



CLIMATE *Friendly* PARKS

# Mojave National Preserve Action Plan

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# MOJAVE NATIONAL PRESERVE BECOMES A CLIMATE FRIENDLY PARK

Mojave National Preserve, a vast desert wonderland of 1.6 million acres located in eastern California was created by the 1994 California Desert Protection Act when citizens and elected officials recognized that the land had unique scenic, scientific, educational and recreational values. Within the Park boundaries lie crenulated mountains, singing sand dunes, the largest and densest Joshua tree forest in the world, and an amazing array of plants and animals.

As a participant in the Climate Friendly Parks program, Mojave National Preserve belongs to a network of parks nationwide that are putting climate friendly behavior at the forefront of sustainability planning. By conducting an emission inventory, setting an emission reduction goal, developing this Action Plan, and committing to educate Park staff, visitors, and community members about climate change, Mojave National Preserve provides a model for climate friendly behavior within the Park service.

This Action Plan identifies steps that Mojave National Preserve can undertake to reduce greenhouse gas (GHG) emissions and mitigate its impact on climate change. The plan presents the Park's emission reduction goals, and associated reduction actions to achieve the Park's goals. Strategies and action plan items were developed by working groups at the Mojave Desert and Mediterranean Coast Climate Friendly Parks Workshop.<sup>1</sup> While the plan provides a framework needed to meet the Park's emission reduction, it is not intended to provide detailed instructions on how to implement each of the proposed measures. The Park's Environmental Management System will describe priorities and details to implement these actions.

Mojave National Preserve aims to

- 1) Increase onsite renewable energy sources
- 2) Reduce emissions from stationary and purchased sources.
- 3) Reduce waste
- 3) Reduce mobile sources of emissions from Park operations

To meet these goals, the Park will implement strategies proposed in this plan that relate to the Park's current and future emission inventories. These strategies are:

**Strategy 1:** Identify and implement mitigation actions that the Park can independently take to reduce GHG emissions resulting from activities within and by the Park

**Strategy 2:** Increase climate change education and outreach efforts

**Strategy 3:** Monitor progress with respect to reducing emissions and identify areas for improvement

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<sup>1</sup> Original notes from these workshops, including detailed action items not presented in the final plan have been archived by Mojave National Preserve and are available upon request.

## THE CHALLENGE OF CLIMATE CHANGE

Climate change presents significant risks and challenges to the National Park Service and Mojave National Preserve. Scientists cannot predict with certainty the general severity of climate change nor its impacts. Average global temperature on the Earth's surface has increased about 1.1°F since the late 19<sup>th</sup> century, and the 10 warmest years of the 20<sup>th</sup> century all occurred in the last 15 years. The single leading cause of this warming is the buildup of GHGs in the atmosphere—primarily carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>) and nitrous oxide (N<sub>2</sub>O)—which trap heat that otherwise would be released into space.

The continued addition of CO<sub>2</sub> and other GHGs to the atmosphere will raise the Earth's average temperature more rapidly in the next century; a global average warming of a possible 4-7°F increase by the year 2100. Rising global temperatures will further raise sea levels and affect all aspects of the water cycle, including snow cover, mountain glaciers, spring runoff, water temperature, and aquatic life. Climate change is also expected to affect human health, crop production, animal and plant habitats, and many other features of our natural and managed environments.

The state of California will be dramatically affected by climate change in terms of economic development, agricultural production, water resources and the natural systems upon which diverse plants and animals depend. California's newly released California Climate Adaptation Strategies, which describes current climate changes based on future scenarios for future climate and adaptation strategies states the following:

"Generally, research indicates that California should expect overall hotter and drier conditions with a continued reduction in winter snow (with concurrent increases in winter rains), as well as increased average temperatures, and accelerating sea-level rise. In addition to changes in average temperatures, sea level, and precipitation patterns, the intensity of extreme weather events is also changing. The impacts assessment indicates that extreme weather events, such as heat waves, wildfires, droughts, and floods are likely to be some of the earliest climate impacts experienced."<sup>2</sup>

According to the report the following changes in climate will be likely in California by 2050

- Increases in temperature of 2-5 °F by 2050
- 12-35% overall decrease in precipitation by 2050 (confirmed by 11 out of 12 computer models from the Scripps Oceanographic Institute)
- Sea level rise of 12-18 inches by 2050

The report continues to make the following points about climate change temperature projections (these were generated for the 2009 Scenarios Project) that are relevant to a discussion on how climate change will affect the Mojave National Preserve and Mojave Desert.

- Average temperature increase is expected to be more pronounced in the summer than in the winter season
- Inland areas are likely to experience more pronounced warming than coastal regions
- Heat waves are expected to increase in frequency, with individual heat waves also showing a tendency toward becoming longer, and extending over a larger area, thus more likely to encompass multiple population centers in California at the same time
- Precipitation will fall more often as rain rather than snow

<sup>2</sup> 2009 California Climate Adaptation Strategy. California Natural Resources Agency. Sacramento, CA. p.15  
Available online at [www.climatechange.ca.gov/adaptation/count/click/php](http://www.climatechange.ca.gov/adaptation/count/click/php)

- In the next few decades, it is likely that the state will face a growing number of climate change related extreme events such as heat waves, wildfires, droughts, and floods

At Mojave National Preserve increased temperatures and changing precipitation patterns may alter Park ecosystems, changing vegetation communities, habitats, species composition, and the experience of Park visitors. The Southwestern United States has been identified as one of the country's most sensitive areas to the effects of climate change, through increased variability, especially in terms of precipitation.

Furthermore, the U.S. Global Change Research Program (USGCRP) has found that recent warming in the southwest is among the most rapid in the nation. According to the U.S. Global Change Research Program website, temperatures in the Southwest have already increased 1.5 °F compared to a 1960-1979 temperature baseline. Projections from the USGCRP state that later this century the average temperatures in the Southwest could increase 4-10 °F <sup>3</sup>.

The USGCRP states that as a result of the temperature increase, conditions will lead to increased competition for water supplies and that drought, wildfire, and invasive species will all transform the landscape as we know it. As a consequence of these changes, unique tourism, recreation opportunities, and quality of life are likely to be altered.

It also states that:

- The total area of burns is expected to increase in wildfires
- Declines in high elevation ecosystems such as alpine forests or tundra, are expected to decline 60-90% in California
- Two-thirds of 5,500 native plant species are projected to experience range reductions of up to 80% before the end of this century under projected warming trends, also in California

## Effects of Climate Change on the Mojave National Preserve's Resources

The result of climate change will change the desert ecosystem represented in Mojave National Preserve. A basic ecological tenet is that most species perform best in a fairly specific environment, temperature-wise. The increases in temperatures likely to cause many desert animals stress, affecting animals' metabolic energy intake and expending energy outside their temperature comfort zones. Plants will doubtlessly be affected by higher air temperatures which will cause an increase in evapotranspiration and variable precipitation.

Another area of concern is how organisms will respond to changes in plant and animal life cycles due to climate change. Climate change may disrupt ancient natural relationships like the one between flowering plants and their pollinators, such as plant blooming earlier and missing the adult phase of a crucial bee or fly pollinator. Such an ecological mismatch would result in failed reproduction - no fruit or seeds - for the plant. Changes in temperature and precipitation could also cause shrubs to germinate earlier, fruit later and grow later in the season. A change in the phenology of plants due to climate change will affect many animal species. Along the Colorado River corridor, changes to the timing of mesquite flowering might impact migrating birds that prey on insects attracted by the flowering mesquite. Here in the Mojave, a change in the life cycle of plants could affect the desert tortoise, a threatened herbivore that subsists largely on annual wildflowers.

<sup>3</sup> U.S. Global Change Research Program. "Southwest". Washington, DC. 2009.

Available online at [www.globalchange.gov/publications/reports/scientific-assessments/us-impacts/regional-climate-change-impacts/southwest](http://www.globalchange.gov/publications/reports/scientific-assessments/us-impacts/regional-climate-change-impacts/southwest)

Finally, the Park's mountain front springs or perched aquifers are highly susceptible to climate change. Many of these springs respond fairly rapidly to changes in precipitation and increased evaporation rates. Park data indicate that many of these springs would go dry during an extended drought. In the event of a drought or succession of droughts, loss of these small wetlands could severely impact native biota.

## GREENHOUSE GAS EMISSION INVENTORY AT MOJAVE NATIONAL PRESERVE

Naturally occurring GHG include CO<sub>2</sub>, CH<sub>4</sub>, N<sub>2</sub>O, and water vapor. Human activities (e.g., fuel combustion and waste generation) lead to increased concentrations of these gases (except water vapor) in the atmosphere.

### Greenhouse Gas Emissions

Greenhouse gas emissions result from the combustion of fossil fuels for transportation and energy (e.g., boilers, electricity generation), the decomposition of waste and other organic matter, and the volatilization or release of gases from various other sources (e.g., fertilizers and refrigerants).

In 2008, GHG emissions within Mojave National Preserve totaled 6,271 metric tons of carbon dioxide equivalent (MTCO<sub>2</sub>E), which are calculated using the CLIP tool section of the Climate Friendly Parks Program. This includes emissions from Park and concessioner operations and visitor activities, including vehicle use within the Park. By comparison, a typical single family home in the U.S. produces approximately 11 MTCO<sub>2</sub> per year<sup>4</sup>. Thus, the combined emissions from Park and concessioner operations and visitor activities within the Park are roughly equivalent to the emissions from the electricity use of 580 households each year.

Mojave National Preserve faces some unique challenges in reducing its greenhouse gas emissions. Among those is the fact that this 1.6 million acre park located in eastern California is extremely remote. The Climate Friendly Parks Emissions Inventory shows that the Mojave Preserve has minimal stationary emissions, offsets the use of purchased electricity by utilizing electricity produced through photovoltaic technology, and will make significant progress in minimizing waste. The largest emission sector for Mojave National Preserve is mobile combustion, totaling 426 MTCO<sub>2</sub>E for Park operations, and 5,933 MTCO<sub>2</sub>E including an estimate of vehicle miles traveled by Park visitors. It is apparent from this analysis that, over 85% of the Park's estimated greenhouse gas emissions come from mobile sources.

Reducing the vehicle miles that Park staff drive will be a challenge. Mojave National Preserve's headquarters are located in Barstow, California, over 100 miles away from the visitor center at Kelso Depot. Additionally, resource staff must travel long distances to refuel while the Park's maintenance staff regularly drives several hundred miles in one day to complete their tasks.

Park staff have identified four possible solutions to these challenges. The first approach is to implement a carpooling program from Barstow to the Kelso Depot, as well as other daily commutes within the Park. Second, the Park will keep hybrid vehicles at Barstow and maintain four wheel drive vehicles at a staging center at Cima. This would allow Park staff to reduce their emissions and gas consumption entering the Park, but they would still have access to the Mojave National Preserve's backcountry. A third possible option is to enhance the ability of resource staff to stay out in the field longer, perhaps staying overnight at the Kelso Depot, Cima, or Hole-in-the-Wall Fire Center. The final possibility is to provide more employee housing on location, rather than in Baker or Barstow, which will help to cut down commutes.

Outside the Park, there is a possibility for a program similar to that of Yosemite Area Regional Transit System (YARTS). This program would include a shuttle system between Joshua Tree National Park, Mojave National Preserve, and Death Valley

<sup>4</sup> U.S. EPA, Greenhouse Gases Equivalencies Calculators – Calculations and References, Retrieved , Website: <http://www.epa.gov/RDEE/energy-resources/calculator.html>

National Park, as well as local communities and campgrounds in a close proximity to these parks. This would help to reduce the number of personal vehicles driven between these locations, theoretically lowering the emissions output of visitors.

Finally, the Park could facilitate the creation of a passenger train to the Kelso Depot on tracks that already run through the preserve. The train could pick up staff at Park headquarters in Barstow and then deposit them at the Kelso Depot, where vehicles could be kept for resource staff. An added benefit of a train would be that passengers could enter the Park from the gateway community of Barstow and possibly receive interpretation of the natural and cultural resources of the Park while on the train.

The following tables and figures summarize the data entered into the CLIP tool for Mojave National Preserve for FY2008. The first table is the final summary and the next sections give some detail on each category. Total Park operations resulted in 764 MTCO<sub>2</sub>E of GHG.

TABLE 1

*Mojave National Preserve FY2008 Inventory Results for Park Operations (764 MTCO<sub>2</sub>E)*

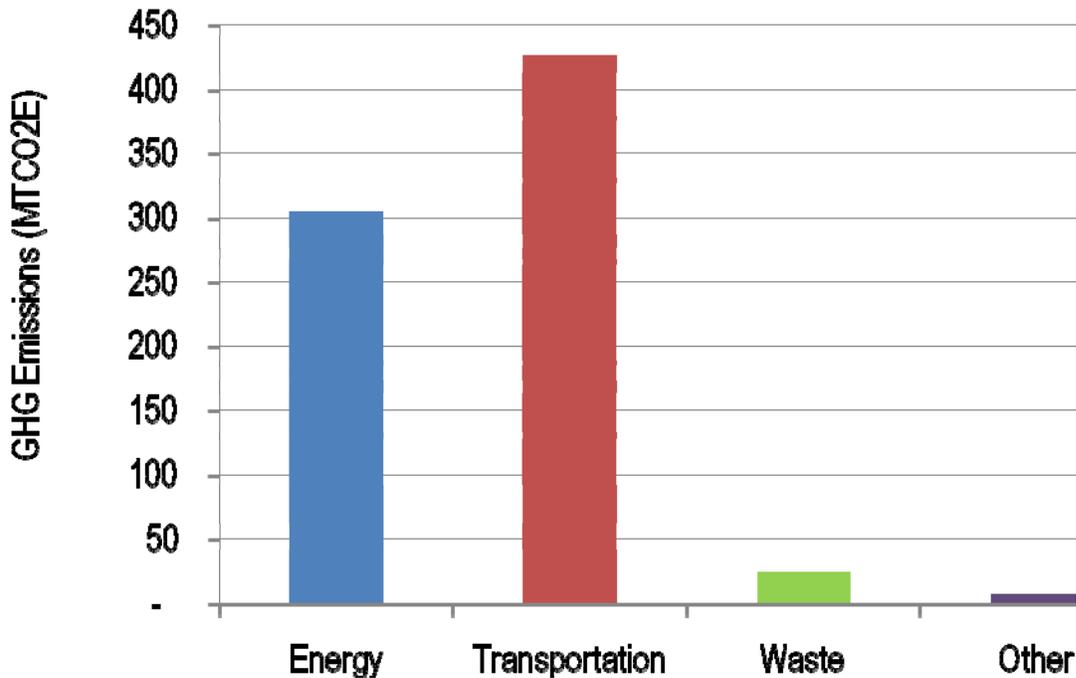


FIGURE 1

*Mojave National Preserve 2008 Park Operations Emissions (764 MTCO<sub>2</sub>E) by Sector*

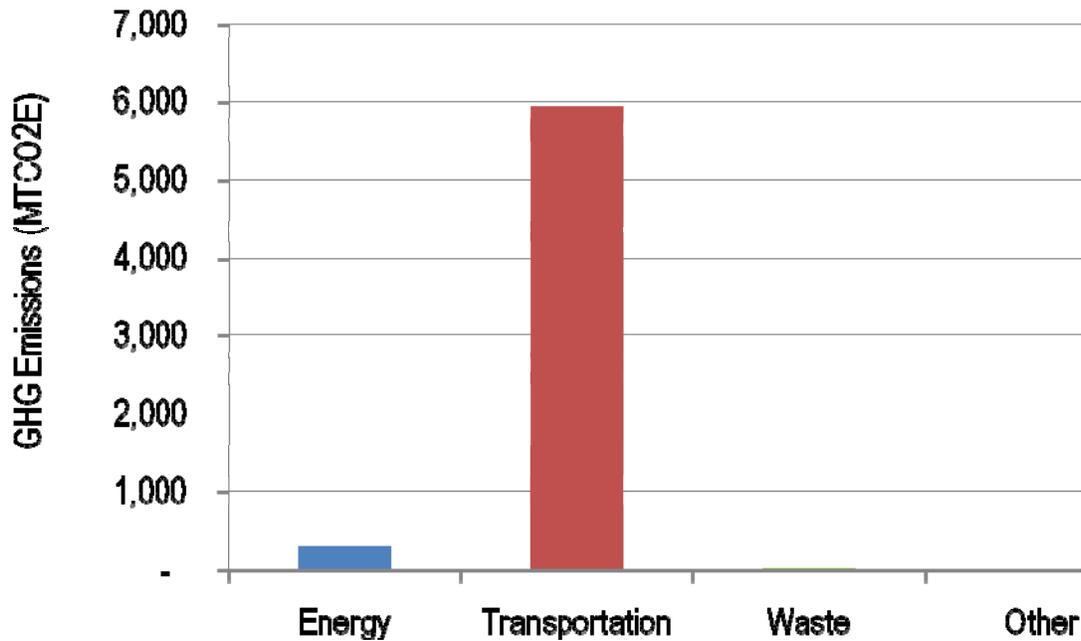
	MTCO <sub>2</sub> E
<b>Energy</b>	<b>304</b>
Stationary Combustion	149
Purchased Electricity	155
<b>Transportation</b>	<b>426</b>
Mobile Combustion	426
<b>Waste</b>	<b>25</b>
Landfilled Waste	25
Wastewater	-
<b>Other</b>	<b>8</b>
Refrigeration and Air Conditioning	8
<b>Total</b>	<b>764</b>

Note - Totals may not sum due to rounding

Not applicable data sources represented by "-"

## FIGURE 2

Mojave National Preserve 2008 Park Operations and Visitor Use Emissions (6,271 MTCO<sub>2</sub>E) by Sector



## TABLE 2

Mojave National Preserve FY 2008 Total GHG Emissions by Sector and Source in MTCO<sub>2</sub>E

	MTCO <sub>2</sub> E
<b>Energy</b>	<b>304</b>
Stationary Combustion	149
Purchased Electricity	155
<b>Transportation</b>	<b>5,933</b>
Mobile Combustion	5,933
<b>Waste</b>	<b>25</b>
Landfilled Waste	25
Wastewater	-
<b>Other</b>	<b>8</b>
Refrigeration and Air Conditioning	8
<b>Total</b>	<b>6,271</b>

Note - Totals may not sum due to rounding

Not applicable data sources represented by "-"

# Mojave National Preserve Responds to Climate Change

*The following actions were developed during the Mojave Desert and Mediterranean Coast Climate Friendly Parks Workshop on December 1-2, 2009, in order to meet the Park's climate change mitigation goals.*

## STRATEGY 1: REDUCE GHG EMISSIONS RESULTING FROM ACTIVITIES WITHIN AND BY THE PARK

The Mojave National Preserve has developed a set of actions that the Park is committed to taking in order to reduce emissions from activities within and by the Park. These strategies have been prioritized based on a qualitative assessment of a set of criteria including: emission reduction potential, cost-effectiveness, feasibility, co-benefits, regional impact, and ability to rapidly implement. Actions that the Mojave National Preserve will take have been presented below in order from highest to lowest priority within each sub-category with the goal of achieving overall 20% reduction in Park operations GHG emissions from 2008 levels by the year 2019. This will be done by replacing 100% of purchased electricity with photovoltaic.

### Energy Use Management

*Emission Reduction Goal: Reduce Park operations GHG emissions from purchased electricity to 100% below 2008 levels by 2019.*

Improving energy efficiency and implementing alternative energy sources reduces Park-based fuel use, lowers GHG emissions, decreases electricity consumption, and offers monetary benefits for the Park. Emissions inventory results indicate that approximately 20% of the Park Operations GHG emissions are from purchased electricity. Consequently, Mojave National Preserve identified actions it will take to reduce energy-related emissions. Presented below are the actions that are currently underway and comprise the Park's progress to date, as well as those actions the Park will pursue.

### Progress to Date

- Mojave National Preserve has educated the residents in the Hole-in-the-Wall Fire Center dormitory in FY09 about energy conservation in order to reduce the use of the propane generators and the wear on the batteries. This has also been done at Zzyzx and for certain rooms at the Kelso Depot.
- Light bulbs have already been replaced with CFLs. Fluorescents have replaced incandescent light bulbs.
- Mojave National Preserve ensures that maintenance to water supply lines is performed on a regular basis to maximize efficiency.
- Staff have been trained in Green Procurement.
- Mojave National Preserve has developed and implemented a HVAC inspection schedule for coils, filters, dampers, and fans and maintenance schedule that ensures timely replacement and cleaning (recommended monthly). The Preserve has contracted a local vendor to do work at the Kelso Depot Visitor Center.
- All computers are cycled to be replaced. Half have already been replaced with energy efficient models. All computers are set to energy star recommendations.
- All thermostats, with the exception of Headquarters, are controlled by maintenance to optimize energy efficiency.
- Mojave National Preserve has a solar system that is capable of producing 6 kilowatts (Kw) of electricity on the roof of the Maintenance Facility in Baker. A 2nd system is planned for Headquarters in FY2010. A new solar system at Zzyzx is 25% complete, and the Kessler housing units are currently utilizing solar power.
- A number of staff currently work from home, which reduces emissions from commutes and at the workplace.

- Mojave National Preserve has installed a geothermal heating system in the Kelso Depot Visitor Center.

## Energy Use Management – Planned Actions

### 1 Promote energy efficiency and energy conservation in the Park through behavioral change

- Encourage energy conservation in all Park activities by shutting off lights, using natural lighting, turning off electronics or setting to hibernate.
- Encourage staff to conserve energy by holding a training session at the Hole-in-the-Wall Fire Center Dormitory, Zzyzx, and at the Kelso Depot.
- Ensure that maintenance to water supply lines is performed on a regular basis.
- Enable staff to work from home and investigate the potential for flexible work hours.
- Adjust thermostats to no more than 68°F in the winter and no less than 78°F in the summer to ensure efficient heating and cooling of buildings.

### 2 Upgrade lighting options

- Install solar light tubes in two buildings in FY11.
- Buy and install motion sensing light switches for the common areas in the Hole-in-the-Wall Fire Center dormitory, the rest rooms in the basement of Kelso Depot.

### 3 Switch to more efficient electronics and devices

- Buy and install a smart power strip for electronics at Hole-in-the-Wall Fire Center.

### 4 Improve building structures and envelopes

- Insulate the attic in the Hole-in-the-Wall Visitor Center to reduce energy use.
- Install a new cool roof on the Hole-in-the-Wall Visitor Center to reduce energy use in FY11 to include solar light tubes.

### 5 Utilize alternative energy sources

- Install a 1.2 Mw grid-tied solar system at Baker that would offset all of the electricity used by Mojave National Preserve, Joshua Tree National Park, Death Valley National Park, and some of Sequoia-Kings Canyon National Park.
- Install a 12 kW grid tied solar system on Baker office roof.

## 6 Measure energy use throughout the Park

- Install meters on the solar system at the Hole-in-the-Wall Fire Center in order to record energy production.

## 7 Other Energy Actions

- Require concessioners at Desert Studies Center to include sustainable performance in contract.
- Develop an Energy Conservation Plan for Mojave and educate Park staff on energy conservation measures.
- Remove the last remaining diesel generator, located at Zzyzx.
- Upgrade the photovoltaic system components at Hole-in-the-Wall Fire Center to improve efficiency.
- Install solar yard lights at the Baker compound and Hole-in-the-Wall.

## Transportation Management

*Emission Reduction Goal: Reduce Park operations transportation emissions to 30% below 2008 levels by 2019.*

As the inventory results indicate, GHG emissions from transportation comprise 55.8% of Park operations emissions and 95% percent of the Park's overall emissions, including visitors. Accordingly, in addition to the Park operations emissions reduction goal, Mojave National Preserve sets a goal to reduce overall transportation emissions by 30% to below 2008 levels. Given the lack of alternative transportation, the large area to manage, and the likely addition of staff, maintaining total transportation at or below 2008 levels will be challenging. Presented below are the actions that are currently under way and comprise the Park's progress to date, as well as those actions that the Park will pursue to meet its goal.

### Progress to Date

- The Mojave National Preserve is currently using reclaimed materials for new roads and paving.

## Transportation Management – Planned Actions

### 1 Transportation-related Behavioral Changes

- Encourage staff carpooling for commuting to work. Develop carpooling information and support services for staff.
- Investigate implementing passenger train, shuttle service throughout and to the Preserve.
- Add internal capabilities to enable webinars and conference calls so as to reduce staff travel for meetings.
- Educate staff about not idling motors.

## 2 Reduce visitor vehicle fuel consumption

- Coordinate with local groups to develop bus/shuttle/train service to Park. University of California Irvine Department of Transportation has completed a study about transportation in Mojave National Preserve and service to the Gateway Community of Barstow.
- Improve tracking of visitor transit data by incorporating more traffic counters.

## 3 Reduce NPS vehicle and equipment fuel consumption

- Analyze fleet fuel consumption patterns for efficiency improvements.

## 4 Replace NPS vehicles and equipment

- Consider developing a vehicle replacement plan, depending on available funds.
- Study fleet compatibility and replace and/or right-size vehicles when necessary.
- Incorporate alternative fuel guidelines into fleet specifications.
- Conduct a fleet study on the feasibility of replacing four wheel vehicles with more fuel efficient two wheel vehicles.

## 5 Vehicle maintenance

- Work with GSA to develop and implement a fleet maintenance schedule that is more consistent with a desert climate, and back country road driving.

## 6 Other

- Develop a Park-centered fueling station that is located near Cima to reduce travel to and from the commercial fueling stations. This will reduce drives to refuel in Baker.
- Implement a Park-based staging area where two wheel drive vehicles and fuel-efficient government vehicles can be exchanged for four wheel drive vehicles. The significance of this is that Park resource staff from headquarters in Barstow can drive the 100 mile distance to the Baker staging area in a hybrid and then switch to a four wheel drive vehicle for backcountry surveying and monitoring. Also consider relocating several headquarters based position to be placed in the field to further cut back on miles driven.
- Develop a Park-based maintenance station to reduce trips to Baker or Las Vegas for maintenance.
- Challenge Park staff, especially maintenance and visitor protection work groups who drive a significantly higher amount of miles than others, to look for ways to drive less while still accomplishing their work. Consider offering awards/incentives. Possibly station individuals at main locations and have them serve that area only.

## Waste Management

*Emission Reduction Goal: Reduce Park operations waste emissions below 2008 levels through waste diversion and reduction.*

The connection between waste and GHG emissions may not be obvious. However, waste management—in the form of source and solid waste reduction—can dramatically reduce GHG emissions. Landfills are the largest human-generated source of CH<sub>4</sub> emissions in the United States. Reducing the amount of waste sent to landfills reduces CH<sub>4</sub> emissions caused by decomposition as well as the GHGs emitted from the transportation of waste. The less the Park and its visitors consume in terms of products and packaging, the less energy is used and fewer GHGs are emitted.

Mojave National Preserve's Park operation activities emitted 25 MTCO<sub>2</sub>E from waste management in 2008. Diverting or reducing the Park's waste stream through increased recycling efforts will reduce the amount of waste sent to landfills and resulting emissions. Presented below are the actions that are currently under way and which comprise the Park's progress to date as well as those actions that the Park will pursue to meet its goal.

### Progress to Date

- Donated old equipment to schools and senior centers. Recycled unusable computers and electronics. Ensured that the recycler of the e-waste is an EPA-certified recycler so that toxic components are properly managed.
- Removed all of the paper plates, cups, and plastic utensils from its Headquarters employee break room and replaced with reusable dinnerware.
- Hand dryers were recently installed at Kelso Depot's outside bathrooms.
- Four surface dumps and recycled reclaimed materials have been remediated.
- All of the styrofoam cups from Headquarter's employee break room have been replaced with reusable dinnerware.
- Water efficient technology for toilets, e.g. composting toilets and waterless urinals are being utilized.
- Installed low-flow faucets in all housing units.
- Recycled asphalt from a California Department of Transportation project was used to pave 3 miles of Zzyzx Road, saving over two million dollars on this project and preventing over 14,000 tons of used asphalt from being disposed in a landfill.
- Created a materials and equipment exchange program.
- Placed pre-paid boxes to collect old batteries in office buildings to enable convenient battery recycling.
- Developed and implemented an Integrated Solid Waste Alternatives Plan (ISWAP) to manage solid waste at the Park.
- Measured the baseline solid waste generation at the Park.

## Waste Management – Planned Actions

### 1 Decrease waste through behavior change

- Discontinue printing articles that could be circulated via email.
- Significantly decrease amount of printed materials.
- Encourage Park staff to reduce unnecessary photocopying.

### 2 Implement recycling and composting practices

- Install recycling trailers at both of the Park's campgrounds to enable convenient recycling.
- Install recycling facilities and methods of removal for paper, cardboard, etc. at visitor centers.

### 3 Reduce waste through green procurement

- Continue green procurement training to educate staff about sustainable procurement practices.
- Purchase locally-produced materials when appropriate.

### 4 Reduce and reuse wastewater

- Install low-flow faucets throughout the Park.
- Conserve water used in grounds maintenance by planting native flora.

## STRATEGY 2: INCREASE CLIMATE CHANGE EDUCATION AND OUTREACH

Climate change is a complex and easily misunderstood issue. Mojave National Preserve can play an integral role in communicating the cause and consequences of anthropogenic climate change to Park visitors, local schools, and communities. A better understanding of the challenges and benefits of reducing GHG emissions can motivate staff, visitors, and community members to incorporate climate friendly actions into their own lives. Mojave National Preserve recognizes that the greatest potential impact the Park can have on mitigating climate change is through public education. Thus, the Park sees public education as a goal of any climate initiative. From increasing the efficiency of public transportation to developing a green purchasing program, the actions Mojave National Preserve take to address climate change serve as opportunities for increasing the public's awareness of climate change. Presented below are actions currently underway and those actions that the Park plans to undertake.

### Progress to Date

- A climate change training workshop for interpretive rangers was conducted in February of 2010.
- Taught fourth grade students from Barstow about climate change in the Mojave Outdoor Education Program in June of 2009.
- Featured an article about how climate change will affect Joshua tree populations into the Park newsletter.
- Participated in creating a climate change youth guide to be distributed in the Mojave Network of National Parks.

### Park Staff

#### **Incorporate climate change into Park staff training, events, and performance plans.**

Developing a climate change education program for Park staff is essential to increasing awareness about climate change among Park visitors and fostering a sense of collective responsibility among staff to help reduce Park emissions. By incorporating climate change education into staff development programs Mojave National Preserve will enable its staff to demonstrate their commitment through leading by example, and providing visitors with the tools and resources they need to reduce GHG emissions in the Park and in their own communities. Planned actions include:

- Create a Park Climate Change Policy Memorandum specific to Mojave National Preserve.
- Include the science and impacts of climate change into Park education tools.
- Create personal incentives for staff to reduce GHG emissions in the Park and at home.
- Create visual reminders for Park employees regarding climate change and tips on how employees can help reduce emissions.
- Incorporate sessions on climate change into new staff and seasonal staff training.
- Include Climate Friendly Parks language in kiosks and other educational materials.

- Develop a seminar series for Park staff including concessioners, partners, and occasionally visitors to educate about current climate change science, the Park's efforts, and what they can do.

## Visitor Outreach

Understanding climate change and its consequences is essential to initiating individual behavioral change. Mojave National Preserve realizes that it has a unique opportunity to educate the public in a setting free from many of the distractions of daily life. By using existing materials, developing Park-specific materials, highlighting what the Park is currently doing about climate change, and encouraging visitors to reduce emissions, Mojave National Preserve can play an important role in educating the public about climate change.

Mojave National Preserve staff recognize that many different audiences visit the Park, including recreational and non-recreational Park visitors, "virtual visitors" who visit the Park online, school-aged visitors, local and out of town visitors, local Native American groups, and external audiences. Reaching these various audiences with climate change information and engaging them in the Park's efforts requires appropriately focused messaging. The Park has developed a number of strategies to reach these various audiences effectively. These strategies include:

- Create and/or distribute previously produced information on climate change and its effects on National Parks in general and on the Park in particular.
- Integrate climate change themes into interpretive programs.
- Incorporate climate change information into existing Park brochures.
- Incorporate climate friendly information into interpreter programs and talks.
- Educate visitors about their recycling options at the Park and at home.
- Communicate with local communities, Park visitors, and local media about actions they can take to reduce GHG emissions.
- Create demonstration projects and exhibits that convey the Park's sustainability message to visitors.

## Local Community Outreach

The gateway communities, agencies, vendors, and volunteers surrounding Mojave National Preserve can play a significant role in supporting the Park's climate change mitigation goals. As such, when appropriate, Park staff will assist local communities with incorporating climate change messages into community events and find partners to promote climate change education at those events, and engage with surrounding agencies to coordinate effective outreach and education efforts. Planned actions include:

- Work with community partners such as Desert Discovery Center to promote climate-friendly actions at community events such as Earth Day.
- Create a community event for Earth Day.



## STRATEGY 3: EVALUATE PROGRESS AND IDENTIFY AREAS FOR IMPROVEMENT

By taking the actions established in strategies 1 and 2 above, Mojave National Preserve plans to reduce its emissions to the specified goals. Achieving these goals will require an ongoing commitment by the Park, which may include subsequent emission inventories, additional mitigation actions, and reevaluation of goals. As part of this strategy, Mojave National Preserve will:

- Monitor progress with respect to reducing emissions. This will include subsequent emission inventories to evaluate progress toward goals stated in this action plan.
- Develop additional emission mitigation actions beyond those listed in this plan.
- Periodically review and update this plan.
- The Park will track climate friendly actions through the Environmental Management System.

## CONCLUSION

Mojave National Preserve has a unique opportunity to serve as a model for over 600,000 recreational visitors annually.<sup>5</sup> This report summarizes the operational actions the Park commits to undertake to address climate change. Specifically, the Park realizes its ability to educate the public and serve as a valuable model for citizens. By seriously addressing GHG emissions within the Park and sharing its successes with visitors, Mojave National Preserve will help mitigate climate change far beyond the Park's boundaries.

The National Park Service faces an uncertain future due to the possible effects of climate change. However, by seriously addressing climate change impacts and reducing emissions, Mojave National Preserve will reduce its contribution to the problem while setting an example for its visitors. The strategies presented in this Action Plan present an aggressive first step towards moving Mojave National Preserve to the forefront of Climate Friendly Parks.

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<sup>5</sup> Mojave National Preserve: Park Statistics. Available online at: <http://www.nature.nps.gov/stats/viewReport.cfm>

## APPENDIX A: LIST OF WORK GROUP PARTICIPANTS

- Dennis Schramm - Superintendent , Mojave National Preserve
- Seth Shteir- National Parks Conservation Association
- Debra Hughson- Science Advisor, Mojave National Preserve
- Lisa Wilson- Administrative Officer, Mojave National Preserve
- David Burdette- Environmental Protection Specialist, Mojave National Preserve
- Steve Carlson- Facility Manager, Mojave National Preserve
- Hilary Clark, Mojave National Preserve
- Alan Hurd- Maintenance Worker, Mojave National Preserve
- David Moore- GIS Specialist/ Landscape Architect, Mojave National Preserve