



Pictured Rocks National Lakeshore  
April 2008

# CLIMATE FRIENDLY PARKS



## PICTURED ROCKS NATIONAL LAKESHORE Action Plan

Produced by the NPS Environmental Leadership Program, with technical assistance from EPA's Office of Air and Radiation/Office of Atmospheric Programs Climate Change Division/Program Integration Branch and NPS's Natural Resources Stewardship and Science Division.

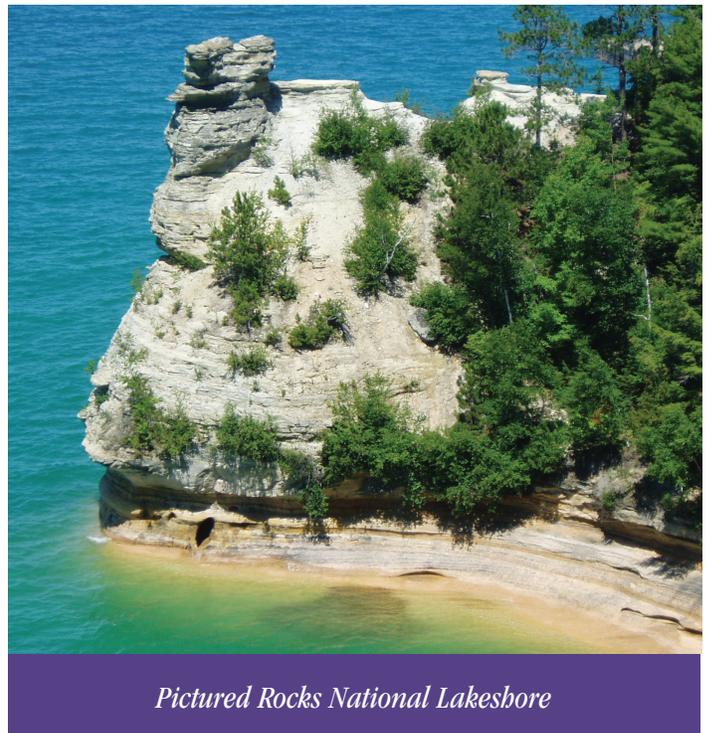
This document reports commitments to reduce greenhouse gases (GHGs) and criteria air pollutants (CAPs) through the climate friendly management of park operations and increased education and outreach efforts. Developed using the Climate Friendly Park's CLIP (Climate Leadership In Parks) Tool, this Action Plan serves a guide for meeting concrete emission reduction targets through climate friendly behavior within the Park.

## Pictured Rocks National Lakeshore Becomes A Climate Friendly Park

As a participant in the Climate Friendly Parks program, Pictured Rocks National Lakeshore (PIRO) 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, Pictured Rocks National Lakeshore (NL) is serving as a model for climate friendly behavior within the park service.

Pictured Rocks NL has committed to reducing GHG emissions by 15% below 2005 levels. This Action Plan lays out the measures the park will take to meet this goal by 2012. In addition to implementing these measures, Pictured Rocks NL will:

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



*Pictured Rocks National Lakeshore*

photo credit: xx

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## The Challenge Of Climate Change

Climate change presents significant risks and challenges to the National Park Service. For example, as a result of climate change, Pictured Rocks NL will likely see lake levels and temperatures vary significantly from historical averages—the consequences of which may include impaired species habitat and decreased recreation opportunities. In short, climate change threatens the identity and unique resources of our national parks.

Scientists cannot predict the general severity of climate change nor its impacts with certainty. 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 19th century, and the 10 warmest years of the 20th 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 level 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 habitats, and many other features of our natural and managed environments.

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## Goals and Objectives

The objective of this Action Plan is to identify actions that Pictured Rocks NL can undertake to reduce GHG emissions and thus address climate change. This Plan presents the park's emission reduction targets and associated reduction measures 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 Pictured Rocks NL'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.

Pictured Rocks NL aims to:

**Reduce GHG emissions from Pictured Rocks National Lakeshore operations to 15% below 2005 levels by the year 2012 by implementing emission mitigation actions identified by the Park.**

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 emissions inventories. Specifically, the plan recommends two main strategies:

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**STRATEGY 1:**  
**Reduce fuel use and GHG emissions from park facilities and operations.**

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

## Greenhouse Gas Emission and Criteria Air Pollutant Inventory at Pictured Rocks National Lakeshore

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. Criteria air pollutants, which lead to numerous air quality and public health problems, include sulfur dioxide (SO<sub>2</sub>), nitrogen oxides (NO<sub>x</sub>), volatile organic compounds (VOCs), particulate matter (PM10 and PM2.5), and carbon monoxide (CO).<sup>2</sup> While GHGs contribute to climate change on a global scale, the impacts of criteria air pollutants are often local and regional in nature.

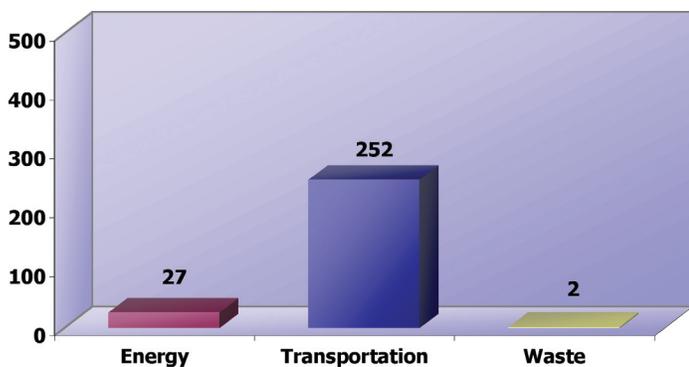
### Greenhouse Gas Emissions

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

In 2005, Pictured Rocks NL's GHG emissions totaled 281 metric tons of carbon equivalent (MTCE). As Figure 1 and Table 1 demonstrate, Pictured Rock NL's largest emission sector was Transportation, which

**Figure 1**

*Pictured Rocks National Lakeshore's 2005 GHG Emissions by Sector*



The same activities that generate GHGs often also generate CAPs. Therefore, addressing activities that generate GHGs also often has the added, or co-, benefit of reducing CAPs.

totaled 252 MTCE. Pictured Rock NL's emissions are less than the amount of carbon estimated to be sequestered annually (approximately 4,118 MTCE) by the over 65,000 acres of forested land managed by the park and collaborating entities.

**Table 1**

*Pictured Rocks National Lakeshore's 2005 GHG Emissions by Sector and Source*

	Emissions (MTCE)	% of Total
<b>Energy</b>	<b>27</b>	<b>10%</b>
Stationary Combustion	14	5%
Purchased Electricity	13	5%
<b>Transportation</b>	<b>252</b>	<b>90%</b>
Highway Vehicles(3)	108	38%
Non-road Equipment <sup>1</sup>	30	11%
Watercraft <sup>2</sup>	113	40%
<b>Waste</b>	<b>2</b>	<b>1%</b>
Solid Waste Disposal	2	1%
<b>Total Emissions</b>	<b>281</b>	
<b>Forest Management</b>	<b>-4,118</b>	
Forestry	-4,118	

Totals may not sum due to rounding

1 - Includes visitor snowmobiles

2 - Includes visitor watercraft and Pictured Rocks Cruises

(3) Includes total ALTRAN mileage in park related transportation

### Criteria Air Pollutants

CAP sources include stationary sources (e.g., boilers), mobile sources, and area sources (e.g., campfires, solvent use). In 2005, Pictured Rocks NL produced 120,665 lbs of CO, 7,297 lbs of NO<sub>x</sub>, 35,500 lbs of VOCs, 954 lbs of PM2.5, and 3 lbs of PM10 (Figure 2). As Table 2 demonstrates, at 120,665 lbs, CO is the most emitted CAP, largely from the Transportation Sector (120,650 lbs).

<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>

<sup>2</sup> Criteria air pollutants were calculated and are presented in the inventory section of this document due to their co-benefit relation with GHGs. However, it is important to realize that criteria air pollutants do not contribute directly to climate change.

**Table 2**

*Pictured Rocks National Lakeshore's 2005 GHG CAPs by Sector and Source*

	CO (lbs)	SO2 (lbs)	NOx (lbs)	VOC (lbs)	PM <sub>2.5</sub> (lbs)	PM <sub>10</sub> (lbs)
<b>Energy</b>	<b>15</b>	<b>0</b>	<b>112</b>	<b>0</b>	<b>0</b>	<b>3</b>
Boilers, Heaters, and Generators	15	0	112	0	0	3
<b>Transportation</b>	<b>120,650</b>	<b>0</b>	<b>7,185</b>	<b>35,398</b>	<b>954</b>	<b>0</b>
Highway Vehicle	42,328	0	4,412	6,493	36	0
Non-road Equipment <sup>1</sup>	77,791	0	295	28,555	762	0
Watercraft <sup>2</sup>	531	0	2,478	350	156	0
<b>Other Emission Sources</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>102</b>	<b>0</b>	<b>0</b>
Area Sources	0	0	0	2	0	0
Fuel Storage Tanks	0	0	0	100	0	0
<b>Total Emissions</b>	<b>120,665</b>	<b>0</b>	<b>7,297</b>	<b>35,500</b>	<b>954</b>	<b>3</b>

Totals may not sum due to rounding

1 - Includes visitor snowmobiles

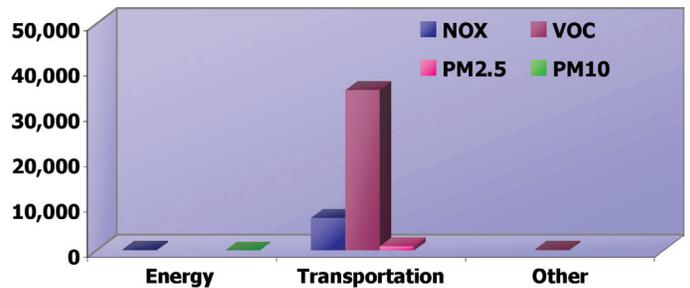
2 - Includes visitor watercraft and Pictured Rocks Cruises



*Pictured Rocks National Lakeshore*

**Figure 2**

*Pictured Rocks National Lakeshore's 2005 CAPs by Sector*



Carbon monoxide emissions excluded due to scale.

## Pictured Rocks National Lakeshore Responds To Climate Change

Pictured Rocks NL staff developed the following actions during the park's CFP Workshop on July 19th, 2007 in order to meet the park's climate change mitigation goals.

### STRATEGY 1: Reduce Fuel Use And Greenhouse Gas Emissions From Park Facilities And Operations

#### Transportation management

**Emission Reduction Goal: Reduce transportation emissions to 12.5% below 2005 levels by 2012.**

Reducing vehicle miles traveled, improving vehicle efficiency, and using alternative fuels can significantly reduce Pictured Rocks NL's emissions. As the inventory results indicate, approximately 90 percent of the park's GHG emissions are a result of transportation. The following strategies were developed to meet the park's transportation emission reduction goal:

#### Replace existing park, concessionaire, and other vehicles with alternative fuel vehicles (AFVs) and hybrids.

- Replace park vehicles with hybrids, AFVs, or other efficient vehicles within five years where practical and available.
- Reduce vehicle fleet by five vehicles within the next five years by removing high-maintenance vehicles.
- Coordinate with Apostle Islands NL to determine the best available technologies for replacement boats.
- Replace diesel fuel used by all diesel trucks with B20 (biodiesel). Reduce fuel consumption among non-road equipment

#### Reduce fuel consumption among non-road equipment

- Enforce existing park policy that any National Park Service snowmobile motors must be 4-stroke or best available technology. Coordinate with Michigan Snowmobile Association and local snowmobile organizations to advance this effort.

- Purchase best available technology non-road equipment when replacing existing non-road equipment (e.g., diesel ATVs).

#### Work with partners to improve efficiency of transportation systems

- Establish a no-idling policy for visitor and school buses and other vehicles.
- Formally involve Pictured Rocks Cruises and ALTRAN in environmental management committee. Potential cooperative efforts include
  - Visitor package deals between ALTRAN and Pictured Rocks Cruises.
  - Hybrid or electric vehicle use by ALTRAN
  - Renewable fuel-sharing or knowledge sharing (e.g., encourage Pictured Rocks Cruises to use B20 in their fleet within the next 5 years, encourage Pictured Rocks Cruises to follow park lead in converting to soy products).
- Work with the state to provide incentives for alternative fuel in tour buses.
- Establish an improved intra-park commuting scheduling program to allow park staff to commute to park locations more efficiently.
- Prepare a cost-benefit analysis of placing a fueling station on-site to avoid travel to in-town fuel stations.

#### Energy Use Management

**Emission Reduction Goal: Reduce Energy Use Emissions to 15% below 2005 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, approximately 10 percent of the park's GHG emissions result from energy consumption. The following strategies were developed to meet the park's energy use emission reduction goal:

#### Install energy efficient light fixtures

- Replace existing indoor lights (e.g., incandescent) with energy efficient compact fluorescent bulbs within one year.
- Develop solution for proper disposal of compact fluorescent light bulbs within the next five years.
- Replace inefficient lighting fixtures with energy efficient fixtures within five years.

### Replace existing inefficient devices with energy efficient devices

- Replace park headquarters boiler with one that maximizes annual fuel utilization efficiency (AFUE) to improve efficiency of headquarter heating.
- Investigate establishing an alternative to personal gas generators used by visitors to charge fishing batteries by installing an NPS photovoltaic charging station.
- Replace existing refrigerators (20+year old devices) with newer energy efficient models.
- All new appliance purchases will carry the “Energy Star” rating

### Develop park policy that promotes energy efficiency and energy conservation

- Develop active messaging program to encourage staff to turn off lights and computers, using daylight, etc.
- Make future park headquarters a LEED standard building.
- Incorporate LEED building standards into research, education, and stewardship center plans.
- Investigate potential for wind energy at Grand Marais and Munising maintenance areas.
- Investigate energy efficient window coverings for buildings.
- Shut down or zone the heating for select buildings, including Grand Marais quarters 57, and Grand Marais ranger station. Reduce the \$6,000–\$7,000 dollars annual cost of heating from 2 hot water heating tanks by investigating purchase of higher efficiency water heaters.
- Expand relationships with NMU, high school classes, Michigan State University to bring students who can assist with the following,
  - Meter and document, with help from summer interns, existing facilities and photovoltaic systems, and
- Investigate off-grid heating systems for equipment storage building.
- Record and compare data from activity monitoring systems.
- Investigate opportunities to install curtain panels to allow cars to pass through maintenance building doors without opening maintenance building doors.

### Waste Management:

**Emission Reduction Goal: Reduce Waste emissions to 35% below 2005 levels by 2012 through waste diversion.**

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. Pictured Rocks NL activities emitted 109 MTCE from waste management in 2006. The following strategies were developed to meet the park’s waste emission reduction goal:

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

- Develop a set of guidelines to formalize waste prevention strategies into standard park practices (e.g., water coolers, double-sided printing, re-using garbage bags, separating food waste).
- Prepare Reduce, Reuse Recycle messaging — connect to climate change message.
- Expand on-going efforts to foster recycling within the greater Munising area to include metal, glass and plastic.
- Inform visitors that the park has limited ability to recycle; encourage them to take their recyclables home with them if they have a functional program.
- Consult with EPA’s office of waste to develop local recycling opportunities.
- Set internal policy, with input from green team, on procurement thought process.
- Reduce staff meeting hand-outs, e.g. calendars, etc.

### Did You Know?

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

## STRATEGY 2: Increase Climate Change Education And Outreach

### Emission Reduction Goals:

- Recruit 50% of park staff participating in Do Your Part! Program in 2008
- Motivate 10% of PIRO visitors reduce their household emissions by 10% annually by 2012

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 greenhouse gas emissions can motivate staff, visitors, and community members to incorporate climate friendly actions into their own lives. Pictured Rocks NL 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 Pictured Rocks NL 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, Pictured Rocks NL 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 trainings

In an effort to provide Pictured Rocks NL staff with the knowledge and tools to educate visitors, the park will:

- Develop climate change training for all park staff.
- Ensure that all staff have the appropriate training to share information about climate friendly park features
- Encourage all staff to participate in Do Your Part.
- Work with partners to develop an internship program intended to support necessary data collection and education and outreach.
- Develop and award Certificates of Climate Friendly Park Actions for area businesses and organizations.

### Visitors

Understanding climate change and its consequences is essential to initiating individual behavioral change. Pictured Rocks NL realizes that it has a unique opportunity to educate the public in a setting free from 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, Pictured Rocks NL can play an important role in educating the public about climate change.

### Incorporate Climate Change awareness into visitor education

Park Heritage Education staff have the opportunity to introduce the issue of climate change to many visitors and local residents. Pictured Rocks NL encourages staff to include messages about climate change in their presentations. The park will:

- Include climate change topics new and existing school groups, youth programs, etc.
- Explore developing a scout Climate Change Merit Badge.
- Incorporate climate change messaging into existing interpretive programs where appropriate.
- Develop climate change messaging on ALTRAN backpacker shuttle)

### 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 Pictured Rocks NL. The park will:

- Develop a page on the PIRO website dedicated to climate change that will be linked to the Do Your Part Program.
- Include Climate Friendly Parks messaging and logos in appropriate outreach material.
- Partner with local, state, and national partners to develop specific and relevant education and interpretive materials.
- Include climate friendly messaging on appropriate park exhibits.
- Include climate change strategies in the Long Range and Annual Interpretive Plans.
- Develop appropriate print and web materials on climate change and include on appropriate park bulletin boards.
- Heritage Education and Science staff will take the lead to stay current on rapidly changing climate change information.

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

Pictured Rocks NL 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:

- Develop exhibits and messaging for climate friendly park features so that visitors are aware of the actions the park has taken.

### Encourage Visitors to reduce greenhouse gas emissions

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

- Incorporate materials including a Do Your Part kiosk, poster and brochures in appropriate outreach venues including the visitor's center.
- Develop local partnerships to secure the needed funding and support for the Do Your Part program.

### Local Community

The communities that surround Pictured Rocks NL play a significant role in supporting the parks GHG reduction goals. As such, when appropriate, Pictured Rocks NL 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

Pictured Rocks NL realizes that climate change does not adhere to geographic or political boundaries. In an effort to reach out to the community, the park will engage in strategies such as:

- Work with the Native American community on promoting climate change messaging and action.
- Promote community "Sustainability Forums."

## Conclusion

Pictured Rocks NL has a unique opportunity to serve as a model for over 475,000 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, Pictured Rocks NL 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 established Environmental Management System (EMS). Realistic environmental commitments created by Pictured Rocks NL staff and approved by the park's Superintendent will significantly reduce the park's GHG emissions and CAPs 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. Pictured Rocks NL'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, Pictured Rocks NL 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 Pictured Rocks NL to the forefront of Climate Friendly Parks.