

National Park Service  
U.S. Department of the Interior



CLIMATE *Friendly* PARKS

# Lava Beds National Monument Action Plan

January 2011

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## LAVA BEDS NATIONAL MONUMENT BECOMES A CLIMATE FRIENDLY PARK

As a participant in the Climate Friendly Parks program, Lava Beds National Monument 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, Lava Beds National Monument provides a model for climate friendly behavior within the National Park system.

This Action Plan identifies steps that Lava Beds National Monument can undertake to reduce GHG emissions to 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 Klamath 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. These steps also will help insure that our energy and materials expenditures are as efficient as possible. This will become increasingly important as our fiscal resources become even more limited.

Lava Beds National Monument aims to:

- Reduce 2007 energy GHG emissions from park operations by 35 percent by 2016.
- Reduce 2007 transportation GHG emissions from park operations by 35 percent by 2016.
- Reduce 2007 waste GHG emissions from park operations by 10 percent by 2016.
- Reduce total 2007 park GHG emissions, including concessioners, by 20 percent by 2016.

To meet these goals, the park will implement strategies proposed in this plan that relate to the park's current and future emission inventories. Specifically, the plan recommends three strategies:

**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.

## THE CHALLENGE OF CLIMATE CHANGE

Climate change presents significant risks and challenges to the National Park Service and specifically to Lava Beds National Monument. Scientists cannot predict with certainty the general severity of climate change nor its impacts. Average global temperatures on the Earth's surface have 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.

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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 Lava Beds National Monument and are available upon request.

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 4-7°F by the year 2100 is considered likely.<sup>2</sup> 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.

Lava Beds National Monument contains rich and diverse cultural and natural resources that are susceptible and likely to incur impacts due to ongoing changes in climate. Changes from seasonal baseline conditions in both temperature and precipitation will have effects on the preservation of cultural resources, the viability of sensitive species, and may significantly alter cave environments, which are a major resource of the monument.

The monument has been inhabited for over 11,000 years. This expanse of time encompasses early Native American use, habitation by the Modoc tribe, the Modoc war, the CCC and homesteading. The preservation of artifacts, rock art and structures related to these periods has been facilitated by Lava Bed's cold and dry climate. Changes within baseline climatic conditions could lead to the accelerated decomposition of these cultural resources. The majority of the monument's rock art is either etched into soft volcanic tuff or stained on with pigments. Both types of rock art are susceptible to increases in erosion and weathering. Changes in seasonal weather patterns may also lead to the decay of structures related to defenses used during the Modoc war or village sites of early inhabitants.

Lava Beds is a sanctuary for a host of sensitive species. Some species are state listed (Townsend's big-eared bat) and others are known endemics of the cave environment (Isopods, pseudo-scorpion). Perhaps the species most likely to be affected by changes in climate is the pika. These distant relatives to rabbits inhabit areas with deep lava fissures and cave entrances in order to escape predation and more importantly solar heat. Pikas are particularly sensitive to heat and will quickly expire if trapped in warm conditions. Unique to the monument is a population of pika that is found lower in elevation than any other known group. They are at the edge of their known range and losses incurred by this population are likely indicators of a changing climate.

The monument's bats and cave-adapted macro-invertebrates use caves to complete their life cycles. Cave microclimates are strongly correlated with mean outside temperatures and respond to precipitation events. Species that require the use of the cave environment to survive and reproduce are susceptible to changes in these baseline conditions.

Evidence of changing microclimates in caves is being evaluated and monitored. Perennial ice resources deep in the monument's caves have been in dramatic decline over the past 20 years. The occurrence of warmer conditions in caves is leading to melt and a smaller window of time when ice can accumulate.

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<sup>2</sup> IPCC 2007. Climate Change 2007: The Physical Science Basis. Intergovernmental Panel on Climate Change, Geneva Switzerland. Available online at <<http://ipcc-wg1.ucar.edu/wg1/wg1-report.html>>

## GREENHOUSE GAS EMISSION INVENTORY AT LAVA BEDS NATIONAL MONUMENT

Naturally occurring GHGs 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

GHG emissions primarily result from the combustion of fossil fuels for transportation and energy (e.g., heating, cooling and lighting buildings), the decomposition of waste and other organic matter both within and far from the monument. A much, much smaller amount of emissions result from the volatilization or release of gases from various other sources (e.g., fertilizers and refrigerants).

In 2007, GHG estimated emissions within Lava Beds National Monument totaled 653 metric tons of carbon dioxide equivalents (MTCO<sub>2</sub>E). This includes emissions from park operations and visitor activities, including vehicle use within the park. For perspective, a typical single family home in the U.S. produces approximately 11 MTCO<sub>2</sub> per year.<sup>3</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 59 households each year, which indicates Lava Beds is already achieving relatively efficient use of energy resources.

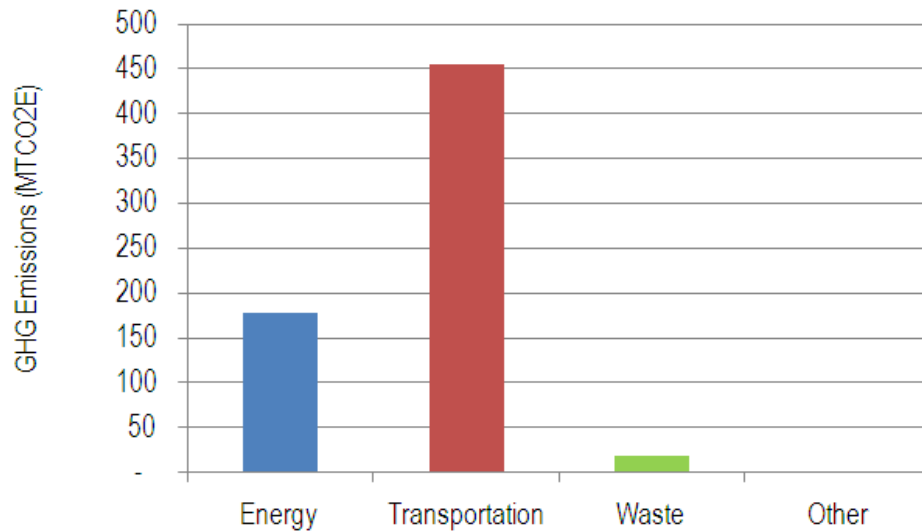
The largest emission sector for Lava Beds National Monument is transportation, totaling 456 MTCO<sub>2</sub>E (see Figure 1 and Table 1). The vast majority of Transportation-related emissions result from visitor vehicle travel within park boundaries.

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<sup>3</sup> U.S. EPA, Greenhouse Gases Equivalencies Calculators – Calculations and References, Retrieved , Website: <http://www.epa.gov/RDEE/energy-resources/calculator.html>

## FIGURE 1

*Lava Beds National Monument 2007 Total Greenhouse Gas Emissions by Sector*



## TABLE 1

*Lava Beds National Monument 2007 Total Greenhouse Gas Emissions by Sector and Source*

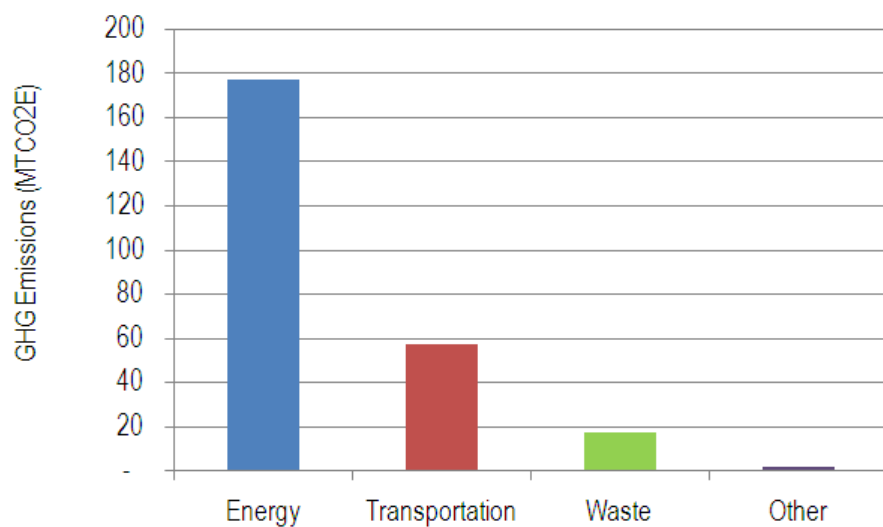
	MTCO2E
<b>Energy</b>	<b>177</b>
Stationary Combustion	30
Purchased Electricity	148
<b>Transportation</b>	<b>456</b>
Mobile Combustion	456
<b>Waste</b>	<b>18</b>
Land filled Waste	18
<b>Other</b>	<b>2</b>
Refrigeration and Air Conditioning	2
<b>Total</b>	<b>653</b>

Note - Totals may not sum due to rounding

Not applicable data sources represented by "-"

## FIGURE 2

*Lava Beds National Monument 2007 Park Operations Emissions by Sector*



## TABLE 2

*Lava Beds National Monument 2007 Park Operations Emissions by Sector*

	MTCO2E
<b>Energy</b>	<b>177</b>
Stationary Combustion	30
Purchased Electricity	148
<b>Transportation</b>	<b>57</b>
Mobile Combustion	57
<b>Waste</b>	<b>18</b>
Land filled Waste	18
<b>Other</b>	<b>2</b>
Refrigeration and Air Conditioning	2
<b>Total</b>	<b>255</b>

Note - Totals may not sum due to rounding  
 Not applicable data sources represented by "-"

# Lava Beds National Monument Responds to Climate Change

*The following actions were developed during the Klamath Climate Friendly Parks Workshop on April 14<sup>th</sup> and 15<sup>th</sup>, 2010, in order to meet the park's climate change mitigation goals.*



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

Lava Beds National Monument 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 Lava Beds National Monument will take have been presented below in order from highest to lowest priority within each sub-category.

### Energy Use Management

*Emission Reduction Goal: Reduce park operations' energy use emissions to 35 percent below 2007 levels by 2016.*

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 70 percent of the park's GHG emissions from Park Operations are from energy consumption. Consequently, Lava Beds National Monument identified actions it will take to reduce energy-related 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 the park will pursue.

#### Progress to Date

##### Behavioral Changes

- Currently providing a general message on energy conservation and Climate Change in the annual seasonal training (start of summer season), plus periodic updates via email and other events throughout the year

##### Lighting

- All buildings have been retrofitted from T12 to T8 high efficiency bulbs and ballasts & motion sensor switches installed in all park offices and shops
- Eliminated all incandescent lighting in Offices, shops and seasonal housing and replaced with fluorescent lighting
- Reduced exterior lighting around buildings to minimum required for safety and security (also for Dark Sky protection)

##### Heating, Ventilation, and Air-Conditioning (HVAC)

- Completed switch from Constant Volume air distribution systems to variable air volume systems in the Administration and Fire buildings.
- The HVAC systems are inspected twice a year in order to maintain efficiency.
- Thermostats have been calibrated in the Visitor Center to run more efficiently.
- Installed programmable thermostats in most offices and thermostatically controlled heaters in all seasonal housing units

- Buildings and housing units not in use over the winter are “winterized” by shutting off and draining water systems and shutting off heat

### Energy-efficient Electronics and Devices

- The park’s IT specialist has set the default for all printing to be double sided to save on the amount of paper and energy used.

### Improving Building Envelope

- Installed R30+ insulation in all of the attics for the housing units within park boundaries.
- Installed insulated doors, windows and garage doors in all shop buildings.

### Alternative Energy

- Installed a 13 kW grid-tied photovoltaic array on the Visitor Center.
- Investigated local weather records to determine if wind power could be a potential future source of on-site energy (result was that our average wind speeds are too low).

### Other Energy Management Actions

- Individual buildings have their own metering to better track their electricity use.

## 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.
  - Conduct quarterly Superintendent message to park staff on energy topics/climate change relationship.
  - Conduct behavioral contests amongst building occupants on the level of energy consumed (reward with items like gift certificate to a local restaurant).
  - Educational posters in employee housing laundry on cold water washing and drying clothes on the line (possible superintendent message to all employees regardless of where they live).
- Additional energy-use actions.
  - Formalize climate change message to seasonal and permanents at the annual Spring Orientation training.
  - Add to the message of conservation to the Employee Handbook.
  - Institute staff feedback on energy use with individual buildings.
  - Institute quarterly newsletters on energy consumption/conservation.

## 2 Upgrade lighting options

- Install lighting controls.
  - Complete installation of motion sensor lighting controls in the park's buildings.
- Installed PV powered LED bollard lighting along walks in employee housing area
- Use day lighting.
  - Investigate the potential for the use of solar tube lighting.

## 3 Heating, Ventilation, and Air Conditioning (HVAC)

- Investigate disabling reheat systems in the summer months.
  - Look into the feasibility and evaluate the potential energy reduction with turning off the reheat systems throughout the park.
- Upgrade air distribution systems.
  - Investigate the potential for additional replacement of the constant air systems depending on the results of the audit results.

## 4 Switch to more efficient electronics and devices

- Establish and implement a green procurement policy that sets minimum energy performance standards for all electronic equipment.
  - Conduct refresher courses for all employees involved in purchasing.
- Install Smart Strip power strips.
  - IT has purchased smart power strips for the park and an evaluation will be conducted to see if there is any additional need for more strips.
- Inventory and replace old energy wasting appliances (refrigerators, vending machines etc.) in shops, offices and employee housing with new more efficient "Energy-star" rated appliances.
- Install energy-efficient water heaters.
  - Evaluate converting hot water systems in employee's offices and housing to tankless systems or whichever system is more efficient.
- Install energy meters to measure energy use and monitor big consumers.
  - Evaluate the potential for installing watt meters.
- Additional actions.

- Provide incentive based award program to employees who live in housing. Look into awards for drying clothes on clothes lines and evaluating if possible to give awards to the smallest kWh usage per apartment. Work on developing ideas under this topic and look into winter apartment use and awards.

## 5 Improve building structures and envelopes

- Weatherize park buildings by adding R-values to improve insulation effectiveness.
  - Evaluate building envelopes on insulation, windows, doors, fire places to detect any additional improvements that can be made. Conduct this activity in a systematic manner and look at monthly electric bills and go after those problems.
  - Over the next five years evaluate additional insulation opportunities in all facilities.
- Replace/upgrade old windows with new windows.
  - Add window films on south facing windows.
  - Inventory single-pane windows for replacement with more energy-efficient double-pane windows.
- Window shading.
  - Analyze tree planting around housing to conserve energy.
- Identify areas to reduce lawn landscape areas
  - Plan to plant native plants is partially complete in duplex housing. Plan includes at reducing lawn area and moving towards xeric landscapes.

## 6 Utilize alternative energy sources

- Install photovoltaic panels on park buildings, parking lots, open areas, etc.
  - The new GMP calls for installing on-site electrical generation capacity (likely photovoltaic panels) to cover all the NPS electricity demands at Lava Beds, which would be around 250,000 kilowatt hours (kWh).

## 7 Measure energy use throughout the park

- Conduct an energy audit for all park buildings. Partner with local utilities to conduct the audit.
  - Continue to look for funding sources for an all building energy audit that will be completed in the next 2 to 5 years.
  - Contact Oregon Institute of Technology (OIT) in nearby Klamath Falls, OR and check the availability of students to conduct the audits.

## Transportation Management

*Emission Reduction Goal: Reduce park operations' transportation emissions to 35 percent below 2007 levels by 2016.*

Reducing vehicle miles traveled, improving vehicle efficiency, and using alternative fuels can significantly reduce Lava Beds National Monument's emissions. As the inventory results indicate, GHG emissions from transportation comprise 23 percent of park operations emissions and 70 percent of the park's overall emissions (including visitors). It is important to note that the vast majority of the Lava Beds vehicle fleet is leased from the General Services Administration (GSA). Therefore how effective we will be in reducing our emissions through actions such as having more efficient vehicle sizes and types will be contingent upon obtaining the cooperation from GSA. In addition to the park operations emissions reduction goal, Lava Beds National Monument set a goal to reduce visitor transportation emissions by 10 percent below 2007 levels by 2016. 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.

### Progress to Date

#### Behavioral Changes

- In 2006 the park started encouraging and providing support services for its employees to carpool to work, and to periodically work remotely (at home and in Klamath Falls and Tulelake offices).

#### Vehicle and Equipment Fuel Consumption

- The park uses a biodiesel blend for the fleet vehicles and equipment that run on diesel. Currently a B10 blend (10% biodiesel 90% #2) is used and the park is seeking to increase the percentage of biodiesel used, however the cold weather is presenting a challenge.

#### Vehicle and Equipment Replacement

- In 2008, replaced a SUV 4x4 with a more efficient patrol sedan in the Law Enforcement division.
- Lava Beds has taken initial steps to keep the vehicle fleet level to a minimum number of vehicles
- Superintendent does not have a dedicated vehicle but shares with other Divisions

#### Other Transportation Management Actions

- Implemented snow plowing SOP (plow only core roads and parking) to limit fuel consumption.
- Placed new aggregate on un-paved roads that will reduce fuel consumption of traffic on those roads (less likely to "washboard" and requires less frequent maintenance grading).

## Transportation Management – Planned Actions

### 1 Transportation-related behavioral change

- Investigate prohibiting or discouraging visitor vehicle idling.
  - Evaluate tourist bus idling and general visitors to look into strategies for educating the public the topic of idling vehicles.
- Encourage staff carpooling.
  - Lava Beds National Monument will promote the carpool strategy and assist when possible on developing this theme further.
- Reduce staff idling.
  - Investigate parking as many vehicles as possible inside garages so that no “warm up or defrost” idling is required
  - Messages provided in seasonal orientation and impart new information on the “10 second factor”. Also, update through quarterly messages and placards in vehicles.
- Encourage staff that lives in Park to bike or walk to work.
  - Improve convenience of the bike program by placing bikes in convenient locations. Place bike racks in front of main office areas.
- Encourage staff to carpool or use alternative modes of travel in the park.
  - Lava Beds National Monument will discuss and encourage the staff to use alternative forms of transportation while traveling within the park.
- Reduce meeting travel.
  - Improve upon using the Telnet and evaluate additional technology that is becoming available. Improve upon same time technology and implement this further into all office locations. Carpool as much as possible when attending remote meetings.
- Other transportation behavior-related actions.
  - Stay focused on combining work trips and personal trips. Have this theme placed into a quarterly message.
  - Evaluate weight in vehicles during winter and summer months. Send out quarterly message on removing excess weight each spring.
  - Work with GSA to obtain better selection of smaller and more efficient leased vehicles (especially pick-up trucks)

### 2 Reduce visitor vehicle fuel consumption

- Promote accessible front-country trails.



- Look to expand the trail system to encourage visitors to hike more trails while at the park. Currently in process with the new General Management Plan (GMP) and a subsequent Trail Plan.
- Other visitor vehicle-related actions.
  - Investigate establishing a carbon offset sticker program. Establish an account that will take these donations and will directly be spent on conservation of energy. Have stickers available for sale at the visitor center. Provide an educational tool with this program to tell the public about the footprint of visitor travel.

### 3 Reduce NPS vehicle and equipment fuel consumption

- Exceed federal fleet performance requirements set by Energy Policy Act (EPAct), Executive Order 13423, and the Energy Independence and Security Act (EISA). This will require the cooperation of GSA to meet and/or exceed the requirements.
- Promote efficient driving by park staff.
  - Add the topic of efficient driving (i.e., reducing speed, decrease fuel consumption, and behavioral patterns) in to the defensive driving class employees have to take.
- Analyze fleet fuel-consumption patterns for efficiency improvements.
  - Identify one employee per division to monitor vehicle fuel consumption.

### 4 Replace NPS vehicles and equipment

- Increase fleet fuel efficiency through replacement with new more efficient models.
  - When GSA leased vehicles come up for replacement, the Management Team will review each vehicle to insure that we select the most efficient vehicle type and model. Maintenance Chief will monitor the most efficient vehicles that may be available from GSA.
  - Replace 4-wheel drive with 2-wheel drive vehicles where appropriate.
  - When NPS owned vehicles are to be replaced (only large trucks and specialized heavy equipment), the most efficient types and models will be selected.
- Other NPS vehicle-related actions.
  - Superintendent of Lava Beds works with other Regional program managers in furthering the message to GSA on appropriate vehicle sizes to improved efficiencies.

### 5 Implement appropriate vehicle maintenance procedures

- Develop and maintain a maintenance schedule.
  - Need to formalize a tire pressure maintenance
- Use bio-based lubricants and greases.
  - Will evaluate purchasing for chainsaw bar oils.
- Operate all fleet vehicles using re-refined oil.

- Will work with GSA to implement for the park's leased vehicles.
- Utilize retreaded tires when appropriate.
  - Will work with GSA to implement using retreaded tires for the park's leased vehicles.
- Additional vehicle maintenance-related actions
  - During Fiscal Year 2011, make sure that every vehicle has the supplies needed to de-ice windows prior to starting vehicle to reduce the amount of idling.
  - Install changeable operational messages in each vehicle on improving efficiencies of operations.
- Identify one employee per division to monitor vehicle condition (i.e., tire-pressure, fluids, tire wear, change air filters every 3,000 miles, etc.).
- Consider funding a higher frequency of vehicle maintenance than GSA would fund.

## 6 Improve transportation infrastructure

- Promote accessible front-country trails.
  - Look to expand the trail system to encourage visitors to hike more trails while at the park. Currently in process with the new General Management Plan (GMP) and a subsequent Trail Plan.

## 7 Other transportation management actions

- Continue the quarterly message to staff on driving 45 mph within the park to conserve on fuel.

## Waste Management

*Emission Reduction Goal: Reduce park operations waste emissions to 10 percent below 2007 levels by 2016 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.

Lava Beds National Monument's park operation activities emitted 18 MTCO<sub>2</sub>E from waste management in 2007. Diverting or reducing the park's waste stream through increased recycling efforts and waste management 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.



## Progress to Date

### Behavioral Changes

- Lava Beds has implemented visitor education programs on recycling. Recycling in visitor areas is currently limited to aluminum cans and plastic bottles.
- In employee housing and work areas paper, cardboard, glass, plastic and aluminum are collected. Scrap metal is also collected from maintenance and building projects.

### Waste Prevention

- Lava Beds reuses as many used building materials as possible by sharing with other nearby federal and local agencies and by donating to Habitat for Humanity program in Klamath Falls.
- Reduce waste generated at meetings and employee functions.
  - Starting in 2010 notices for social functions will remind staff to bring their own plates, drinking cups and silverware.

### Waste Diversion (Recycling and Composting)

- Electronic devices (old computers, monitors, etc.), florescent bulbs, flashlight batteries, and motor oil are recycled at local County solid waste transfer station. Waste asphalt pavement is accepted and recycled at local asphalt plant. Used tires are returned to vendor.
- The auto shop uses re-refined oils and coolants in all of the fleet vehicles.
- Waste stream is measured and tracked to look for trend and ways to improve the recycling and waste programs at Lava Beds.
- In 2009, initiated a small scale test composting program in employee housing and office areas.
- Newly purchased garbage truck (arriving in early 2011) that will be smaller and more efficient (9 yd<sup>3</sup> down to 6 yd<sup>3</sup>)

### Green Procurement

- Incorporated environmental considerations in purchasing specifications for construction projects.
- The park purchases (and will continue) as much recycled content materials as possible such as office materials food and beverage supplies, and building materials.
- Uses post-consumer recycled paper in the parks brochure publications.
- The park uses no- or low-VOC paint for maintenance and construction projects.
- Established purchasing requirements for low/no-VOC insulation materials, carpets, paints, adhesives, etc.

- Established purchasing requirements for computers, fax machines, printers, scanners, and other office electronic equipment.
- Lava Beds National Monument has been in the process reducing use of pressure treated wood to minimum for projects.

#### Reduce Wastewater

- Have converted all public and employee work places, restrooms, and seasonal housing toilets to low-flow or dual flush models.

#### Other Waste Management Actions

- The park manages and tracks the waste that is sent to landfill to monitor reductions and success in diverting waste and recycling more.
- Cave Flash-Light program – converted to LED bulbs which greatly extends battery life and reduces use and recycling of batteries.

## Waste Management – Planned Actions

### 1 Decrease waste through behavior change

- Implement an improved visitor education program on the NPS recycling program. Conduct an assessment on improving our recycling image – are we using the correct messages? Look at auditing the whole program for efficiencies.
- Need to improve getting visitors to put recyclables into the proper container.

### 2 Establish new plans and policies that promote waste reduction

- Incorporate waste reduction into green office practices.
  - Need to investigate the potential for placing electric hand dryers into staff office areas with the goal to limit paper towel use.
- Start a comprehensive waste reduction and recycling outreach campaign aimed at park visitors.
  - Expand recycling program to all visitor use sites; evaluate feasibility of recycling additional materials (glass, paper, cardboard, flashlight batteries and propane bottles).
- Pack-it-in and pack-it-out.
  - Improve upon this topic by developing additional interpretive messages.
- Purchase products that minimize packaging.
  - The park will look into implementing requirements to purchase only products with minimal packaging and purchase packaging made of post-consumer recycled content.

- Begin to ask for Styrofoam replacement packaging for all purchasing.
- Promote the use of recycled content products and materials procurement within the NPS.
  - Continue to implement and promote the use of recycled materials.
- Reduce plastic water bottle use.
  - Educate the public and our employees that Lava Beds has very good water and plastic bottles should not be used. Place educational signs at water spigots/faucet, i.e., at picnic sites.

### 3 Implement recycling and composting practices

- Continually increase the amount of waste material at the park that can be recycled.
  - Evaluate existing recycling program to see if greater opportunities exist for diversion.
- Start a comprehensive recycling outreach campaign aimed at park visitors.
  - Implement an improved visitor education program on the NPS recycling program. Look at auditing the whole program for efficiencies.
- Compost yard and food waste.
  - Evaluate the current yard waste composting systems and look for improvements.
  - Evaluate implementing a food waste composting activity in the campground and look into additional storage containers in other locations, i.e., visitor center.
- Institute alkaline, lithium battery recycling locations in every office building.
  - Evaluate housing deposit location within Lava Beds for better diversion rates.
- Assign at least one full time person to act as a park recycling leader/manager.
  - Through training and quarterly messages, make sure all employees are educated and take home the message of the park trying to reduce its carbon footprint through recycling.
  - Maintenance will continue in the physical management of the program.
- Evaluate establishing a propane cylinder recycling program.
  - Look into recycling propane metal containers.

### 4 Reduce waste through green procurement

- Train staff on green procurement practices.
  - Re-visit training of park staff in green procurement practices.
- Inventory commonly used products and review for green substitutions.
  - Develop a list of preferred products that the park will purchase that meet green qualifications.

- Buy Forest Stewardship Council (FSC) certified wood.
  - The park will look into purchasing FSC-wood for the construction projects around the park.
- Use carpet with high recycled content for any building projects.
  - Implement a park-wide program that requires the purchase of carpets with high recycled content for all new construct projects.

## 5 Reduce and reuse wastewater

- Install low-flow faucets.
  - Inventory all fixtures to determine remaining fixtures needing conversion to the low flow models.
- Replace toilets with low-flow models.
  - Inventory all toilets to determine remaining toilets needing conversion to low flow models in staff housing.

## 6 Additional waste-related actions

- Improve waste collection and transportation efficiency.
  - In the process of improving the way the park collects and transports waste. Looking into a more efficient/ environmental way to conduct business.
- Install conservation shut-off valves on all showerheads within Lava Beds.
- Establish a five-year plan for landscaping conversion in housing.
- Implement a protocol to limit junk mail and junk catalogues that come to the park on a daily basis. Assign staff per division to take the lead on reducing this waste.
- Obtain SOP on waste and utensil use from Redwoods National Park.

## STRATEGY 2: INCREASE CLIMATE CHANGE EDUCATION AND OUTREACH

Climate change is a complex and easily misunderstood issue. Lava Beds National Monument can play an integral role in communicating about climate change to a vast audience. 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. Lava Beds National Monument 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 an end goal of any climate initiative. From increasing the efficiency of public transportation to developing a green purchasing program, the actions Lava Beds National Monument takes to address climate change serve as opportunities for increasing the public's awareness of climate change. Presented below are the actions that are currently under way and which comprise the park's progress to date, and those actions that the park will pursue.

### Progress to Date

#### Climate Change Education

- Incorporated sessions on climate change into various interpretations talks.

### Park Staff

#### Incorporate climate change into park staff training, events, and performance plans

Developing a climate change education program for park staff is vital 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, Lava Beds National Monument 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. Potential actions include:

- Create a Park Climate Change Policy Memo specific to Lava Beds National Monument.
  - Will create a memo establishing and promoting the park's position on climate change.
- Hold internal Climate Friendly Park discussions and workshops.
  - Conduct discussions and workshops at seasonal training and amongst peers at Lava Beds.
  - Send quarterly message from Superintendent to all staff.
- Keep staff members that are part of the Green Team/Environmental Management Team informed about climate-related issues.
  - Re-visit the EMS plan and update actions with current climate change actions and protocols.
- Incorporate climate change issues into the employee handbook.
  - Update the employee handbook with a section that covers climate change actions that the park is taking to reduce the carbon footprint.

- Include the science and impacts of climate change into park education tools.
  - Develop and remind seasonal interpreters to have the science behind climate change in all public programs.
- Incorporate sessions on climate change into new staff training.
  - Add accomplishments on energy conservation into evening programs (i.e., steps taken to recycle, etc.)
  - Lava Beds will begin to implement training through inviting manufacturer's representatives to talk about their products to take steps to become more efficient or look into better products.
- Develop a brown bag 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.
  - Initiate a green-brown lunch opportunity with all divisions and circle this activity amongst the divisions.
- Create visual reminders for park employees with climate change information and tips on how employees can help reduce emissions.
  - Provide reminders encouraging park staff to change habits and help lower the carbon footprint of the park and in their own lives.
- Create personal incentives for staff to reduce GHG emissions in park and at home.
  - Implement creative ways to reward climate friendly activities by park staff.
- Develop intranet pages to inform staff about climate friendly actions, webinars, and workshops.
  - Update web-pages to show successes in energy conservation.
  - The Maintenance Chief will send notices of webinars concerning the topic of climate change on the parks intranet page.
  - Include all climate change topics, including research and monitoring- ice levels.
- Develop and leverage relationships with other agencies and entities to create opportunities for workshops on climate friendly activities.
  - Contact local universities and schools to develop relationships that will lead to effective outreach, adaptation, and mitigation strategies.
- Disseminate information about climate friendly actions the park is taking at conferences, publications, meetings, and regional workshops.
  - Investigate the possibility of hosting events that encourage best practices of climate friendly activities for the local community and park staff.
  - As accomplishments are made contribute articles to the PWR Green Voice publication.

## Visitor Outreach

Understanding climate change and its consequences is essential to initiating individual behavioral change. Lava Beds National Monument 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, Lava Beds National Monument can play an important role in educating the public about climate change.

Lava Beds National Monument staff recognize the many different audiences that 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 tribes, 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:

- Educate visitors about climate change.
  - Use climate friendly logo throughout park to begin establishing the message about Lava Beds being involved in this effort.
  - Green junior ranger program will be looked into by contacting Lassen Volcanic National Park for information.
  - Contact Lewis and Clark National Historic Park on hosting a traveling exhibit and look into other resources available. Plan on hosting during the peak visitation months of July and August.
  - Evaluate opportunities to limit the sale of plastic bottles and look into moving from plastic to aluminum cans at the Visitor Center.
- Create and distribute previously produced information on climate change and its effects on national parks in general and on Lava Beds National Monument in particular.
  - Talk with the NHA about the opportunity to use previously produced information concerning climate change.
  - Look into cool possibility of making t-shirts and/or poster with climate friendly message.
- Create signs promoting the park’s efforts to curb emissions.
  - Establish exhibits and materials at the Visitor Center. Look into showing photo/images of photovoltaic and have interactive displays showing energy production.
  - Install table top placards on picnic tables talking about recycling and climate change actions the park is taking.
- Host distance learning events on climate change.
  - Search for the opportunity to host educational events of climate change.
- Incorporate/Create climate change information into existing park brochures.
  - Utilize brochures to highlight climate friendly actions and goals for Lava Beds.
  - Contact other parks to see what has been done to incorporate climate change issues into their interpretive talks.
- Incorporate climate friendly information into interpreter programs and talks.
  - Remind interpreters to update on message on an annual basis.
  - Provide a climate friendly tip per evening program.
  - Use the Superintendent messages as a lead message for the public.

- Educate visitors about their recycling options at the park and at home.
  - Evaluate what the park can do to improve upon concerning the education on recycling issues.
  - Expand upon placing messages into bathrooms in campground on the use of water and effects of water use with using dollars to pump water. Look into providing a diagram on from well to crescent butte to the campground and cost incurred.
- Communicate with local communities, park visitors, and local media about actions they can take to reduce GHG emissions.
  - Converse with local community to discuss saving money with GHG reduction actions.
- Develop and distribute Do Your Part! materials.
  - Use the Do You Part! website as a tool to reach visitor and impact their lives in a positive way.
- Develop a Do Your Part! kiosk in the visitor's center.
  - Look into developing information to disseminate concerning the Do You Part! website.
- Create demonstration projects and exhibits to convey park sustainability message to visitors.
  - Establish a Visitor Center demo on energy conservation, waste reduction, etc.

## Local Community Outreach

The gateway communities, agencies, vendors, and volunteers surrounding Lava Beds National Monument 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. Potential actions include:

- Work with the surrounding community to address climate change.
  - Work with OIT, College of the Siskiyous and KCC as potential working partners as potential energy audits operators.
- Host climate change education workshops.
  - Lava Beds will participate where possible in developing workshops dedicated to the topic of climate change. Will work with Modoc National Forest and other area governmental departments on this topic.
- Plan a community event for Earth Day.
  - Will look into basic Earth Day message for Lava Beds and establishing an improved Climate Friendly message during Earth Day.



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

By taking the actions established in strategies 1 and 2 above, Lava Beds National Monument 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, Lava Beds National Monument 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

Lava Beds National Monument has a unique opportunity to serve as a model for its visiting public.<sup>4</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, Lava Beds National Monument 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, Lava Beds National Monument 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 toward moving Lava Beds National Monument to the forefront of Climate Friendly Parks.

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<sup>4</sup> Lava Beds National Monument: Park Statistics. Available online at: <http://www.nature.nps.gov/stats/viewReport.cfm>