National Park Service
U.S. Department of the Interior

CLIMATE*Friendly* PARKS

Catoctin Mountain Park
Climate Action Plan
March 2013

Introduction

Catoctin Mountain Park

Catoctin Mountain Park (the park) covers over 5,000 acres and contains hardwood forests, mountain streams, and beautiful vistas. The park provides a natural sanctuary for residents of nearby Baltimore, Maryland and Washington D.C. The park's proximity to these population centers makes it a popular destination for camping, picnicking, wildlife viewing, fly-fishing, and cross country skiing. The park also offers 25 miles of trails ranging from easy to strenuous, many leading to outstanding scenic vistas.

The park has a rich cultural history. Native Americans quarried the site for metarhyolite to make stone tools. Remnants of charcoal and iron industry, farms, and sawmills can still be found in the area, and historic structures and products remain from the depression era Works Progress Administration and the Civilian Conservation Corps. Catoctin Mountain Park was also the site of the first Job Corps Center. These are tangible reminders of the park's natural resources and contribution to strengthening the nation's economic and social fabric through youth work programs and industry.

Catoctin Mountain Park Climate Action Commitment

As the steward of the nation's most valued public lands, the National Park Service (NPS) has an obligation and an opportunity to be a leader in protecting the environment. As a participant in the Climate Friendly Parks (CFP) program, Catoctin Mountain Park belongs to a network of parks that are at the forefront of sustainability planning in national parks. By developing a greenhouse gas (GHG) inventory, setting an emissions reduction target, developing this climate action plan, and committing to educate park staff and the public about climate change and mitigation efforts, the park is leading by example. In doing so, the park commits to reducing GHG emissions from park operations by 19 percent below 2011 levels by 2021 through the following actions:

1. Pursue strategic replacement of incandescent light bulbs throughout the park.
2. Install motion sensors for light fixtures throughout the park in appropriate rooms and buildings.
3. Commission energy audits for park facilities and include special consideration of historic structures.
4. Prioritize facility improvements that will reduce park energy use.
5. Analyze information technology (IT) equipment needs for energy saving opportunities.
6. Develop renewable energy sources.
7. Upgrade park fleet, mowers, and infrastructure to reduce emissions from mobile combustion.
8. Create a culture for staff to reduce GHG emissions from driving.
9. Implement a waste reduction campaign for the cabin camps.
10. Develop strategies for greener meetings (e.g. webinars and teleconferences).

11. Reduce paper waste from park operations.
12. Educate park staff on ways to reduce GHG emissions during the workday.
13. Educate visitors about climate change risks and impacts and the actions that they can take to help reduce GHG emissions at Catoctin Mountain Park.

The Catoctin Mountain Park climate action plan serves to support and enhance existing initiatives, such as the park's Resource Stewardship Strategy, environmental management system (EMS) and the National Capital Region (NCR) EMS. The park's EMS is a comprehensive management system that addresses all environmental programs at the park and provides the context for actions that reduce park emissions. The NCR EMS addresses the energy- and climate-related goals for all parks in the region and aligns with Executive Order (EO) 13423: Strengthening Federal Environmental, Energy, and Transportation Management, and EO 13514: Federal Leadership in Environmental, Energy, and Economic Performance. The goals in this climate action plan will be incorporated into the park's EMS. Additionally, the climate action plan supports the park's long term planning efforts. It should be noted that the purpose of this climate action plan is to reduce park GHG emissions and is not intended to address park adaptation to climate change impacts.

THE CHALLENGE OF CLIMATE CHANGE

The atmosphere has a natural supply of gases that trap heat and keep the temperature of the Earth warm enough for life to survive. Such gases are known as greenhouse gases or GHGs. However, the release of certain GHGs—including carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O)—has disturbed this balance. These gases, resulting from the burning of fossil fuels (e.g. industrial manufacturing, energy production, and vehicles), can stay in the atmosphere for at least 50 years but often remain over many centuries, are accumulating in the atmosphere faster than natural processes are able to remove them. The increase in GHGs is causing an overall warming of the planet, commonly referred to as global warming. The term climate change describes the variable consequences of global warming over time.

According to the Intergovernmental Panel on Climate Change, the leading international scientific organization for the assessment of climate change, "continued GHG emissions at or above current rates would cause further warming and induce many changes in the global climate system during the 21st century that would very likely be larger than those observed during the 20th century."[1] Rising global temperatures will further raise sea level and affect all aspects of the water cycle, including snow cover, mountain glaciers, timing of spring runoff, water temperature, ocean currents and upwelling, salinity levels of inland coastal waters, and aquatic life. Climate change is also expected to affect human health, alter crop production, modify animal habitats, and change many other features of our natural and managed environments.

[1] Intergovernmental Panel on Climate Change, Climate Change: 2007: Synthesis Report, page 45, www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4_syr.pdf.

Catoctin Mountain Park and Climate Change

Climate change presents significant risks and challenges to the NPS. In the area around Catoctin Mountain Park, climate scenarios suggest an increase in the frequency of extreme temperature and precipitation events.[2] Changes in precipitation and temperature will affect the ecological, cultural, and recreational features the park currently provides. The following potential climate change impacts were considered while the park staff brainstormed actions to reduce greenhouse gas emissions:

- Changes in growing seasons, which will affect vegetation.
- Increased opportunity for invasive species establishment.
- Unpredictable management needs for Catoctin Mountain Park natural resources.
- Changes in visitation due to changes in seasonal patterns.

By measuring and reducing GHG emissions from park-related activities, Catoctin Mountain Park intends to minimize its contribution to climate change and the resulting detrimental impacts.

Inventory Process

Catoctin Mountain Park completed the GHG emissions inventory by gathering data from appropriate park staff about park operations, and entering the data into the Climate Leadership in Parks (CLIP) tool. The CLIP tool was initially developed by the NPS CFP program in association with the U.S. Environmental Protection Agency to account for GHG emissions specific to national parks. The tool is designed to:

- Convert energy and resource use data into metric tons of carbon dioxide (CO_2) equivalent ($MTCO_2e$), which is a single unit that standardizes carbon dioxide (CO_2), nitrous oxide (N_2O), and methane (CH_4).
- Educate park employees about the sources of GHGs, and the emissions inventory process through data gathering.
- Assist with identifying strategies for each park to reduce emissions.
- Enable park personnel to track current and future progress toward emissions reduction goals.

Park activities such as fuel and electricity use, refrigeration, and sending solid waste to the landfill for treatment all produce different types of GHGs. Since not all GHGs affect climate change to the same degree, it is necessary to convert each GHG to a common unit in order to compare them in the park inventory. The CLIP tool automatically converts the park's data into $MTCO_2e$. The conversion to $MTCO_2e$ is based on the potential of a specific GHG to contribute to the greenhouse effect, or its global warming potential (GWP), relative to the potential of CO_2, which is given the GWP of 1. The GWP of CH_4 is 21, meaning that an equivalent amount of CH_4 has 21 times the potential of CO_2 to cause global warming. The output of the CLIP tool is the park's emissions profile, which was used to prioritize GHG emission reduction strategies.

[2] Gonzalez, Patrick. "Climate Change Trends for Resource Planning at Catoctin Mountain Park." National Park Service, June 25, 2012.

Catoctin Mountain Park staff gathered annual usage data (e.g., gallons of fuel used in a year) related to park operations and visitor travel within park boundaries for fiscal years (FY) 2010 and FY 2011. The park assigned FY 2011 as the baseline GHG inventory year. Employee commuting data was collected and included in both inventories.

Data categories include stationary combustion, mobile combustion (e.g. the park's vehicle fleet, and mowers), purchased electricity, solid waste, refrigeration, and wastewater. These categories can be divided into direct and indirect GHG emissions. Scope 1 emissions are direct emissions from sources owned and operated by the park. This includes emissions produced when fuel is burned within park boundaries (e.g. wood), or fueling a park vehicle, as well as "fugitive" emissions released from refrigeration use. Scope 2 emissions are indirect GHG emissions from park consumption of purchased electricity. Scope 3 emissions are all other indirect emissions, such as emissions from visitor vehicles, employee commuting, offsite wastewater treatment, and offsite waste disposal. Solid waste disposal creates emissions when organic matter decomposes in the landfill. Because the waste in landfills has little exposure to oxygen, the organic matter decomposes anaerobically, releasing methane in the process.

Park Emissions Profile

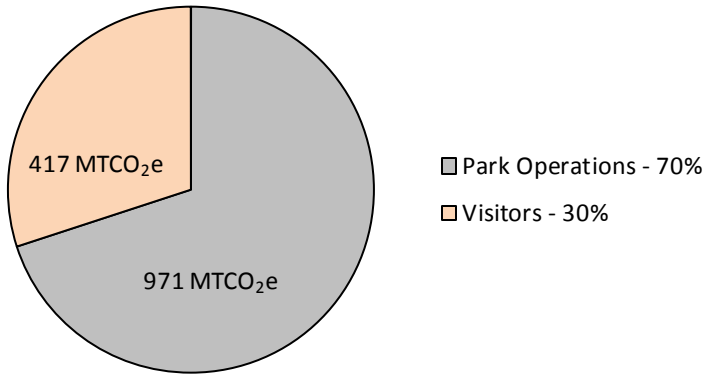
The Catoctin Mountain Park GHG inventories for FY 2010 and FY 2011 include emissions from park operations and visitors. There are no concessions operations at the park. Sources for park operations for Catoctin include: purchased electricity, mobile combustion (park-owned or park-leased vehicles and equipment), wastewater treatment, solid waste disposal, refrigerant use and employee commuting. The park does not use fertilizer. Visitor emissions are estimated based on annual visitation numbers for visitor vehicle transportation, and for burning wood and propane by campers on park property. A summary of each inventory is detailed below.

Catoctin Mountain Park GHG Inventory – FY 2010

Total GHG emissions from park operations and visitors for FY 2010 amounted to 1,388 $MTCO_2e$. For comparison, a typical single family home in the U.S. produces 12 $MTCO_2e$ per year.[3] Thus, the combined emissions from park operations and visitor activities within the park were roughly equivalent to the emissions from the energy use of 116 households. Park operation emissions contributed the greatest percentage of the total emissions from Catoctin Mountain Park, approximately 971 $MTCO_2e$ (71 percent of total emissions). Visitor emissions produced 417 $MTCO_2e$ (30 percent of total emissions), primarily from vehicle use. Stationary Combustion (wood and propane) produced 3 $MTCO_2e$, with the majority of visitor emissions coming from mobile combustion or visitor vehicle use. See Figure 1 showing the total park GHG emissions profile for FY 2010.

[3] U.S. Environmental Protection Agency. "Greenhouse Gases Equivalencies Calculators." Clean Energy Resources. EPA, 2011. Web. http://www.epa.gov/cleanenergy/energy-resources/calculator.html.

FIGURE 1: FY 2010 CATOCTIN MOUNTAIN PARK TOTAL GHG EMISSIONS – 1,388 $MTCO_2E$



In order to target emissions reduction efforts, the park assessed park operations emissions by source. At 741 $MTCO_2e$ (76 percent of total park operations emissions), purchased electricity is by far the largest contributor of GHG emissions from park operations. Mobile combustion contributed 92 $MTCO_2e$ (9 percent) to the total park operations emissions, making it the second largest contributor. Waste disposal contributed 64 $MTCO_2e$ (7 percent), refrigeration (e.g., refrigerators, freezers, and air conditioning) contributed 20 $MTCO_2e$ (2 percent), and wastewater treatment contributed 15 $MTCO_2e$ (less than 2 percent). Park employee commuting contributed 39 $MTCO_2e$ (4 percent) to the parks GHG emissions for 2010. See Figure 2 for a breakdown of all sources and Figure 3 for total percent contribution by source for FY 2010.

FIGURE 2: FY 2010 CATOCTIN MOUNTAIN PARK OPERATIONS GHG EMISSIONS BY SOURCE – 971 $MTCO_2E$

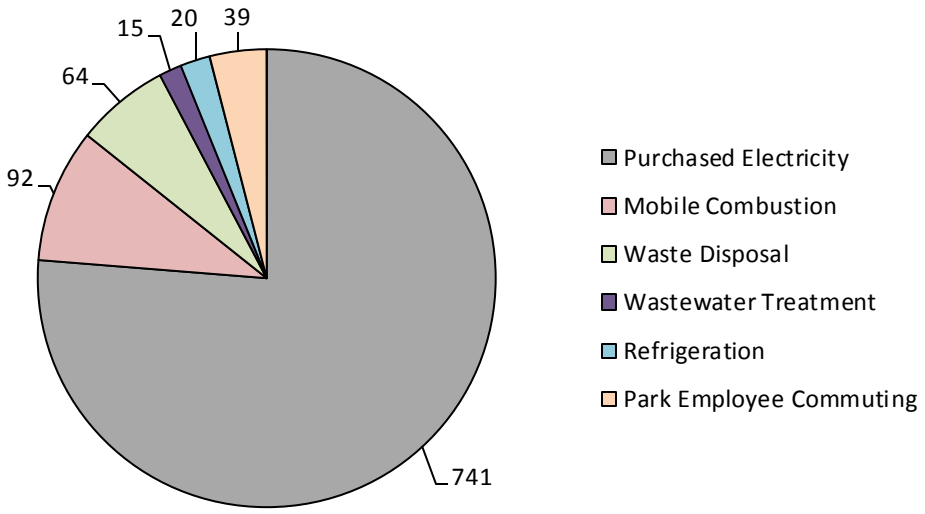
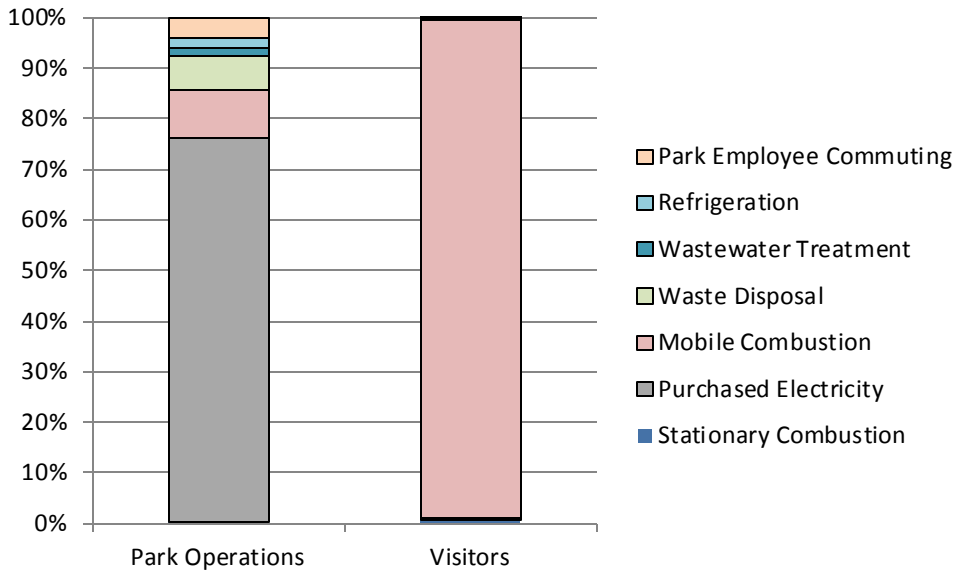


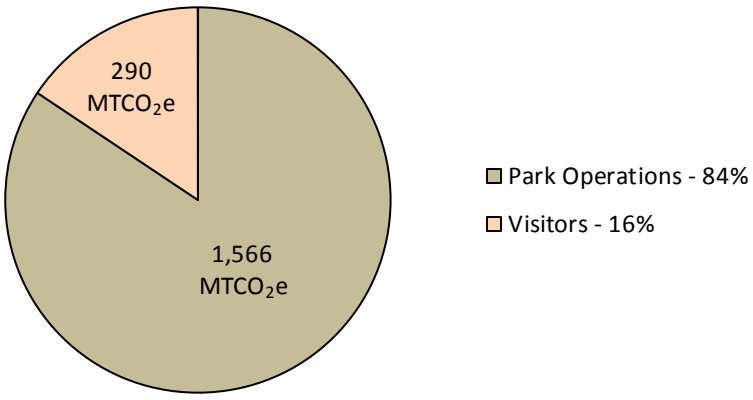
FIGURE 3: FY 2010 CATOCTIN MOUNTAIN PARK GHG EMISSIONS BY SOURCE – PERCENT CONTRIBUTION



CATOCTIN MOUNTAIN PARK GHG INVENTORY – FY 2011

The total GHG emissions from park operations, employee commuting, and visitors for FY 2011 is estimated at 1,856 $MTCO_2e$. Park operations contributed approximately 1,566 $MTCO_2e$ (84 percent) to the total FY 2011 GHG emissions. Visitor emissions produced 290 $MTCO_2e$ (16 percent) to total emissions. Figure 4 shows the total park GHG emissions profile in $MTCO_2e$ for FY 2011.

FIGURE 4: FY 2011 CATOCTIN MOUNTAIN PARK TOTAL GHG EMISSIONS – 1,856 $MTCO_2E$



The park will set emissions reduction efforts from the baseline year of FY 2011. Purchased electricity was the largest contributor of GHG emissions from park operations in FY 2011 and contributed 1,323 $MTCO_2e$ (85 percent) to total emissions from park operations. Mobile combustion was the second largest contributor to emissions from park operations; this sector contributed 99 $MTCO_2e$ (6 percent) to the total park emissions. Waste disposal produced 69 $MTCO_2e$ (4 percent) of park operations emissions. Park employee commuting was the fourth largest contributor 39 $MTCO_2e$ (2 percent) to the parks GHG emissions for 2011. The park produced 20 $MTCO_2e$ (1 percent) from refrigeration and 15 $MTCO_2e$ (less than 1 percent) from wastewater treatment. Figure 5 shows the breakdown of emissions from park operations, and Figure 6 shows the total percent contribution by source for FY 2011.

FIGURE 5: FY 2011 CATOCTIN MOUNTAIN PARK OPERATIONS GHG EMISSIONS BY SOURCE – 1,566 $MTCO_2E$

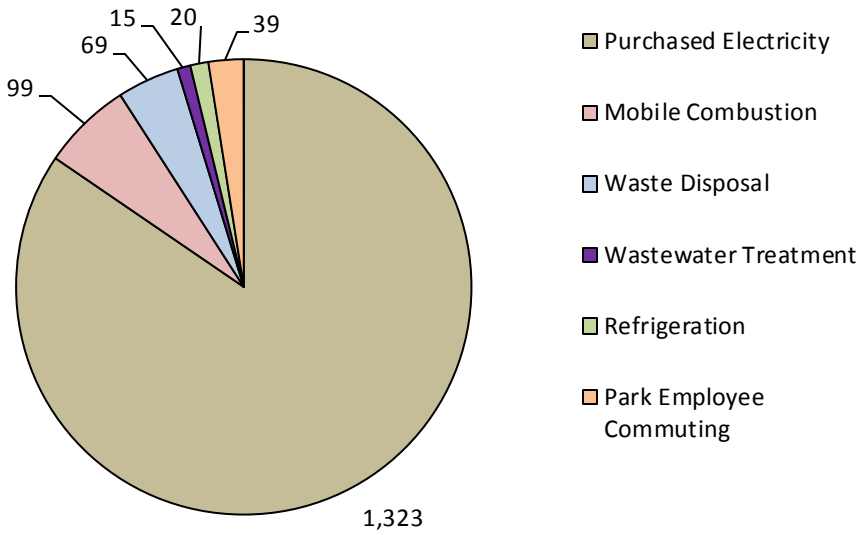
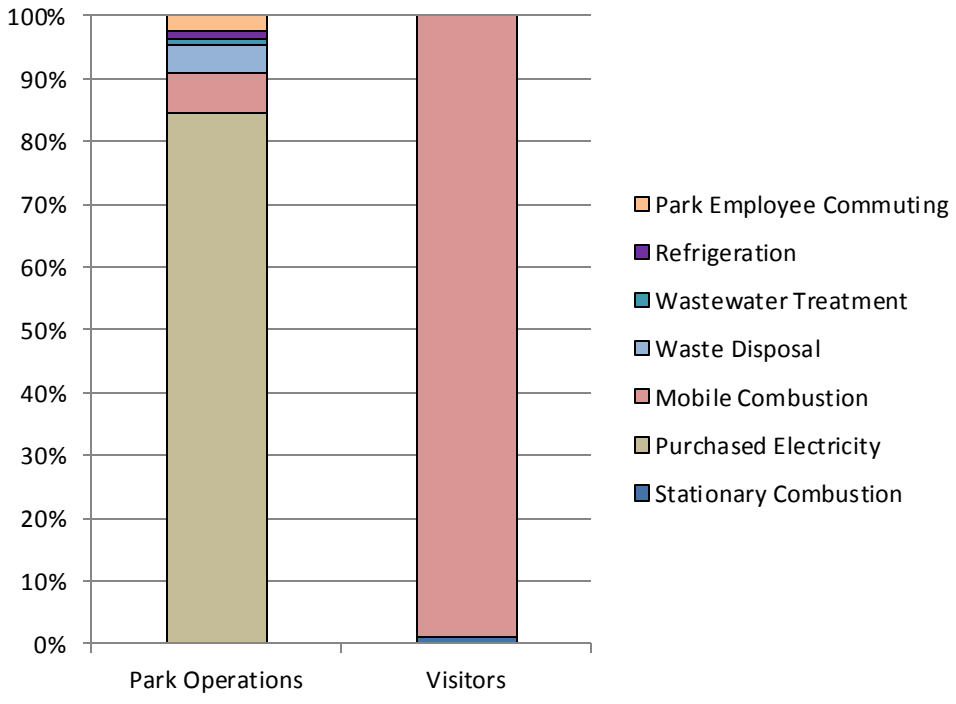


FIGURE 6: FY 2011 CATOCTIN MOUNTAIN PARK GHG EMISSIONS BY SOURCE – PERCENT CONTRIBUTION



Overall, the FY 2011 GHG emissions increased by 465 $MTCO_2e$ from FY 2010—a 33 percent increase. The most significant increase between FY 2010 and FY 2011 was due to emissions from purchased electricity, which increased by 582 $MTCO_2e$. This difference is a result of a change in the park's energy provider, and not a result in increased energy consumption. Total kWh use for 2010 was 1,353,720 kWh and in 2011, total use was 1,281,840 kWh. The increase in Catoctin Mountain Park's emissions is a factor of the energy portfolio of the new energy provider. An energy provider's fuel selection influences the amount of GHG emissions produced. For example, coal as an energy source produces more emissions versus natural gas as an energy source. The CLIP tool calculates the emissions from purchased electricity based on park consumption, and information about the specific energy sources (e.g. coal, natural gas, nuclear) used by the utility. It is likely that the new energy provider uses a greater percentage of coal to power the electricity grid than the previous provider. See Figures 7- 9 below for a comparison between FY 2010 and FY 2011.

FIGURE 7: CATOCTIN MOUNTAIN PARK GHG EMISSIONS 2010 AND 2011 ($MTCO_2E$)

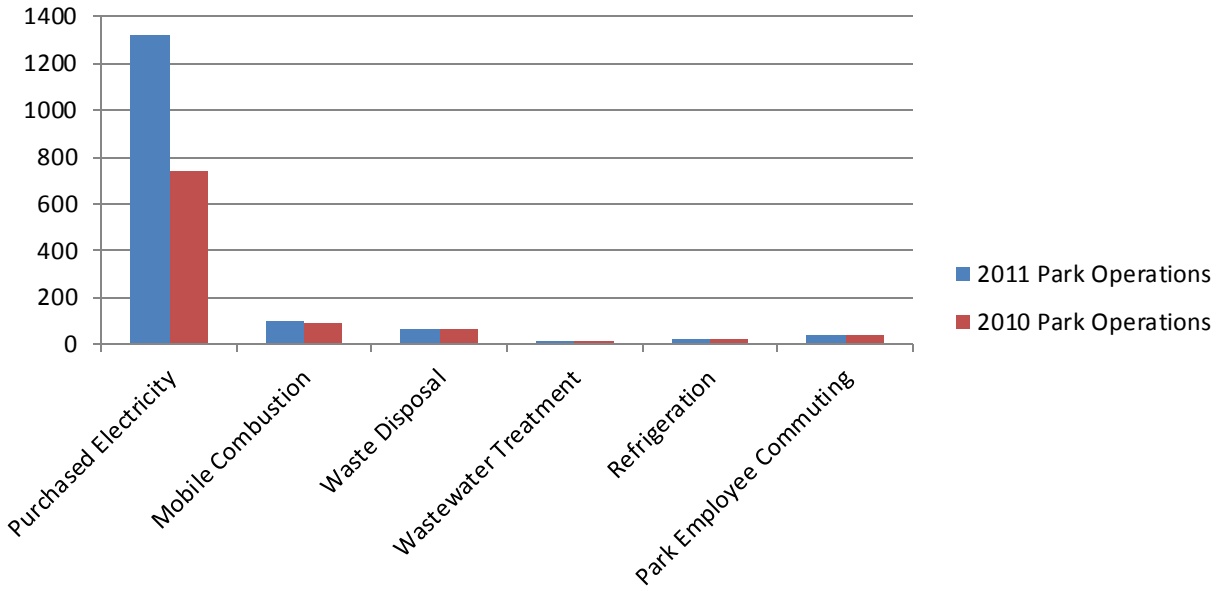


FIGURE 8: CATOCTIN MOUNTAIN PARK EMISSIONS FROM PURCHASED ELECTRICITY ($MTCO_2E$)

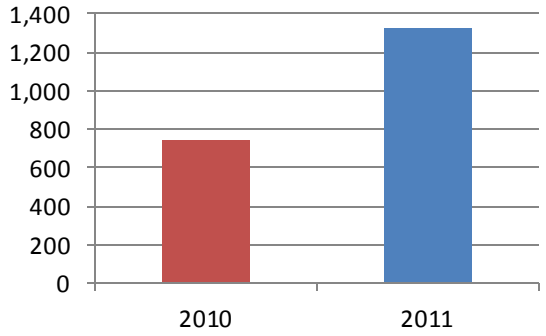
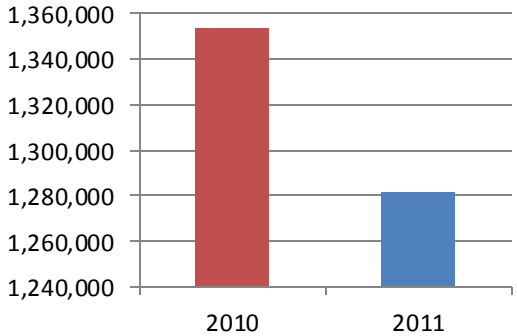


FIGURE 9: CATOCTIN MOUNTAIN PARK PURCHASED ELECTRICITY (KWH)



Strategies for Reducing Emissions

Catoctin Mountain Park developed GHG reduction strategies and actions during the park's CFP workshop held on October 10 and 11, 2012, at Camp Greentop at Catoctin Mountain Park. These strategies focus on reducing energy consumption, reducing transportation emissions, addressing water and source reduction, and increasing climate change education efforts. Park staff identified a number of strategies to reduce emissions based on emission reduction potential, cost-effectiveness, feasibility, co-benefits, local impact, and feasibility.

Strategy 1: Reduce GHG Emissions from Park Energy Use by 20 percent below FY 2011 levels by 2021

The largest contributor of GHGs from park operations is purchased electricity, which produced 1,323 $MTCO_2e$ in FY 2011. Because of this, Catoctin Mountain Park will focus on actions to reduce energy consumption as a top priority. In addition to reducing overall GHG emissions, reducing energy consumption will provide the park with reduced costs and overall operational savings.

PROGRESS AS OF OCTOBER 2012:

- Installed occupancy sensor lights in some offices, purchased occupancy sensor lights to be installed in other buildings.
- Installed programmable thermostats.
- Installed some on-demand tankless water heaters.

CATOCTIN MOUNTAIN PARK COMMITS TO THE FOLLOWING ACTIONS IN ORDER TO REDUCE PARK ENERGY USE:

1. Pursue strategic replacement of incandescent light bulbs throughout the park.
    - Replace lights throughout cabin camps with light-emitting diode (LED) lights.
    - Install compact fluorescent lights, known as CFLs, and replace light fixtures to safely enclose them.
    - Consider installing LED exit lights.
2. Install motion sensors for light fixtures throughout the park in appropriate rooms and buildings and on exterior lighting.
3. Commission energy audits for park facilities and include special consideration of historic structures.
4. Prioritize facility improvements that will reduce park energy use.
    - Implement weatherizing starting with the facilities with the highest energy use
        - o Seal cracks, gaps, and holes
        - o Seal air ducts
        - o Install storm doors and windows
    - Update laundry machines at Camp Greentop and Round Meadow.
    - Prioritize appliances to upgrade.
    - Upgrade window air conditioning units to heat pumps with programmable thermostats.

- Upgrade refrigerators for reduced size and greater energy efficiency.
- Power off freezers when not in use.
- Consider geothermal heating and cooling when developing new construction.
- Conduct heating, ventilation, and air conditioning audits in buildings to understand opportunities to re-zone thermostats.
- Conduct lighting audits by room to optimize lighting of buildings and rooms.
- Install more programmable thermostats and increase the efficiency of HV/AC units.
- Turn heat down in buildings when not in use, for example over weekends and in the evenings.

5. Analyze IT equipment needs.
    - Review Department of the Interior policy to leave computers on at night.
    - Turn off monitors, printers, faxes, and other office equipment when not in use.
    - Provide power strips in offices so that devices can be shut down when people leave.
6. Explore possibility of switching energy providers.
    - Talk to the region about opportunities for contract consolidation of electricity.
    - Consider environmental implications of any changes in electricity provider.
7. Develop renewable energy sources.
    - Research the potential for solar panels at non-historic buildings, such as the gym.

STRATEGY 2: REDUCE GHG EMISSIONS FROM TRANSPORTATION BY 29 PERCENT BELOW 2011 LEVELS BY 2021

The second largest contributor of GHGs from park operations is transportation, or mobile combustion, which produced 99 $MTCO_2e$ in FY 2011. Therefore, taking actions to reduce transportation-related emissions is critical for reducing the park's GHG emissions. This includes fuel use in vehicles and small equipment.

PROGRESS AS OF OCTOBER 2012:

- Replaced two fleet vehicles with Hybrid vehicles.
- Submitted a Clean Cities Proposal to fund the replacement of 4 gasoline vehicles with 4 hybrid/electric vehicles and the replacement of 3 gasoline mowers with 4 propane mowers.

CATOCTIN MOUNTAIN PARK COMMITS TO THE FOLLOWING ACTIONS TO REDUCE PARK EMISSIONS FROM TRANSPORTATION:

1. Upgrade park fleet and infrastructure to reduce emissions from mobile combustion.
    - Study fleet use at a macro-level to identify opportunities to right-size the fleet and determine the most efficient vehicles that will meet the park's needs.
    - Use small trailers to haul equipment to reduce vehicle size requirements and to reduce back-and-forth driving to project sites.
    - Consider restructuring offices and maintenance storage areas to reduce vehicle miles travelled over the mountain.
        - Distribute equipment and supplies between two maintenance shops on either side of the park or consider consolidating facilities.

- Analyze existing types and uses of fuel and equipment and research alternatives.
- Reduce vehicle idling.

2. Support visitor use of non-vehicle transportation around the park.
    - Create a brochure or podcast to help direct people to alternative ways of enjoying the scenery of the park outside of their cars.
    - Study the feasibility of adding a bus route to transport people to and through the park during peak seasons; consider partnerships with the town of Thurmont or the state park.
3. Support a culture for staff to reduce GHG emissions from driving.
    - Use education programs to encourage "eco-driving" habits among staff and to reduce fuel use.
    - Increase opportunities for telecommuting when on site work is not necessary.
    - Encourage carpooling to meetings or teleconferencing and webinars when appropriate to help reduce vehicle miles travelled.

STRATEGY 3: REDUCE GHG EMISSIONS FROM WASTE BY 11 PERCENT BELOW 2011 LEVELS BY 2021

The disposal of solid waste and wastewater treatment produced a total of 84 (69 and 15, respectively) $MTCO_2e$ in FY 2011. Although this is a relatively small contributor to the overall emissions, there are opportunities to significantly reduce GHG emissions associated with this activity. In addition, reducing solid waste can save on disposal fees and staff time. The high volume of visitors and their associated trash, for example, is both a challenge and an opportunity for waste reduction.

PROGRESS AS OF OCTOBER 2012:

- Encouraged the use of reusable water bottles.
- Expanded recycling program within the park.
- Expanded the types of materials that can be recycled at the park, including batteries, metal, and construction materials.
- Installed composting unit at Camp Greentop.
- Replaced old cleaning chemicals with greener cleaning products.
- Updated solid waste contract to include additional recycling services.

CATOCTIN MOUNTAIN PARK COMMITS TO THE FOLLOWING ACTIONS TO REDUCE PARK EMISSIONS FROM SOLID WASTE DISPOSAL:

1. Implement a waste reduction campaign for the cabins, dorms, and campgrounds.
    - Continue to encourage reusable water bottle use.
    - Provide information about products that can be recycled and resources for recycling.
    - Create signs to be placed in cabins and dorms to encourage recycling.
    - Provide a recycling container at the Poplar Grove Campground.
    - Initiate composting program at Round Meadow and Misty Mount dining halls.
2. Implement strategies for greener meetings.

- Encourage staff to bring their own cup to meetings.
- Have non-disposable mugs available for meeting spaces.
- Hold meetings as teleconference and webinar when appropriate.

3. Reduce paper waste.
    - Set printing default on computers to "duplex printing".
    - Identify park policies that require paper copies and consider opportunities for reducing paper use by transferring to electronic-only systems.
4. Reduce water use.
    - Use low-flow shower and faucet heads, install water-efficient washers, toilets, etc.
    - Repair underground utilities to reduce leaking pipes

STRATEGY 4: INCREASE CLIMATE CHANGE EDUCATION AND OUTREACH

Over 250,000 people visited Catoctin Mountain Park in FY 2011. The park can contribute to greater overall GHG emissions reductions by educating its visitors on actions they can take to reduce emissions. There are also opportunities to educate park staff and members of the surrounding community.

PROGRESS AS OF OCTOBER 2012:

- Installed rain barrels at Round Meadow to demonstrate wastewater saving opportunities.
- Installed a rain garden in Round Meadow with an educational interpretive wayside.
- Worked with the League for People with Disabilities to promote composting and recycling.
- Encouraged park staff participation in the Climate Friendly Park Workshop, where several presenters discussed ways staff can save energy.
- Presented achievements to Frederick County Sustainability Commission.

CATOCTIN MOUNTAIN PARK COMMITS TO THE FOLLOWING ACTIONS TO INCREASE CLIMATE CHANGE EDUCATION AND OUTREACH FOR PARK STAFF, VISITORS, AND THE LOCAL COMMUNITY.

1. Educate park staff on actions that will reduce GHG emissions.
    - Create signs to encourage energy-saving behavior and educate staff about how energy savings help decrease costs. For example, display signs to remind staff to turn off the lights.
    - Create positive educational messaging to encourage energy reduction.
    - Identify an energy issue each month and share information about the amount of energy used over a certain amount of time and opportunities for energy reduction.
    - Involve park partners in EMS meetings and use the park's EMS to implement energy reduction goals.
2. Educate visitors about climate change risks and impacts, and the actions that they can take personally to help reduce GHG emissions at Catoctin Mountain Park.
    - Incorporate educational signs to remind visitors to turn off the lights throughout the park.

- Incorporate environmental messages in the cabin rental agreement language on the website and at check-in.
- Use social media and press releases to share environmental messages.
- Discuss energy use and reduction goals with groups that lease the cabin camps and dorms. Consider implementing incentives to encourage groups to save energy.
- Explore the use of technology, including Quick Response (QR) codes and mobile applications to educate visitors about opportunities to reduce GHG emissions.
- Explore new interpretive programs focused on environmental and sustainability issues; interpretive programs could include personal guides and signage.

Conclusion

Catoctin Mountain Park has a unique opportunity to educate both national and international visitors and set an example for reducing GHG emissions in the National Capital Region and Servicewide. By addressing emissions in a targeted, prioritized manner, the park can efficiently and effectively reduce its GHG emissions. Additionally, by sharing these strategies with park visitors and partners, Catoctin Mountain Park will promote an awareness of climate change and encourage visitors and staff to take action to reduce GHG emissions on a broader scale.