National Park Service
U.S. Department of the Interior

CLIMATE*Friendly* PARKS

Crater Lake National Park Action Plan

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CRATER LAKE NATIONAL PARK BECOMES A CLIMATE FRIENDLY PARK

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

This Action Plan identifies steps that Crater Lake National Park can undertake to reduce GHG emissions and mitigate its impact on climate change. The plan presents the park's emission reduction goals, and associated reduction actions to achieve the park's goals. Strategies and action plan items were developed by working groups at the Klamath Climate Friendly Parks Workshop.[1] While the plan provides a framework needed to meet the park's emission reduction, it is not intended to provide detailed instructions on how to implement each of the proposed measures. The park's Environmental Management System (EMS) will describe priorities and details to implement these actions. The Superintendent has signature approval and mandates implementation of the program and will provide funding.

Crater Lake National Park aims to:

- Reduce greenhouse gas emissions from park operations by 35% below 2007 levels by the year 2016.
- Reduce greenhouse gas emissions by the total park by 15% below 2007 levels by the year 2016.

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

Strategy 1: Identify and implement mitigation actions that the park can independently take to reduce GHG emissions resulting from activities within and by the park.

Strategy 2: Increase climate change education and outreach efforts.

Strategy 3: Monitor progress with respect to reducing emissions and identify areas for improvement.

THE CHALLENGE OF CLIMATE CHANGE

Climate change presents significant risks and challenges to the National Park Service and specifically to Crater Lake National Park. Scientists cannot predict with certainty the general severity of climate change nor its impacts. Average global temperatures on the Earth's surface have increased about 1.1°F since the late 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_2), methane (CH_4) and nitrous oxide (N_2O) —which trap heat that otherwise would be released into space.

The continued addition of CO_2 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.[2] 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.

[1] Original notes from these workshops, including detailed action items not presented in the final plan have been archived by Crater Lake National Park and are available upon request.
[2] 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>

At Crater Lake National Park, increasing temperatures, and changing precipitation patterns may alter park ecosystems, changing vegetation communities, habitats available for species, and the experience of park visitors.

GREENHOUSE GAS EMISSION INVENTORY AT CRATER LAKE NATIONAL PARK

Naturally occurring GHGs include CO_2, CH_4, N_2O, 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 transportation and energy (e.g., boilers, electricity generation), the decomposition of waste and other organic matter, and the volatilization or release of gases from various other sources (e.g., decompositions of the forest, flora and refrigerants).

In 2007, GHG emissions within Crater Lake National Park totaled 10,031 metric tons of carbon dioxide equivalent ($MTCO_2E$). This includes emissions from park and concessioner operations and visitor activities, including vehicle use within the park. For perspective, a typical single family home in the U.S. produces approximately 11 $MTCO_2$ per year.[3] Thus, the combined emissions from park and concessioner operations, and visitor activities within the park, are roughly equivalent to the emissions from the electricity use of 900 households each year.

The largest emission sector for Crater Lake National Park is Energy, totaling 9,078 $MTCO_2E$ (see Figure 1 and Table 1).

In 2007, GHG emissions from park operations within the park totaled 3,088 MTCO2E. Energy use contributed 2,498 or 81% (see Figure 2 and Table 2) of this total.
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[3] U.S. EPA, Greenhouse Gases Equivalencies Calculators – Calculations and References, Retrieved , Website: http://www.epa.gov/RDEE/energy-resources/calculator.html

Figure 1

Crater Lake National Park 2007 Total Greenhouse Gas Emissions by Sector

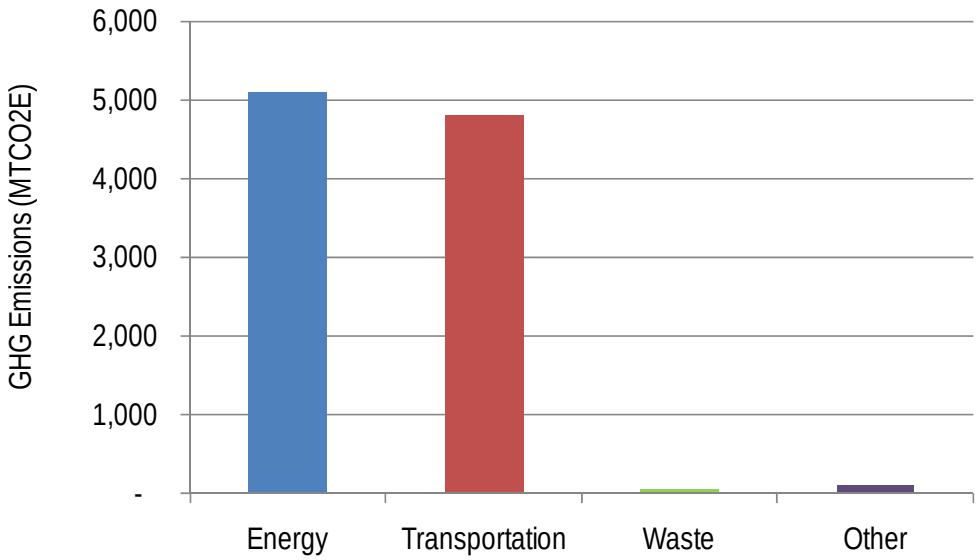

TABLE 1

Crater Lake National Park 2007 Total Greenhouse Gas Emissions by Sector and Source

	MTCO2E
Energy	5,078
Stationary Combustion	2,136
Purchased Electricity	2,942
Transportation	4,789
Mobile Combustion	4,789
Waste	64
Landfilled Waste	64
Other	100
Refrigeration and Air Conditioning	100
Total	10,031

Note - Totals may not sum due to rounding

Not applicable data sources represented by "-"

FIGURE 2

Crater Lake National Park 2007 Park Operations Emissions by Sector

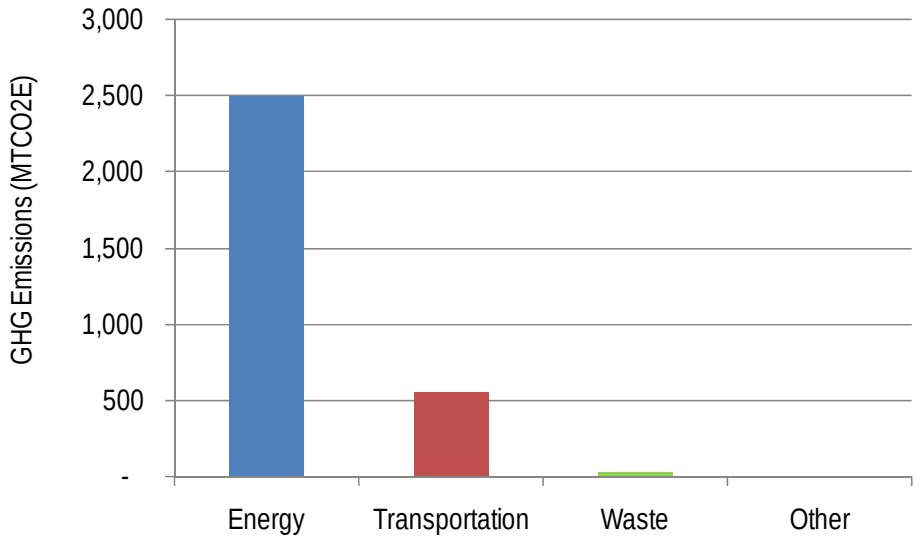

TABLE 2

Crater Lake National Park 2007 Park Operations Emissions by Sector

	MTCO2E
Energy	2,498
Stationary Combustion	1,426
Purchased Electricity	1,072
Transportation	560
Mobile Combustion	560
Waste	26
Landfilled Waste	26
Other	4
Refrigeration and Air Conditioning	4
Total	3,088

Note - Totals may not sum due to rounding

Not applicable data sources represented by "-"

Crater Lake National Park Responds to Climate Change

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

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

Crater Lake National Park has developed a set of actions that the park is committed to taking in order to reduce emissions from activities within and by the park. These strategies have been prioritized based on a qualitative assessment of a set of criteria including: emission reduction potential, cost-effectiveness, feasibility, co-benefits, regional impact, and ability to rapidly implement. Actions that Crater Lake National Park will take have been presented below in order from highest to lowest priority within each sub-category.

Energy Use Management

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

Improving energy efficiency and implementing alternative energy sources reduces park-based fuel use, lowers GHG emissions, decreases electricity consumption, and offers monetary benefits for the park. Emissions inventory results indicate that 81 percent of the park's GHG emissions from park operations are from energy consumption. Consequently, Crater Lake National Park identified actions it will take to reduce energy-related emissions. Presented below are the actions that are currently under way and which comprise the park's progress to date, as well as those actions the park will pursue.

Progress to Date

Behavioral Changes

- The park currently utilizes a janitorial cleaning schedule that ensures buildings are being cleaned during the day, minimizing the need for after hours energy use.

Lighting

- High intensity Discharge (HID) or fluorescent lights are used in all fixtures used more than three hours per day in the Maint, Sager, Canfield, Steel and Rathall buildings.

Energy Efficiency

- The park underwent an energy audit in 2010 funded by Washington Office.
- All computers default to print double-sided.

Energy Use Management – Planned Actions

1 Promote energy efficiency and energy conservation in the park through behavioral change

- Develop Green Minute Division and Squad meetings that focus on promoting energy efficiency through behavioral change.
  - Encourage staff to walk to work from housing areas and eat lunch locally to reduce the need for short trips.
  - Encourage seasonally appropriate clothing instead of adjusting building temperature.
- Encourage energy conservation in all park activities.
- Develop a mandatory energy-saving training program.
  - Develop online energy saving training. Devote time during all employee meetings to energy awareness training.

- Ensure lights are turned off when area is not in use and motion sensors are used where possible. Make sure all doors and windows are closed when leaving building
- Consider having an energy talk/suggestions included in seasonal training. All employees should be included in this session as a mandatory attendance. Maybe bring an outsider in to teach energy awareness.

- Create incentives for seasonal employees to conserve energy in housing.
- Establish an Operations and Maintenance (O&M) schedule that evaluates energy use across the entire park.
  - Review Operation and Maintenance schedule to make sure that implementation of the schedule is in line with the needs of park buildings. Continue to review and improve the schedule if increased or decreased monitoring is required.
  - Insure thermostat settings on hot water heaters are set to 90 degrees F.
- Ensure all computers' power management settings follow current ENERGY STAR recommendations.
  - Set to turn off automatically at night. Set to hibernate after 15 minutes of non use.

2 Upgrade lighting options

- Install energy-efficient light fixtures.
  - Ensure that all housing areas and night time lighting is energy efficient in housing areas, maintenance buildings, Canfield, Steel, Sager, Rathall, Sinnot and Snow Tunnels.
  - Develop written policies for outdoor and indoor lighting regarding reducing or down lighting and sky lighting.
- Install and enable lighting controls.
  - Utilize timers for external lighting and set existing timers for operational needs.
  - Continue to install motion sensors in buildings on case-by-case basis.
- Develop a list of buildings that should have reduced or no lights on at night.
  - Check that facilities on list are not using unnecessary lighting after hours.
  - Task rangers with checking up on buildings to prevent over-lighting after hours.
- Reference Lighting Design Lab materials provided by the Pacific West Regional Office to gain insight on best lighting fits for park buildings.
  - Continue to work with Pacific West Regional Office contacts when there are specific questions regarding appropriate fixtures and energy-efficient alternatives.
- Use ambient light and take advantage of day lighting opportunities.
- Explore ways to revise park housing policies to promote maximum efficiency in lighting.

3 Heating Ventilation and Air Conditioning (HVAC)

- Recalibrate thermostats to improve energy efficiency.

- Develop HVAC Maintenance Schedule.
- Upgrade Air Distribution Systems.
  - Investigate solution to remedy overheating of maintenance shop (Building 14). PMIS project needed.
  - Consider retrofitting to regulate heat within maintenance shop building and include in Project Management Information Systems (PMIS) statement.
- Investigate new options for renovating historic buildings for greater energy efficiency.
  - Initially target Canfield, Sager, Natural Resources, and Steel buildings for energy efficiency retrofits.
  - Prioritize and implement recommendations from energy audits and include recommendations from park cultural resources staff.
- Investigate the possibility of reusing excess or waste heat in the server room to heat other areas of buildings.

4 Switch to more efficient electronics and devices

- Replace park's existing boiler or furnace with an energy-efficient model.
  - Funding for this action is planned for Fiscal Year 2011 (B14).
- Establish and implement a green procurement policy that sets minimum energy performance standards for all electronic equipment and purchase only energy-efficient electronics.
  - Ensure that all new electronic/office equipment is ENERGY STAR qualified at www.energystar.gov, and rather than purchasing individual copy, fax, print, and scanning equipment, consider a multi-function device.
  - Develop a green purchasing workshop for micro purchasing awareness. This information is on the S:\ drive for all to read.
  - As computer system needs upgrading, ensure that the upgrade employs energy-efficient technology.
  - Refer to the Federal Energy Management Program guidelines for purchasing energy-efficient appliances in accordance with federal procurement procedures.
- Investigate Biodiesel in boilers to offset emissions.
- Investigate the potential for additional portable photovoltaic arrays to be used with the park.
  - Lower temperatures in offices; provide all employees with space heaters.
  - Explore opportunity to share this equipment with other Klamath Network parks.
  - Alternatively, consider the possibility of moving the North Entrance Station to the North Junction. Waiting on funding, in planning.

5 Improve thermal performance and energy efficiency in new and existing buildings

- For new and existing buildings focus on increasing the efficiency of building envelopes through weatherization. Honey comb window coverings will help keep heat in, and cold out.

- Minimize air infiltration and adding R-Values to improve insulation effectiveness. Target buildings and entryways where energy audits have identified as lacking insulation.
- Consider integrating passive house design concepts in the rehab of Community Center and all new constructions and building retrofits. Provide Pacific West Regional staff with as-built design for review and integration of passive house design concepts.

- Weatherize or replace windows with new energy-efficient windows where needed.
  - Look to improve or weatherize windows where possible before replacing.
  - Look for spectrally selective glass, double-glazed, low-e systems, gas filled windows, and electro chromic windows that provide better insulation and solar selectivity in windows that require replacement.
  - Replace windows in Steel Circle Housing, and work with PWR historical architects to develop more efficient glazing strategy for all the park's historic buildings.
- Consider updating space management plan to include areas of conditioned air in the building to minimize unneeded energy use for heating and cooling.
- Involve staff from Pacific West Regional Office involved in planning stages for park visitor center reconstruction.

6 Utilize alternative energy sources and improve power quality at park

- Purchase electricity from a renewable energy provider.
  - Research costs and benefits of renewable electricity options through Pacific Power's Blue Sky Program to reduce electricity-related GHG emissions.
  - Investigate off-season building utilization so buildings are not heated while not being used.
- Switch to biomass and biofuel instead of conventional fuel to heat park buildings.
  - Add supplemental heating in houses with pellet stoves. Saves money and energy.
  - Conduct study for long-term transition of community center and residence areas off of fossil fuels. Consider working with the Oregon Institute of Technology (OIT) to conduct assessment for the park. Provide OIT Team with list of Project Management Information System requirements so they may develop recommendations that are formatted to meets PMIS requirements.
- Investigate the potential for renewable energy and increased energy efficiency on Wizard Island.
- Work with Pacific Power & Light to determine what factors are leading to power of poor quality being provided to the park and investigate possibilities for conducting assessment of power quality with utility. Emphasize that Crater Lake is implementing new technology that requires power of high quality to perform properly.
- Investigate micro-hydro power at Annie Creek. Coordinate with efforts that are underway at Oregon Caves National Monument to take findings of feasibility analysis. (Oregon energy trust, Olympic projects.)

7 Measure energy use throughout the park

- Ensure that energy audits are conducted for all park buildings. Partner with utilities, Pacific West Regional Office, Washington Office and local universities to conduct audits as needed.

- Work with Oregon Institute of Technology to conduct thermal imaging analysis of buildings during the winter months to identify space heating efficiencies and opportunities for envelope and thermal performance improvement. (Contact OIT through Marsha connection about past audit.)
- Ensure that recommendations are made for appropriate lighting solutions for each space as part of energy audits.
- Consider recommendations of energy audit with respect to options for renovating historic buildings and investigate compliance concerns.
- Develop PMIS statements informed by research and discussion on energy audit results and historic building considerations.

- Install building-level utility meters in existing buildings and in new major construction and renovation projects to track and continuously optimize performance.
  - Transfer all metered building data directly in web-based system and drop data directly in ENERGY STAR Portfolio Manager and/or Visible Energy software.

8 Other energy-related actions

- Review and implement the DOI Sustainable Buildings Implementation Plan (SBIP).
  - Ensure that any future work on new or existing buildings complies with SBIP.
- Incorporate energy efficiency criteria into new contracts for park and concessioner construction.
- Notify concessioners of park participation Climate Friendly Parks program and emissions reduction goals to facilitate contract compliance.
- Contracts with the concessionaire need to have language that require contractor to adhere to parks climate action plan. 2018
- Use existing office space efficiently.
  - Assess space utilization of Canfield Building during winter months. Consider opportunities to relocate staff that occupies this building during winter months to reduce heat and electricity use if appropriate.

Transportation Management

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

Reducing vehicle miles traveled, improving vehicle efficiency, and using alternative fuels can significantly reduce Crater Lake National Park's emissions. As the inventory results indicate, GHG emissions from transportation comprise 18 percent of park operations emissions and 51 percent of the park's overall emissions (including visitors, and concessioners). Accordingly, in addition to the park operations emissions reduction goal, Crater Lake National Park set a goal to reduce overall transportation emissions by 10 percent below 2007 levels by 2016. Presented below are the actions that are currently under way and which comprise the park's progress to date, as well as those actions that the park will pursue.

Progress to Date

- The park converted several diesel fuel vehicles to biodiesel and plans on converting more in FY 2011.
- The park purchased three hybrid vehicles for local use in 2010.

- Park staff utilizes videoconference, TELNET and SAME TIME technologies to reduce meeting travel. Investigating video conferencing for Sager building conference room.
- Showcase new technologies in the park through vehicle replacements
  - The park obtained a diesel, electric D7 dozer.
  - All new diesel engines are Tier 4 compliant.

Transportation Management – Planned Actions

1 Transportation-related behavioral changes

- Discourage vehicle idling.
  - Develop park “no idling” policy.
  - Educate staff to the benefits of turning off vehicle when they are not in use and encourage supervisors to enforce "no idling" policy.
  - Empower staff to notify visitors of "no idling" policy, especially at entrance stations, and around visitor centers.
- Encourage staff carpooling.
  - Many park staff that live in close proximity carpool in personal vehicles. The park will explore the possibility of park staff commuting with the trolley operating from Klamath Falls.
  - Use electric car for short trips between buildings. Look into the possible purchase of additional electric vehicles. Investigate electric bicycles and scooters.
- Continue to reduce meeting travel.
  - Continue webinars, TELNET, and SAME TIME activities. Conference calls and carpooling to meetings should also be used when possible. Site meeting locations to be most efficient use of travel for all participants. Investigate video conferencing for some meetings.
- Include safe and sustainable operations in Performance Standards.

2 Reduce visitor vehicle fuel consumption

- Provide alternative modes of visitor travel and partner with surrounding state and local communities on alternative transportation opportunities for visitors.
  - Prototype trolleys to be run on Compressed Natural Gas (CNG) are being planned for the 2010 season to be used as interpretive tour vehicles.
  - Increase the use of alternative fuel buses (using bio-based fuels) to areas of heavy use and traffic, i.e., popular destinations in the park.
  - Investigate the feasibility of using shuttle buses around the park’s rim and look into funding sources for more alternative transportation.

- Incentivize visitor use of high efficiency and alternative fuel vehicles and hybrids as well as carpooling.
  - CNG Trolley car service was added reducing 6,000 trips around rim drive.
  - Consider incentives such as "free" food at lodge, and or discount at book store for visitors arriving in >40-mpg vehicles.
- Designate vehicle free times or locations in the park.
  - Idea of vehicle free times is currently in GMP as a "trial" program at the park.
  - Consider establishing date in the fall when East Rim Drive is closed to public access.

3 Reduce NPS vehicle and equipment fuel consumption

- Exceed federal fleet performance requirements set by Energy Policy Act (EPAct), Executive Order 13423, and the Energy Independence and Security Act (EISA).
- Promote efficient driving.
  - Educate and place the use of this knowledge in employee Performance Standards.
  - Enforce policy concerning government vehicles being used for breaks and lunches. Employees should stay at the location to take breaks and lunches under expectable weather conditions. Also the amount of employees in each vehicle. If many employees are working at the same site they should ride share.
  - Provide incentives for walking to work every day.
  - Provide bikes for commuting between buildings.
  - Coordinate with Xanterra to provide a shuttle for entrance station and other location drop offs.

  Investigate snow coach to rim to enable reduced plowing.
- Apply for a fleet management study for park vehicles. Include fleet fuel consumption pattern analysis.
  - Analyze fleet fuel-consumption patterns for efficiency improvements.
  - Use the Federal Automotive Statistical Tool (FAST) to track fuel use and analyze fleet needs with efficiency improvements.
- Investigate additional partnerships for reducing NPS fuel consumption
  - Partner with OIT during summer months on the use of electric vehicles.
  - Evaluate options for using boats that are less reliant on fossil fuel for use on the lake by both NPS and concessioner.
  - Investigate sharing vehicles with other parks and agencies for off season use.
  - Ask Xanterra if NPS employees could ride on their shuttles.
  - Inquire about park-owned van for shuttle services that would be operated within a four-mile perimeter around the maintenance building for shuttling park staff.
- Continue to use biodiesel and increase blend of biotic component of fuels

- Continue to investigate suppliers and increasing the biotic component of diesel fuels. Educate maintenance staff to PM/RM needs required with biodiesel use. Ask other parks to share expertise in this area.

- Consider plowing one lane around the rim of the lake for single route of traffic, and letting remaining snow melt out during the spring and early summer before plowing, as an alternative to keeping two lanes of road snow free.

4 Replace NPS vehicles and equipment

- Right size the vehicle fleet by the number and type and develop a vehicle replacement plan.
  - Use a Vehicle Allocation Methodology (VAM) to achieve a fleet that is the right size and type.
  - Evaluate Alternative Fuel Vehicle (AFV) options: Hybrid electric vehicles (HEVs), electric vehicles, compressed natural gas (CNG), biodiesel.
  - As older vehicles come up for replacement, order alternative fuel vehicles.
  - Review other parks fleet management plans for fleet best management practices.
- Showcase new technologies in the park through vehicle replacements.
  - Compressed National Gas (CNG) Trolley is in use summer of 2010. Collaborate with OIT to use electric vehicles for demonstration purposes.
- Remove polluting vehicles from fleet.
  - Continue to analyze and renew the fleet with less polluting vehicles.
- Incorporate alternative fuel guidelines into fleet specifications.
  - Work with GSA to catalogue available AFVs and set minimum AFV goals.

5 Increase vehicle maintenance efforts

- Develop and maintain a vehicle maintenance schedule.
  - Encourage vehicle operators to do a daily pre-operation check to ensure that tires, fluids and other systems are functioning properly.
- Use bio-based lubricants and greases.
  - Continue to use these products in vehicle maintenance. Ensure that park's Fire Management program is also using bio-based products.

6 Improve transportation infrastructure

- Align opening of some access points to the park with the natural melt as opposed to plowing to clear roadways in time for normal opening date. (In progress.)
  - Advertise opportunities to use roadways for alternative modes of travel during this period. Advertise the fact that this action saves fuel, which reduces GHGs and saves money to fund additional park staff positions.

Waste Management

Emission Reduction Goal: Reduce park operations' waste emissions to 35 percent below 2007 levels by 2016 through waste diversion and reduction.

The connection between waste and GHG emissions may not be obvious. However, waste management—in the form of source and solid waste reduction—can dramatically reduce GHG emissions. Landfills are the largest human-generated source of CH_4 emissions in the United States. Reducing the amount of waste sent to landfills reduces CH_4 emissions caused by decomposition as well as the GHGs emitted from the transportation of waste. The less the park and its visitors consume in terms of products and packaging, the less energy is used and fewer GHGs are emitted.

Crater Lake National Park's park operation activities emitted 26 $MTCO_2E$ from waste management in 2007. Diverting or reducing the park's waste stream through increased recycling efforts and waste management will reduce the amount of waste sent to landfills and reduce emissions. Presented below are the actions that are currently under way and which comprise the park's progress to date as well as those actions that the park will pursue.

Progress to Date

- Partnering with vendors to reuse and recycle park waste.
- Recycling or donating old computers and electronics.
- Practicing environmentally responsible deconstruction in facilities.
- Using recycled oil, recycled coolant and other fluids in auto shop.
- Managing non-point wastewater, replacing toilets with low flow models and conserving water in grounds maintenance.
- Adapted a list of pre-purchasing questions for park procurement.
- Sending used florescent bulbs to recycling center.
- Recycling using no-VOC paint for interior use.
- Co- located trash and recycling containers.
- Using carpet with high recycled content for building projects.
- Replacing cleaning supplies with non-toxic products.
- Eliminated non-recyclable Styrofoam food service ware and encouraging alternatives to plastic water bottles to reduce plastic water bottle use in park.
- Improving waste collection and transportation efficiency by appropriately sizing vehicles to transport waste.
- Supporting and promoting the Pack-In and Pack-Out Program.
- Purchasing products that minimize packaging.
- Promoting the use of recycled content products and materials procurement within the NPS.
- Using reclaimed materials for new roads and paving.

- The park has stocked piled some roadway regrind material for reuse and will continue to include language on using reclaimed materials in future roads and paving contracts.
- Used tub grinder to grind 375 tons of trees which went to generate electricity.

Waste Management – Planned Actions

1 Decrease waste through behavior change

- Train staff on green procurement practices. (All documents pertaining to green purchasing can be found under s:\Procurement".)
  - Look for online procurement training to provide to staff.
- Train park staff on source waste prevention, recycling and composting initiatives.
  - Connect waste prevention action with data and additional actions developed in the park's Integrated Solid Waste Alternatives Plan (ISWAP).

2 Establish new plans and policies that promote waste reduction and prevention.

- Start a comprehensive waste reduction and recycling outreach campaign aimed at park visitors.
  - Continue to educate visitors through park newsletters on the park's recycling program.
  - Coordinate with Xanterra to look for opportunities to collaborate on recycling.
  - Include waste prevention and recycling messages in park talks.
  - Provide recycling messages in brochures, trail guides, maps, website and posters.
  - Use recycling messaging at waysides, campground display boards, and kiosks.
- Reduce plastic water bottle use.
  - Educate the public on the environmental impacts of plastic water bottles.
  - Collaborate with Xanterra to only sell refillable water bottles and explore other options for water distribution to visitors.
- Incorporate waste reduction into green office practices.
  - Place park on no or single catalog list, work with suppliers and procurement policies that will provide "just in time" deliveries of materials which will help reduce storage and duplication of orders.
- Minimize waste associated with paper towels.
  - Investigate high velocity hand dryers for use in park restrooms.
- Reduce waste generated at meetings and employee functions
  - Obtain Redwoods National Park standard operating procedure for "Green Meetings".
- Create a materials and equipment exchange program.

- Explore hiring network intern to evaluate purchased vs. used material. Recommend to management team actions to correct discrepancies.

3 Implement recycling and composting practices

- Continually increase the amount of waste material at the park that can be recycled.
  - Increase recycling rate of cardboard, aluminum, scrap metal, glass, white paper, carpet and No. 1 PET and 2 HDPE plastics.
  - Investigate glass pulverizer.
- Continue to co-locate trash and recycling and install easy-to-use recycling containers throughout park facilities.
  - Purchase containers with recycled content. Ensure that trash and recycling containers are next to each other.
  - Evaluate recycling signage and update graphics as needed (work with sign committee).
- Continue to recycle or donate old computers and electronics.
  - Recycle unusable computers and electronics.
  - Donate old equipment to schools, senior centers, etc.
  - Practice cradle-to-grave recycling to ensure toxic components are properly managed. Purchase electronics with less toxic components.
- Ensure that at least one full time person is acting as a park recycling leader/manager (Brian Coulter & Matt Shaefer).
  - Primary responsibility of the park recycling leader/manager will be to assess and continually improve park's recycling activities.
- Establish a propane cylinder recycling program. Management Assistant Concession when hired.
  - Explore partnership with Xanterra to implement this program.
- Develop and implement a Construction Waste Management Plan and job site recycling policy that includes source reduction as the priority practice. Other important components should include:
  - Require a Construction Waste Management or Recycling Plan and track quantities of recyclables.
  - Make sure contract language addresses waste plan and recycling. Check on “take-back” policies (e.g., ceiling tiles, cardboard, carpet, drywall).
  - Reuse construction waste on-site, reuse elsewhere, or sell for recycling materials of value including lumber, drywall, metal, rubble, cardboard, fixtures, hardware, and wiring.
  - Require contractors to recycle waste.
  - Work with haulers to prevent contamination of waste sorting. Ensure no illegal dumping occurs off job site.
  - Partner with vendors to reuse and recycle park waste.
  - Reuse of construction waste on-site, reuse elsewhere, or selling recycling materials of value (lumber/wood, drywall, metal, rubble, cardboard, fixtures, hardware, and wiring).

- Requirements that drywall and other construction contractors recycle waste. Testing for lead and asbestos where needed.
- Evaluation of the reuse of old fixtures, windows, toilets, etc. that are not energy efficient, unless there is historic value.
- Investigate replacing offsite ware house with on site building in south yard.
- Requirements for waste haulers to prevent contamination of waste sorting.
- Documentation to ensure no illegal dumping occurs off job site.

- Continue to practice environmentally responsible deconstruction.
  - Old building materials will be reduced, reused, and salvaged, in that order.
  - Inefficient materials or components will not be salvaged; ensure that the reuse of vintage items represents an environmental gain.
- Continue to send used florescent bulbs to recycling service center.
- Investigate alkaline, lithium battery recycling locations in every office building. Also investigate rechargeable battery options.
- Continue to use recycled oil and recycled coolant and other fluids in auto shop.

4 Reduce waste through green procurement

- Continue to update and develop green procurement plan.
  - Continually increase the recycled content of purchased materials.
  - Focus on office supplies, gift shop concessioners, building supplies, furniture and maintenance equipment: hoses, mulch, edging, timbers, posts, and compost with recycled content.
  - Establish purchasing requirements for low or no-VOC insulation, carpets, paints, and adhesives.
  - Use carpet with high recycled content for any building projects.
  - Use no-VOC paint for interior use
  - Buy FSC certified wood
- Continue to update list of pre-purchase questions for the park to accompany green procurement plan.
- Continue to inventory and substitute all cleaning supplies with non-toxic products.
  - Conduct an inventory and review of all cleaning supplies. Substitute products containing hazardous/toxic chemicals with non-toxic products.
- Encourage contractors to practice green procurement practices

5 Reduce and reuse wastewater

- Continue to replace toilets with low-flow models.
  - Install water efficient technology, e.g., composting toilets and waterless urinals where practical.
  - Look at installing composting toilets at park comfort stations where practical.
  - Mark storm drain inlets and trench drains that drain to surface water.
  - Vehicles will be washed in the wash bay.
- Continue to conserve water used in grounds maintenance.
- Continue to monitor, manage non-point wastewater.
  - Prevent pollution and use green products. Keep storm drains clean. Clean up spills, but do not hose into streets.
  - Dispose of pesticides and tank rinsate properly. Check state and local requirements.

6 Other waste-related actions

- Constantly improve waste collection and transportation efficiency
  - Installing waste handling, compacting, and distribution locations and appropriately sizing vehicles to the waste they are transporting can decrease emissions by reducing trips and load size.
- Track and report landfill data to monitor reductions and success in diverting waste from the landfill.
  - Incorporate the tracking and reporting of landfill data into EMS goals; leverage spreadsheet tracking and CLIP tool functionality. Track and report recycling data (e.g., quantity and type of material).
- Ask management team to participate in annual hazards waste dump fair.

STRATEGY 2: INCREASE CLIMATE CHANGE EDUCATION AND OUTREACH

Climate change is a complex and easily misunderstood issue. Crater Lake National Park can play an integral role in communicating about climate change to a vast audience. A better understanding of the challenges and benefits of reducing GHG emissions can motivate staff, visitors, and community members to incorporate climate friendly actions into their own lives. Crater Lake National Park 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 Crater Lake National Park takes to address climate change serve as opportunities for increasing the public's awareness of climate change. Presented the actions that are currently under way and which comprise the park's progress to date, and those actions that the park will pursue.

Progress to Date

- Created brown bag series for park staff, concessioners, partners, and occasionally visitors to educate about current climate change science, the park's efforts, and what they can do.

Park Staff

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

Developing a climate change education program for park staff is vital to increasing awareness about climate change among park visitors and fostering a sense of collective responsibility among staff to help reduce park emissions. By incorporating climate change education into staff development programs, Crater Lake National Park will enable its staff to demonstrate their commitment through leading by example, and providing visitors with the tools and resources they need to reduce GHG emissions in the park and in their own communities. Potential actions include:

- Hold internal Climate Friendly Park discussions and workshops.
  - Devise new strategies to continually reduce greenhouse gas (GHG) emissions.
  - Discuss climate friendly parks successes and new information at quarterly staff meetings.
- Keep staff members that are part of the Green Team/Environmental Management Team informed about climate-related issues.
  - Use materials, publications, and tools available from the U.S. Environmental Protection Agency (EPA) and other agencies and organizations to mentor fellow staff about climate change.
- Incorporate climate change issues into the employee handbook.
  - Include climate materials in employee orientation packets.
- Include the science and impacts of climate change into park education tools.
  - Incorporate sessions on climate change into seasonal staff training.
  - Tailor seasonal staff handbook to include Climate Friendly Parks information.
  - Include Climate Friendly Parks language in kiosks and other educational materials.
- Incorporate sessions on climate change into new staff training.

Visitor Outreach

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

Crater Lake National Park staff recognize the many different audiences that visit the park, including recreational and non-recreational park visitors, “virtual visitors” who visit the park online, school-aged visitors, local and out of town visitors, local tribes, and external audiences. Reaching these various audiences with climate change information and engaging them in the park’s efforts requires appropriately focused messaging. The park has developed a number of strategies to reach these various audiences effectively. These strategies include:

- Continue including discussion of climate change impacts on Crater Lake in park newsletter.
- Include climate change messaging In Junior Ranger Program.
  - Work with Lassen Volcanic National Park on modeling climate change approach in Junior Ranger program after their efforts.

- Contribute park success stories to Pacific West Region's "Green Voice" publication.
    - Assign Science & Learning Center Intern to prepare an article for a future issue.
- Engage the Science and Learning Center on opportunities to incorporate climate change science into the educational materials that it provides to the public (e.g., on-board kiosk on mobile solar display).
- Incorporate sessions on climate change into seasonal and new staff training.
    - Include best practices on sustainability as well as direction on how to interpret climate change in seasonal staff training. Consider having seasonal employees sign commitment of 10 things they will do to behave in a sustainable manner. Include reminders of commitments in staff housing.
- Incorporate climate friendly information into interpreter programs and talks.
    - The park will include climate friendly information in interpretive programs.
- Create signs promoting the park's efforts to curb emissions.
    - Create appropriate signage throughout the park that demonstrates the benefits of actions Crater Lake has taken to reduce GHGs.
- Consider hosting a climate change traveling exhibit.
    - Host the "Arrange for Change" traveling exhibit at the park in August, 2011.
- Advise staff on monthly webinars hosted by the Climate Change Steering Committee.
    - Notifications about monthly webinars will be emailed to all employee mailing lists.
- Educate visitors about their recycling options in the park and at home.
    - Ensure that recycle bins around the park are easily accessible and clearly identified.
- Communicate with local communities, park visitors, and local media about actions they can take to reduce GHG emissions.
    - The park will serve as one of the pilot parks providing off-sets for purchase through the Crater Lake Natural History Association.
- Create interpretive programs at the park.
    - Messages about climate change will be included in multiple park interpretive programs.
- Create demonstration projects and exhibits to convey park sustainability message to visitors.
- Continue to collaborate with other agencies on research learning centers to included climate change education in outreach efforts.
- Continue to be involved in Department of Interior Landscape Conservation Cooperatives.
- Include discussion of snow removal policy in newspaper that presents the benefits with respect to GHG mitigation efforts.
- Post seasonal house energy performance to demonstrate those that are top performers.

- Educate visitors about climate change.
  - Information about climate change will be included in interpretive programs, the park newspaper, and on the park website.
- Develop plan for interpretation on shuttle buses.
  - A new commercial use authorization in 2011 will provide for ranger led trolley tours around Rim Drive. The trolleys are powered by CNG, and messages about climate change will be included in the interpretation provided on the tours.
- Develop A "Do Your Part" Program for online visitors.
  - The park will provide links to the Do Your Part! website from the park website.
- Set climate change priorities and host climate change education workshops.
  - Science & Learning Center intern will create curriculum related to climate change. The park plans to host a teacher workshop once the curriculum has been developed.
- Contact possible park partners, such as park concessioners, tribes, friends groups, local environmental groups, and representatives from the local tourism/community business board, representatives from the state environment/energy departments, teachers, and local university partners to discuss climate change initiatives.
  - Continue working with Oregon Institute of Technology and Southern Oregon University on climate friendly projects through the park Science & Learning Center.
- Create personal incentives for staff to reduce GHG emissions in park and at home.
  - Add a "green award" category to the park awards policy.
- Create visual reminders for park employees regarding climate change and how employees can help reduce emissions.
  - Create signage to remind staff to turn off lights when not in use.
- Disseminate information about climate friendly actions the park is taking at conferences and regional workshops.
  - Information about climate friendly actions being taken at Crater Lake will be shared when staff members attend conferences or workshops.
- Incorporate climate change information into existing park brochures.
  - Make PWR climate change brochure available to the public.
  - Continue to include information about climate change in the park newspaper.
- Create an informational piece that describes the park's participation in the Climate Friendly Parks Program and key points of what this means in terms of park policy.

Local Community Outreach

The gateway communities, agencies, vendors, and volunteers surrounding Crater Lake National Park can play a significant role in supporting the park's climate change mitigation goals. As such, when appropriate, park staff will assist local communities with incorporating climate change messages into community events and find partners to promote climate change education at those events, and engage with surrounding agencies to coordinate effective outreach and education efforts. Potential actions include:

- Consider the local economy in procurement and other areas.

STRATEGY 3: EVALUATE PROGRESS AND IDENTIFY AREAS FOR IMPROVEMENT

By taking the actions established in strategies 1 and 2 above, Crater Lake National Park plans to reduce its emissions to the specified goals. Achieving these goals will require an ongoing commitment by the park, which may include subsequent emission inventories, additional mitigation actions, and revaluation of goals. As part of this strategy, Crater Lake National Park will:

- Monitor progress with respect to reducing emissions. This will include subsequent emission inventories to evaluate progress toward goals stated in this action plan.
- Develop additional emission mitigation actions beyond those listed in this plan.
- Periodically review and update this plan.
- The park will track climate friendly actions through the environmental management system.

CONCLUSION

Crater Lake National Park has a unique opportunity to serve as a model for over 400,000 recreational visitors annually.[4] This report summarizes the operational actions the park commits to undertake to address climate change. Specifically, the park realizes its ability to educate the public and serve as a valuable model for citizens. By seriously addressing GHG emissions within the park and sharing its successes with visitors, Crater Lake National Park will help mitigate climate change far beyond the park's boundaries.

The National Park Service faces an uncertain future due to the possible effects of climate change. However, by seriously addressing climate change impacts and reducing emissions, Crater Lake National Park 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 Crater Lake National Park to the forefront of Climate Friendly Parks.

[4] Crater Lake National Park: Park Statistics. Available online at: http://www.nature.nps.gov/stats/viewReport.cfm

APPENDIX A: LIST OF WORK GROUP PARTICIPANTS

- Bob Shaefer
- Craig Ackerman – Superintendent
- Mac Brock
- Cynthia Hunter