggered shifts, fluctuating schedules, and employees living far from each other. Suggestions from field staff for improving the incentives or other ways to reduce commute emissions included allowing “banking” of carpool days so that carpooling more than the minimum number of days in one pay period could make up for carpooling less in another pay period, increasing the stipends and/or making the bike stipend equal to the carpool stipend, and allowing rangers living within a certain distance of their patrol route to take their patrol vehicle home rather than commuting to an office to begin their day, though this last option may or may not have a significant impact on emissions as it could simply shift emissions from the Employee Commute sector to the Vehicles, Equipment, and Business Travel sector. Currently, rangers living in District residences on preserves are permitted to take their District patrol trucks to their rented residence and begin their workday from their residence since they are originating from District land, and can begin patrolling District lands from their residence, and provide after-hours response, when needed. Rangers living elsewhere (not on District lands) are only permitted to take a District patrol truck to their private residence in special cases e.g. when going to a full-day training offsite. While this change would lower the reported commute mileage, the mileage and wear & tear of District patrol vehicles may

increase based on where the ranger resides. Moreover, rangers who live in private residences are unable to begin their patrol duties until they arrive to their reporting station.

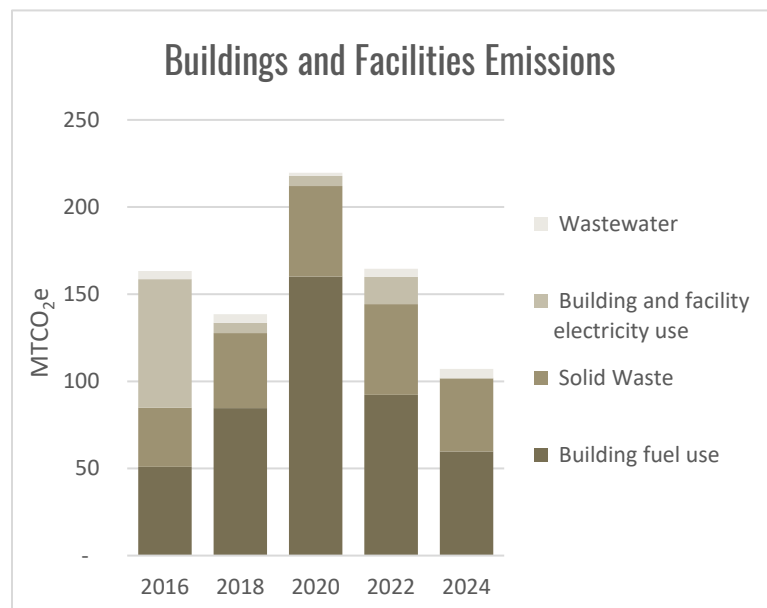
### Performance Indicators

EMPLOYEE COMMUTE INDICATORS	2016	2018	2020	2022	2024
Average AO commute distance (miles round-trip)	36	39	43	38	43
Average field office commute distance (miles round-trip)	41	37	40	39	35
Percentage of employees who typically drive alone (non-EV)	83%	82%	88%	83%	83%
Percentage of employees who drive EVs	N/A	N/A	6%	12%	15%
Percentage of employees who utilize commute incentives	N/A	N/A	21%	17%	26%

### Facilities: 34% Decrease Since 2016

Emissions from the operation of Midpen’s facilities result from electricity, heating fuels (natural gas and propane), solid waste (trash, recycling, and compost), and wastewater. Emissions for this sector made up 12% of total administrative emissions in 2024 and decreased 34% from 2016 to 2024. Primary drivers were:

- Continued use of renewable and zero-carbon energy plans;
- An increase in renewables in the standard PG&E electricity mix; and
- Sale of the old administrative office building and comparatively high energy efficiency at the refurbished 5050 El Camino office.



### Electricity: 99% Decrease Since 2016

Electricity emissions decreased by 99% from 2016 to 2024 despite electricity usage increasing by 45%. The increase in usage is due to the opening and acquisition of additional facilities, and the installation and use of EV chargers. The decrease in emissions is primarily from the purchase of renewable electricity from Peninsula Clean Energy and Silicon Valley Clean Energy, which began in 2017. These “community choice energy” providers purchase power from renewable and carbon-free<sup>3</sup> sources, offering 50% and 100% renewable alternatives to the standard mix provided by PG&E. The 50% renewable default plans have only slightly higher emissions factors than the opt-in 100% renewable options offered by these providers, because all electricity sources for both plans are carbon-free. All

<sup>3</sup> Carbon-free sources include large hydropower and nuclear, which are not considered renewable by the state of California, but which nonetheless have a minute carbon footprint compared to fossil fuels. The main renewable sources of electricity in California are solar and wind.

District facilities except Skyline Field Office were switched to 100% renewable in early 2023. Emissions factors for electricity in 2020 and 2022 were updated in 2024 based on newly available records from the California Energy Commission (CEC). This resulted in an increase in reported electricity emissions in 2022 from 5 to 16 MTCO<sub>2e</sub> due to an increase in the carbon intensity of the Silicon Valley Clean Energy 100% renewable plan, which was unable to meet the 100% renewable demand and thus purchased 5% of its electricity mix from other sources in 2022. The emissions for 2020 did not change significantly. Going forward, the previous inventory's electricity emissions factors will be updated at each new inventory, as the CEC records lag by a year. For example, this inventory uses 2023 emissions factors, which will be updated to 2024 emissions factors during the 2026 inventory.

Skyline Field Office remains on PG&E because its physical location and street address are in two different counties, complicating enrollment in county-specific energy plans. Fortunately, PG&E's default electricity mix has incorporated significantly more renewables since 2016, and in 2024 the carbon intensity of the default PG&E mix was extremely low.

Compared to 2022, electricity consumption decreased overall but increased slightly for the Administrative Office, likely because the building is now at full occupancy, including downstairs areas that were not occupied in 2022. In 2022, the Administrative Office used 5.4 kWh per square foot of office space (annual usage calculated from monthly average during the 2022 period after move-in), and in 2024 annual usage was 7.7 kWh per square foot. This is still a significant decrease from the 14.3 kWh per square foot used by the former 330 Distel Circle and 4984 El Camino offices when last inventoried in 2022. Additionally, the rooftop solar panels installed at the 5050 El Camino office produced 9300 kWh of electricity during 2024. The solar panels were working only intermittently due to an issue with the building's circuit breaker. That issue is still ongoing due to challenges to the procurement and installation of the retrofit component necessary to resolve it. Once it is fixed, additional energy savings are anticipated.

### Heating Fuels: 17% Increase Since 2016

Heating fuel emissions, which include natural gas and propane, increased by 17% from 2016 to 2024, though they dropped 35% from 2022. Natural gas emissions increased by 26% while propane emissions decreased by 17%. Only two District facilities use natural gas for heating, the Administrative Office and the South Area Office, which opened in 2021. The opening of the South Area Office accounts for a quarter of the increase in natural gas use since 2016. While the Administrative office at 5050 El Camino uses more natural gas overall than the 2016 baseline for the old office at 330 Distel Circle, it is three times larger and in 2024 used 61% less gas per square foot than the baseline for 330 Distel Circle.

Propane emissions from the Foothill and Skyline field offices were 17% below baseline in 2024. Propane use is variable because it is used both for heating and for emergency power during outages, meaning usage can depend strongly on weather, including cold, storms, and fire weather. The likelihood of power outages complicates the phasing out of propane for these field offices. While it would be preferable from an emissions standpoint to run entirely on electricity, it is not feasible to maintain operations – including emergency response capacity – without propane as a backup.

This necessity is reflected in draft designs for the new Skyline field office (construction anticipated in 2028), which include electric heating, backup batteries, and solar panels, but will retain propane generators for emergency use. The battery-solar systems can typically provide up to a day of power depending on weather and solar intensity. However, for longer outages, propane will still be necessary. One additional measure to consider would be including inverters to enable bidirectional charging (i.e. feeding energy from a vehicle's battery into the building's electricity system) so that electric vehicles could be used for additional battery capacity. Not all EVs are able to do this, but it is becoming more common, and the District already owns several vehicles with this capability.

### Solid Waste: 50% Increase Since 2016

Solid waste emissions increased by 23% from 2016 to 2024. Midpen sent 56 tons of trash to landfills in 2024, a tonnage increase of 34% from baseline. Three-bin systems (trash, recycling, and organics) are implemented at most offices, though Skyline Field Office does its own composting of kitchen scraps. Skyline and Foothill field offices also utilize dumpsters for the bulkier refuse generated by field projects.

While the availability of recycling and compost services has enabled Midpen to limit what is sent to landfill, the quantity of trash and associated emissions can be expected to increase as the staff grows. Staffing increased by 67% between 2016 and 2024, while per-capita solid waste emissions have decreased. Tonnage and emissions have not increased at the same rate (emissions increasing more slowly) because of different emission factors for the three landfills to which Midpen's waste is sent. These depend on how gases from decomposition (landfill gas or LFG) are treated at the landfill. LFG contains a high percentage of methane, a very strong GHG. No treatment of LFG has the highest emission factor, and in 2024 applied to 56% of Midpen's waste. The second highest emissions factor is for capture and flaring of LFG, applied to 40% of Midpen's waste in 2024. Only one landfill that serves Midpen has the lowest emission factor, for capturing LFG and using it to generate electricity. This applied to 4% of Midpen's waste in 2024. This is not a factor that Midpen has control over, however, it could improve in the future if the other landfills implement better LFG treatments.

### Wastewater: 7% Increase Since 2016

Wastewater emissions increased 7% from 2016 to 2024, from 4.7 to 5.0 MTCO<sub>2</sub>e. This reflects a combination of growth in staffing and changes to the wastewater treatment plant's processing methods that reduced emissions. Absent those changes, we would expect significantly more growth in Midpen's wastewater emissions.

The wastewater treatment emissions for 2016 and 2018 were corrected in 2024 to reflect improved understanding of the data sources. This inventory draws on wastewater emissions data from the City of Palo Alto's greenhouse gas inventory. These emissions are divided by the service population to yield per-capita emissions, then multiplied by the number of staff at Midpen to estimate emissions attributable to Midpen. This year, based on clarifications from City of Palo Alto staff, the population used for calculating per-capita emissions in 2016 and 2018 was changed from the entire service population of the treatment plant to a percentage reflecting only Palo Alto's service population. Using the total service area population in these years resulted in underreporting Midpen's wastewater emissions baseline and 2018. This correction does not significantly affect trends or achievement of Policy goals.

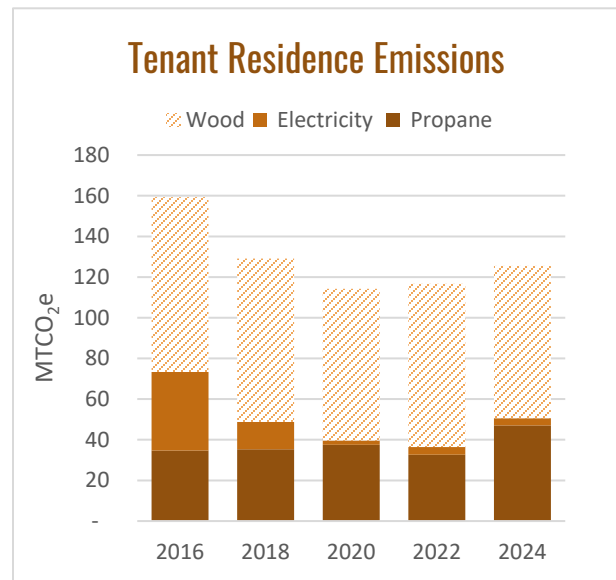
## Performance Indicators

FACILITIES INDICATORS	2016	2018	2020	2022	2024
Former AOs electricity kWh/ft <sup>2</sup> /yr	11.3	16.9	8.5	14.3	N/A
5050 El Camino electricity kWh/ft <sup>2</sup> /yr	-	-	12.9	5.4	7.7
Field office electricity kWh/ft <sup>2</sup> /yr	5.4	5.1	5.6	5.5	7.1
Percentage of electricity from renewable sources	33%	50%	49%	69%	91%
Former AO natural gas therms/ft <sup>2</sup> /yr	0.3	0.6	0.3	1.2	N/A
5050 El Camino natural gas therms/ft <sup>2</sup> /yr	-	-	0.5	0.2	0.2

### Tenant Residences: 31% Decrease Since 2016

Midpen leases residences located on its land to staff, agricultural leaseholders and their workers, and some members of the public. Emissions from residential electricity and heating fuels (propane and wood) made up 6% of administrative emissions in 2024, and have decreased 31% since 2016, though emissions have increased from a low in 2020. The net decrease was driven by:

- An increase in renewable electricity;
- Variance in vacancies and whether residents heat with propane or wood; and
- An increase in number of rental residences occupied.



### Electricity: 91% Decrease Since 2016

Electricity emissions decreased 91% from 2016 to 2024. The main driver was automatic enrollment in 50% renewable electricity plans in 2017, and fluctuations thereafter have primarily been due to variance in the carbon intensity of the non-renewable portion of that energy mix, which depends on what energy sources are utilized. Fossil fuels are not part of the 50% renewable mix, but other non-fossil sources such as large hydroelectric and biomass do produce a small amount of carbon emissions.

In 2024, electricity usage data accuracy for tenant residences in San Mateo County improved as Peninsula Clean Energy, the service providing electricity to those homes, was able to provide an aggregated total for the homes' electricity use. For residences in Santa Clara County, the electricity use was estimated as before based on square footage. The same correction of emissions factors that was applied to the electricity emissions calculations in the Fleet, Facilities, and Business Travel sector this year was also applied to the Tenant Residences electricity emissions calculations. Because of the relatively small amount of electricity used by these residences, this did not result in a significant change to emissions in the corrected years.

### Propane: 35% Increase Since 2016

Emissions from propane increased 35% from 2016 to 2024. The number of homes rented by the District has grown from 32 (13 using propane for heat) in 2016 to 43 (20 using propane) in 2024 as the District has purchased large acreages of open space lands that include structures, so an increase in emissions in this sector is expected. In 2024, six tenants shifted to using electricity, the first year any reported doing so. However, because electric heating is more expensive and can be unreliable in rural homes during storms or fire weather, most choose to use propane and/or wood.

### Wood: Biogenic Emissions

In 2024, emissions from heating with wood totaled 75 MTCO<sub>2</sub>e. These emissions are not counted with Administrative Emissions. Beginning in 2024, wood heating emissions will be reported with other biogenic emissions (see Appendix 1. Non-Administrative Emissions). This aligns with CARB's most recent reporting methods for California's GHG inventories. References in this report to previous inventories use revised numbers for past years.

Midpen is working to facilitate a switch to electric heating systems (likely while retaining propane or wood as a backup) by improving the energy efficiency of rental residences, which can significantly reduce the cost of heating with electricity. Many of the residences are older and poorly insulated, so simple upgrades such as blow-in insulation and double-paned, well-sealed windows can produce significant energy savings. The Facilities and Fleet department has replaced windows in several homes and is in the process of auditing the remainder to identify which are most in need of such improvements. In 2024, one home received new windows and another was fully remodeled, including new windows and installation of an electric heat pump.

### Performance Indicators

TENANT RESIDENCES INDICATORS	2016	2018	2020	2022	2024
Total residences	32	33	38	36	43
Vacant residences	6	6	3	4	3
Number of homes receiving energy-efficiency improvements	0	0	1	2	2

## Moving Forward

Midpen has been highly successful at cutting emissions thus far, thanks largely to a combination of “low-hanging fruit” actions implemented early on and major changes that arose from the COVID-19 pandemic. Significant reductions in the largest sector, Vehicles, Equipment, and Business Travel, will emerge in the next several years as older vehicles are retired and replaced with new low- and zero-emissions models. Further reductions in other sectors may be challenging, requiring further investment of staff time and budget. In some cases, emissions can be expected to increase – for example, in staff commutes – as the agency continues to grow. These increases must be offset in other areas for progress to continue, highlighting the importance of continued action. The following Climate Action Plan items are underway in the Fiscal Year 2026 Budget and Action Plan:



Climate Action Plan Item	Budget	Lead Department(s)
Continue incentives for green commutes	\$10,000	Administrative Services
Purchase two electric and one hybrid truck for Visitor Services	\$150,000	Facilities & Fleet
Purchase carbon offsets for business flights	\$1,000	Natural Resources
Make Title 24 energy efficiency improvements to 10 tenant residences	\$209,000	Facilities & Fleet
Install additional EV charging infrastructure	\$131,500	Facilities & Fleet, Engineering & Construction
IT support for continued hybrid work	\$0*	Information Systems and Technology

\*No budget; staff time only

## Sequestration, Adaptation and Resilience

Midpen's Climate Change Policy goes beyond greenhouse gas reduction, also including elements for carbon sequestration, adaptation, and resilience. Adaptation and resilience are related but distinct concepts, as are sequestration and storage. In this context, adaptation refers to changes within a system that reduce risk and potential future impacts from climate change. Resilience is the ability of a system to withstand and recover from disturbance – resilience is typically a goal of adaptation work. Sequestration is the process by which carbon is removed from the atmosphere (primarily through photosynthesis), while storage refers to the amount of carbon held in biomass, aqueous, and mineral forms.

Reduction of greenhouse gases, the purview of the Climate Action Plan, is one important piece of a multi-component path to tackling climate change. While continued inputs of GHGs to the atmosphere worsen climate change, impacts are already occurring, threatening the resilience of this region's landscape, its ability to sequester and store carbon, and the function of its ecosystems. Climate change has also already affected Midpen's operations, with infrastructure damage and an elevated need for fire preparedness during a longer fire season.

Midpen is undertaking several actions to support the adaptation and resilience branch and the sequestration and storage branch of the Climate Program in Fiscal Year 2026.

Climate Program Item	Budget	Lead Department
<b>Resilience and Adaptation</b>		
Develop agency-wide Adaptation and Resilience Plan	\$35,000	Natural Resources
Develop oak woodland restoration plan for Long Ridge OSP to improve drought and fire resilience	\$20,000	Natural Resources
<b>Carbon Sequestration and Storage</b>		
Implement carbon sequestration projects identified in carbon farming plan	\$20,000	Natural Resources
Baseline data collection for study of biochar impacts to grasslands	\$25,000	Natural Resources



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## Appendix 1: 2024 GHG Inventory by Sector – Non-Administrative Emissions

In addition to administrative GHG emissions, Midpen also tracks Biogenic Emissions and Visitor Transportation, i.e. vehicle emissions from visitor trips to and from a subset of preserves. Biogenic Emissions is a new sector in 2024. It includes emissions from renewable diesel and wood combustion along with livestock emissions (of these, livestock emissions was the only source previously reported in Non-Administrative Emissions).

Visitor transportation emissions were not included in the 2016 baseline GHG inventory, but have been estimated for 6 preserves beginning in the 2018 GHG Inventory. The visitor transportation figure does not represent total visitor emissions, as data is only available for a subset of preserve, but it can serve as a snapshot of general trends in visitation over time. These sectors represent opportunities to reduce emissions above and beyond Midpen's administrative GHG reduction goals.

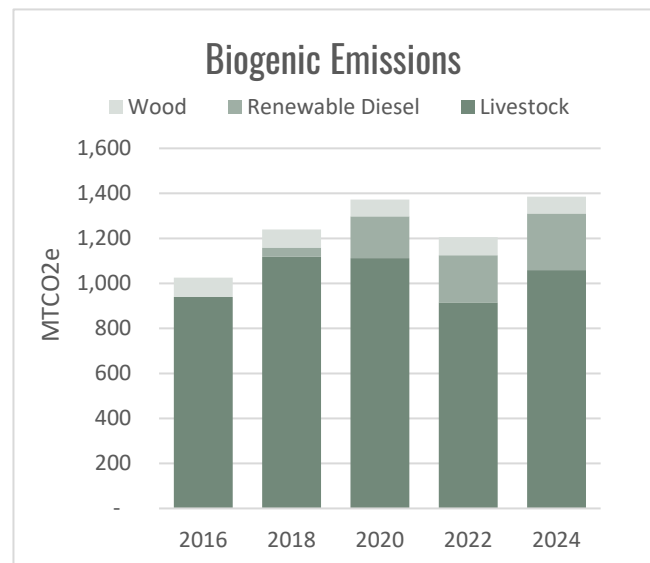
### Biogenic Emissions: 35% Increase since 2016

Biogenic Emissions is a new sector as of 2024, to capture emissions that do not result from fossil fuels but rather biological sources. These emissions include enteric emissions of livestock, wood burned for heat, and combustion of renewable diesel fuel, which is made from agricultural byproducts.

Biogenic Emissions have increased 35% since 2016.

Main drivers of this increase are:

- The use of renewable diesel as a fuel for District vehicles and equipment, and
- A slight increase in the number of livestock in District conservation grazing leases.



This new sector aligns Midpen's GHG inventory with CARB's reporting protocols for California's GHG inventories, which reports biogenic carbon separately and does not count these emissions against emission reduction goals. This is because biogenic emissions are not additive to atmospheric carbon in the same way fossil fuel emissions are. Carbon emitted from biological sources (respiration, decomposition, combustion of organic materials, and enteric emissions) is cycling on short timescales between the atmosphere and the organisms where it is temporarily stored. This is in contrast to fossil carbon, which has been kept out of this short-term cycling for tens of millions of years prior to release through combustion of fossil fuels. These additive emissions are responsible for the increasing atmospheric CO<sub>2</sub> concentrations driving climate change.

### Renewable Diesel

Midpen began offering renewable diesel at the Foothills and Skyline Field Office fuel tanks December 2018 and in 2024 it accounted for a third of all fuel use. The renewable diesel that Midpen purchases for

field office fuel tanks is derived from beef tallow, a byproduct of the beef industry. It is also available at 76 brand gas stations; staff at the South Area Office purchase renewable diesel from a nearby station as there is no fuel tank on-site at the office. On their website, 76 identifies “vegetable oils and fats” as the feedstock for their renewable diesel.

Tailpipe emissions for renewable diesel totaled 252 MTCO<sub>2</sub>e in 2024. The emissions factor used to calculate these emissions was updated to match the tailpipe emissions factor for fossil diesel. Renewable and fossil diesel are chemically equivalent and produce the same amount of GHG emissions upon combustion. The emissions factor used previously was based on CARB data regarding lifecycle carbon intensity, however, the emissions factors used for gasoline and conventional diesel are for tailpipe (combustion) emissions, not lifecycle emissions. The updated emissions factor brings the calculations for renewable diesel in line with those for other fuels, and also matches methods used by CARB in state GHG inventories.

### Livestock

Livestock emissions totaled 1,059 MTCO<sub>2</sub>e in 2024. Livestock on Midpen lands include cattle in the conservation grazing program, as well as small numbers of pigs, horses, and other farm animals managed by leaseholders. Most of Midpen’s livestock emissions come from cattle, which are grazed by agricultural leaseholders on approximately 9,480 acres of Midpen property in San Mateo County. Livestock emissions increased 13% since 2016, as grazed rangeland acreage increased by 17%. However, the true net increase environmentally within the region is substantially much lower given that most of the new acreage acquired that was added to the conservation grazing program was already in active grazing prior to District ownership.

Conservation grazing with a low density of cattle enables Midpen to reduce fuel loads, promote 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 managed for conservation exist within a complex biological system in which they both produce emissions, and reduce the risk of carbon emissions from fire by removing fine fuel (grasses) from the landscape and preventing the establishment of hotter-burning woody fuels (brush). They also maintain a mosaic of grassland habitat with varied heights and densities of vegetation, providing niches for diverse grassland specialist species including grasshopper sparrows, burrowing owls, and American badgers. Livestock offer a time- and cost-effective alternative to mechanical vegetation management and prescribed fire, each of which also has its place and its tradeoffs (e.g. soil compaction, particulate and GHG emissions, permitting difficulties, noise, cost, infeasibility in certain terrain types, and staff time).

Midpen has begun projects to offset livestock emissions through carbon-negative rangeland management practices. These include sparsely planting oak trees (oak savanna silvopasture), restoring and widening wooded riparian corridors, preventing cattle from entering streams, and studying the effects of applying biochar to the soil. Biochar is a mostly inert carbon product that results from burning biomass (usually wood) at very high temperatures and low oxygen concentrations. Biochar does not readily decompose and it is an effective way to store carbon for hundreds to thousands of years. If the

pilot study demonstrates no negative effect, in-house biochar production could potentially be a way to convert woody biomass removed in Midpen’s fuel reduction projects to long-term carbon storage.

### Wood

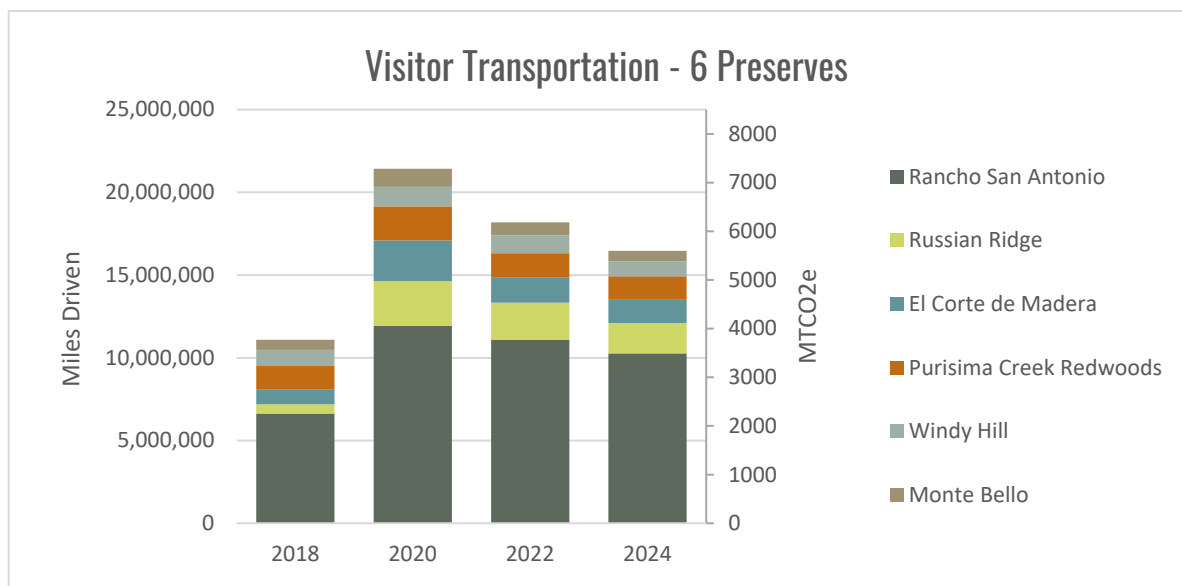
In 2024, emissions from home heating with wood totaled 75 MTCO<sub>2</sub>e. Approximately half of Midpen’s residential tenants heat their homes primarily with woodstoves or wood-burning fireplaces, though the number fluctuates year to year. As Midpen continues to make energy efficiency improvements to the residences and when possible, install electric heat pumps, the number of tenants using wood as their primary heat source should decline.

### Performance Indicators

BIOGENIC EMISSIONS INDICATORS	2016	2018	2020	2022	2024
Renewable diesel as percent of total fuel	0%	6%	25%	29%	34%
Cattle grazed on District lands	383	494	486	376	463
Number of acres grazed	8,092	8,092	8,490	8,964	9,480
Percentage of occupied residences using wood for primary heat	52%	48%	46%	45%	47%

### Visitor Transportation : 49% Increase Since 2018

The data used to estimate visitor transportation emissions have only been available since 2018, and only for specific parking lots at a handful of preserves. While this subset does not provide a complete picture of visitor emissions, it does demonstrate that emissions from visitor vehicles are significant. In 2024, visitors drove an estimated 16,470,000 million miles, resulting in 5,651 MTCO<sub>2</sub>e of emissions, to and from the six preserves in the sample. This continues a downward trend since a peak in 2020, when the pandemic shelter-in-place orders resulted in record visitation. Importantly, though visitor transportation emissions are substantial, Midpen both protects land from development (land use change being one of the largest sources of GHGs globally) and provide a close-to-home option for residents of the Peninsula to recreate in a natural setting, reducing the need to drive to more distant options like state or national



parks. Therefore, while visitation does create emissions, the existing scenario almost certainly results in lower emissions than an alternative without Midpen preserves.

Methods for this sector were amended in 2024. The car counters sometimes malfunction due to vandalism, electrical issues, high winds, or even insect damage. These issues result in days with low or missing counts, and occasionally artificially high counts. The original method to correct these errors was to use the annual average daily visitation number for any day with an obvious malfunction. In 2022, staff developed a machine-learning algorithm using EPA data to interpolate missing data from the car counters. This machine-learning algorithm produced more realistic data than the old method, however, in 2024 the EPA stopped publishing the weather and air quality data used to train the algorithm, so a return to the previous methods was necessary. The mileage and emissions for 2018-2022 were also reverted for the sake of standardization for comparison year-to-year.

An update to Midpen's 2017 Visitor Use Survey would aid in developing a more complete assessment of visitor emissions. The visitor emissions estimate uses ZIP code data from this survey, and periodic updates would capture changes in this demographic over time. Additionally, an update could collect ZIP code data from visitors to Mt. Umunhum, which was not open during the first survey, but which does now have a car counter.

## Appendix 2: Detailed Table of Greenhouse Gas Emissions Changes 2016-2024

ADMINISTRATIVE EMISSIONS (MTCO <sub>2</sub> E)	2016	2018	2020	2022	2024	CHANGE
<b>Vehicles, Equipment, Business Travel</b>	<b>676</b>	<b>608</b>	<b>500</b>	<b>508</b>	<b>430</b>	<b>-36%</b>
Gasoline	439	457	426	423	421	-4%
Diesel	140	128	8	13	2	-98%
Personal Vehicle Reimbursements	10	11	7	5	7	-34%
Business Air Travel	88	0*	0*	0*	0*	-100%
<b>Employee Commute</b>	<b>463</b>	<b>389</b>	<b>287</b>	<b>267</b>	<b>278</b>	<b>-40%</b>
Administrative Staff	244	196	71	120	127	
Field Staff	219	193	217	147	151	
<b>Facilities</b>	<b>163</b>	<b>139</b>	<b>220</b>	<b>165</b>	<b>107</b>	<b>-34%</b>
Electricity	74	6	6	16	1	-99%
Heating Fuels	51	85	160	92	60	17%
Solid Waste	36	44	52	54	42	23%
Wastewater	4.7	5.0	1.8	4.7	5	7%
<b>Tenant Residences</b>	<b>73</b>	<b>49</b>	<b>40</b>	<b>36</b>	<b>51</b>	<b>-31%</b>
Electricity	39	13	2	4	4	-91%
Heating Fuels	35	35	38	33	47	35%
<b>Administrative GHG Emissions Total</b>	<b>1,377</b>	<b>1,172</b>	<b>987</b>	<b>909</b>	<b>865</b>	<b>-37%</b>
NON-ADMINISTRATIVE EMISSIONS (MTCO <sub>2</sub> E)	2016	2018	2020	2022	2024	CHANGE
<b>Biogenic Emissions</b>	<b>1,026</b>	<b>1,239</b>	<b>1,373</b>	<b>1,206</b>	<b>1,385</b>	<b>35%</b>
Livestock	939	1,118	1,112	915	1,059	13%
Renewable Diesel	-	41	186	210	252	508% (from 2018)
Wood	86	80	75	80	75	-13%
<b>Visitor Transportation – 6 Preserves</b>	<b>-</b>	<b>3803</b>	<b>7350</b>	<b>6240</b>	<b>5651</b>	<b>49%</b>
*Midpen's flight emissions were 165 MTCO <sub>2</sub> e in 2018, 13 MTCO <sub>2</sub> e in 2020, 73 MTCO <sub>2</sub> e in 2022, and 101 MTCO <sub>2</sub> e. These emissions were offset and are not counted toward the inventory total.						

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