



National Park Service  
U.S. Department of the Interior



CLIMATE *Friendly* PARKS

# Bandelier National Monument Action Plan

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## BANDELIER NATIONAL MONUMENT BECOMES A CLIMATE FRIENDLY PARK

As a participant in the Climate Friendly Parks program, Bandelier National Monument belongs to a network of parks that are putting climate friendly behavior at the forefront of sustainability planning in national parks. By conducting an emission inventory, setting an emission reduction target, developing this Action Plan, and committing to educate park staff, visitors, and community members about climate change, Bandelier National Monument is serving as a model for climate friendly behavior within the park service.

Bandelier National Monument has committed to reducing greenhouse gas (GHG) emissions by 50% below 2007 levels by 2012 and set a goal of being carbon neutral by 2016. This Action Plan lays out the measures the park will take to meet this goal. In addition to implementing these measures, Bandelier National Monument will:

- Perform subsequent emission inventories to monitor progress
- Identify additional actions to reduce GHG emissions and inform the public on climate change
- Include additional actions, and strengthen existing actions, to reduce GHG emissions in future Action Plans

## THE CHALLENGE OF CLIMATE CHANGE

Climate change presents significant risks and challenges to the National Park Service. At Bandelier National Monument, increased temperatures and varying precipitation levels may alter the natural ecosystems present and change the habitats available for species.

Scientists cannot predict with certainty the general severity of climate change nor its impacts. However, the current warming trend suggests that the problem is real and should be taken seriously. 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.

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>1</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.

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<sup>1</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>>



## GOALS AND OBJECTIVES

The objective of this Action Plan is to identify actions that Bandelier National Monument can undertake to reduce GHG emissions and thus address climate change. This plan presents the park's emission reduction targets and associated reduction strategies designed to achieve the park's emission reduction goals.

While the plan does not provide detailed instructions on how to carry out each of the proposed measures, it provides the essential framework needed to meet Bandelier National Monument's emission reduction targets. The plan presents an opportunity for the park to devote resources for climate action through a mandate from the park's superintendent. This mandate gives park staff the resources and authority to pursue the mitigation strategies contained in this plan.

Bandelier National Monument aims to:

***Reduce GHG emissions from Bandelier National Monument operations to 50% below 2007 levels by the year 2012 by implementing emission mitigation actions identified by the park, and be carbon neutral by 2016.***

In order to meet or surpass this goal, the park will implement strategies proposed in this plan that build from the park's current and future emission inventories. Specifically, the plan recommends three main strategies:

**Strategy 1:** Reduce emissions from park facilities and operations by identifying and implementing emission mitigation actions.

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

**Strategy 3:** Evaluate progress and identify areas for improvement.

## GREENHOUSE GAS EMISSION INVENTORY AT BANDELIER NATIONAL MONUMENT

Naturally occurring greenhouse gases 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.

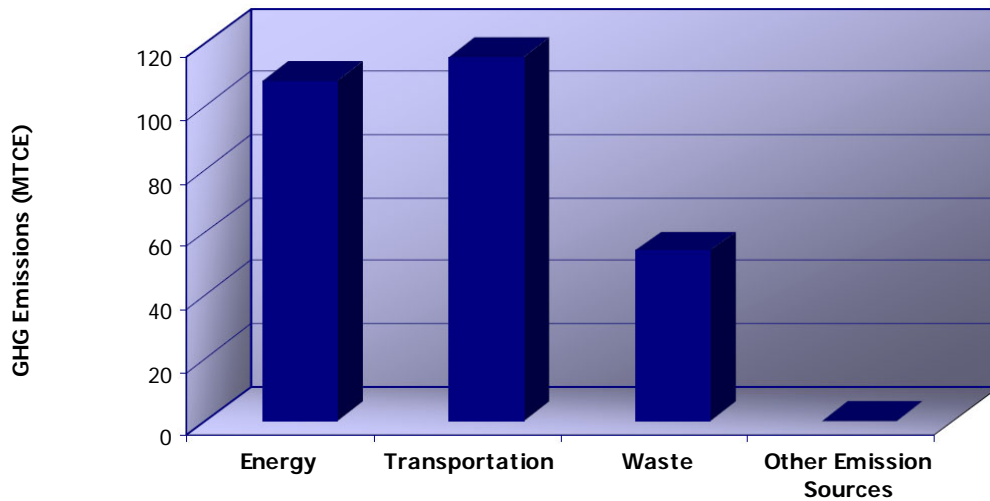
### Greenhouse Gas Emissions

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

In 2007, Bandelier National Monument's GHG emissions totaled 278 metric tons of carbon equivalent (MTCE). As Figure 1 and Table 1 demonstrate, the largest source of Bandelier National Monument's emissions is Transportation - totaling 116 MTCE.

## FIGURE 1

*Bandelier National Monument's 2007 Greenhouse Gas Emissions by Sector*



## TABLE 1

*Bandelier National Monument's 2007 Greenhouse Gas Emissions by Sector and Source*

	Emissions (MTCE)	% of Total
<b>Energy</b>	<b>108</b>	<b>38.9%</b>
Stationary Combustion	39	14.0%
Purchased Electricity	69	25.0%
<b>Transportation</b>	<b>116</b>	<b>41.6%</b>
Mobile Combustion	116	41.6%
<b>Waste</b>	<b>54</b>	<b>19.4%</b>
Solid Waste Disposal	54	19.3%
Wastewater Treatment	0	0.2%
<b>Other Emission Sources</b>	<b>0</b>	<b>0.0%</b>
Refrigeration	0	0.0%
<b>Total Emissions</b>	<b>278</b>	

# How Bandelier National Monument is Responding to Climate Change

*The following actions were developed during the CFP workshop hosted by Bandelier National Monument on May 13<sup>th</sup> and 14<sup>th</sup>, 2008 in order to meet the park's climate change mitigation goals.*

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

## Transportation Management

*Emission Reduction Goal: Reduce transportation emissions to 40% below 2007 levels by 2012.*

Reducing vehicle miles traveled, improving vehicle efficiency and using alternative fuels can significantly reduce Bandelier National Monument's emissions. As the inventory results indicate, 41.6 percent of the Park's GHG emissions are a result of mobile combustion. The following strategies were developed to meet the park's transportation emission reduction goal:

### 1 Reduce fuel consumption by NPS, concession, and visitor vehicles

- Reduce fleet vehicle fuel consumption by 50% of baseline (gasoline, 12,824 gallons; diesel, 4,335 gallons) by reducing vehicle travel, downsizing fleet, developing an employee carpooling program, and purchasing more fuel-efficient vehicles. Acquire at least one "smart car" or similar super high efficiency vehicle for employee use between work sites or for local business.
- Replace one custodian vehicle and one fee vehicle with state of the art non-emissive electric vehicle.
- Reduce visitor vehicle miles driven by developing a sticker program to offset miles driven within park (Feebate), and connect this program to Do Your Part!
- Develop a public transportation link to the Los Alamos County transit system for both visitors and employees. The shuttle system could partner with other services to bring visitors from Albuquerque and Santa Fe.
- Explore implementing an employee shuttle system from the Mesa Top.
- Develop central fueling capacity in park on the Mesa Top.
- Reduce air travel (evaluate alternatives such as teleconferencing).
- Work with delivery companies to drop deliveries at Mesa Top when efficient.
- Develop partnerships with National Renewable Energy Laboratory and other groups to showcase new technologies.
- Look into adapting fee structure to encourage high occupancy/fuel efficient vehicles (WASO Level). Reduce fees for county-based shuttle riders and include incentives for walkers. Limit entrance of personal vehicles during certain times of the year.
- Explore the possibility of reducing entrance fees for high occupancy vehicles and hybrids.

### 2 Other

- Encourage concessioner to look into alternative-fueled or electric vehicles.
- Encourage concessioner to recycle grease as a biofuel.
- Consider other alternative fuels when making purchasing decisions.
- Look into following the Pacific West Region's lead and offsetting travel with internal green tags.



- Explore NPS policy for employee plug-in of personal vehicles while at work.
- Replace vehicle fuel with cleaner-burning alternatives whenever possible.

## Energy Use Management

*Emission Reduction Goal: Reduce energy use emissions to 70% below 2007 levels by 2012.*

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. As the inventory results indicate, 38.9 percent of the Park's GHG emissions result from energy consumption. Consequently, Bandelier National Monument will take the following actions to reduce energy-related emissions. The following strategies were developed to meet the park's energy use emission reduction goal:

### 1 Install energy efficient light fixtures and light-controlling devices

- Install light tubes and timers (for night-time use) in campground bathrooms.
- Prepare a lighting inventory and swap out inefficient light bulbs with more energy efficient bulbs where possible.
- Unplug appliances, centralize switch controls, install timers and programmable thermostats (buy tools that encourage sustainability).
- Assess areas for motion sensors and photocells (office space, concessioner areas, visitor center areas, etc.). Install motion sensors in all applicable park building areas. Educate park staff about office lights and turning off porch lights during daytime.

### 2 Promote energy efficiency and energy conservation in NPS-owned facilities

- Have an energy and water audit conducted by National Renewable Energy Laboratory (NREL) or utility.
- Weatherize building envelopes park-wide. Achieve a 20% reduction in natural gas consumed for heating (estimated 970,000 ft<sup>3</sup>). Weatherizing occurs in concert with furnace replacements.
- Replace inefficient natural-gas fired heaters with more fuel efficient versions (assume 90% AFUE for replacement heaters).
- Evaluate the need for temperature-sensitive fans to increase energy efficiency of refrigeration equipment.
- Make sure all transformer devices are managed so that they are only plugged in when in use.
- Inventory and replace as needed hot water heaters with on-demand hot water heaters or solar hot water systems.
- Improve electrical and natural gas metering to make sure building-by-building data is available.
- Ensure that all computers are set to energy saving mode (auto shut off), and off at night.
- Only replace appliances, computers, etc. with energy star approved devices.
- Investigate solar water-based space heating systems.





### 3 Produce clean energy or purchase electricity from a renewable energy provider

- Conduct feasibility analysis for concentrated solar array at technical area 49 (LANL property) in conjunction with LANL and Sandia NL. Have conversations with NREL to conduct a feasibility study for this effort. Work to make sure that the electricity functions on a net metering basis.
- Consider purchasing green energy (come online when green energy is available).
- Purchase or produce renewable energy to meet remaining electricity needs following energy conservation measures.

### 4 Invest in carbon offsets

- Consider purchasing carbon offsets to reach the goal of being carbon neutral by 2016
- Incorporate provisions into concession contracts that requires that offsets account for the GHG not reduced through efficiency improvements or clean energy sources.
- Investigate opportunities for carbon “brokers” to apply funds to Bandelier National Monument to institute emission reduction measures with long-term goal of becoming carbon neutral.

## Waste Management

*Emission Reduction Goal: Reduce waste emissions to 40% below 2007 levels by 2012 through waste diversion and reduction.*

The connection between waste and GHG emissions may not be obvious. However, waste management—in the form of source reduction and solid waste reduction—can dramatically reduce GHG emissions. The less we consume in terms of products and packaging, the less energy is used and fewer GHGs are emitted. Additionally, reducing the amount of waste sent to landfills reduces CH<sub>4</sub> emissions caused by decomposition.

Diverting or reducing the park’s waste stream through increased recycling efforts and waste management procedures will reduce the amount of waste sent to landfills, which are the largest human-generated source of CH<sub>4</sub> emissions in the United States. Bandelier National Monument activities emitted 54 MTCE from waste management in 2007. The following strategies were developed to meet the park’s waste emission reduction goal:

### 1 Manage waste through source reduction, composting, recycling, and combustion

- Reduce glass consumption by 10%. Glass consumption is 30% of total 262 tons sent to landfill. Encourage reduce, reuse, recycle. Limit glass use in park by encouraging residents to reuse and visitors to carry out if they can recycle at home.
- Reduce non-recycled plastic waste by 50%. Encourage reduction of plastic packaging.
- Investigate feasibility of composting with partner(s) with a goal of composting 5% of baseline year waste amounts.
- Ensure maximum recycling of paper waste.
- Train entrance station staff to ask visitors if they need publications rather than assuming everyone needs them.
- Pair recycling bins with trash bins in all areas.



- Create park-wide messaging on reducing, reusing, recycling and use of environmentally-friendly products in creating these materials.
- Add recycle boxes in Visitor Center and at entrance station for publications.

## 2 Green Purchasing

- Implement green purchasing and consolidate purchasing. Purchase energy star computers, monitors, and appliances. Use highest recycled content paper.

# STRATEGY 2: INCREASE CLIMATE CHANGE EDUCATION AND OUTREACH

Climate change is a complex issue that the park can help communicate to the public. A better understanding of the problem and the benefits of reducing GHG emissions can motivate staff, visitors, and community members to incorporate climate friendly actions into their own lives. Bandelier 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 Bandelier National Monument takes to address climate change serve as opportunities for increasing the public's awareness of climate change.

## Park Staff

Developing a climate change education program for park staff is vital to increasing awareness about climate change among park visitors. By incorporating climate change education into staff-development programs and creating new opportunities for staff to learn about climate change, Bandelier National Monument will reduce park emissions and provide visitors with the tools and resources they need to reduce GHG emissions at home and in their own communities.

### **Incorporate climate change into park staff training and performance plans**

In an effort to provide Bandelier National Monument staff with the knowledge and tools to educate visitors, the park will:

- Institute park staff and concession staff trainings about climate change.
- Incorporate sustainability messaging at seasonal training and throughout year in squad notes.
- Develop a "Myth Busters" check list for all offices and reminders to turn things off with facts about sustainability to show benefits.
- Create a climate friendly pin to incentivize employees, visitors, etc., that participate in the "Do Your Part" program – to be worn on uniforms.
- Continue to offer Climate Change/sustainability training for Leadership Los Alamos.
- Communicate sustainability expectations in housing agreements for park residents.



## Visitors

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

### Incorporate climate change awareness into visitor education

Park interpretive staff have the opportunity to introduce the issue of climate change to many visitors. Bandelier National Monument encourages staff to include messages about climate change in their visitor talks. The park will:

- Organize a sustainability month with a special family event that features sustainability demonstrations & transit options from the county & free park entry to transit users (April or October).
- Prepare a demonstration project at the entrance station for visitors. Tie in to solar-positioning of pueblos. Demonstration project may use batteries to store electricity (may not function on a net metering basis).

### Develop park-specific interpretive materials for visitors

Educating visitors about the tangible effects of climate change is a powerful way to encourage visitors to reduce GHG emissions. The park will use existing climate change interpretive resources, and promote the development of climate change materials specific to impacts in Bandelier National Monument. The park will:

- Create a sustainability exhibit/interactive touch table (Do Your Part carbon calculator) with messages related to Bandelier and share science of climate change in Southwest (talk with Glacier about their approaches).
- Integrate climate change materials at all levels into the bookstore; encourage sale of recycled materials.
- Experiment with ways to encourage visitors to use recycling bins appropriately and assure that bins are consistently available in key area and clearly labeled. Incorporate climate-friendly message with the trash exhibit.
- Develop sustainability elements on park website and link to EPA resources and climate friendly park sites.
- Develop a climate change/sustainability element for the Webranger program with WASO.

### Highlight what the park is doing to address climate change

Bandelier National Monument has already taken many climate friendly actions. In an effort to lead by example and demonstrate climate friendly behavior for the public, the park will increase education and outreach efforts related to sharing the successes it has already achieved. The park will:

- Implement "branded" magnets on all sustainable actions.
- Create sustainability exhibit & activities for the annual PEEC (Pajarito Environmental Education Center) Earth Day event.
- Consider poster messaging on Atomic Transit w/photo of Bandelier thanking them for riding transit & helping the environment.

### Encourage visitors to reduce greenhouse gas emissions

Perhaps the greatest potential for Bandelier National Monument to help reduce GHGs is to increase visitors' awareness of how they can reduce their personal GHG emissions. The park will:

The Do Your Part! program provides easy actions people can take every month to reduce emissions in their everyday lives.



- Implement the “Do Your Part” program on the website for park visitors, employees, VIPs, partners, and area residents.

## Local Community

The communities that surround Bandelier National Monument play a significant role in supporting the parks GHG reduction goals. As such, when appropriate, Bandelier National Monument staff will assist local communities with incorporating climate change messages into community events and find partners to promote climate change education at those events. Park staff will use their knowledge of climate change resources to help local communities engage in climate friendly actions.

### Encourage climate change awareness in the community and region

Bandelier National Monument realizes that climate change does not adhere to geographic or political boundaries. The park will:

- Look at diversifying the venues for communicating sustainability messages to surrounding communities (county line emails, LA monitor articles, KRSN interviews, mailings in utility bills).
- Kick off the sustainability efforts with a special summer edition of the Tuff Times newspaper distributed to visitors & LA County residents & posted on the park website.
- Partner with the YMCA iCARE program for sustainability projects & climate change education/monitoring (butterflies).
- Coordinate the climate change/sustainability elements with the HS Environmental Science program (use EPA materials; butterfly monitoring data & monitoring w/PEEC).
- Identify sustainability projects for youth groups & VIPs.
- Partner with other sustainability entities to offer a Climate Change/Sustainability lecture series at UNMLA (have Los Alamos Monitor (newspaper) staff attend).
- Develop a web element for Bandelier climate change examples to be used with EPA educational resources in schools.
- Work with the regional office to develop webcast for Southwest climate change.

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

By taking the actions established in strategies 1 and 2 above, Bandelier National Monument plans to reduce it's emissions to the specified goal. Achieving this goal will require an ongoing commitment by the park, which may include subsequent emission inventories, additional mitigation actions, and reevaluation of goals.

- Perform subsequent emission inventories to evaluate progress toward goals stated in this action plan.
- Develop additional emission mitigation actions beyond those listed in this plan.
- Form a committee to meet periodically to review progress on this plan.



## CONCLUSION

Bandelier National Monument has a unique opportunity to serve as a model for 200,000 – 300,000 visitors annually. This report summarizes the operational actions the park commits to undertake to affect 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, Bandelier National Monument will help mitigate climate change far beyond the park's boundaries.

This Action Plan also serves as an important enhancement mechanism for the Park's Environmental Management System (EMS). Realistic environmental commitments created by Bandelier National Monument staff and approved by the park's superintendent will significantly reduce the park's GHG emissions in the coming years. The mitigation actions included in this plan have been developed in order to be directly transferable to the park's EMS. Bandelier National Monument's Action Plan thus provides an effective way to meet EMS goals.

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, Bandelier 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 towards moving Bandelier National Monument to the forefront of Climate Friendly Parks.

