



Chesapeake and Ohio Canal National Historic Park Climate Action Plan

CONTENTS

Introduction.....	1
Chesapeake and Ohio Canal National Historical Park	1
Chesapeake and Ohio Canal National Historical Park Climate Action Commitment.....	1
The Challenge of Climate Change	3
Chesapeake and Ohio Canal National Historical Park and Climate Change.....	3
Inventory Process.....	4
Park Emissions Profile	5
Employee Commuting Data.....	6
Emissions by Source.....	6
Strategies for Reducing Emissions.....	8
Strategy 1: Reduce GHG Emissions from Park Energy Use by 10 percent below 2010	
levels by 2016.....	8
Strategy 2: Reduce GHG Emissions from Transportation by 15 percent below 2010	
levels by 2016.....	9
Strategy 3: Reduce GHG Emissions from Solid Waste by 12 percent below 2010 levels	
by 2016	11
Strategy 4: Increase Climate Change Education and Outreach	12
Conclusion	13
Appendix A: C&O Canal NHP GHG Reduction Goal Tables A1- A4	14
Appendix B: Climate Change Related Terms	15



Introduction

CHESAPEAKE AND OHIO CANAL NATIONAL HISTORICAL PARK

The Chesapeake and Ohio Canal National Historical Park (C&O Canal NHP) consists of nearly 22,000 acres of a diverse landscape that runs along the Potomac River from the Georgetown neighborhood in the District of Columbia to Cumberland, Maryland. The park encompasses the historic C&O Canal, which was built in 1828 and operated as a commercial transportation artery until 1924 .



Floods were a dominant issue along the Potomac River long before man attempted to tame it for use as a commercial transportation corridor. During the C&O Canal's 97-year operational period, floods were a frequent threat to the resources and viability of the canal. While the canal and the towpath run alongside the Potomac River, it has been designated as a national historical park as well as a wonderful regional recreation amenity, floods continue to be a primary management concern; a major flood has occurred on average every 12 years since the canal was built.

The geography of the park and the dynamic influence of the Potomac River present a rich geological, ecological, and biological diversity. The C&O Canal NHP includes 46 sites recognized as state and nationally significant natural areas. More than 100 rare, threatened, and endangered species, including the bald eagle, currently exist in the park. Additionally, there are over 1,500 species of vascular plants, 68 documented important invasive plant species, nearly 100 animal species, 11 natural caves, and several complexes of historic mines within the park boundary.

The park serves many purposes and provides numerous educational and recreational opportunities that allow visitors to experience the cultural and natural resources along this riparian area of the Potomac River. More than 60 developed recreational sites in the park provide opportunities for outdoor activities close to several metropolitan areas on the East Coast, and the Appalachian Trail traverses the canal for three miles. The towpath is one of the most highly used and extensive recreational trails in the nation. Visitors enjoy hiking, biking, camping, canoeing, boating, and fishing, as well as participating in organized park activities.

CHESAPEAKE AND OHIO CANAL NATIONAL HISTORICAL 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 and serve as a model to the nation in the reduction of greenhouse gasses. As a participant in the Climate Friendly Parks (CFP) program, C&O Canal NHP belongs to a network of national parks that are at the forefront of sustainability planning. 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.

The park commits to the following goals:

1. Reduce electricity consumption in park owned and leased structures, facilities and offices.
2. Investigate and develop the use of renewable energy sources inside the park, where appropriate.
3. Upgrade vehicles and other fuel-powered tools to reduce GHG emissions.
4. Install alternative fuel and electric vehicle infrastructure, in appropriate locations.
5. Support a culture for staff to reduce GHG emissions associated with commuting by encouraging video conferencing, webinars, teleworking opportunities and flexible work schedules.
6. Increase recycling and reduce solid waste.
7. Reduce wastewater and greywater generated by the park.
8. Reduce animal waste generated within the park.
9. Identify opportunities for reuse of natural waste products that would otherwise be sent to the landfill.
10. Educate park staff on how to reduce GHG emissions, solid waste, and energy use.
11. Educate visitors about climate change risks and impacts and the steps that C&O Canal NHP is taking to reduce emissions.
12. Identify partnerships with colleges and universities to evaluate alternative energy opportunities.

The C&O Canal NHP climate action plan serves to support and enhance existing initiatives at the park, regional, and national level. The following documents and resources were considered while creating this action plan:

- December 2011 C&O Canal NHP Energy Audit: outlines energy conservation measures for park operations.
- C&O Canal NHP Environmental Management System (EMS): addresses all environmental programs at the park and provides the context for actions that reduce park emissions.
- National Capital Region EMS: addresses goals related to energy and climate change 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.
- NPS Director’s Memo “Applying National Park Service Management Policies in the Context of Climate Change”: guides park managers to engage partners and use the best available science, including climate change science, to inform park planning; also encourages parks to continue to provide leadership and education on climate change to partners and the public.

Additionally, this climate action plan will be incorporated into the park’s EMS in order to integrate it with other environmental initiatives and management goals. It should be noted that the purpose of this climate action plan is to reduce park GHG emissions, waste, and energy usage to support NPS leadership in mitigating and educating the public on climate change. This plan is not intended to address how the park will adapt 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 (CO₂), methane (CH₄), and nitrous oxide (N₂O)—through industrial processes has disturbed this balance. These gases, which can stay in the atmosphere from at least 50 years to as long as several centuries, are accumulating in the atmosphere faster than natural processes are able to remove them. In effect, they are creating a layer that is keeping more heat on the surface of the Earth. 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 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.

CHESAPEAKE AND OHIO CANAL NATIONAL HISTORICAL PARK AND CLIMATE CHANGE

Climate change presents significant risks and challenges to the NPS. In the mid-Atlantic region, which includes Washington, D.C.; Virginia; Maryland; and West Virginia, sea level is currently rising one to two inches per decade. However, climate change is expected to double that rate, causing sea level to rise 15 to 40 inches by 2100.² In addition, due to sediment compaction processes that cause land in the mid-Atlantic to sink, sea level rise in the region is currently significantly greater than global sea level rise.³

Increased temperatures and hydrologic changes will alter the natural and manmade landscape of C&O Canal NHP, impacting the wide variety of ecological, cultural, and recreational features the park currently manages. Climate change may affect the cultural and natural resources entrusted to C&O Canal NHP. The following potential climate change impacts were considered while park staff developed this climate action plan:

National Oceanic and Atmospheric Administration (NOAA) records show sea levels in the Washington D.C. area have risen over a foot in the past one hundred years.

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

² U.S. Environmental Protection Agency. EPA/903/F-00/002. June 2001. How Will Climate Change Affect the Mid-Atlantic Region? http://oaspub.epa.gov/eims/eimscomm.getfile?p_download_id=4011

³ U.S. Climate Change Science Program. Coastal Sensitivity to Sea-Level Rise: A Focus on the Mid Atlantic Region. Synthesis and Assessment Product 4.1. January 2009. Page 19. www.epa.gov/climatechange/effects/coastal/pdfs/SAP_4-1_SynthesisandAssessmentProduct.pdf

- Landscape changes that will affect access to and the structural integrity of bridges, locks, lock houses, culverts, dams, monuments, and other canal related structures.
- Changes in growing seasons that will affect vegetation and the animals that depend on that vegetation.
- Increased opportunity for invasive species establishment.
- Unpredictable management needs for C&O Canal NHP.
- Shifts in visitor trends related to temperature changes.
- Increased occurrences of severe storms, flooding, and other unpredictable weather patterns.
- Changes in visitor use patterns because of weather.

By measuring and reducing GHG emissions from park-related activities, the C&O Canal NHP intends to minimize its contribution to climate change and its resulting detrimental impacts. In addition, the C&O Canal NHP hopes to achieve an even greater reduction in GHG emissions through visitor education.

INVENTORY PROCESS

C&O Canal NHP's GHG emissions inventory was completed by gathering data from NPS staff and concessioners, and entering this data into the Climate Leadership in Parks (CLIP) tool. The CLIP tool was 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 CO₂ equivalent (MTCO₂e).
- Educate park employees about the contributors to greenhouse gas emissions, including energy use, sending solid waste to the landfill, and vehicle emissions, and involve park employees in the data gathering process to inform the greenhouse gas inventory.
- Assist with identifying strategies for each park to reduce emissions, reduce waste, and lower energy usage through a workshop.
- Enable park personnel to track current and future progress toward the goals of reducing GHG emissions, waste, and energy use.

Park activities such as fuel use, stationary combustion (i.e. devices located at the park that combust fuel for electricity and or heat generation), electricity use, refrigeration, and sending solid waste to landfills for treatment all produce different types of GHGs. GHGs and their common sources at the park are detailed below in Table 1. Since not all GHGs affect climate change to the same degree, it is necessary to convert each GHG to one common unit in order to compare them in the park inventory. The CLIP tool automatically converts the park's data into MTCO₂e, a single unit that normalizes CO₂, N₂O, and CH₄. The conversion to MTCO₂e 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 CO₂, which is given the GWP of 1. The GWP of CH₄ is 21, meaning that an equivalent amount of CH₄ has 21 times the potential of CO₂ to cause global warming. The GWP of each gas is also included in Table 1.

Table 1: Summary of Greenhouse Gases and Relative Contribution to MTCO₂e Calculation

GHG Symbol	Name	Common Sources	Global Warming Potential
CO ₂	Carbon dioxide	Fossil fuel combustion	1
CH ₄	Methane	Landfills, production and distribution of natural gas and petroleum, fermentation from the digestive system of livestock, fossil fuel combustion	21
N ₂ O	Nitrous Oxide	Fossil fuel combustion, fertilizers, manure	310
HFCs	Hydrofluorocarbons	Refrigeration gases	1,300-1,400

Data categories for most parks include stationary combustion, mobile combustion, purchased electricity, waste, fertilizer, refrigeration, and wastewater. These categories can be divided into direct and indirect emissions. Scope 1 emissions, or direct emissions, are emissions from sources owned and operated by the park. This includes emissions produced when fuel is burned within park boundaries to perform such tasks as powering a park generator, using natural gas, or fueling a park vehicle, as well as ‘fugitive’ emissions released from refrigeration and fertilizer use. Scope 2 and scope 3 emissions are indirect emissions generated by sources not owned or operated by the park, but produced as a result of park activities. Scope 2 emissions are generated from the production of electricity, heat, or steam, which is then purchased by the park. Scope 3 emissions are all other indirect emissions that are related to the park’s activities, such as emissions from concessioner operations, visitor vehicles, employee commuting, offsite wastewater treatment, and offsite waste disposal.

Park Emissions Profile

C&O Canal NHP staff gathered annual usage data for the baseline inventory year, fiscal year (FY) 2010. The C&O Canal NHP GHG inventory includes emissions from the following sources:

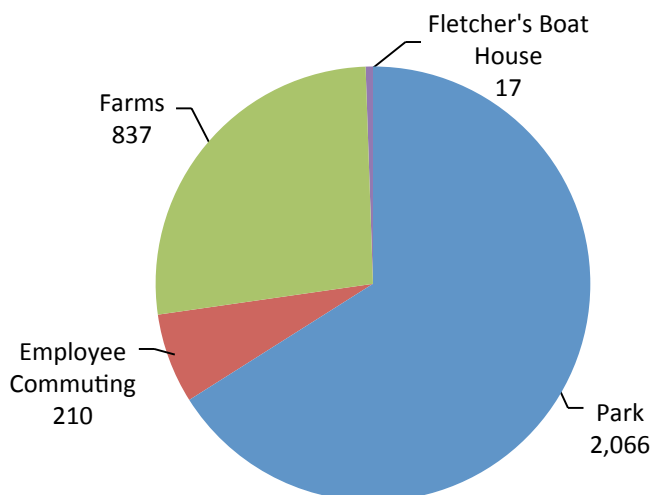
- Park operations: stationary combustion, purchased electricity, park-owned or park-leased vehicles, park wastewater and solid waste disposal, and refrigerant use.
- Employee commuting: collected by a survey in December 2011 as proxy for the FY 2010 inventory.
- Farms (at C&O Canal NHP farms maintain the historic landscape and open space and promote locally grown food): fertilizer use and livestock.
- Fletcher’s Boat House (park concessioner): purchased electricity.

C&O Canal NHP has minor, incidental visitor emissions compared to other park units because visitors drive to the park on county roads, park their cars, and explore the park by foot, bicycle, or boat.

Total GHG emissions from park operations, employee commuting, farms, and Fletcher’s Boat House for FY 2010 were estimated to be 3,130 MTCO₂e. See Figure 1 below. Approximately 2,066

MTCO₂e (66 percent) are from park operations. 837 MTCO₂e (27 percent) are from farm emissions, and 210 MTCO₂e (7 percent) are from employee commuting. The emissions from Fletcher's Boat House total 17 MTCO₂e (1 percent).

FIGURE 1: FY 2010 C&O CANAL NHP TOTAL GHG EMISSIONS – 3,130 MTCO₂E



EMPLOYEE COMMUTING DATA

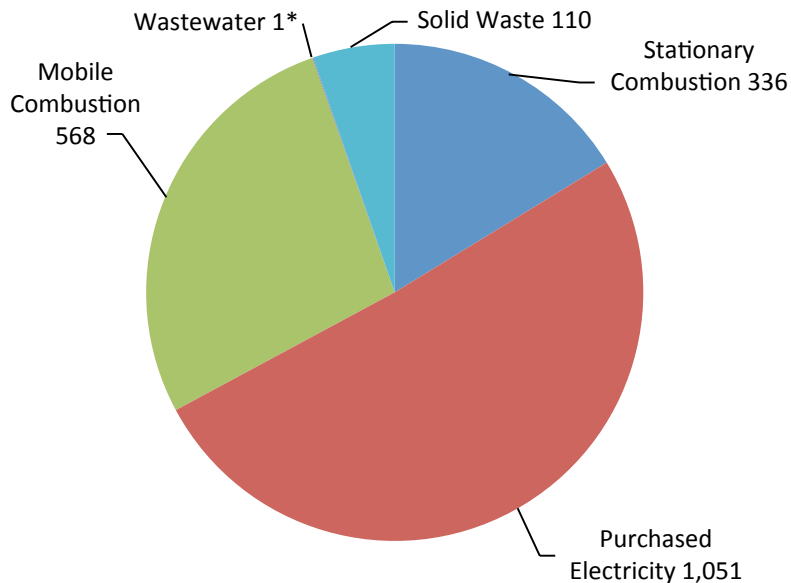
In December 2011, park staff shared information on their commute by taking an online survey prepared by the Climate Friendly Parks program. The survey collected information on daily commuting habits as well as barriers that staff face to have a more sustainable commute, and general suggestions for increased sustainability at the park. Overall, the survey showed that the average round trip commute for park employees was approximately 51 miles to their respective work sites. The majority of staff commutes by gasoline cars or trucks, with some exceptions for hybrid cars and motorcycles. The most common barriers for sustainable travel included impractical or lack of public transportation, length of commutes hindering biking/walking potential, and large distances to regional or other park meetings. General recommendations by park employees for increasing sustainability at the park included investing in hybrid cars/trucks for the park fleet, allowing employees to work remotely, and additional ideas for increased office energy efficiency.

EMISSIONS BY SOURCE

In order to target emission reduction efforts, the park assessed park operational emissions by source (see Figure 2). At 1,051 MTCO₂e (51 percent), purchased electricity is by far the largest contributor of GHG emissions from park operations. Mobile combustion is the second largest contributor of GHG emissions, responsible for 568 MTCO₂e (27 percent). Mobile combustion includes transportation with the park's vehicle fleet as well as other sources, such as mowing and landscape activities. Solid waste treatment produced 110 MTCO₂e (5 percent). Park operations produce zero emissions from fertilizer application and refrigerant use; therefore these categories are not included

as sources. Only 1 MTCO₂e comes from wastewater treatment. Please note that Figure 2 does not contain emissions from employee commuting.

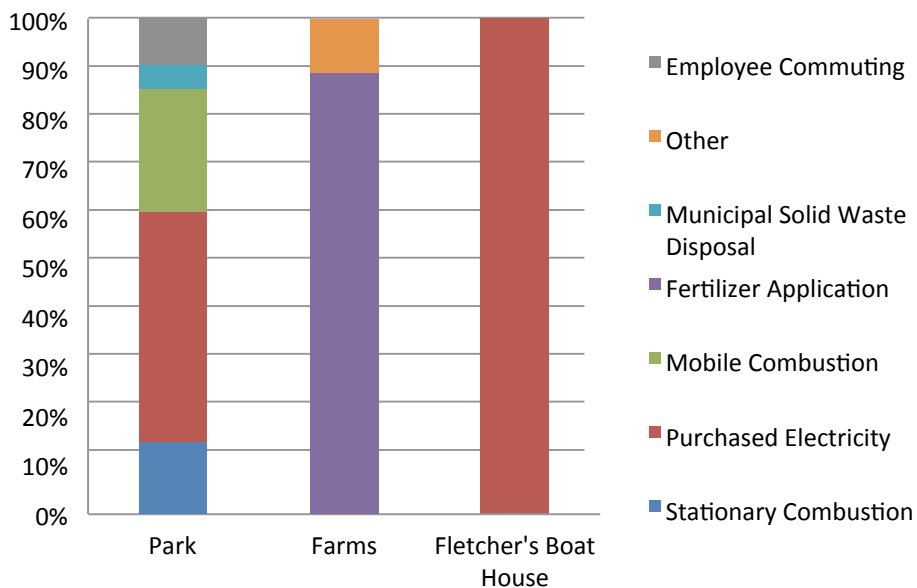
FIGURE 2: FY 2010 C&O CANAL NHP OPERATIONS GHG EMISSIONS BY SOURCE – 2,066 MTCO₂E



*Percentage of graph for 1 MTCO₂e is too small to appear.

Figure 3 below shows the emissions profile for each group (park, concessioners, and farmers). As noted above, most emissions from park operations are from purchased electricity. The emissions from farm activities include both fertilizer application and “other,” which consists of emissions from horses and cattle. The only emissions source for Fletcher’s Boat House is from purchased electricity (wastewater from Fletcher’s Boat House is treated in a septic system; therefore, it is not included in the wastewater emissions). As noted in Figure 2 above, park wastewater emissions are too small to appear in the graph. Since visitors explore the park by foot, bicycle, and/or paddle boat, visitor emissions are not detailed below. However, visitors do contribute to the park’s profile in terms of purchased electricity, stationary combustion, wastewater, and waste.

FIGURE 3: C&O CANAL NHP AND CONCESSIONER GHG EMISSIONS PERCENT CONTRIBUTION BY SOURCE



Strategies for Reducing Emissions

C&O Canal NHP developed GHG reduction strategies and actions during the park’s CFP workshop, held December 7 and 8, 2011, at the National Conservation Training Center in Shepherdstown, West Virginia. Strategies focus on reducing energy consumption and transportation emissions, decreasing water use and waste generation, and increasing climate change educational efforts. Developing and implementing a comprehensive action plan will allow for more informed decision making. The C&O Canal NHP strategies to reduce emissions are based on emission reduction potential, cost-effectiveness, feasibility, co-benefits, local impact, and implementation timeframe.

STRATEGY 1: REDUCE GHG EMISSIONS FROM PARK ENERGY USE BY 10 PERCENT BELOW 2010 LEVELS BY 2016

By far the most significant contributor of GHGs from park operations is purchased electricity. Therefore, C&O Canal NHP will focus on actions to reduce energy consumption, including a reduction in purchased electricity and stationary combustion. In addition to reducing GHG emissions, reducing energy use will provide the park with financial savings from reduced costs.

PROGRESS AS OF DECEMBER 2011:

- Upgraded to ENERGY STAR computers.
- Created a plan to reduce lawn mowing activities.
- Encouraged telework and had appropriate employees signing a telework agreement.
- Replaced 30-year-old T8 lamps with motion activated T5s at the Williamsport Maintenance Facility.

C&O CANAL NHP COMMITS TO THE FOLLOWING ACTIONS IN ORDER TO REDUCE PARK ENERGY USE:

1. Reduce electricity use in park buildings:
 - Institute phased implementation of recommendations made in the park energy audit.
 - Perform a targeted energy audit for Ehouse, Tavern, Cushwa, and Cumberland Ranger Station.
 - Explore passive cooling techniques at the Tavern and Ferry Hill.
 - Implement a policy of turning off the lights when not in use at park headquarters building.
 - Implement a policy throughout Park offices of turning off computers and monitors when not in use.
 - Install additional motion sensors at Headquarters and in offices throughout the park.
 - Sub-meter electricity in buildings in order to determine needed conservation measures.
 - Identify areas that would benefit from light tube/solar tube technology.
 - Explore the use of induction lights at maintenance facilities.
 - Continue to consolidate the number of local printers by installing network printers.
 - Eliminate the use of air conditioning in the Ferry Hill building.
 - Eliminate the use of air conditioning in the first floor of the Great Falls Tavern.
 - Mothball the Engineers House at Great Falls.
2. Develop renewable energy sources.
 - Investigate geothermal climate control at the Ferry Hill Building.
 - Identify additional opportunities for geothermal heating and cooling.
 - Develop solar energy at Monocacy, Four Locks, and Paw Paw district maintenance shops.
 - Transition from heating oil to a wood-burning furnace or pellet stoves in select locations; and
 - Explore the ability of crops growing in the park to produce biofuels as part of a new approach to the park agriculture program.
 - Explore purchasing existing hydro-produced energy from Potomac Edison dams adjacent to the park.
 - Add solar energy panels at the Canal Farm to power the well.

STRATEGY 2: REDUCE GHG EMISSIONS FROM TRANSPORTATION BY 15 PERCENT BELOW 2010 LEVELS BY 2016

Transportation associated with park operations is C&O Canal NHP's second largest source of GHG emissions (see Figure 2, mobile combustion). Therefore, taking actions to reduce transportation-related emissions can significantly reduce the park's GHG emissions.

PROGRESS AS OF DECEMBER 2011:



- Relocated park headquarters to Hagerstown, Maryland, 10 years ago to be more centrally located and therefore more easily accessible.
- Leased flex fuel and hybrid vehicles when renewing General Services Administration leases (currently have five hybrids, 35 flex fuel vehicles, and two biodiesel vehicles).
- Right-sized vehicles and equipment and established practice of using small utility vehicles for short trips:
 - Acquired crew cab trucks for maintenance staff to ride together to a job site.
 - Purchased and used battery-operated lawn equipment and weed eaters.
- Supported telecommuting when appropriate.
- Participated in meetings via conference call to reduce driving.
- Identified opportunities for carpooling/shuttling to meetings (voluntary by division).
- Eliminated two SUVs in the Maintenance Division.

C&O CANAL NHP COMMITS TO THE FOLLOWING ACTIONS TO REDUCE PARK EMISSIONS FROM TRANSPORTATION:

1. Upgrade vehicles and other fuel-powered tools to reduce GHG emissions:
 - Review alternative transportation study.
 - Complete fleet optimization study and identify opportunities for vehicle sharing.
 - Pursue Clean Cities Initiative funding to buy hybrids, electric vehicles, and electric lawn mowers.
 - Continue to rigorously right-size vehicles in fleet and develop standards for when it is appropriate to use larger vehicles.
 - Consider adding biodiesel, propane, and electric vehicles.
 - Educate staff about flex fuels and biodiesel vehicles.
 - Consider propane, biodiesel, or other alternatives for dump trucks and heavy equipment with very low mileage.
 - Research propane or biodiesel mowers.
 - Explore options for alternative fuel bus fleet for education trips and shuttles through Clean Cities and Canal Towns.
 - Replace gas-powered all-terrain vehicles at Great Falls with electric ranger patrol vehicle(s).
 - Investigate methods for law enforcement vehicle radios to remain powered without the vehicle idling.
2. Install alternative fuel and electric vehicle infrastructure:
 - Explore the possibility of installing solar powered charging stations for electric vehicles where appropriate.
 - Research ways to source biodiesel, including the possibility of partnering with other government facilities.
 - Work with partners, including Clean Cities and other parks, to implement alternative fueling stations.
3. Support a culture for staff to reduce GHG emissions from driving:
 - Implement a no-idling policy for park-owned vehicles.

- Identify federal and state incentives for carpooling and communicate these incentives to staff.
- Allow telecommuting when appropriate and set a park-level policy to communicate when staff are telecommuting and when they are on leave.
- Analyze and create a policy for flex working place.
- Establish video conference stations at Palisades, headquarters, and Cumberland to encourage fewer in-person meetings and more virtual meetings in order to reduce driving.
- Make shared office space available at facilities or different parks in the region so staff can work closer to home or near a meeting.
- Develop an efficient heating, ventilation, and air conditioning (HVAC) system for the non-historic portion of Ferry Hill to make co-working from this location feasible.
- Follow up on employee commuting survey to see how new policies implemented over the next year affect commuter emissions.

STRATEGY 3: REDUCE GHG EMISSIONS FROM SOLID WASTE BY 12 PERCENT BELOW 2010 LEVELS BY 2016

Solid waste disposal is the third largest contributor to park operations GHG emissions (see Figure 2). While C&O Canal NHP is already a “trash free” park for visitors, it will be important for park operations to further reduce solid waste in order to reduce the associated GHG emissions.

PROGRESS AS OF DECEMBER 2011:

- Implemented a “trash free” park program for park visitors.
- Created a recycling program at headquarters for batteries, phones, plastic bottles, paper, aluminum, oil, and antifreeze.
- Reduced and recycled excess equipment and sold equipment to scrap metal recyclers;
- Hosted river cleanup events.
- Asked volunteers to sort trash after river cleanup events to capture recyclables.
- Implemented a green purchasing policy for appliances, equipment, and office supplies.
- Collected and disposed of approximately 200 used tires annually since 2010.

C&O CANAL NHP COMMITS TO THE FOLLOWING ACTIONS TO REDUCE PARK EMISSIONS FROM WASTE GENERATION:

1. Increase opportunities for recycling and reducing solid waste:
 - Create a system for visitors to recycle trail maps at Great Falls and/or consider re-usable maps.
 - Negotiate with contracted janitorial staff to improve recycling at facilities at headquarters.
 - Recycle at all park and partner events.
 - Evaluate the elimination of trash bags or to switch to biodegradable or other environmentally preferable bags throughout the park.
 - Change permits for events in the park to require participants to “pack out” trash.

- Host trash-free volunteer appreciation events.
 - Sort trash after all river cleanups.
 - Eliminate the use of pre-packaged bottled water for park volunteers and at volunteer events.
 - Install water bottle filling stations at park visitor centers.
2. Reduce wastewater and animal waste:
 - Evaluate whether composting toilets could be installed in appropriate areas.
 - Reconfigure the pumps at Cumberland to use less water.
 - Sub-meter water supply lines to help isolate leaks and stop water system leaks at Palisades.
 - Install waterless urinals and solar-powered sink faucets where appropriate.
 - Manage mule waste more effectively; use mule manure as compost at the Canal Farm.
 3. Identify opportunities for reuse of natural waste products that would otherwise be sent to the landfill:
 - Coordinate with the state of Maryland and farmers to explore opportunities for recycling silt from the canal.
 - Look into opportunities to develop micro-methane energy generation.
 - Evaluate the tradeoff of the emissions from tractors to apply fertilizer and the benefits of the fertilizer use.

STRATEGY 4: INCREASE CLIMATE CHANGE EDUCATION AND OUTREACH

Approximately four million people visit C&O Canal NHP annually. This presents an opportunity to educate the public about climate change and GHG emissions reductions. There are also opportunities to educate park staff and members of the surrounding community.

C&O CANAL NHP COMMITS TO THE FOLLOWING ACTIONS TO INCREASE CLIMATE CHANGE EDUCATION AND OUTREACH WITH PARK STAFF, VISITORS, AND THE LOCAL COMMUNITY:

1. Educate park staff on how to reduce GHG emissions:
 - Email energy-saving tips to park staff.
 - Hold virtual meetings.
 - Add a carpooling coordination resource to the park SharePoint site to promote communication about shared meeting destinations or errands.
 - Develop an incentives and employee recognition program.
 - Place signage on light switches in all offices reminding staff to turn out the lights when not in use.
2. Educate visitors about climate change risks and impacts and the actions that C&O Canal NHP is taking to reduce GHG emissions:
 - Develop education programs on climate change impacts.
 - Install warm season grasses to replace mowed turf where appropriate throughout the park and educate visitors about the environmental benefits of the program.

- Install electric charging stations in high profile areas.
 - Place interpretive signs in restrooms about energy efficiency improvements.
 - Include climate change educational pieces in high-traffic areas, including visitor centers.
 - Implement “no-idling” vehicle rule and educate of staff and bus drivers and the rule;
 - Encourage bike commuting on the Towpath and Capital Crescent Trail and conduct data collection on pilot bike loaner program to evaluate success and opportunity for expansion.
 - Emphasize connectivity of trails.
 - Include signs on low-emitting park vehicles.
 - Create specific climate change messaging for C&O Canal NHP and include messaging in signs, brochures, newsletters, websites, and social media.
3. Identify partnerships with colleges and universities to evaluate alternative energy opportunities:
- Partner with colleges and universities to study alternative energy at the park.
 - Identify projects that could include student participation.

Conclusion

C&O Canal NHP has a unique opportunity to educate visitors and staff and set an example for reducing GHG emissions. This plan summarizes the actions to which the park commits in order to reduce its GHG emissions. 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, concessioners, and partners, C&O Canal NHP will promote an awareness of climate change as well as actions to reduce GHG emissions on a broader scale.

Appendix A: C&O Canal NHP GHG Reduction Goal Tables A1- A4

Table A.1 Overall Reduction Goals	
Total reduction goal by 2016	11%
Total reduction goal in MTCO ₂ e	236 MTCO ₂ e

Table A.2 Energy Reduction Goals		MTCO ₂ e Reduction
Stationary Combustion	Reduce diesel fuel use by 10%	136 MTCO ₂ e
	Reduce propane use by 10%	
Purchased Electricity	Reduce purchased electricity by 15%	
Reduce overall energy emissions by 10%		

Table A.3 Transportation Reduction Goals		MTCO ₂ e Reduction
Reduce miles driven by light trucks by 20%		86 MTCO ₂ e
Reduce miles driven by heavy trucks by 20%		
Reduce overall transportation emissions by 15%		

Table A.4 Waste Reduction Goals		MTCO ₂ e Reduction
Reduce waste generation by 8 tons		14 MTCO ₂ e
Increase recycling by 2 tons		
Reduce overall waste emissions by 12%		

Appendix B: Climate Change Related Terms

CO ₂	Carbon Dioxide
GHG	Greenhouse Gas
GWP	Global Warming Potential
HFCs	Hydrofluorocarbons
MTCO ₂ e	Metric ton Carbon Dioxide Equivalent
N ₂ O	Nitrous Oxide