MIDPENINSULA REGIONAL OPEN SPACE DISTRICT

CLIMATE ACTION PLAN

October 2018

MIDPENINSULA REGIONAL OPEN SPACE

CASCADIA CONSULTING GROUP

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TABLE OF CONTENTS

Foreword

With this Climate Action Plan, Midpen is taking action to minimize our own operational climate change impacts on our community and the surrounding natural environment. Climate change is putting at risk nearly 50 years of incredible conservation gains made by this organization and our partners. Changing temperatures are altering rainfall, vegetation, and ultimately the health of our local biodiversity. People are also witnessing and directly experiencing the wide-reaching impacts of climate change.

Midpen remains committed to protecting a regional greenbelt of open space that increases our community's ability to cope with climate change. Preserved forests and grasslands, and even the soil beneath them, continuously capture and store excess carbon in the atmosphere that originates from the burning of fossil fuels for transportation and energy. Open space lands buffer surrounding communities from catastrophic events such as sea level rise, flooding, and wildfire. Interconnected open space with wildlife corridors allows native plants and wildlife to move across the landscape, seeking livable habitats in response to changing conditions.

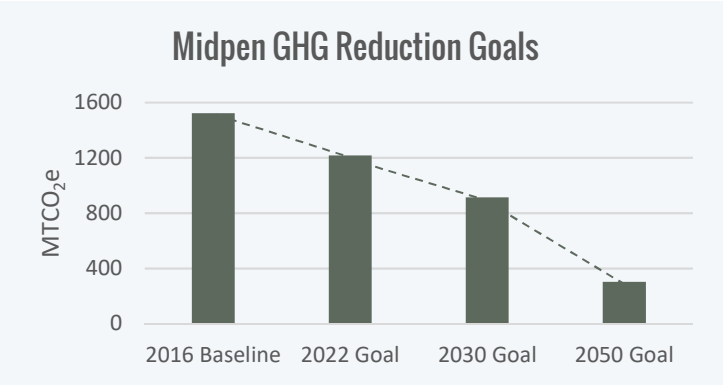
Midpen is seizing the opportunity to lead by example and be part of the solution**.** From the energy we use, to which lands we preserve, to how we manage open space, this Climate Action Plan is our roadmap to meeting aggressive voluntary greenhouse gas reduction goals. We invite you to join us in taking a few additional steps to further reduce your own carbon footprint. Collectively, our actions make a real and lasting difference.

Ana María Ruiz
General Manager

Executive Summary

Climate change is a direct threat to Midpeninsula Regional Open Space District's (Midpen's) mission to acquire and preserve a regional greenbelt of open space land *in perpetuity*. Climate change is affecting temperatures, precipitation, weather patterns, species ranges, and wildfire risk, thereby affecting Midpen lands. Midpen believes that action on climate change must start from within and aims to lead by example by reducing its carbon footprint as an agency. The Climate Action Plan serves as a roadmap to meet Midpen's ambitious commitment to:

Reduce administrative greenhouse gas (GHG) emissions 20% below 2016 baseline by 2022, 40% by 2030, and 80% by 2050.



This goal will be reached by implementing the following climate action strategies:

VEHICLE FLEET, EQUIPMENT, AND BUSINESS TRAVEL - 45% OF BASELINE ADMINISTRATIVE GHG EMISSIONS

Increase electric and alternative fuel vehicles and equipment, increase vehicle fuel economy, increase use of electric transportation options, reduce miles driven, and purchase carbon offsets for flights.

EMPLOYEE COMMUTE - 30% OF BASELINE ADMINISTRATIVE GHG EMISSIONS

Reduce the number of commute days, incentivize and enable low-emissions commute modes, and reduce commute distances.

FACILITIES - 13% OF BASELINE ADMINISTRATIVE GHG EMISSIONS

Move towards 100% renewable electricity for all Midpen facilities, maximize energy efficiency in new and existing buildings, and reduce solid waste generated through Midpen operations.

TENANT RESIDENCES - 12% OF BASELINE ADMINISTRATIVE GHG EMISSIONS

Move towards 100% renewable electricity for residences, increase energy efficiency, move towards cleaner heat sources, and improve data and guidance for decision-making.

In addition, Midpen seeks strategies to reduce or offset livestock emissions, enhance carbon sequestration, reduce visitor transportation emissions, and increase staff and visitor awareness and action on climate change.

The Climate Action Plan is designed to be a living document, serving as a starting point for a long-term commitment to address climate change. It is our hope that by taking steps to reduce GHG emissions internally, Midpen can draw attention to this critical issue, catalyze GHG reduction in our resident community and the broader environmental community, and contribute to local, state, and global progress on stabilizing the climate and protecting life in all its forms.

Introduction

Climate change is a direct threat to Midpeninsula Regional Open Space District's (Midpen's) mission to acquire and preserve a regional greenbelt of open space land **in perpetuity**. Now and in the future, climate change has wide-reaching consequences for the Bay Area's natural environment and the people who depend on it. Greenhouse gases (GHGs) released from burning fossil fuels for transportation and energy are changing the climate. As a result, the Bay Area is already seeing warmer temperatures, changes to plant and animal habitat ranges, more intense wildfires, sea level rise, and more frequent droughts and floods.

Midpen believes that action on climate change must start from within. The Climate Action Plan (CAP) presents a roadmap to reduce Midpen's carbon footprint. Midpen aims to further regional and global progress on climate change mitigation, draw attention to this critical issue, and catalyze community-wide greenhouse gas reductions by leading by example and demonstrating what solutions look like in practice.

The CAP summarizes Midpen's carbon footprint and outlines strategies to reduce it. Midpen has adopted an ambitious voluntary goal of **reducing greenhouse gas emissions 20% by 2022, 40% by 2030, and 80% by 2050**, in line with the State of California's goals. In pursuit of that goal, the CAP lays out a suite of greenhouse gas reduction strategies, actions, and performance indicators as well as an implementation and monitoring plan.

CLIMATE ACTION PLAN DEVELOPMENT PROCESS

In 2017, Midpen initiated a climate action planning process to assess and develop strategies to reduce agency greenhouse gas emissions. Midpen hired a management fellow through the City/County Managers Association of San Mateo and Santa Clara Counties to lead this work. Partner organizations like the Bay Area Open Space Council have commended Midpen's leadership in dedicating staff resources to climate change.

Staff at all levels have been involved in the development of the Climate Action Plan in order to create a roadmap that is feasible and balances climate goals with the important work done by Midpen staff. An interdepartmental climate project team was convened in November 2017 to guide the scope and content of the Climate Action Plan. This team of 12 representatives from seven departments met monthly throughout the project. In addition, three working groups composed of a total of 16 staff took a deep dive into the largest emissions sectors over the course of 14 brainstorming and prioritization meetings. The full staff was engaged in the project through all-staff and department presentations. Finally, 101 employees (56% response rate) responded to a survey on Climate Action Plan strategies to share their ideas and feedback. A majority of employees supported every single GHG reduction strategy in the survey, with support ranging from 65-97% across strategies.

The Board of Directors held three meetings to inform the development of the Climate Action Plan:

- March 28, 2018, to review Midpen's greenhouse gas inventory and forecast
- June 27, 2018, to provide feedback on Midpen's greenhouse gas reduction goals
- September 12, 2018, to provide feedback on the draft Climate Action Plan and draft Climate Change Policy

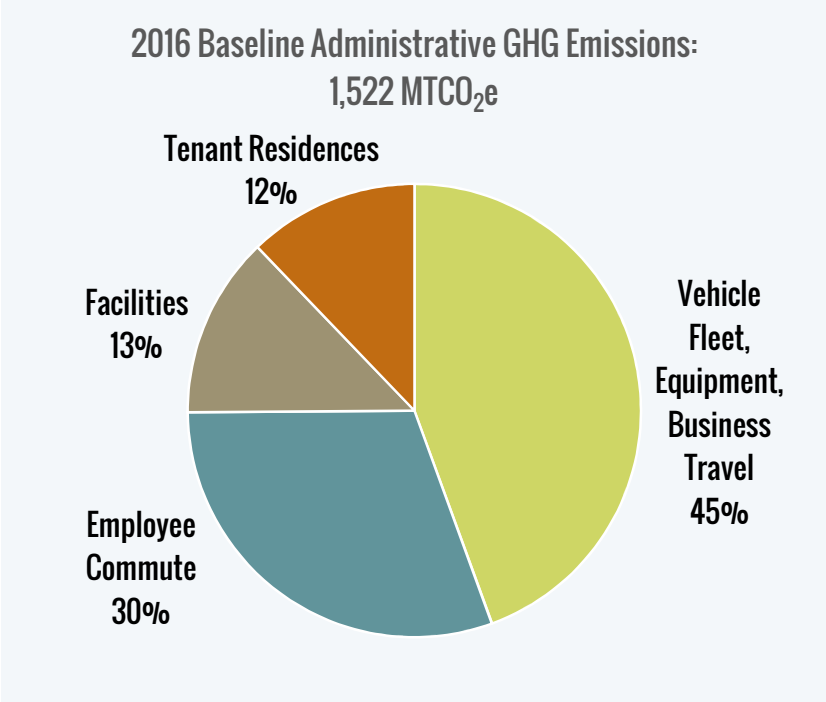
Baseline Summary

Greenhouse Gas Inventory

The baseline GHG Inventory is for the year 2016, the earliest year for which full data was available. Midpen is using an **administrative scope** that focuses on GHG emissions from Midpen administration and operations:

- Vehicle fleet, equipment, and business travel
- Employee commute
- Facilities (including electricity, heating fuels, solid waste, and wastewater)
- Tenant residences (including electricity and heating fuels)

In 2016, Midpen produced 1,522 metric tons of carbon dioxide equivalent ($MTCO_2e$). Vehicles, equipment, and business travel was the largest emissions sector at 45%. Employee commute was the second highest contributor at 30%. Facilities made up 13% of administrative emissions, followed by tenant residences at 12%. These administrative emissions sectors are the focus of Midpen's GHG reduction goals, and details on each sector can be found in the Greenhouse Gas Reduction Strategies and Actions section.

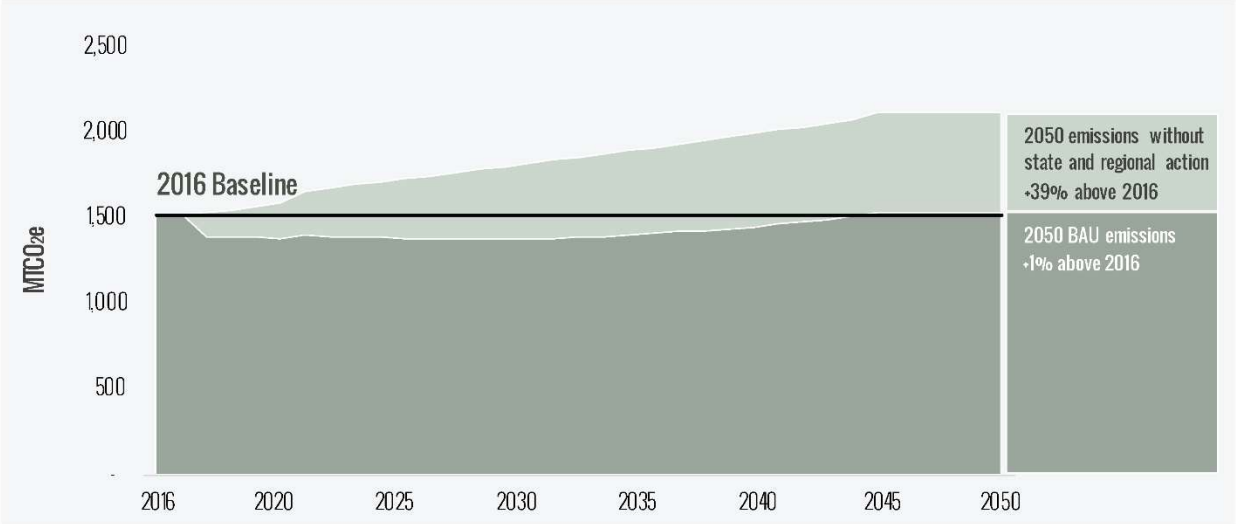


There are also non-administrative GHG emissions related to Midpen activities but that Midpen has less control over, such as livestock and visitor transportation to preserves. These non-administrative emissions sectors are discussed in Appendix 1. They represent areas for additional analysis to establish GHG emissions baselines and identify opportunities to reduce emissions above and beyond Midpen's administrative GHG reduction goals. Initial strategies to establish emissions baselines and reduce or offset emissions from livestock and visitor transportation are described in Appendix 1.

Business-as-Usual Emissions Forecast

The business-as-usual (BAU) emissions forecast projects greenhouse gas emissions through 2050 to provide a sense of how emissions will change over time if Midpen takes no action to reduce emissions. The forecast takes Midpen's significant organizational growth into account, including expected growth in staff, vehicles, office facilities, and land acquisition. The BAU forecast also factors in state and regional laws and policies that will affect emissions in the future, such as fuel efficiency and renewable energy standards.

Administrative GHG Emissions Forecast 2016-2050



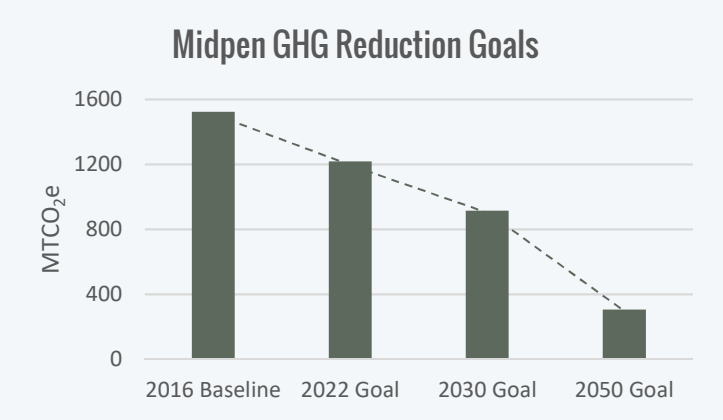
The BAU forecast indicates that planned organizational growth will be largely offset by regional and state changes to **electricity carbon intensity** and **vehicle fuel efficiency**. The result is an overall 1% increase in administrative emissions between 2016 and 2050. Without these planned policy changes at the regional and state level, Midpen's administrative emissions would grow 39% above the 2016 baseline by 2050, as shown in the figure above. The dip in emissions that can be seen in 2017-2018 is because Midpen facilities are being automatically enrolled in 50% renewable electricity from Silicon Valley Clean Energy and Peninsula Clean Energy.

Based on this business-as-usual emissions forecast, Midpen will have to take action that goes beyond regional and state initiatives to meet its goal to reduce emissions 20% by 2022, 40% by 2030, and 80% by 2050.

Greenhouse Gas Reduction Goals and Targets

A specific, numerical goal for greenhouse gas reduction will help drive progress and measure the success of Midpen's climate mitigation efforts. Midpen sets the following voluntary greenhouse gas reduction goals to be achieved by the Climate Action Plan:

Reduce administrative greenhouse gas (GHG) emissions 20% below 2016 baseline by 2022, 40% by 2030, and 80% by 2050.



Overall and sector-specific targets provide metrics for assessing progress towards climate action goals. Key indicators are also identified within each emissions sector to provide additional information on trends over time that may be enabling or inhibiting GHG reductions. Midpen staff will track progress towards reaching these targets by conducting a GHG Inventory update and providing reports to the Board every two years (see Implementation and Monitoring section).

CLIMATE ACTION PLAN GOALS	BASELINE (2016)	TARGET (2022)	TARGET (2030)	TARGET (2050)
Reduce **vehicle fleet, equipment, and business travel** emissions 20% by 2022, 40% by 2030, 80% by 2050	676 ($MTCO_2e$)	541 ($MTCO_2e$)	406 ($MTCO_2e$)	135 ($MTCO_2e$)
Reduce **employee commute** emissions 20% by 2022, 40% by 2030, 80% by 2050	463 ($MTCO_2e$)	371 ($MTCO_2e$)	278 ($MTCO_2e$)	93 ($MTCO_2e$)
Reduce **facilities** emissions 20% by 2022, 40% by 2030, 80% by 2050	197 ($MTCO_2e$)	158 ($MTCO_2e$)	118 ($MTCO_2e$)	39 ($MTCO_2e$)
Reduce **tenant residences** emissions 20% by 2022, 40% by 2030, 80% by 2050	185 ($MTCO_2e$)	148 ($MTCO_2e$)	111 ($MTCO_2e$)	37 ($MTCO_2e$)

STATE, NATIONAL, AND INTERNATIONAL CONTEXT

This target is aligned with the State of California and regional peers. California has set a statewide greenhouse gas reduction requirement **of 80% below 1990 baseline levels by 2050**. The California Legislature passed a mid-term 2030 reduction target to reduce emissions to **40% below 1990 baseline levels by 2030**.[1] Midpen uses a 2016 baseline rather than a 1990 baseline because 2016 is the earliest year for which full data

[1] "Climate Change Programs." California Air Resources Board, 2018.

was available. Best practices recommend setting a baseline year in this manner rather than attempting to "back-cast" emissions in 1990 with very minimal data.

Additionally, the 80% by 2050 reduction target is broadly accepted internationally by cities, states, and nations. This target is the foundation of the "Under2 MOU," an agreement initiated in 2015 and now signed by California and over 200 jurisdictions from around the world to meet the intentions of the Paris Agreement. The "Under2 MOU" requires signatories to commit to "limit emissions to below 80 to 95 percent below 1990 levels, or below 2 annual metric tons per capita, by 2050—the level of emission reduction believed necessary to limit global warming to less than 2 degrees Celsius."[2]

HOW WILL WE GET THERE?

The Climate Action Plan serves as an achievable roadmap to reduce administrative emissions 20% below baseline by 2022 and 40% below baseline by 2030. Achieving an 80% reduction by 2050 is a vision as important as it is challenging. Advances in technology, changes to everyday operations, and incorporating climate change into decision-making will all be required to meet this more ambitious long-term target. Midpen has an opportunity and a duty as an environmental agency to lead by example and confront this critical challenge head on.

[2] "The Under2 MOU." Under2 Coalition, 2018.

Effectiveness and Cost Analysis of 10 Sample Actions

GHG reductions and costs were modeled for ten sample Climate Action Plan actions that, if implemented, would reduce administrative GHG emissions by 40% (see table below). This analysis identifies one **pathway to reducing administrative emissions by 40% below baseline, exceeding Midpen's 2022 target and meeting Midpen's 2030 target**, but many other combinations of actions could achieve the same reduction. Therefore, the information presented in the table is not meant to be prescriptive but rather to illustrate that reaching the 40% reduction goal is possible. Costs and GHG reductions were not analyzed for the full list of actions in the Climate Action Plan.

The table below shows that some actions would result in ongoing annual operating costs, such as purchasing 100% renewable electricity ($1,534 per year) or providing a transit/carpool/bike incentive ($21,002 to $43,619 per year depending on participation). Some actions would require upfront capital costs that are paid back over time through cost savings, such as purchasing electric bikes or all-terrain vehicles for ranger patrol ($60,000 upfront cost, paid back in two years through vehicle fuel savings). Downsizing trucks would result in both capital savings (due to lower purchase price at the time of replacement) and operating savings (due to fuel savings). Finally, some actions would have no associated cost, such as expanding telecommuting and compressed work schedules. The addition of a solar panel system for the new Administrative Office (AO) is expected to result in a net cost savings on energy use. At this time, it is too early to know whether other direct and indirect costs would apply to improve the energy efficiency of the building.

Altogether, the ten sample actions analyzed would result in an **estimated net annual operating savings of $81,707** due to savings in fuel and energy use. Net upfront capital costs will depend on energy efficiency improvements and costs associated with the AO building.

SECTOR	ACTION	GHG REDUCTION FROM BASELINE	PAYBACK PERIOD (YEARS)	NET ANNUAL OPERATING COST*	NET UPFRONT CAPITAL COST*
Vehicles, Equipment, Business Travel	Switch to renewable diesel (Completed in September 2018)	6%	N/A	$0	$0
	Downsize F350 trucks at time of replacement (25% of trucks and 100% of trucks scenarios)**	2.5-10%	N/A	($13,952 - $55,807)	($34,729 - $138,915)
	Increase ranger patrol on electric bikes or all-terrain vehicles (ATVs)	4%	2	($33,434)	$60,000
	Purchase carbon offsets for all business travel	6%	No payback	$374	$0
Employee Commute	Transit/carpool/bike incentive (low and high scenarios)	3-6%	No payback	$21,002 - $43,619	$0
	Expand telecommuting (low and high scenarios)	2-5%	N/A	$0	$0
	Expand compressed work schedules (low and high scenarios)	1.5-3%	N/A	$0	$0
	Allow Administrative Office (AO) staff to work at new South Area Office (low and high scenarios)	0.3-0.8%	N/A	$0	$0
Facilities	Purchase 100% renewable electricity	5%	No payback	$1,534	$0
	New AO: Zero Net Energy (solar panel system plus 60% energy use reduction through renovation)	2%	TBD	($47,612)	TBD
TOTAL (RANGE)		32-48%		($49,471 - $113,943)	($79,915) - $25,271 + AO costs
TOTAL (AVERAGE)		40%		($81,707)	($26,822) + AO costs

**Negative values indicate net savings.*

***It may not be feasible to downsize all F350 trucks. Further analysis is required to assess whether smaller trucks could meet Midpen's operational needs for fire response and off-road patrol and maintenance. This table shows that downsizing F350 trucks has high GHG and cost savings potential.*

Employee Commute Scenario Assumptions

- *Transit/carpool/bike incentive: Low – 13% of employees shift to always alternative commute; High – 27% of employees shift to always alternative commute*
- *Expand telecommuting: Low – 50% of AO employees telecommute 1 day/week; High – 75% of AO employees telecommute 2 days/week*
- *Expand compressed work schedules: Low – 81% of employees on 9/80 schedule; High – all employees on 9/80 schedule plus 34% of employees shift to 4/10 schedule (changes modeled on top of current 34% of employees already on 9/80 schedule)*
- *Allow Administrative Office staff to work at new South Area Office: Low – 20% of AO employees 1 day/week; High – 25% of AO employees 2 days/week*

Greenhouse Gas Reduction Strategies and Actions

The following sections detail Midpen's GHG reduction strategies and actions by sector. Strategies are high-level approaches that specify how changes within that sector will reduce GHG emissions. Actions, nested within each strategy, provide a suite of specific implementation measures. In the following tables, strategies are shown as headers and actions are listed below each strategy. Prioritization and implementation are discussed in the Implementation and Monitoring section.

Vehicle Fleet, Equipment, and Business Travel

In total, vehicle fleet, equipment, and business travel account for the **largest portion of Midpen's administrative emissions, 45% in 2016**. Midpen uses vehicles to carry out maintenance activities, patrol open space preserves, provide emergency response, and transport employees. Maintenance equipment is used to build and maintain trails, structures, and facilities. Employees also travel for work, including flights to conferences. Air travel is a highly carbon-intensive mode of travel, and alone accounts for 6% of Midpen's administrative emissions.

Climate action strategies can reduce fleet and equipment emissions by transitioning to electric and alternative fuel vehicles and equipment, increasing fuel efficiency, and optimizing operations to reduce driving distances. To reduce business travel emissions, Midpen can reassess the need to attend far-away conferences and purchase carbon offsets for flights.

A key challenge in this sector is the operational demands of off-road vehicles. At present, there are few low-emissions options for trucks that can meet Midpen's patrol, maintenance, and emergency response needs. Tracking evolving technologies and testing new truck options as they emerge will be a key priority for greening the vehicle fleet.

STRATEGIES AND ACTIONS TABLE KEY

LEAD DEPARTMENT/DIVISION

- **AS:** Administrative Services
- **E&C:** Engineering and Construction
- **HR:** Human Resources
- **IST:** Information Systems and Technology
- **L&F:** Land and Facilities
- **NR:** Natural Resources
- **PA:** Public Affairs
- **PL:** Planning
- **VS:** Visitor Services

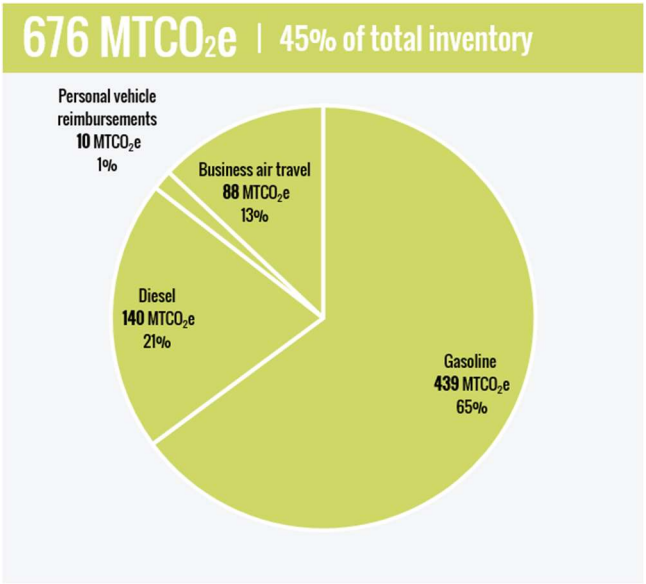
TIMEFRAME

- **Complete:**
- **Ongoing:**
- **Short-term:** 1-3 years
- **Medium-term:** 3-6 years
- **Long-term:** 6-12 years

OFFICE FACILITIES

- **AO:** Administrative Office
- **CAO:** Coastal Area Office
- **FFO:** Foothills Field Office
- **SAO:** South Area Office
- **SFO:** Skyline Field Office

Vehicles/Equipment GHG Emissions Breakdown



Midpen has already taken steps to reduce vehicle fleet, equipment, and business travel emissions by:

- Changing diesel fuel tanks to **renewable diesel** in September 2018.
- Installing electric vehicle chargers at the administrative office and acquiring a plug-in hybrid.
- Incorporating fuel efficiency into vehicle replacement guidelines.
- Replacing three F350 trucks with more efficient F150 trucks at time of replacement.
- Acquiring and testing electric maintenance equipment such as chainsaws and brush cutters.
- Acquiring and testing two electric bicycles at Skyline Field Office for transportation to maintenance activities.

First fueling with renewable diesel in September 2018.

GOALS, TARGETS, AND KEY PERFORMANCE INDICATORS

VEHICLE, EQUIPMENT, AND BUSINESS TRAVEL GOAL	BASELINE (2016)	TARGET (2022)	TARGET (2030)	TARGET (2050)
Reduce **vehicle fleet, equipment, and business travel** emissions 20% by 2022, 40% by 2030, 80% by 2050	676 ($MTCO_2e$)	541 ($MTCO_2e$)	406 ($MTCO_2e$)	135 ($MTCO_2e$)
Vehicle, Equipment, & Business Travel Indicators				
Average vehicle fuel economy (miles per gallon)	15.6			
Total fleet vehicle miles traveled (miles, WEX cards only)	883,713			
Proportion of equipment that is powered by renewable fuel or electricity (%)	0%			
Annual miles flown for business travel (miles)	50,000			

VEHICLE, EQUIPMENT, & BUSINESS TRAVEL STRATEGIES AND ACTIONS		LEAD DEPARTMENT	TIMEFRAME
Increase Electric and Alternative Fuel Vehicles and Equipment			
V1	Switch fuel tanks to renewable diesel.	L&F	
V2	Track technology development for hybrid, electric, or alternative fuel trucks. When a viable option comes on the market, acquire and test one truck as a pilot project.	L&F; VS	
V3	Install electric vehicle chargers at all field offices.	L&F	
V4	Acquire and test new electric equipment as technology develops. Update Maintenance Operations Manual to provide guidance to choose electric maintenance equipment when tasks allows.	L&F	
V5	As administrative vehicles are up for replacement, replace with electric or hybrid vehicles wherever possible.	L&F	
V6	Purchase one hybrid or long-range electric vehicle for each field office for highway/town travel and on-road maintenance projects.	L&F	
Increase Vehicle Fuel Economy			
V7	Evaluate fire response program and assess feasibility of alternative fire response models with lower emissions, such as acquiring brush trucks and downsizing F350s (e.g. City of Palo Alto).	VS; L&F	
V8	Update Maintenance Operations Manual to provide guidance to choose most fuel efficient vehicle possible for task.	L&F	
Increase Use of Alternative Electric Transportation Options			
V9	Acquire and test electric bikes, motorcycles, ATVs, or mules as technology develops. Stage electric transportation equipment at preserves to enable use.	L&F; VS	
V10	Expand ranger patrols on electric bikes, motorcycles, ATVs, or mules. Update Ranger Operations Manual to encourage this option and provide guidance.	VS	
V11	Update Maintenance Operations Manual to provide guidance to use electric transportation equipment to get to/from project site when tasks allows.	L&F	
Reduce Vehicle Miles Driven			
V12	Evaluate patrol and maintenance circulation routes to identify mileage reduction opportunities.	VS; L&F	
V13	Minimize driving to meetings and trainings through teleconferencing technology and efficient scheduling.	IST	
Purchase Carbon Offsets for Flights			
V14	Purchase carbon offsets for flights.	AS	

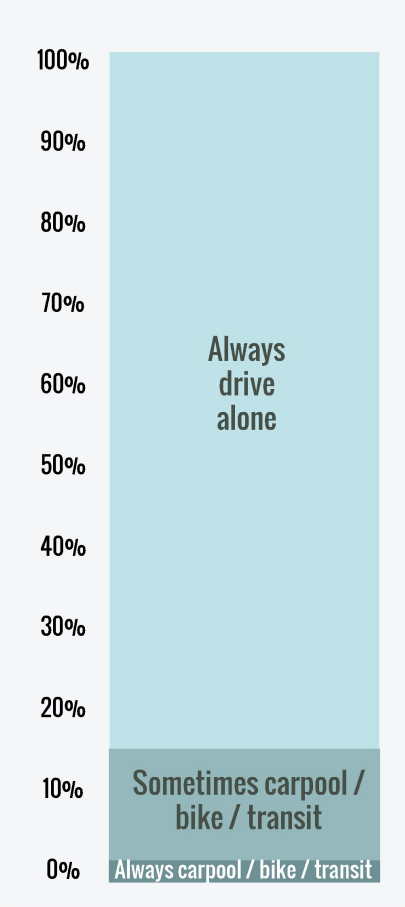
Employee Commute

Midpen employees commuted nearly 1.5 million miles in 2016, and this activity accounts for 30% of Midpen's administrative emissions. **Over 80% of employees always drive alone to work** due to high local housing costs and limited public transit options, particularly for field staff.

While employee commute choices are not under Midpen's control, Midpen can influence employee habits to reduce emissions by promoting alternative commute options like carpooling, public transit, and biking. Midpen will strive to create an environment conducive to efficient commuting by offering flexible work schedules, expanding telecommuting when possible, and pursuing opportunities to provide employees with Midpen-owned housing. Reducing employees' commute trips and providing employees with options for how they commute has significant co-benefits for employee morale and retention.

Midpen has already taken steps to reduce employee commute emissions by:

- Offering "9/80" compressed work schedules for some employees.
- Offering telecommuting one day per week for some employees.
- Installing electric vehicle chargers at the Administrative Office.
- Offering Commuter Checks for employees to use pre-tax dollars for public transit (as required by Bay Area Air Quality Management District). [3]
- Providing Midpen-owned housing to some employees.



GOALS, TARGETS, AND KEY PERFORMANCE INDICATORS

EMPLOYEE COMMUTE GOAL	BASELINE (2016)	TARGET (2022)	TARGET (2030)	TARGET (2050)
Reduce **employee commute** emissions 20% by 2022, 40% by 2030, 80% by 2050	463 ($MTCO_2e$)	371 ($MTCO_2e$)	278 ($MTCO_2e$)	93 ($MTCO_2e$)
Employee Commute Indicators				
Total drive-alone employee vehicle miles traveled (miles)	1,350,784			
Percent employees who always drive alone to work (%)	83%			
Percent employees who work a compressed 9/80 schedule (%)	32%			
Percent administrative employees who telecommute regularly (%)	9%			

[3] The Bay Area Air Quality Management District requires employers with more than 50 employees to either provide pre-tax Commuter Checks (Midpen's current approach) or provide a transit incentive of at least $75 per month to participating employees.

EMPLOYEE COMMUTE STRATEGIES AND ACTIONS		LEAD DEPARTMENT	TIMEFRAME
Reduce the Number of Commute Days			
C1	Expand and encourage telecommuting.	HR; IST	
C2	Expand and encourage compressed work schedules.	HR; VS; L&F	
C3	Assess the feasibility of a weekly or biweekly administrative office closure (compressed schedules or telework on closure day).	L&F; HR	
Incentivize and Enable Low-Emissions Commute Modes			
C4	Create an incentive for employees commuting via carpool, public transit, bike, or walking.	HR	
C5	Install electric vehicle chargers at all field offices.	L&F	
C6	Create intranet page with commute resources and carpool database.	HR	
C7	Offer competitive pricing for employee electric vehicle charging.	AS	
C8	Assess opportunities to partner with local employee shuttles (e.g., Chariot, San Mateo County, and tech companies).	HR	
C9	Create a guaranteed ride home safeguard to reimburse an employee's taxi or rideshare ride home in case of personal emergency or illness.	HR	
Reduce Commute Distances			
C10	Pilot project to allow administrative employees to work out of the new South Area Office two days per week.	L&F	
C11	Assess the feasibility of acquiring more Midpen-owned housing.	PL	

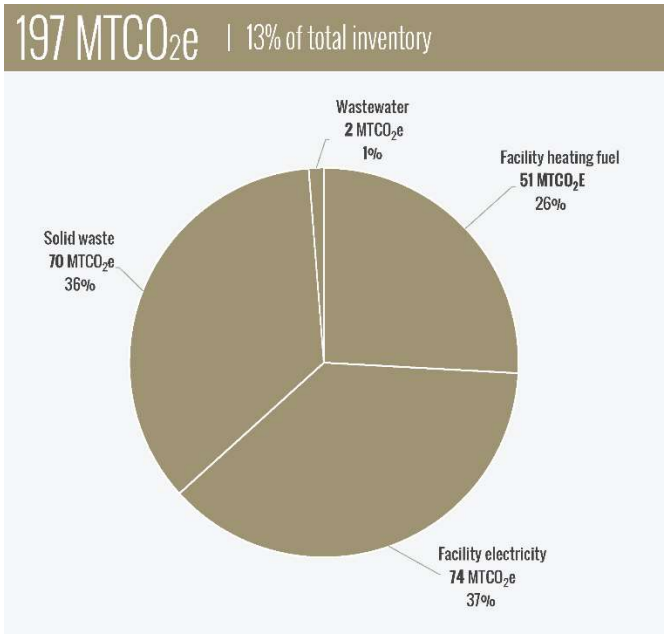
Specific supporting actions to expand and encourage telecommuting (Action C1) and compressed work schedules (Action C2) may include one or more of the following:

- For administrative employees:
  - Allow employees to do both a compressed schedule and telecommute.
  - Add a four 10-hour days (4/10) compressed schedule option.
  - Increase the number of days per week employees can telecommute to two.
  - Expand the job classifications that are eligible for telecommuting or compressed schedules.
- For field employees:
  - Expand 9/80 or 4/10 compressed schedules when feasible.
- Strengthen the telecommuting and compressed schedule programs by clarifying and reinforcing the framework, requirements, and expectations laid out in the existing policies through:
  - Trainings for managers and employees.
  - Formalizing workplace norms to minimize disruption such as ensuring all employees have their telecommute/off days in their Outlook and department calendars.
- Inform employees of the option to telecommute for half of time spent on transit (supports Action C4).

Facilities

Midpen occupies administrative and field offices that produce greenhouse gas emissions through energy use and waste generation. Electricity and heating fuels are used to make buildings comfortable, and both Midpen operations and visitors generate solid waste and wastewater. In total, facilities account for 13% of administrative emissions. As shown in the chart at right, the **top two contributors to facility emissions are electricity use and solid waste generation**.

Facilities GHG Emissions Breakdown



To reduce electricity emissions, Midpen can reduce electricity use and increase the portion of electricity generated by renewable energy. The top two electricity users are the AO and AO2-4. As Midpen plans a new Administrative Office, incorporating energy efficiency and renewable energy could have a substantial impact on Midpen's facility emissions. Taking steps to increase energy efficiency at other facilities, such as field offices and the Daniels Nature Center, can reduce the use of electricity and heating fuels like natural gas and propane. To reduce solid waste emissions, Midpen will work to divert recyclable materials and organic waste from the landfill. When organic material decomposes in a landfill, it releases methane, a potent greenhouse gas.

An odd dynamic in this sector is that, from a greenhouse gas accounting standpoint, once Midpen begins purchasing 100% renewable electricity, there is little to no additional GHG reduction to be gained from increasing energy efficiency or installing solar panels. This accounting quirk masks the significant resource costs of energy generation (such as transmission loss and water use) and the benefits of generating renewable energy on site locally (such as independence and contributing additional clean energy to the grid). Therefore, increasing energy efficiency and assessing the viability of installing solar panels are key facility recommendations despite their marginal contribution to GHG reduction on paper.

Midpen has already taken steps to reduce facility emissions by:

- Seeking an energy audit of AO, FFO, and SFO from Silicon Valley Energy Watch and Ecology Action.
- Reusing and recycling solid waste from routine maintenance activities.
- Creating a waste diversion policy and meeting waste diversion targets for capital projects.

GOALS, TARGETS, AND KEY PERFORMANCE INDICATORS

FACILITIES GOAL	BASELINE (2016)	TARGET (2022)	TARGET (2030)	TARGET (2050)
Reduce **facilities** emissions 20% by 2022, 40% by 2030, 80% by 2050	197 ($MTCO_2e$)	158 ($MTCO_2e$)	118 ($MTCO_2e$)	39 ($MTCO_2e$)
Facilities Indicators				
Administrative office electricity use per square foot (annual kWh/SQFT)	11.34			
Field office average electricity use per square foot (annual kWh/SQFT)	5.37			
Percent of electricity from renewable sources (%)	33%			
Solid waste diversion rate (% diverted)	34%			

STRATEGIES AND ACTIONS

	FACILITIES STRATEGIES AND ACTIONS	LEAD DEPARTMENT	TIMEFRAME
Move Towards 100% Renewable Electricity for All Midpen Facilities			
F1	Purchase 100% renewable electricity for Midpen facilities.	L&F	
F2	Assess the feasibility of rooftop/carport solar at the Foothills Field Office, Skyline Field Office, and preserve parking lots and implement where possible.	E&C	
Maximize Energy Efficiency in New and Existing Buildings			
F3	Implement energy efficiency upgrades at the Skyline and Foothills Field Offices, including measures identified in the Ecology Action Energy Audit.	L&F; E&C	
F4	Seek the highest level of energy efficiency and sustainability possible while planning for the new Administrative Office, including LEED standard and/or utilizing electric heating to achieve zero net energy.	E&C	
F5	Assess the feasibility of a weekly or biweekly administrative office closure (compressed schedules or telework on closure day).	L&F; HR	
Reduce Solid Waste Generated Through Midpen Operations			
F6	Implement office waste reduction measures: restart compost program, improve recycling, and minimize single-use disposables at events.	L&F	
F7	Study characterization of waste generated from maintenance activities; identify any additional opportunities to reuse or divert maintenance materials.	L&F	
F8	Update waste diversion policy and create contract language to incentivize contractors to use sustainable practices, such as reducing solid waste and fuel use, and provide documentation to Midpen.	E&C; AS	

Tenant Residences

Midpen owns 40 homes that are leased to employees, agricultural tenants, and members of the public. Emissions from tenant residences come from electricity use and heating. Heating fuels used in residences include natural gas, wood, and propane. While residences contribute a small portion to the total inventory—12% in 2016—there are opportunities to reduce greenhouse gas emissions and particulate matter. Switching residences from wood-fired heating to gas or preferably electric heating would have a positive impact on local air quality because burning wood releases harmful particulate matter into the air. Midpen can also reduce emissions by encouraging residents to purchase renewable electricity and increasing energy efficiency.

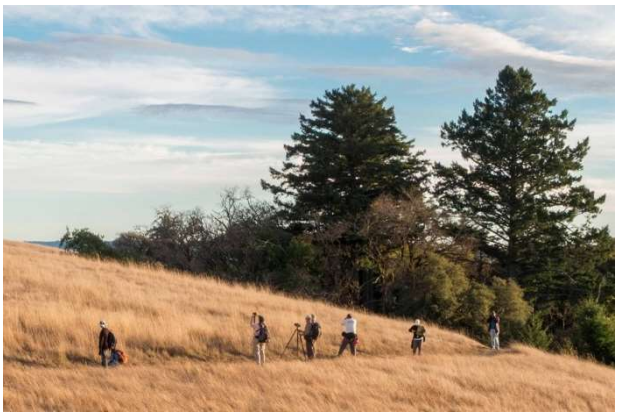
GOALS, TARGETS, AND KEY PERFORMANCE INDICATORS

TENANT RESIDENCES GOAL	BASELINE (2016)	TARGET (2022)	TARGET (2030)	TARGET (2050)
Reduce **tenant residences** emissions 20% by 2022, 40% by 2030, 80% by 2050	185 ($MTCO_2e$)	148 ($MTCO_2e$)	111 ($MTCO_2e$)	37 ($MTCO_2e$)
Tenant Residences Indicators				
Percent of tenant residences using electric heat (%)	32%			
Percent of tenants purchasing highest renewable option from utility (%)	0%			

STRATEGIES AND ACTIONS

	TENANT RESIDENCES STRATEGIES AND ACTIONS	LEAD DEPARTMENT	TIMEFRAME
Move Towards 100% Renewable Electricity for Residences			
R1	Encourage residents to purchase 100% renewable electricity. Assess viability of requiring as leases are renewed.	L&F	
R2	Assess the feasibility of rooftop solar on residences, including leasing or power purchasing agreements.	L&F; E&C	
Increase Energy Efficiency			
R3	Make basic energy efficiency upgrades such as installing weather stripping, LED lighting, and double-paned windows.	L&F	
R4	Assess the viability of more significant energy efficiency improvements such as heat pumps and insulation.	L&F	
Mover Towards Cleaner Heat Sources			
R5	Reduce woodstove use by installing or upgrading gas or preferably electric heating in homes with woodstoves.	L&F	
Improve Data and Guidance for Decision-Making			
R6	Ask tenants to share PG&E bills and other heat expenses with Midpen to improve data and GHG monitoring.	L&F	
R7	Create guidelines to incorporate sustainability into decisions about residence improvements.	L&F	

Education and Outreach



By taking steps to reduce GHG emissions internally, Midpen will serve as a model and inspire the broader community, visitors, and partner organizations to take action on climate change. Therefore, communicating the importance of climate change and what actionable steps individuals and organizations can take to reduce their impact is a key priority. Increasing awareness and action on climate change both internally and in the broader community will help Midpen be a leader on climate change. Internal education will help build momentum to implement the Climate Action Plan and enable staff and docents to communicate climate change effectively with the public. Educating visitors on climate change can influence their behavior within Midpen preserves and in their homes. Midpen has a unique opportunity as an environmental agency to reach thousands of visitors with credible messages about climate change.

Midpen has already taken steps to engage staff and visitors about climate change by:

- Creating a climate change page for the Midpen website.
- Providing the first ever climate change training session for docents.
- Partnering with Save the Redwoods League to develop a "Redwood Ecology and Climate Change" environmental education field learning program for high school students.
- Developing a draft climate change communications plan.
- Participating in climate change forums and initiatives such as California Climate Action Planning Conference, California Adaptation Forum, Global Climate Action Summit, Golden Gate National Parks Sustainability Summit, Adapting to Rising Tides, and SeaChange San Mateo County.

GOALS, TARGETS, AND KEY PERFORMANCE INDICATORS

EDUCATION AND OUTREACH GOAL	BASELINE (2016)	TARGET (2022)	TARGET (2030)	TARGET (2050)
Increase staff and visitor **awareness and action** on climate change	N/A	N/A	N/A	N/A
Education and Outreach Indicators				
Number of staff engaged through the Green Team or internal newsletter	Establish baseline			
Number of docents and other volunteers trained to discuss climate change	Establish baseline			
Number of press releases/newsletters/social media posts on climate change	Establish baseline			

EDUCATION AND OUTREACH STRATEGIES AND ACTIONS		LEAD DEPARTMENT	TIMEFRAME
Improve Internal Capacity to Address Climate Change			
E1	Establish a Midpen Green Team to implement the Climate Action Plan and continue improving sustainability efforts.	NR	
E2	Improve internal communication about climate change through an intranet page and newsletter on Midpen action, regional news, and resources for staff to improve their sustainability at home.	NR	
Educate Visitors and the Community About Climate Change			
E3	Provide training on climate change content and communication techniques to volunteers, rangers, and public affairs staff.	NR; VS	
E4	Incorporate climate change into docent-led interpretative activities and Public Affairs outreach events and materials. Encourage visitors to reduce their GHG emissions with messaging on tangible actions.	VS; PA	
E5	Use Climate Action Plan actions as demonstration projects to highlight via press releases, social media posts, informal visitor interactions, and signage (when project is in a public area).	PA; VS	
Participate and Play a Leadership Role in Regional and State Efforts			
E6	Support and influence regional and state climate change-related policies and funding allocations.	PA; AS	
E7	Support and participate in regional climate change initiatives, conferences, and general community of practice.	NR; PA	
E8	Foster partnerships to respond to climate change collaboratively and seek opportunities to share information with other agencies.	NR; PA	
E9	Seek grant opportunities to fund implementation of Climate Action Plan, carbon sequestration, and natural resource resilience efforts.	AS	

Implementation and Monitoring

The Climate Action Plan identifies a suite of actions that Midpen can implement to reach its goal of reducing emissions 20% by 2022 and 40% by 2030. The Climate Action Plan will be implemented through the annual Capital Improvement and Action Plan (CIAP) and Budget process. Each year, implementation actions will be selected based on Board-approved prioritization criteria. Annual prioritization and selection will allow Midpen to adapt to changes and advances in technologies, climate change response options, and funding opportunities. The selected actions and any associated funding will be subject to review by the General Manager's Office and approval by the Board. Departments will incorporate implementation actions for each fiscal year into their budget requests and resource loading for staff time.

Prioritization criteria for annual selection of CAP implementation actions are as follows:

- Greenhouse gas reduction effectiveness
- Cost
- Cost-effectiveness
- Availability of external funds, such as grants or rebates
- Operational impacts (for example, vehicle/equipment replacements need to be balanced with operational demands of off-road patrol and maintenance)
- Staff capacity
- Ease of implementation
- Ability to leverage other ongoing programs or projects for economy of scale
- Co-benefits to the public, staff, and environment
- Consistency with Measure AA, Vision Plan, Strategic Plan, and other Midpen goals and priorities
- Public feedback and requests

To track progress on implementing the Climate Action Plan and reducing administrative GHG emissions in line with Midpen's climate goals, staff will conduct a regular GHG Inventory approximately every two years and report findings to the Board. In addition to the key metric of GHG reduction, tracking and reporting should also include relevant indicators identified in the Climate Action Plan to illuminate underlying trends contributing to progress or challenges. These climate change response efforts will evolve over time as operations and solutions change, so monitoring approaches should be flexible and focused on collecting meaningful information that will help Midpen reach its climate change goals. The Climate Action Plan should be updated between 2025 and 2030 to assess progress and identify new strategies in pursuit of Midpen's goal of reducing emissions 80% below baseline by 2050. Managing and tracking the implementation of the Climate Action Plan is estimated to take approximately 0.5 of a full time equivalent (FTE) staff position.

Finally, the baseline GHG Inventory identified a number of areas where data was lacking or unavailable. Future GHG Inventory updates should strive to **improve data quality** to give more confidence to estimates of GHG emissions and GHG reduction strategies. Recommendations to improve data quality are as follows:

VEHICLE FLEET, EQUIPMENT, AND BUSINESS TRAVEL
Institute tracking of annual fuel use and mileage by vehicle
Create system for tracking business travel – capture all flights in one GL or through manual reporting, improve consistency of which GL is used for mileage reimbursement, scan all travel credit card receipts so flights/rental cars/gas can be parsed out
EMPLOYEE COMMUTE
Conduct regular employee commute survey with each GHG Inventory update that collects data on commute miles, office location, transportation mode by # days per week, telework/compressed schedule
Institute tracking for number of employees participating in telework and compressed schedule options
FACILITIES
Waste characterization study of field office solid waste from maintenance activities
TENANT RESIDENCES
Request PG&E bills or data from tenants
Request information on participation in community choice energy options from tenants
Request other data on heating costs (e.g. quantity of firewood) from tenants
OTHER DATA GAPS
Continue to seek livestock emissions factor data specific to California rangelands
Assess carbon sequestration in grazed and ungrazed rangelands to determine grazing effect on soil carbon
Determine visitor transportation emissions baseline using data on number of visitors (from car counters) and visitor origin (from preserve use survey)
Collect data on contractor solid waste (could come from Waste Management Plan required by county)
If possible, collect data on contractor fuel use
Collect data on volunteer transportation to work sites
Incorporate full materials lifecycle analysis as methodology becomes more accessible

Carbon Sequestration, Adaptation, and Resilience

Even if global greenhouse gas emissions stopped today, some amount of climate change is inevitable, and climate change impacts can already be observed on Bay Area natural resources and communities. Understanding and preparing for these impacts is referred to as climate adaptation. Midpen's goal in managing lands in a changing climate is to promote the resilience of natural resources to climate change impacts.

Climate change impacts have already been observed locally in the Golden Gate National Parks:[4]

- Increase in average annual temperatures of 1.2 °C (2.2 °F) between 1960 and 2010
- Northern shifts in winter bird ranges of 0.5 km (0.3 mi) per year between 1975 and 2004
- Upward shifts in elevation for 12% of endemic species and 27% of non-native species between the periods of 1895-1970 and 1971-2009
- Sea level rise of 22 cm (9 in) from 1854 to 2016
- Decrease in coastal fog by 33% between the periods of 1901-1925 and 1951-2008
- Increase in heavy storms by 25% between the periods of 1901-1960 and 1991-2000
- Human-caused climate change accounted for 10-20% of the 2012-2014 drought
- Climate was the dominant factor controlling the extent of wildfire burn areas between 1916 and 2003, even during periods of active fire suppression

While adapting to climate change impacts and increasing the resilience of natural resources is outside the scope of the Climate Action Plan, this work falls under the broader umbrella of Midpen's Climate Change Program.

KEY TERMS

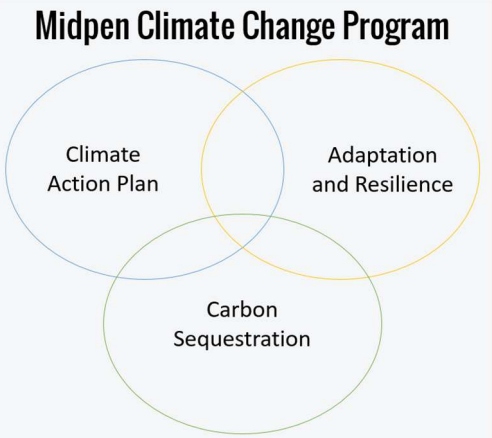
Climate mitigation: Actions that reduce greenhouse gas emissions, which contribute to climate change

Climate adaptation: Actions that increase the ability to withstand, respond to, or cope with climate change impacts

Climate resilience: The capacity of ecosystems to withstand and bounce back from climate stress and hazardous events

Carbon sequestration: Process by which carbon dioxide is moved from the atmosphere into other stores, such as plants and soils

Carbon store: Semi-permanent biological reservoir of carbon, such as plants and soils



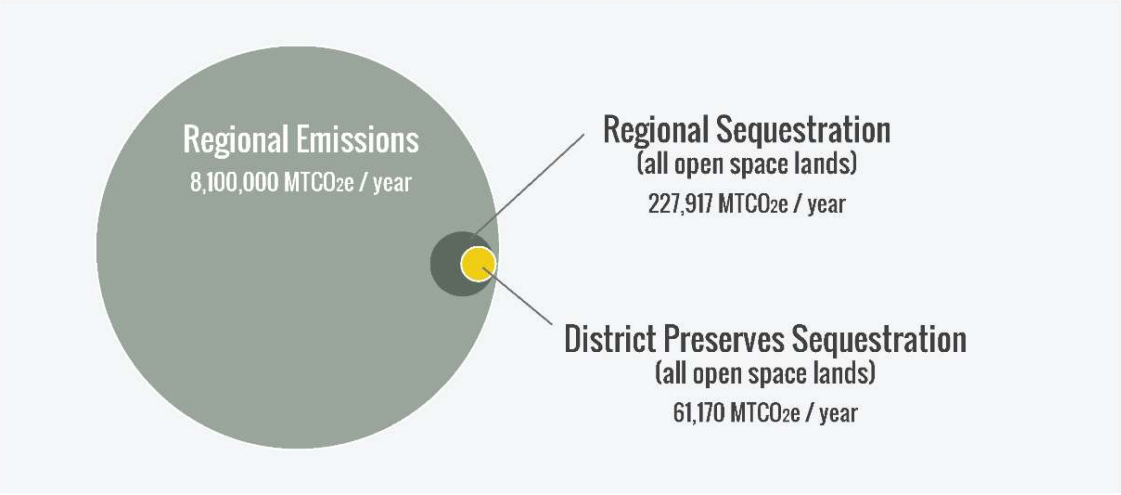
CARBON SEQUESTRATION

Progress to-date focused on a preliminary assessment of baseline carbon sequestration and storage in Midpen lands. Carbon sequestration is a related but distinct concept to climate mitigation (reducing emissions) and adaptation (preparing for impacts). Carbon sequestration removes carbon from the atmosphere and stores it in plant biomass and soils, functionally helping to reduce emissions. It is important to note that current levels of carbon sequestration in Midpen lands are considered a baseline, and to qualify for carbon offsets Midpen would need to undertake projects or acquisitions resulting in *additional* carbon

[4] Patrick Gonzalez, Ph.D. "Climate Change in the National Parks of the San Francisco Bay Area, California, USA." National Park Service and University of California, Berkeley, 2016.

sequestration. Creating carbon offsets to sell would require a more rigorous baseline assessment and verification of additional carbon sequestration. The assessment described below is intended to provide a general order of magnitude of Midpen's carbon sequestration to inform the direction of future work.

In 2018, GIS staff used plant biomass data from the LANDFIRE data set, provided by the California Air Resources Board, and soil carbon data from the Natural Resources Conservation Service to conduct a preliminary assessment of baseline carbon storage and sequestration in Midpen lands. This assessment was a conservative estimate because complete data was not available. The assessment found that **Midpen lands store, or hold in a semi-permanent biological reservoir, about 372 $MTCO_2e$ per acre** in plant biomass and soils, for a total of 23 million $MTCO_2e$ across all preserves. This semi-permanent store of carbon is best thought of as *potential emissions* that could be released through wildfire or development. The assessment also found that **Midpen lands sequester, or take in through photosynthesis, about 1 $MTCO_2e$ per acre per year** for a total of 61,000 $MTCO_2e$ per year across all preserves. This ongoing movement of carbon from the atmosphere to plant biomass is best thought of as *emissions being removed* from the atmosphere. Sequestration data was not available for many vegetation types, leading to a known underestimate. While Midpen lands take in far more carbon than is emitted by Midpen operations each year, open space preserves act as a breathing lung for the entire region. The residents within Midpen's jurisdictional boundary produce about 8 million $MTCO_2e$ every year,[5] which means that **Midpen lands take in less than 1% of Midpen residents' GHG emissions**. Combining Midpen lands with all other open space lands within Midpen's jurisdictional boundary, regional carbon sequestration only takes in 3% of regional emissions. This finding underscores the need to significantly reduce GHG emissions as an agency and contribute to community and regional efforts to mitigate climate change.



[5] "Greenhouse Gas Emission Inventory." California Air Resources Board, 2018.

This finding is consistent with a recent study by The Nature Conservancy that found that maximizing land conservation and stewardship across the globe could "provide 37% of cost-effective CO_2 mitigation needed through 2030" to meet the goals of the Paris Climate Agreement.[6] Both land-based carbon sequestration and storage *and* ambitious efforts to significantly reduce GHG emissions are needed to prevent catastrophic climate change.

Carbon sequestration is an important ecosystem service Midpen can incorporate as it balances managing land for multiple benefits. Actions that increase carbon sequestration, such as restoring forests or riparian areas, may also help prepare for climate impacts and increase resilience. Midpen can also take steps to prevent the release of landscape carbon from catastrophic wildfire, such as fuel reduction and prescribed burns. Refining Midpen's data on landscape carbon, using that information in planning and decision-making, and implementing projects to increase carbon sequestration are key climate action priorities.

ADAPTATION AND RESILIENCE

Going forward, adaptation and resilience efforts will focus on assessing the vulnerability of natural resources to climate change, identifying land management strategies to increase resilience, continuing biological monitoring, and implementing restoration projects. This work is closely tied to much of what the Natural Resources Department manages, including prescribed and wildland fire, forest restoration, special status species, integrated pest management, and ongoing monitoring and restoration.

[6] "Natural Climate Solutions." Proceedings of the National Academy of Sciences, October 2017.

Glossary

DEPARTMENTS/DIVISIONS

- AS: Administrative Services
- E&C: Engineering and Construction
- HR: Human Resources
- IST: Information Systems and Technology
- L&F: Land and Facilities
- NR: Natural Resources
- PA: Public Affairs
- PL: Planning
- VS: Visitor Services

OFFICE FACILITIES

- AO: Administrative Office
- CAO: Coastal Area Office
- FFO: Foothills Field Office
- SAO: South Area Office
- SFO: Skyline Field Office

CLIMATE CHANGE TERMINOLOGY

- **Administrative emissions/administrative scope**: Midpen emissions from administration and operations (vehicles, equipment, business travel, employee commute, facilities, and tenant residences) for which Midpen is setting a quantitative GHG reduction goal
- **Carbon sequestration**: Process by which carbon dioxide is moved from the atmosphere into other stores, such as plants and soils
- **Carbon store**: Semi-permanent biological reservoir of carbon, such as plants and soils
- **Climate adaptation**: Actions that increase the ability to withstand, respond to, or cope with climate change impacts
- **Climate mitigation**: Actions that reduce greenhouse gas emissions, which contribute to climate change
- **Climate resilience**: The capacity of ecosystems to withstand and bounce back from climate stress and hazardous events
- **Greenhouse gas (GHG)**: Climate change-causing gases such as carbon dioxide, methane, and nitrous oxide, named for the warming "greenhouse effect" they have on the atmosphere by absorbing infrared radiation
- **Metric ton of carbon dioxide equivalent ($MTCO_2e$)**: Standard unit of measurement for greenhouse gases

Appendix 1: Non-Administrative Emissions - Livestock & Visitor Transportation

In addition to the administrative GHG emissions discussed in the Climate Action Plan, there are also non-administrative GHG emissions related to Midpen activities but that Midpen has less control over, such as livestock and visitor transportation to preserves. Livestock emissions are not included in the administrative scope because livestock serve a very different function than vehicles and facilities, provide community benefits, and exist within a complex biological system. Likewise, visitor transportation emissions are not included in the administrative scope because Midpen has limited control over visitor transportation.

ADMINISTRATIVE GHG EMISSIONS 2016 BASELINE ($MTCO_2E$)	
Vehicle Fleet, Equipment, Business Travel	676
Employee Commute	463
Facilities	197
Tenant Residences	185
NON-ADMINISTRATIVE GHG EMISSIONS 2016 BASELINE ($MTCO_2E$)	
Livestock	876
Visitor Transportation	TBD

These sectors represent opportunities for additional analysis to identify strategies to reduce emissions above and beyond Midpen's administrative GHG reduction goals. Initial strategies to reduce or offset emissions are described in the following sections. An emissions baseline of 876 $MTCO_2e$ in 2016 was determined for livestock. However, emissions are highly variable across cattle depending on region, diet, age, weight, and other factors. The Intergovernmental Panel on Climate Change estimates that the uncertainty for cattle emissions factors is between ± 20% and ± 50%.[7] Therefore, refining data on livestock emissions and associated carbon sequestration in grazed areas is a recommendation in the Climate Action Plan. A visitor transportation emissions baseline has not been established, but the necessary data is available and establishing a baseline is a recommendation in the Climate Action Plan.

NON-ADMINISTRATIVE EMISSIONS GOALS	BASELINE (2016)	TARGET (2022)	TARGET (2030)	TARGET (2050)
Reduce or offset **livestock** emissions and enhance soil carbon sequestration	876 ($MTCO_2e$)	N/A	N/A	N/A
Reduce **visitor transportation** emissions	Establish baseline	N/A	N/A	N/A

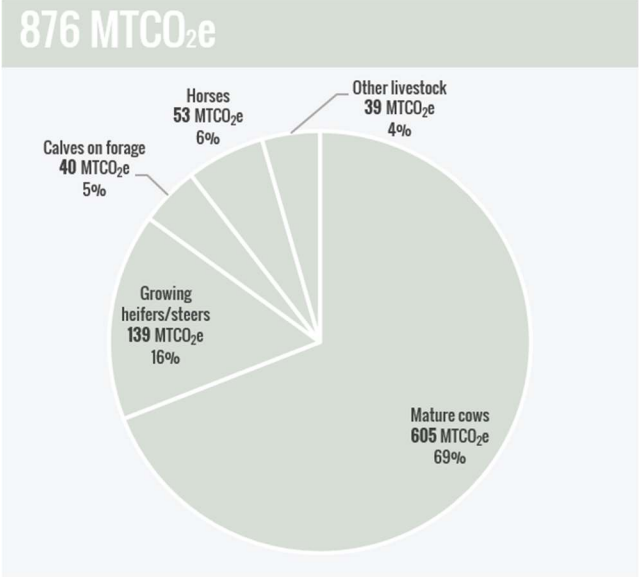
Livestock

Midpen uses conservation grazing to manage fuel (flammable vegetation) for fire protection, enhance the diversity of native plants and animals, help sustain the local agricultural economy, and foster the region's rural heritage. As part of the Coastside Protection Area Service Plan, Midpen has committed to conserving open space and agricultural land, preserving agricultural operations on the coast, and encouraging viable agricultural use of Midpen-owned lands. Currently, Midpen has tenants grazing about 400 cattle on 10,800 acres. One grazing tenant also keeps other livestock, such as horses, sheep, pigs, and chickens; however, the majority of grazing livestock are cattle.

[7] "IPCC Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories." Intergovernmental Panel on Climate Change, 2006.

Ruminant animals like cattle produce and release methane when they digest grass. Methane is a strong greenhouse gas that has almost thirty times the impact of carbon dioxide on the atmosphere. While there are few opportunities to change the quantities of methane that rangeland cattle release, Midpen will ensure the grazing program is meeting land management objectives and work to maximize the carbon sequestration potential of rangeland. Point Blue Conservation Science suggests that "methane production be acknowledged as an intrinsic trade-off to beef production that may be justified by the role cattle play as a means to manage and protect rangelands."[8]

Livestock GHG Emissions Breakdown



Livestock emissions are excluded from the administrative scope for the GHG Inventory and GHG reduction goals because livestock serve a very different function than vehicles and facilities, provide community benefits, and exist within a complex biological system. The effect of cattle grazing on soil carbon varies widely depending on the grazing regime. While conventional commercial grazing can result in a net loss of soil carbon, prescribed grazing can increase soil carbon, perhaps even enough to offset some portion of the cattle's methane emissions from digestion.[9] There are also a number of land management strategies to increase carbon sequestration in grazed areas, such as applying compost amendments and restoring stream habitat.[10] Key next steps for addressing livestock emissions include gaining a better understanding of current carbon sequestration and the impact of the current grazing regime, and assessing the viability of land management practices to increase carbon sequestration.

[8] "Methane Emissions from Livestock." Point Blue Conservation Science Issue Brief, 2018.
[9] "Methane Emissions from Livestock." Point Blue Conservation Science Issue Brief, 2018.
[10] "Carbon and Greenhouse Gas Evaluation for NRCS Conservation Practice Planning." Natural Resources Conservation Service, 2018.

Midpen has already taken steps to reduce livestock emissions by:

- Conducting ongoing monitoring of vegetation and environmental quality in grazed areas to ensure grazing practices are in compliance with prescribed grazing plans.
- Meeting with partners at TomKat Ranch and San Mateo Resource Conservation District for initial talks on developing a carbon farm plan and projects to increase soil carbon sequestration.

GOALS, TARGETS, AND KEY PERFORMANCE INDICATORS

LIVESTOCK GOAL	BASELINE (2016)	TARGET (2022)	TARGET (2030)	TARGET (2050)
Reduce **livestock** emissions and enhance soil carbon sequestration	876 ($MTCO_2e$)	N/A	N/A	N/A
Livestock Indicators				
Number of animals with high enteric emissions (year-round equivalent cattle, excluding calves on milk)	374			
Number of animals with low enteric emissions (year-round equivalent horses, sheep, pigs, goats, alpacas, donkeys)	177			
Annual additional landscape carbon sequestration due to grazing ($MTCO_2e$)	Establish baseline			
Percent of annual livestock emissions offset by carbon sequestration projects (%)	0%			

STRATEGIES AND ACTIONS

	LIVESTOCK STRATEGIES AND ACTIONS	LEAD DEPARTMENT	TIMEFRAME
Maximize Soil Carbon Sequestration and Storage			
L1	Assess current carbon sequestration in grazed and ungrazed rangelands to determine effect of grazing on soil carbon.	NR	
L2	Partner with San Mateo Resource Conservation District to develop carbon farm plan.	NR; L&F	
L3	Implement carbon sequestration projects identified in carbon farm plan.	NR; L&F	
Ensure Grazing Program is Attaining Land Management Objectives			
L4	Continue monitoring grazing impact on invasive species and fuel reduction objectives.	NR	
L5	Where agricultural sustainability is not a leading factor, assess alternative grassland management techniques such as mowing, prescribed burns, and use of other livestock such as goats.	NR	

Visitor Transportation

Emissions associated with visitor transportation were not included in the baseline greenhouse gas inventory, so strategies in this sector include establishing an emissions baseline. Visitor travel is likely a large source of emissions over which Midpen has minimal influence. However, Midpen can support the use of alternative transportation through infrastructure and education. Midpen can also address inequity in communities' access to open space by increasing transportation options for people who do not own cars. Increasing access to Midpen preserves via biking, walking, and transit will benefit Midpen's climate efforts as well as community health.

Midpen has already taken steps to reduce visitor transportation emissions by:

- Initiating Rancho San Antonio Carrying Capacity and Multimodal Access Study to engage stakeholders and partner agencies in exploring non-motorized mobility, transit options, and parking alternatives.
- Installing visitor use counters at 13 locations in 2017 to collect data on preserve visitation.
- Conducting preserve use survey in 2017 that included questions on transportation.
- Providing bike racks at preserve parking lots.

GOALS, TARGETS, AND KEY PERFORMANCE INDICATORS

VISITOR TRANSPORTATION GOAL	BASELINE (2016)	TARGET (2022)	TARGET (2030)	TARGET (2050)
Reduce **visitor transportation** emissions	Establish baseline	N/A	N/A	N/A
Visitor Transportation Indicators				
Total visitor miles to and from preserves (miles)	Establish baseline			
Percent of visitor trips made via transit, bike, or electric vehicle (%)	Establish baseline			

STRATEGIES AND ACTIONS

	VISITOR TRANSPORTATION STRATEGIES AND ACTIONS	LEAD DEPARTMENT	TIMEFRAME
Collect Data on Visitor Transportation			
T1	Establish visitor transportation emissions baseline.	NR	
T2	Complete Rancho San Antonio Carrying Capacity and Multimodal Access Study, implement results, and identify relevant findings that could be applied to other preserves.	PL	
Increase Visitor Use of Electric Vehicles, Bikes, and Public Transit			
T3	Install electric vehicle chargers at preserve parking lots.	L&F	
T4	Install bike racks at preserves without racks where bikes are allowed.	L&F	
T5	Partner with San Mateo County Parks to identify lessons learned from their parks shuttle pilot project.	PL	

Appendix 2: Full Strategies and Actions List by Sector

VEHICLE, EQUIPMENT, & BUSINESS TRAVEL STRATEGIES AND ACTIONS		LEAD DEPARTMENT	TIMEFRAME
Increase Electric and Alternative Fuel Vehicles and Equipment			
V1	Switch fuel tanks to renewable diesel.	L&F	
V2	Track technology development for hybrid, electric, or alternative fuel trucks. When a viable option comes on the market, acquire and test one truck as a pilot project.	L&F; VS	
V3	Install electric vehicle chargers at all field offices.	L&F	
V4	Acquire and test new electric equipment as technology develops. Update Maintenance Operations Manual to provide guidance to choose electric maintenance equipment when tasks allows.	L&F	
V5	As administrative vehicles are up for replacement, replace with electric or hybrid vehicles wherever possible.	L&F	
V6	Purchase one hybrid or long-range electric vehicle for each field office for highway/town travel and on-road maintenance projects.	L&F	
Increase Vehicle Fuel Economy			
V7	Evaluate fire response program and assess feasibility of alternative fire response models with lower emissions, such as acquiring brush trucks and downsizing F350s (e.g. City of Palo Alto).	VS; L&F	
V8	Update Maintenance Operations Manual to provide guidance to choose most fuel efficient vehicle possible for task.	L&F	
Increase Use of Alternative Electric Transportation Options			
V9	Acquire and test electric bikes, motorcycles, ATVs, or mules as technology develops. Stage electric transportation equipment at preserves to enable use.	L&F; VS	
V10	Expand ranger patrols on electric bikes, motorcycles, ATVs, or mules. Update Ranger Operations Manual to encourage this option and provide guidance.	VS	
V11	Update Maintenance Operations Manual to provide guidance to use electric transportation equipment to get to/from project site when tasks allows.	L&F	
Reduce Vehicle Miles Driven			
V12	Evaluate patrol and maintenance circulation routes to identify mileage reduction opportunities.	VS; L&F	
V13	Minimize driving to meetings and trainings through teleconferencing technology and efficient scheduling.	IST	
Purchase Carbon Offsets for Flights			
V14	Purchase carbon offsets for flights.	AS	

EMPLOYEE COMMUTE STRATEGIES AND ACTIONS		LEAD DEPARTMENT	TIMEFRAME
Reduce the Number of Commute Days			
C1	Expand and encourage telecommuting.	HR; IST	
C2	Expand and encourage compressed work schedules.	HR; VS; L&F	
C3	Assess the feasibility of a weekly or biweekly administrative office closure (compressed schedules or telework on closure day).	L&F; HR	
Incentivize and Enable Low-Emissions Commute Modes			
C4	Create an incentive for employees commuting via carpool, public transit, bike, or walking.	HR	
C5	Install electric vehicle chargers at all field offices.	L&F	
C6	Create intranet page with commute resources and carpool database.	HR	
C7	Offer competitive pricing for employee electric vehicle charging.	AS	
C8	Assess opportunities to partner with local employee shuttles (e.g., Chariot, San Mateo County, and tech companies).	HR	
C9	Create a guaranteed ride home safeguard to reimburse an employee's taxi or rideshare ride home in case of personal emergency or illness.	HR	
Reduce Commute Distances			
C10	Pilot project to allow administrative employees to work out of the new South Area Office two days per week.	L&F	
C11	Assess the feasibility of acquiring more Midpen-owned housing.	PL	

FACILITIES STRATEGIES AND ACTIONS		LEAD DEPARTMENT	TIMEFRAME
Move Towards 100% Renewable Electricity for All Midpen Facilities			
F1	Purchase 100% renewable electricity for Midpen facilities.	L&F	
F2	Assess the feasibility of rooftop/carport solar at the Foothills Field Office, Skyline Field Office, and preserve parking lots and implement where possible.	E&C	
Maximize Energy Efficiency in New and Existing Buildings			
F3	Implement energy efficiency upgrades at the Skyline and Foothills Field Offices, including measures identified in the Ecology Action Energy Audit.	L&F; E&C	
F4	Seek the highest level of energy efficiency and sustainability possible while planning for the new Administrative Office, including LEED standard and/or utilizing electric heating to achieve zero net energy.	E&C	
F5	Assess the feasibility of a weekly or biweekly administrative office closure (compressed schedules or telework on closure day).	L&F; HR	
Reduce Solid Waste Generated Through Midpen Operations			

F6	Implement office waste reduction measures: restart compost program, improve recycling, and minimize single-use disposables at events.	L&F	
F7	Study characterization of waste generated from maintenance activities; identify any additional opportunities to reuse or divert maintenance materials.	L&F	
F8	Update waste diversion policy and create contract language to incentivize contractors to use sustainable practices, such as reducing solid waste and fuel use, and provide documentation to Midpen.	E&C; AS	

TENANT RESIDENCES STRATEGIES AND ACTIONS		LEAD DEPARTMENT	TIMEFRAME
Move Towards 100% Renewable Electricity for Residences			
R1	Encourage residents to purchase 100% renewable electricity. Assess viability of requiring as leases are renewed.	L&F	
R2	Assess the feasibility of rooftop solar on residences, including leasing or power purchasing agreements.	L&F; E&C	
Increase Energy Efficiency			
R3	Make basic energy efficiency upgrades such as installing weather stripping, LED lighting, and double-paned windows.	L&F	
R4	Assess the viability of more significant energy efficiency improvements such as heat pumps and insulation.	L&F	
Mover Towards Cleaner Heat Sources			
R5	Reduce woodstove use by installing or upgrading gas or preferably electric heating in homes with woodstoves.	L&F	
Improve Data and Guidance for Decision-Making			
R6	Ask tenants to share PG&E bills and other heat expenses with Midpen to improve data and GHG monitoring.	L&F	
R7	Create guidelines to incorporate sustainability into decisions about residence improvements.	L&F	

EDUCATION AND OUTREACH STRATEGIES AND ACTIONS		LEAD DEPARTMENT	TIMEFRAME
Improve Internal Capacity to Address Climate Change			
E1	Establish a Midpen Green Team to implement the Climate Action Plan and continue improving sustainability efforts.	NR	
E2	Improve internal communication about climate change through an intranet page and newsletter on Midpen action, regional news, and resources for staff to improve their sustainability at home.	NR	
Educate Visitors and the Community About Climate Change			
E3	Provide training on climate change content and communication techniques to volunteers, rangers, and public affairs staff.	NR; VS	
E4	Incorporate climate change into docent-led interpretative activities and Public Affairs outreach events and materials. Encourage	VS; PA	

	visitors to reduce their GHG emissions with messaging on tangible actions.		
E5	Use Climate Action Plan actions as demonstration projects to highlight via press releases, social media posts, informal visitor interactions, and signage (when project is in a public area).	PA; VS	
Participate and Play a Leadership Role in Regional and State Efforts			
E6	Support and influence regional and state climate change-related policies and funding allocations.	PA; AS	
E7	Support and participate in regional climate change initiatives, conferences, and general community of practice.	NR; PA	
E8	Foster partnerships to respond to climate change collaboratively and seek opportunities to share information with other agencies.	NR; PA	
E9	Seek grant opportunities to fund implementation of Climate Action Plan, carbon sequestration, and natural resource resilience efforts.	AS	

LIVESTOCK STRATEGIES AND ACTIONS		LEAD DEPARTMENT	TIMEFRAME
Maximize Soil Carbon Sequestration and Storage			
L1	Assess current carbon sequestration in grazed and ungrazed rangelands to determine effect of grazing on soil carbon.	NR	
L2	Partner with San Mateo Resource Conservation District to develop carbon farm plan.	NR; L&F	
L3	Implement carbon sequestration projects identified in carbon farm plan.	NR; L&F	
Ensure Grazing Program is Attaining Land Management Objectives			
L4	Continue monitoring grazing impact on invasive species and fuel reduction objectives.	NR	
L5	Where agricultural sustainability is not a leading factor, assess alternative grassland management techniques such as mowing, prescribed burns, and use of other livestock such as goats.	NR	

VISITOR TRANSPORTATION STRATEGIES AND ACTIONS		LEAD DEPARTMENT	TIMEFRAME
Collect Data on Visitor Transportation			
T1	Establish visitor transportation emissions baseline.	NR	
T2	Complete Rancho San Antonio Carrying Capacity and Multimodal Access Study, implement results, and identify relevant findings that could be applied to other preserves.	PL	
Increase Visitor Use of Electric Vehicles, Bikes, and Public Transit			
T3	Install electric vehicle chargers at preserve parking lots.	L&F	
T4	Install bike racks at preserves without racks where bikes are allowed.	L&F	
T5	Partner with San Mateo County Parks to identify lessons learned from their parks shuttle pilot project.	PL	

Appendix 3: Full Strategies and Actions List by Department

LAND AND FACILITIES ACTIONS		LEAD DEPARTMENT	TIMEFRAME
Complete			
V1	Switch fuel tanks to renewable diesel.	L&F	
Ongoing			
C2	Expand and encourage compressed work schedules.	HR; VS; L&F	
F6	Implement office waste reduction measures: restart compost program, improve recycling, and minimize single-use disposables at events.	L&F	
V5	As administrative vehicles are up for replacement, replace with electric or hybrid vehicles wherever possible.	L&F	
Short-Term			
C5/ V3	Install electric vehicle chargers at all field offices.	L&F	
F1	Purchase 100% renewable electricity for Midpen facilities.	L&F	
F3	Implement energy efficiency upgrades at the Skyline and Foothills Field Offices, including measures identified in the Ecology Action Energy Audit.	L&F; E&C	
L2	Partner with San Mateo Resource Conservation District to develop carbon farm plan.	NR; L&F	
R1	Encourage residents to purchase 100% renewable electricity. Assess viability of requiring as leases are renewed.	L&F	
R6	Ask tenants to share PG&E bills and other heat expenses with Midpen to improve data and GHG monitoring.	L&F	
T3	Install electric vehicle chargers at preserve parking lots.	L&F	
V2	Track technology development for hybrid, electric, or alternative fuel trucks. When a viable option comes on the market, acquire and test one truck as a pilot project.	L&F; VS	
V7	Evaluate fire response program and assess feasibility of alternative fire response models with lower emissions, such as acquiring brush trucks and downsizing F350s (e.g. City of Palo Alto).	VS; L&F	
V9	Acquire and test electric bikes, motorcycles, ATVs, or mules as technology develops. Stage electric transportation equipment at preserves to enable use.	L&F; VS	
Medium-Term			
C10	Pilot project to allow administrative employees to work out of the new South Area Office two days per week.	L&F	
F7	Study characterization of waste generated from maintenance activities; identify any additional opportunities to reuse or divert maintenance materials.	L&F	
L3	Implement carbon sequestration projects identified in carbon farm plan.	NR; L&F	

R2	Assess the feasibility of rooftop solar on residences, including leasing or power purchasing agreements.	L&F; E&C	
R3	Make basic energy efficiency upgrades such as installing weather stripping, LED lighting, and double-paned windows.	L&F	
T4	Install bike racks at preserves without racks where bikes are allowed.	L&F	
V4	Acquire and test new electric equipment as technology develops. Update Maintenance Operations Manual to provide guidance to choose electric maintenance equipment when tasks allows.	L&F	
V8	Update Maintenance Operations Manual to provide guidance to choose most fuel efficient vehicle possible for task.	L&F	
V11	Update Maintenance Operations Manual to provide guidance to use electric transportation equipment to get to/from project site when tasks allows.	L&F	
V12	Evaluate patrol and maintenance circulation routes to identify mileage reduction opportunities.	VS; L&F	
Long-Term			
C3/ F5	Assess the feasibility of a weekly or biweekly administrative office closure (compressed schedules or telework on closure day).	L&F; HR	
R4	Assess the viability of more significant energy efficiency improvements such as heat pumps and insulation.	L&F	
R5	Reduce woodstove use by installing or upgrading gas or preferably electric heating in homes with woodstoves.	L&F	
R7	Create guidelines to incorporate sustainability into decisions about residence improvements.	L&F	
V6	Purchase one hybrid or long-range electric vehicle for each field office for highway/town travel and on-road maintenance projects.	L&F	

NATURAL RESOURCES ACTIONS		LEAD DEPARTMENT	TIMEFRAME
Ongoing			
E1	Establish a Midpen Green Team to implement the Climate Action Plan and continue improving sustainability efforts.	NR	
E3	Provide training on climate change content and communication techniques to volunteers, rangers, and public affairs staff.	NR; VS	
E7	Support and participate in regional climate change initiatives, conferences, and general community of practice.	NR; PA	
E8	Foster partnerships to respond to climate change collaboratively and seek opportunities to share information with other agencies.	NR; PA	
L4	Continue monitoring grazing impact on invasive species and fuel reduction objectives.	NR	
T1	Establish visitor transportation emissions baseline.	NR	
Short-Term			
E2	Improve internal communication about climate change through an intranet page and newsletter on Midpen action, regional news, and resources for staff to improve their sustainability at home.	NR	

L1	Assess current carbon sequestration in grazed and ungrazed rangelands to determine effect of grazing on soil carbon.	NR	
L2	Partner with San Mateo Resource Conservation District to develop carbon farm plan.	NR; L&F	
Medium-Term			
L3	Implement carbon sequestration projects identified in carbon farm plan.	NR; L&F	
L5	Where agricultural sustainability is not a leading factor, assess alternative grassland management techniques such as mowing, prescribed burns, and use of other livestock such as goats.	NR	

VISITOR SERVICES ACTIONS		LEAD DEPARTMENT	TIMEFRAME
Ongoing			
C2	Expand and encourage compressed work schedules.	HR; VS; L&F	
E3	Provide training on climate change content and communication techniques to docents, rangers, and public affairs staff.	NR; VS	
E4	Incorporate climate change into docent-led interpretative activities and Public Affairs outreach events and materials. Encourage visitors to reduce their GHG emissions with messaging on tangible actions.	VS; PA	
Short-Term			
V2	Track technology development for hybrid, electric, or alternative fuel trucks. When a viable option comes on the market, acquire and test one truck as a pilot project.	L&F; VS	
V7	Evaluate fire response program and assess feasibility of alternative fire response models with lower emissions, such as acquiring brush trucks and downsizing F350s (e.g. City of Palo Alto).	VS; L&F	
V9	Acquire and test electric bikes, motorcycles, ATVs, or mules as technology develops. Stage electric transportation equipment at preserves to enable use.	L&F; VS	
Medium-Term			
E5	Use Climate Action Plan actions as demonstration projects to highlight via press releases, social media posts, informal visitor interactions, and signage (when project is in a public area).	PA; VS	
V10	Expand ranger patrols on electric bikes, motorcycles, ATVs, or mules. Update Ranger Operations Manual to encourage this option and provide guidance.	VS	
V12	Evaluate patrol and maintenance circulation routes to identify mileage reduction opportunities.	VS; L&F	

HUMAN RESOURCES ACTIONS		LEAD DEPARTMENT	TIMEFRAME
Ongoing			

C1	Expand and encourage telecommuting.	HR; IST	
C2	Expand and encourage compressed work schedules.	HR; VS; L&F	
Short-Term			
C4	Create an incentive for employees commuting via carpool, public transit, bike, or walking.	HR	
C6	Create intranet page with commute resources and carpool database.	HR	
C9	Create a guaranteed ride home safeguard to reimburse an employee's taxi or rideshare ride home in case of personal emergency or illness.	HR	
Long-Term			
C3/ F5	Assess the feasibility of a weekly or biweekly administrative office closure (compressed schedules or telework on closure day).	L&F; HR	
C8	Assess opportunities to partner with local employee shuttles (e.g., Chariot, San Mateo County, and tech companies).	HR	

ENGINEERING AND CONSTRUCTION ACTIONS		LEAD DEPARTMENT	TIMEFRAME
Short-Term			
F3	Implement energy efficiency upgrades at the Skyline and Foothills Field Offices, including measures identified in the Ecology Action Energy Audit.	L&F; E&C	
F4	Seek the highest level of energy efficiency and sustainability possible while planning for the new Administrative Office, including LEED standard and/or utilizing electric heating to achieve zero net energy.	E&C	
Medium-Term			
F2	Assess the feasibility of rooftop/carport solar at the Foothills Field Office, Skyline Field Office, and preserve parking lots and implement where possible.	E&C	
F8	Update waste diversion policy and create contract language to incentivize contractors to use sustainable practices, such as reducing solid waste and fuel use, and provide documentation to Midpen.	E&C; AS	
R2	Assess the feasibility of rooftop solar on residences, including leasing or power purchasing agreements.	L&F; E&C	

ADMINISTRATIVE SERVICES ACTIONS		LEAD DEPARTMENT	TIMEFRAME
Ongoing			
E6	Support and influence regional and state climate change-related policies and funding allocations.	PA; AS	
Short-Term			
C7	Offer competitive pricing for employee electric vehicle charging.	AS	

E9	Seek grant opportunities to fund implementation of Climate Action Plan, carbon sequestration, and resilience efforts.	AS	
V14	Purchase carbon offsets for flights.	AS	
Medium-Term			
F8	Update waste diversion policy and create contract language to incentivize contractors to use sustainable practices, such as reducing solid waste and fuel use, and provide documentation.	E&C; AS	

PUBLIC AFFAIRS ACTIONS		LEAD DEPARTMENT	TIMEFRAME
Ongoing			
E4	Incorporate climate change into docent-led interpretative activities and Public Affairs outreach events and materials. Encourage visitors to reduce their GHG emissions with messaging on tangible actions.	VS; PA	
E6	Support and influence regional and state climate change-related policies and funding allocations.	PA; AS	
E7	Support and participate in regional climate change initiatives, conferences, and general community of practice.	NR; PA	
E8	Foster partnerships to respond to climate change collaboratively and seek opportunities to share information with other agencies.	NR; PA	
Medium-Term			
E5	Use Climate Action Plan actions as demonstration projects to highlight via press releases, social media posts, informal visitor interactions, and signage (when project is in a public area).	PA; VS	

PLANNING ACTIONS		LEAD DEPARTMENT	TIMEFRAME
Ongoing			
T2	Complete Rancho San Antonio Carrying Capacity and Multimodal Access Study, implement results, and identify relevant findings that could be applied to other preserves.	PL	
Long-Term			
C11	Assess the feasibility of acquiring more Midpen-owned housing.	PL	
T5	Partner with San Mateo County Parks to identify lessons learned from their parks shuttle pilot project.	PL	

INFORMATION SYSTEMS AND TECHNOLOGY ACTIONS		LEAD DEPARTMENT	TIMEFRAME
Ongoing			
C1	Expand and encourage telecommuting.	HR; IST	
V13	Minimize driving to meetings and trainings through teleconferencing technology and efficient scheduling.	IST	

Appendix 4: Full List of Performance Indicators

VEHICLE, EQUIPMENT, & BUSINESS TRAVEL INDICATORS	BASELINE (2016)
Average vehicle fuel economy (miles per gallon)	15.6
Total fleet vehicle miles traveled (miles, WEX cards only)	883,713
Proportion of equipment that is powered by renewable fuel or electricity (%)	0%
Annual miles flown for business travel (miles)	50,000

EMPLOYEE COMMUTE INDICATORS	BASELINE (2016)
Total drive alone employee vehicle miles traveled (miles)	1,350,784
Percent of employees who always drive alone to work (%)	83%
Percent of employees who work a compressed 9/80 schedule (%)	32%
Percent of administrative employees who telecommute regularly (%)	9%

FACILITIES INDICATORS	BASELINE (2016)
Administrative office electricity use per square foot (annual kWh/SQFT)	11.34
Field office average electricity use per square foot (annual kWh/SQFT)	5.37
Percent of electricity from renewable sources (%)	33%
Solid waste diversion rate (% diverted)	34%

TENANT RESIDENCES INDICATORS	BASELINE (2016)
Percent of tenant residences using electric heat (%)	32%
Percent of tenants purchasing highest renewable option from utility (%)	0%

EDUCATION AND OUTREACH INDICATORS	BASELINE (2016)
Number of staff engaged through the Green Team or internal newsletter	Establish baseline
Number of docents and other volunteers trained to discuss climate change	Establish baseline
Number of press releases/newsletters/social media posts on climate change	Establish baseline

LIVESTOCK INDICATORS	BASELINE (2016)
Number of animals with high enteric emissions (year-round equivalent cattle, excluding calves on milk)	374
Number of animals with low enteric emissions (year-round equivalent horses, sheep, pigs, goats, alpacas, donkeys)	177
Annual additional landscape carbon sequestration due to grazing ($MTCO_2e$)	Establish baseline
Percent of annual livestock emissions offset by carbon sequestration projects (%)	0%

VISITOR TRANSPORTATION INDICATORS	BASELINE (2016)
Total visitor miles to and from preserves (miles)	Establish baseline
Percent of visitor trips made via transit, bike, or electric vehicle (%)	Establish baseline