

Chugach National Forest

*FY2008
Environmental Footprint Report*



R10-MB-745
April 2011

Message from the Forest Supervisor



This is the first Chugach National Forest Environmental Footprint Report. The document discusses the demands we place on the natural environment as we carry out our mission and identifies ways in which we can reduce the size of that footprint. Our report also establishes a baseline that can be used to track progress toward specific commitments, such as that of contributing to a government-wide greenhouse gas inventory and meeting a percentage reduction target.

This report also recognizes and celebrates sustainable leadership that has taken root and is growing across the Chugach National Forest and among the communities we serve. The vision of the Chugach Green Team is that this report and efforts like it will lead to strategic integration of sustainable practices throughout all aspects of our day-to-day operations. Please take the time to read about these accomplishments. I look forward to sharing more success stories next year!

Terri Marceron
Forest Supervisor

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CONTENTS

<i>Introduction</i>	4
<i>Sustainable Leadership</i>	5
<i>Energy Use in Facilities</i>	8
<i>Fleet and Transportation</i>	11
<i>Water Use in Facilities</i>	12
<i>Green Purchasing</i>	15
<i>Waste Prevention and Recycling</i>	18
<i>Literature and Resources</i>	21
<i>Appendix I: In-Town Facilities</i>	23
<i>Appendix II: Greenhouse Gas Inventory</i>	23

A tapestry of land, water plants and animals.

The Chugach National Forest (Chugach) has been providing visitors with the chance to connect with nature since it was designated a national forest by President Theodore Roosevelt in 1907. America's most northerly and second largest forest, the Chugach is an outdoor recreational haven, a place of cultural and historical significance, and a source of clean water, habitat for wildlife, and healthy salmon fisheries. The forest's many resources generate economic value from tourism and timber products for the local community. The forest also serves as a carbon sink that helps mitigate climate change and is one of the few places in the world where glaciers continue to shape the landscape. The United States Forest Service (USFS), an agency within the U.S. Department of Agriculture (USDA), manages this national treasure.

The Chugach's 5.5 million acres in southcentral Alaska are divided into three distinct landscapes: the Copper River Delta, Prince William Sound, and the Eastern Kenai Peninsula, and managed as three ranger districts: Cordova, Glacier, and Seward. As part of a recreational, multi-use forest, each district offers a variety of activities to visitors including camping, bird watching, kayaking, and fishing. Salmon is the star of the area's recreational fishing scene, and the Chugach is home to one of the most important sockeye salmon fisheries sites in the world. The Chugach provides visitors with a variety of educational opportunities and often partners with local community organizations to improve their services. Currently, the Forest Service and its partners are improving portions of the Iditarod National Historic Trail. The trail will provide future educational activities.

The USFS is tasked with sustaining the health, diversity, and productivity of the U.S. forests and grasslands to ensure they meet the needs of current and future generations of Americans. In 2009, USDA Secretary Tom Vilsack laid out a new vision for America's forests that stressed conservation and restoration. As part of Chugach's efforts to support this vision and help the USDA meet federal sustainability requirements, the forest assessed the environmental footprint of current operations. The assessment involved reviewing the Chugach's progress towards meeting the goals of Executive Order (EO) 13423, Strengthening Federal Environmental, Energy, and Transportation Management, and a new EO, 13514, Federal Leadership in Environmental, Energy, and Economic Performance.

This report details the findings of the environmental footprint assessment, establishes a baseline from which to measure the forest's future progress, and discusses the Chugach's goals for becoming a leader in sustainability. The report provides a transparent look at Chugach's operations, highlighting environmental stewardship achievements while also pointing out opportunities for the forest to further reduce its negative environmental impacts. Each section of the report presents regulatory requirements related to a specific footprint area, documents current Chugach practices and achievements in this area, and lays out the next steps the forest can take to reach its sustainability goals.



Sustainable Leadership

Chugach National Forest is striving to become a leader in sustainable operations by exceeding environmental requirements and implementing best management practices. Chugach staff members recognize that sustainability is engrained in the mission of the USFS and are committed to integrating sustainability into the forest culture at all levels. To facilitate this, the Chugach has established a “Green Team,” a group of motivated employees who will help implement sustainable actions and educate staff and visitors. With the support of forest leadership, the Green Team works to implement sustainability actions at each of the three districts.

I. MISSION STATEMENT

- The Green Team’s mission is to take the lead in researching, implementing, promoting, and sustaining initiatives such as energy conservation, waste reduction, and other environmental practices in the day-to-day work operations at the Chugach National Forest.

II. PURPOSE

- To create and foster a common understanding of “green” practices among staff.
- To coordinate and align “green” efforts across the Chugach National Forest and with local communities.
- To establish a baseline understanding of our energy consumption and waste generation.
- To serve as a forum to address staff ideas and concerns regarding our mission.
- To assist in the implementation of the USFS Environmental Management System and EOs 13423 and 13514.

The Chugach Green Team currently consists of nine employees from all divisions and has representatives from all three districts. The Green Team championed the environmental footprint assessment that resulted in this baseline report, and is responsible for implementing the forest’s sustainability action plan.

The Green Team draws on resources and guidance from the USFS Sustainable Operations program, and leverage partnerships with other forest, such as the Western Collective. The Western Collective is a group of national forests in the western US and Alaska focused on finding solutions to environmental and sustainability challenges across the Forest Service.

Chugach National Forest recognizes it is only at the beginning of its sustainability journey and that staff now need to turn ideas into action.



VIEW OVER THE CITY OF CORDOVA



CORDOVA RANGER DISTRICT OFFICE

Energy Use in Facilities

Regulatory Requirements

EO 13423 REQUIRES FEDERAL AGENCIES¹ TO:

- Reduce energy intensity² by 3 percent each year, leading to a 30 percent reduction by the end of fiscal year (FY) 2015 relative to a FY 2003 baseline
- Ensure that at least half of all renewable energy required under the Energy Policy Act of 2005 (EPAAct 2005) comes from new renewable sources

EO 13514 REQUIRES FEDERAL AGENCIES TO:

- Reduce greenhouse gas (GHG) emissions relative to a FY 2008 baseline
- Increase renewable energy use and on-site renewable energy projects

THE FOREST SERVICE ALSO SET INTERNAL ENERGY GOALS TO:

- Reduce energy intensity by 25 percent by 2012 and by 50 percent by 2016 relative to a FY 2003 baseline
- Become energy neutral by 2020

CURRENT CONDITIONS

The Chugach has a number of energy challenges related to the region's cold weather and geography. Annual temperatures across the forest range between 15°F and 65°F and some Chugach facilities, such as public use cabins, are very remote. Built facilities on the Chugach range in age from around 80 years old to less than 2 years old and encompass diverse building types: office buildings, warehouses, single family homes, multi-family homes, modular offices, and dorm-style lodging. The majority of buildings are occupied year-round or used intermittently year-round; however some crew houses are only opened during summer months.

Given these challenges, the Chugach requires a variety of sources, including hydro-powered electricity, natural gas, diesel and fuel oil to meet its energy needs. Recognizing that fossil fuel combustion from forest operations contributes to climate change and that energy consumption is expensive, Chugach employees are aware of the need to conserve energy, for both environmental and financial benefits. All Chugach districts are making strides to reduce energy use and increase energy efficiency. However, given the direct effects of climate change on the Chugach's resources, including retreating glaciers, as well as the opportunity to educate staff and visitors about energy use and climate change, there is much more that can be done.

In the Cordova district, electricity is provided by the Cordova Electric Cooperative (CEC). Sixty percent of the time electricity from CEC is powered by a hydroelectric dam. When water flow is reduced during winter, electricity is produced by the CEC's diesel generator. While there are environmental concerns associated with hydroelectric power, water is abundant on the Chugach and hydropower does not pollute the air or release greenhouse gases. Hydropower is considered a renewable energy source by the US Department of Energy. Therefore, when Cordova's electricity is powered by the hydroelectric dam, its environmental impact related to air pollution and greenhouse gas emissions is significantly lower than when the diesel generator is used. Diesel-powered electricity is also more expensive than hydro-powered electricity.

¹These requirements apply to the USDA as a whole; Chugach is responsible for doing its part to help the agency reach these goals.

²Energy intensity is the ratio of energy consumption to a measure of demand for services (e.g., number of buildings, total floor space, number of employees). This measure allows comparisons to be made between energy use at facilities of different sizes and functions.

Since the cooperative is member-owned, members have a financial incentive to invest in conservation and efficiency measures.

Electricity supplied to the Glacier and Seward districts is powered by natural gas with a small percentage (less than 10%) powered by hydropower. In the Glacier district, electricity is provided by Enstar Natural Gas Company. The City of Seward supplies electricity from the Chugach Electric Association, which is also publicly owned, to Chugach facilities on the Seward district. Natural gas is cleaner than other fossil fuels such as coal; however, it still produces a significant amount of greenhouse gas emissions and requires transportation in pipelines that can disrupt natural habitats.

Glacier District relies primarily on natural gas for heating purposes, while Cordova and Seward districts use fuel oil as their main heating energy source. Fuel oil is used for space heating, domestic hot water heating, and back-up generators across the Chugach. Fuel oil is supplied by Shoreside Petroleum on the Glacier and Seward districts. Fuel oil is a petroleum- or fossil fuel-derived product and therefore has a significant impact on the environment, given that the burning of fossil fuels releases greenhouse gases and contributes to climate change. Chugach employees are aware of the negative environmental impacts of burning fossil fuels and are interested in learning how to decrease consumption and increase efficiency.

The table below presents energy use in facilities on the three districts in FY 2008.

TABLE 1. FY 2008 ENERGY USE IN FACILITIES

	ELECTRICITY (KWH)	NATURAL GAS (CUBIC FT.)	PROPANE (GAL)	FUEL OIL (GAL)	TOTAL ENERGY (MMBTU)	AREA (SQ. FT.)	ENERGY INTENSITY (BTU/SQ. FT.)
CORDOVA	127,962	0	250	11,234	2,017	26,993	74,134
GLACIER	303,494	1,443,201	2,633	0	2,760	36,956	74,692
SEWARD	167,003	0	400	14,578	2,628	37,367	70,733
TOTAL	598,459	1,433,201	3,283	25,812	7,406	101,316	73,100

The sources of energy and the total area of facilities varies across the three districts “Appendix I: In-Town Facilities” for facilities. Therefore, energy intensity (measured in British thermal units (Btu) per square foot) is used to standardize energy consumption and allows for a comparison between districts. Glacier has the highest energy intensity at 74,692 Btu per square foot, followed closely by Cordova at 74,134 Btu per square foot. Seward uses energy in facilities most efficiently at 60,733 Btu per square foot. This is likely due, at least in part, to the energy efficient Kenai Lake Office on the Seward district. Built in 2006, it is the newest building on the Chugach and the second largest building on the district.

The Chugach conducted a greenhouse gas (GHG) inventory to estimate GHG emissions from forest operations. The USFS is a member of the Environmental Protection Agency’s (EPA) Climate Leaders program and the Chugach GHG inventory was conducted using the Climate Leaders Simplified Emissions Calculator (see “Appendix II”). The Chugach is one of only seven national forests that have assessed their GHG emissions, following the lead of the Greater Yellowstone Area forests and the Tongass National Forest. The Chugach inventory includes emissions from stationary combustion (natural gas, propane and fuel oil use in facilities), purchased electricity, and mobile combustion (vehicle fleet), It also estimates emissions from employee commuting and chartered flights, which are optional sources.(Emissions from stationary combus-

tion and electricity are presented here, while emissions from mobile combustion and chartered flights are presented in “Fleet and Transportation”.)

TABLE 2. FY 2008 GREENHOUSE GAS EMISSIONS FROM ENERGY USE IN FACILITIES

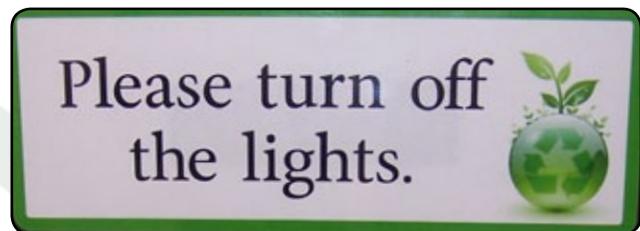
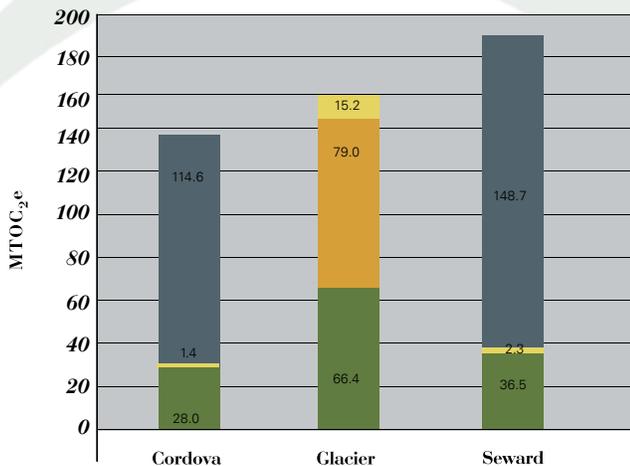
	GHG EMISSIONS (MTCO ₂ E)	GHG EMISSIONS (MTCO ₂ E)
CORDOVA	144.0	5.3
GLACIER	160.6	4.3
SEWARD	187.5	5.0
TOTAL	492.1	4.9

Table 2 shows GHG emissions and GHG intensity (MTCO₂e per thousand square foot) by district. The majority of GHG emissions from energy use in facilities (361.3 metric tons of carbon dioxide equivalent (MTCO₂e), comes from stationary combustion of natural gas, fuel oil and propane. This represents 43% of Chugach emissions, excluding optional emissions sources Electricity represents 130.8 MTCO₂e, or 15% of GHG emissions from energy use in facilities.

Seward produces the most emissions from energy use in facilities (187.5 MTCO₂e), followed closely by Glacier (160.6 MTCO₂e) and then Cordova (144 MTCO₂e). It is interesting to contrast these results with the energy intensity results above. While Seward is the most energy efficient district, it is responsible for the highest estimate of greenhouse gas emissions. This is likely due to the make up of its energy profile, compared to that of Glacier. Seward’s facility square footage is close to that of Glacier, but Seward relies largely on fuel oil for heating (Graph 1). Glacier relies on natural gas for heating, which releases fewer greenhouse gases per unit compared to fuel oil.

In order to better understand energy use across the forest and to support the USDA in complying with Federal requirements, the Chugach conducted a detailed energy and water audit of 50 percent of its facilities in July 2010. The energy and water audit consisted of a detailed survey of building equipment and operating conditions, interviews with occupants and building managers, and a review of mechanical drawings. While a number of energy efficiency improvements were already implemented, the audit revealed additional opportunities to reduce energy use and improve energy efficiency. Energy conservation measures (ECMs) encompassing equipment controls and operation improvements, building shell upgrades, lighting upgrades, equipment upgrades, renewable energy opportunities, and water conservation measures were identified (see below, Moving Forward).

GRAPH 1. FY 2008 GREENHOUSE GAS EMISSIONS FROM ENERGY USE IN FACILITIES



A REMINDER SIGN PLACED NEAR LIGHT SWITCHES IN MANY CHUGACH FACILITIES

- Fuel Oil
- Natural Gas
- Propane
- Electricity

CHUGACH HAS ALREADY INVESTED IN A NUMBER OF ENERGY EFFICIENT SOLUTIONS INCLUDING:

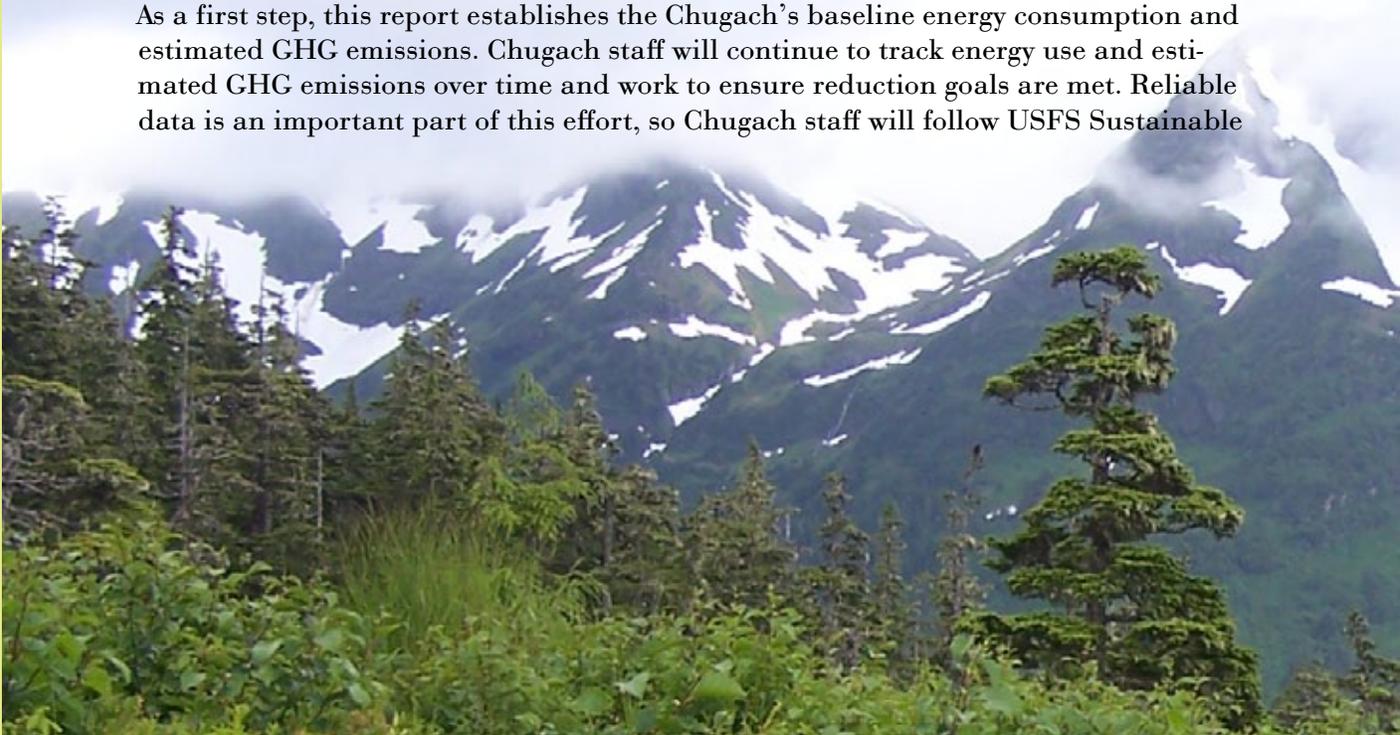
- Installation of more efficient light bulbs and lighting fixtures in the main office at the Glacier
- Attic insulation added to three buildings, single pan windows replaced with triple pane in three buildings, wood burners upgraded in two residences, exterior doors and weather stripping replaced in facilities across Seward Ranger District
- Reduction in oil use at the Kenai Lake Work Center from 14,000 gallons to 9,000 gallons over three years
- Installation of programmable thermostats in some locations.
- Locking windows at Cordova Ranger District's main office during winter
- Using vending machines with energy misers
- Residence appliances replaced with more efficient Energy Star and water conserving appliances in Seward Ranger District
- Installation of motion sensing lighting in some locations
- Placing reminder signs to turn off lights by some switches
- Use of Energy Star qualified electronics
- Installation of motion sensing hand-dryers in some locations
- Flex-time policy: some staff work four 10-hour days, work on weekends, and staff can work from home
- Construction of more efficient facilities: Kenai Lake Office and FLEX Housing facility at Seward

The Chugach is engaged in renewable energy initiatives. The forest is supporting the Cordova Renewable Energy Workgroup and the Native Village of Eyak's efforts to explore the potential of resources such as wind. The Chugach is also working with Alaska Pacific University to establish a wind-turbine test facility that will test turbines in extreme wind and ice conditions in the Portage Valley near the Begich Boggs Visitor Center.

MOVING FORWARD

The Chugach has many opportunities to not only reduce energy use across the forest but to educate forest visitors and local communities about energy saving actions and benefits. The Chugach's first Sustainability Action Plan will include energy as a focus area and detail energy reduction and education goals and actions.

As a first step, this report establishes the Chugach's baseline energy consumption and estimated GHG emissions. Chugach staff will continue to track energy use and estimated GHG emissions over time and work to ensure reduction goals are met. Reliable data is an important part of this effort, so Chugach staff will follow USFS Sustainable



Operations **guidelines** to assess the forest's utility bills.

The majority of buildings on the Chugach have excellent opportunities to achieve energy savings simply by operating existing equipment more efficiently.

CHUGACH STAFF WILL DEVELOP A STRATEGY AND TIMETABLE TO IMPLEMENT THE FOLLOWING ENERGY SAVING ACTIONS, AS FEASIBLE:

- Install programmable thermostats
- Set back space temperatures
- Replace old and inefficient boilers
- Insulate hot water pipes
- Seal gaps
- Upgrade attic and crawlspace insulation
- Replace lighting
- Install occupancy sensors
- Install wind power

If all of the energy and water conservation measures identified by the energy audit are implemented, the initial cost will be about \$313,000 but the potential utility cost savings will total \$29,000 per year and the forest will reduce its energy consumption by about 23 percent. The forest will reap financial benefits from many of these energy conservation projects in as a little as one year.

Chugach staff will share energy education initiatives across the forest, reaching both staff and visitors. Chugach staff will post signs to remind people to turn off lights, appliances and electronics when not needed. Informational signs that state the forest or district's energy consumption or GHG emissions will be posted in high traffic areas to increase awareness.

The benefits from implementing both cleaner and more efficient energy initiatives, whether a simple practice like turning back thermostat temperatures or a more complicated wind power project, can add up to dramatic environmental improvements and financial savings.



Fleet and Transportation

Regulatory Requirements

EO 13423 REQUIRES FEDERAL AGENCIES TO:

- Reduce fleet total petroleum products use by 2 percent annually through 2015 relative to a FY 2005 baseline
- Increase nonpetroleum-based fuel use by 10 percent annually

EO 13514 REQUIRES FEDERAL AGENCIES TO:

- Increase nonpetroleum-based fuel use by 10 percent annually



TRUCKS AT THE KENAI LAKE WORK CENTER

CURRENT CONDITIONS

Transportation is fundamental to the land management duties carried out by Chugach employees. Because of the remoteness of some forest facilities and the region's rugged geography and extreme weather, Chugach staff require powerful vehicles, aircraft and watercraft to travel to do their work. For example, Cordova is separated from Seward and Glacier districts by the Chugach Mountains and Prince William Sound, accessible only by aircraft or boat. The forest land includes many islands and steep mountain passes. Unfortunately, the predominant modes of transportation used by forest staff burn fossil fuels, releasing pollutants such as carbon monoxide and nitrogen oxides which impact environmental and human health, and greenhouse gases which contribute to climate change. Therefore, the Chugach is committed to minimizing travel, right-sizing the forest vehicle fleet, ride-sharing and choosing more fuel efficient vehicles.

VEHICLE FLEET

The Chugach vehicle fleet includes light-duty trucks (pick-up trucks with gross weight under 8,500 pounds), heavy-duty vehicles (larger pick-up trucks and SUVs over 8,500 pounds) and passenger cars. The FY2008 fleet consisted of 104 vehicles, 98 of which have documented mileage values for the year (6 vehicles have mileage values of 0 miles driven in FY2008). The majority of Chugach vehicles are light-duty trucks (52 %) and heavy-duty trucks (40 %). Passenger cars make up only 5 % of the fleet. All Chugach vehicles use gasoline. Forty-four vehicles, or 42 % of the fleet, are Working Capital Fund (WCF) vehicles and 60 vehicles, or 58 % of the fleet, are leased from the Government Services Administration (GSA). See Table 3 below for a breakdown of vehicle type by District.

An assessment of GSA vehicles reveals that staff on the Seward District drive the furthest and use the most gasoline, while staff on the Cordova District drive the least and use the least amount of fuel. However, it should be noted that Seward District has the largest number of employees and vehicles, and the greatest distance of roads, while Cordova has the smallest number of employees and vehicles, and the shortest distance of roads.

Vehicles on the Supervisor's Office get the best fuel economy at 18 miles per gallon (MPG), while vehicles on the Cordova District get the worst fuel economy at 13 MPG. It should be noted that the Supervisor's Office fleet includes two hybrid vehicles. Alternate fuels such as biodiesel are currently unavailable in the region. However, Chugach staff have found success with the two hybrid electric vehicles.

In FY2008, Chugach staff drove approximately 600,949 miles and consumed approximately 39,496 gallons of fuel using forest vehicles. This is the equivalent of 346.7 metric tons of carbon dioxide equivalent (MTCO_{2e}). See the Direct 2.0 Mobile tab in the Chugach's Greenhouse Gas Inventory ("Appendix II").

TABLE 3. FY 2008 VEHICLE FLEET

DISTRICT	LIGHT-DUTY TRUCKS	HEAVY-DUTY TRUCKS	PASSENGER CARS	MILES DRIVEN	GALLONS OF FUEL	AVERAGE MPG
GSA VEHICLES-CORDOVA	2	9	0	39,044	3,027	13
GSA VEHICLES-GLACIER	6	6	0	70,866	5,064	16
GSA VEHICLES-SEWARD	17	9	0	150,158	10,046	15
GSA VEHICLES-SO	5*	3	3**	72,112	3,957	18
WCF VEHICLES	26	15	3	260,217	17,403	15
CHUGACH TOTAL	56	42	6	600,949	39,496	15

* INCLUDES ONE FORD ESCAPE HYBRID.
 ** INCLUDES ONE HONDA CIVIC HYBRID.

NON-ROAD FLEET AND OTHER VEHICLES

Other gasoline-powered vehicles used on the Chugach include tractors, mowers, snowmobiles, and all-terrain vehicles (ATVs). Staff use outboard motorboats (two-stroke and four-stroke engines), aluminum hulled workboats and airboats. In recent years, forest staff have made strides towards purchasing more fuel-efficient four-stroke engines over two-stroke engines. The forest does not yet have comprehensive fuel use data or documented hours of use for these types of vehicles. These sources most likely have a significant impact on the environment, including emitting a large amount of greenhouse gases and efforts will be made to collect data on these sources in the future.



STAFF BIKES AT THE GLACIER DISTRICT BUNKHOUSE

The Chugach provides bicycles for forest staff to use as an alternative to motorized vehicles. Employees often choose to ride these bicycles, which both improves their health and the health of the environment.

Chugach staff periodically require the use of rental vehicles and personal vehicles for conducting forest-related business. However, comprehensive data is not yet available for these vehicles either.

AIRCRAFT

In order to reach remote, road-less locations, Chugach staff are required to charter small aircraft frequently to conduct their work. Staff travel on Beaver and Cessna fixed-wing aircraft as well as a variety of helicopters. See Table 4 below for breakdown of hours of flight and gallons of fuel by aircraft type.

TABLE 4. FY 2008 CHARTERED FLIGHTS

AIRCRAFT	HOURS OF FLIGHT	FUEL ECONOMY (GALLONS / HOUR)	GALLONS OF FUEL
BEAVER	186	23	4,278 (Avgas)
CESSNA	179	14	2,506 (Avgas)
AS350B2	35	45	1,575 (Jet A)
AS350BA	28	40	1,120 (Jet A)
206BIII	78	30	2,340 (Jet A)
206L3	13	35	455 (Jet A)
407	2	45	90 (Jet A)
UH1H	4	100	400 (Jet A)

Chartered air travel was included as an optional emissions source in the Chugach's baseline greenhouse gas inventory. In FY2008, chartered air travel contributed 115.5 MTCO_{2e} to the forest's carbon footprint. See the Optional 3.0 Charter Air Travel tab in the Chugach's Greenhouse Gas Inventory ("Appendix II").

Chugach staff also travel on commercial aircraft. However, data on commercial flights is not yet available and therefore not included in this report. Emissions from commercial air travel is expected to represent a significant portion of the forest's carbon footprint and should be included in future reporting efforts.

EMPLOYEE COMMUTING

The USFS conducted a survey of employee commuting behaviors. 127 of Chugach's 256 employees, almost 50%, responded to the survey. Survey data was presented for Region 10 as a whole and not for the forest individually, but it is assumed the Region's results are representative of Chugach employee commuting behavior. Region 10 results were extrapolated to estimate miles commuted by Chugach employees by mode of transport. See Table 5 for Chugach employee commuting estimates.

The majority of staff travel to and from work in individual vehicles. However, employees also take advantage of carpooling and public transportation opportunities. Many employees use more than one mode of transportation option. Employee commuting results in an estimated 146.4 MTCO_{2e}. This is more than the estimated GHG emissions from electricity use (131 MTCO_{2e}) or chartered air travel (116 MTCO_{2e}).

It is important to note that a large percentage of USFS employees in Region 10 travel to and from work on foot or by bike. While miles traveled on foot or by bike are not captured in the table above, these modes of transport have no impact on the environment and significantly reduce the overall impact on employee commuting.

TABLE 5. FY 2008 EMPLOYEE COMMUTING

MODE OF COMMUTING	MILES TRAVELED ANNUALLY	PERCENT OF TOTAL MILES TRAVELED
PASSENGER CAR	138,938	42%
LIGHT TRUCK (GASOLINE)	130,463	39%
LIGHT TRUCK (DIESEL)	14,056	4%
BUS/SHUTTLE	35,554	11%
CARPPOOL/VANPOOL	9,192	3%
MOTORCYCLE	4,849	1%
RAIL	1,051	0%

MOVING FORWARD

The forest's transportation needs and therefore environmental impacts from transportation are significant. However, this means opportunities to reduce impacts from transportation are also great. While forest staff have taken steps to improve the fuel efficiency of the vehicle fleet

by purchasing two hybrid vehicles and combining trips, for example, more efforts can be made to minimize travel, select the most efficient vehicle for each trip, gather transportation data, and reduce impacts from air travel and commuting. The Chugach's first Sustainability Action Plan will include transportation as a focus area and detail vehicle fleet efficiency and travel-related goals and actions.

The Chugach Fleet Manager will continue to monitor annual miles traveled by recording odometer readings at the beginning and end of each year. Additionally, the Fleet Manager, with the support of the Green Team and District Rangers, will work to implement a fuel log system. The fuel log system would require that staff fill out a log documenting the amount of fuel purchased and the odometer reading at the time of purchase in order to better understand fuel usage amounts and the fuel economy of the forest's fleet. In addition, it would be useful to better understand the financial impact of fuel purchases. Fuel logs are currently available on the forest but not widely used.

In the future, the fuel log system should be expanded to watercraft. The Green Team will work with Dispatch to monitor watercraft fuel use and duration of use so that watercraft can be included in future greenhouse gas inventories.

Staff often become used to using a certain vehicle everyday and may come to view a forest truck as my truck, deciding to use the particular truck for all their work travel needs. Staff should instead select the most fuel efficient vehicle for the trip at hand, rather than always selecting their preferred vehicle. In order to help identify which vehicles are the most efficient, the Green Team will consider adding colored tags to each set of vehicle keys where green denotes best fuel efficiency, yellow denotes average fuel efficiency, and red denotes worst fuel efficiency. Staff should aim to select vehicles with green tags over vehicles with yellow or red tags.

Employees will be provided with annual awareness training on the environmental impacts from transportation and the forest's goals to reduce these impacts. Training will include a review of the USFS Sustainable Operations [Eco-Driving Tips](#) and instructions on selecting the appropriate vehicle for the trip and filling out fuel logs. Staff will be encouraged to use the USFS bicycles and to walk instead of drive where possible. The Green Team will consider providing incentives to increase carpooling and ride-sharing.

To more accurately capture the impacts from air travel, the Green Team will explore ways to track employee travel on commercial airlines. Where videoconferencing capabilities are available, travel to meetings and conferences should be avoided.

Minimizing environmental impacts from transportation can improve environmental health and employee health, as well as provide financial benefits for the forest. Chugach staff recognize that they have enormous opportunities to reduce vehicle pollution and greenhouse gas emissions from transportation and will work to implement sustainable transportation actions.



Water Use in Facilities

Regulatory Requirements

EO 13423 WATER-RELATED REQUIREMENTS INCLUDE:

- Reduce water consumption intensity by 2 percent annually or 16 percent by the end of FY 2015 using a FY 2007 baseline
- Conduct energy and water audits on at least 10 percent of buildings per year

EO 13514 EXPANDS WATER-RELATED REQUIREMENTS:

- Reduce building water consumption intensity by 2 percent annually or 26 percent by the end of FY 2020 relative to a FY 2007 baseline
- Reduce industrial, landscaping, and agricultural water consumption by 2 percent annually or 20 percent by the end of FY 2020 relative to a FY 2010 baseline
- Identify, promote, and implement water reuse strategies that reduce potable water consumption, in accordance with state law
- Implement and achieve the objectives identified in the Environmental Protection Agency's (EPA) [storm water management guidance](#)

CURRENT CONDITIONS

From Kenai Lake to the Copper River Delta, from Portage Glacier to Prince William Sound, water plays an integral role in defining the landscape of the Chugach National Forest. With precipitation ranging from 20 to 200 inches per year, water is abundant across the region. The Chugach' pristine rivers and lakes provide habitat for many wildlife species, including the region's five salmon species – sockeye, king, chum, pink and coho – which in turn provide a livelihood for local fishermen and recreational opportunities for fishermen from around the world. Visitors come to the Chugach to witness glaciers calving, orcas breaching and salmon spawning. Given the significance of water within the forest, Chugach staff recognize that water conservation efforts extend from fisheries and aquatic ecosystem management to wise use in facilities.

Chugach' employees and one million annual visitors use faucets, toilets and showers in forest facilities daily. However, water use is not metered at most sites and therefore water consumption is not easily quantified. In order to better understand water use across the forest and to support the USDA in complying with Federal requirements, the Chugach conducted a detailed energy and water audit of 50 percent of its facilities in July 2010. The audit consisted of a detailed survey of building equipment and operating conditions, interviews with occupants and building managers, and a review of mechanical drawings.



WATER EFFICIENT DUAL-FLUSH TOILET IN THE
KENAI LAKE OFFICE

Most sink faucets in forest facilities have flow rates of 2.0 or 2.2 gallons per minute (gpm), and most shower heads have flow rates of 2.5 gpm. The majority of flush fixtures have standard efficiency flush rates, and existing urinals use 1.0 gallons per flush (gpf). The Kenai Lake Office has dual flush toilets. The forest has an opportunity to reduce water use by upgrading water fixtures to more efficient models.

The audit revealed additional opportunities to reduce water consumption and improve water efficiency (see below, *Moving Forward*).



KENAI LAKE

Most locations pay a flat rate for water. While National Financial Center (NFC) data reveals that in FY2008, the Chugach spent \$4,433.00 on 792,155 gallons of water, NFC does not capture all water bills or usage amounts. Therefore, occupancy rates and fixture types were used to determine an average baseline water consumption of 11.7 gallons per square foot. Since Chugach facilities cover 101,538 gross square feet, water consumption is more likely to approximate 1,183,000 gallons.

The Chugach's water-related partnerships include supporting the Copper River Watershed Project (CRWP), a non-profit community effort to "diversify the economy of this unique region while sustaining its natural resources and cultural heritage." CRWP's major projects include water testing to assure quality and citizen monitoring of the Trans-Alaska oil pipeline.

Chugach staff recognize the importance of educating employees and visitors about water conservation. Although there are educational opportunities related to water use in facilities that have not yet been realized, the Chugach has long served as an educational center for the region's water resources. For example, visitors to the Begich Boggs Visitor Center in Portage Valley can learn about the 1989 Exxon Valdez oil spill and its impact on the Prince William Sound, view live salmon via the new solar-powered salmon-cam, and discover the effects of climate change in the region by witnessing Portage Glacier's retreat through the years.

MOVING FORWARD

Because water conservation in facilities has not been a priority in the past, Chugach staff have many opportunities to reduce water use and to educate forest visitors and local communities about the importance of water conservation. Water will be a focus area of the Chugach's first Sustainability Action Plan, which will detail water conservation and education goals and actions.

This report provides an estimate of baseline water consumption in Chugach facilities. However, to fully understand water consumption in forest facilities, metering should be expanded and utility bills tracked. Chugach staff will develop a strategy to track water use over time and follow USFS Sustainable Operations guidelines to assess the forest's utility bills.

Once consumption is better understood, the forest can evaluate and prioritize opportunities for reducing water use. The majority of water fixtures in forest facilities can be upgraded to improve water efficiency. Chugach staff will develop a strategy and timetable to implement the following water saving actions identified in the water audit, as feasible:

- Install low-flow faucet aerators and showerheads
- Install low-slow toilets
- Upgrade toilets and urinals
- Install waterless urinals

Fixture upgrades can potentially reduce water consumption by almost 50 percent in facilities currently fitted with standard fixtures. Additional savings can be realized through behavioral change. Therefore, the Chugach will work to educate staff and visitors about water

saving opportunities. There are opportunities to place informational signs above sinks in restrooms and kitchens that state the estimated amount of water used in forest facilities, for example, and reminder signs to minimize water use and turn off faucets. Instructional signs about dual flush toilets will ensure they are used properly. Water-saving actions are relatively low cost and have the added benefit of helping to reduce energy use as well.

Green Purchasing

Regulatory Requirements

EO 13423 AND 40 CFR 247.2(D) REQUIRE FEDERAL EMPLOYEES TO DEMONSTRATE A PREFERENCE FOR PRODUCTS DESIGNATED AS FOLLOWS:

- Recycled content products designated in the Environmental Protection Agency's (EPA) Comprehensive Procurement Guidelines (CPG)
- Composed of the highest percentage of recovered materials practicable
- Energy-efficient products, such as Energy Star® qualified products
- Water-efficient products, such as WaterSense® labeled products
- Bio-based products designated by the USDA in the Bio-Preferred program
- Electronic Product Environmental Assessment Tool (EPEAT)-registered electronic products
- Alternative fuel vehicles and alternative fuels required by the Energy Policy Act of 2005 (EPAct)
- Products with few or no toxic or hazardous constituents
- Non-ozone depleting substances, as identified in EPA's Significant New Alternatives Policy (SNAP) Program

EO 13423 also requires that contractors operating government-owned facilities or vehicles comply with the EO requirements, and that tenants and concessionaires also help the agency comply with the EO.

Agencies can meet environmental, or green, purchasing requirements by ordering products that are certified or otherwise identified as environmentally preferable by agencies such as the EPA or the USDA. Alternatively, purchasers should consider the environmental impacts across the "cradle to grave" product life cycle from resource extraction, to manufacturing, product use, maintenance, and disposal.



*CLEANING PRODUCTS AT THE
BEGICH-BOGGS VISITOR CENTER*

USDA developed the Green Purchasing Affirmative Procurement Program (GPAPP) to ensure green purchasing requirements are met. The Chugach is committed to supporting USDA's green purchasing efforts.

CURRENT CONDITIONS

Tasked with running the second largest national forest in the United States, Chugach employees must purchase many products and services to properly manage the forest's resources and facilities. From computers and paper towels to seining nets and hip waders, from windows and picnic benches to trucks and snowmobiles, the products and services Chugach employees purchase have an effect on both the environment and the market.

Depending on the product, each stage of a product's life cycle – manufacturing, packaging, transportation, use and disposal – may lead to habitat destruction, natural resource depletion, air and water pollution, and greenhouse gas emissions. The use of certain products, such as toxic cleaning chemicals, may also directly impact the health of the employees who use them. Green purchasing is closely connected to the other focus areas addressed in this report – energy use, water use, waste management and transportation – since one of the

first steps to implementing more sustainable practices such as reducing packaging waste or installing more efficient light fixtures begins with a purchasing decision.

Chugach employees buy products through online Federal purchasing portals such as GSA Advantage and AbilityOne, directly from vendors, and from retailers and suppliers in district communities and in Anchorage. Many products and services are purchased above

the micro-purchase levels of \$3,000 for products and \$2,500 for services. The Chugach purchases over \$10,000 worth of copier and printer paper and toilet paper annually.

ENVIRONMENTALLY PREFERABLE PRODUCTS PURCHASED FOR USE ON THE FOREST INCLUDE:

- 40% post-consumer content and 100% recycled paper towels in the Glacier Warehouse
- Recycled content toilet paper and hand towels at the Seward Ranger District and Begich Boggs Visitor Center
- Biodegradable, non-toxic all-purpose cleaner in the Kenai Lake Work Center Office custodial closet and the Cordova District Office
- Compact fluorescent light bulbs at multiple locations
- Energy Star qualified copy machines at the Cordova District

Fortunately, environmentally preferable products and services, which have a reduced impact on human health and the environment compared to others that perform the same function, are more readily available and affordable than ever before.

All Chugach employees have a responsibility to ensure that green purchasing requirements and goals are met. However, awareness of green purchasing requirements at the forest varies since only purchase card holders receive training through annual online GSA purchasing training. This means that most Chugach employees do not receive awareness training on environmentally preferable products and green purchasing re-

quirements. While purchase card holders are responsible for overseeing purchase transactions, individuals who request items for purchase should also be aware of green purchasing requirements and purchase card holders should be willing share and discuss green alternatives.

The Chugach recently conducted an analysis of purchase card holders to determine who cardholders are, how many transactions occur in a year and if some cards should be cancelled. The goal here is to streamline green purchasing efforts by reducing the number of purchase card holders. The results of the analysis will be available shortly.

Currently, a comprehensive green purchasing program does not exist and purchasing decisions are not tracked. While the Chugach does not have a written green purchasing plan or policy, many forest employees understand important role the USFS plays in reducing environmental impacts through green purchasing and in helping to boost the market for environmentally preferable products. Therefore, many Chugach employees seek out opportunities to use greener products and services, despite not being aware of the specifics of the green purchasing requirements. For example, employees try to use chemicals that are less toxic than conventionally used items and attempt to purchase only what is needed, avoiding leftover product that becomes waste.

Many Chugach contractors, including vehicle maintenance workers, a cleaning crew, landscapers, and construction workers, purchase their own materials. Some contracts stipulate that materials must be reused, but the extent of other GP requirements in contracts at the Chugach is unclear.

MOVING FORWARD

Chugach staff recognize that there are many opportunities to replace traditional products and services with environmentally preferable products and services. Green purchasing will be a focus area of the Chugach Sustainability Action Plan, which will describe educational actions and develop a strategy to increase and track green purchases.

The first step to meeting environmental purchasing goals is to ensure all employees are aware of green purchasing requirements. This objective may be accomplished by distributing a self-administered training (such as the green purchasing training available through AgLearn) or including green purchasing requirements in annual health and safety trainings and new employee orientations.

The Chugach Green Team will consider developing a written green purchasing program or standard operating procedure (SOP) to standardize purchasing practices across the forest. In addition to providing employees clear direction on purchasing procedures, a written program or SOP would help demonstrate that the forest is meeting EO 13514's goal of having at least 95 percent of product purchases be environmentally preferable. The program or SOP could explain:

- The process for researching and choosing environmentally preferable products and services
- Green purchasing training requirements for purchase card holders and other employees
- Documenting the purchase of products and services that are not environmentally preferable
- Incorporating environmental purchasing requirements into future contracts

As the forest develops its program, the Green Team will consider appointing a green purchasing coordinator for each district. This coordinator would be responsible for ensuring that the district-specific SOP is appropriate for that location and would communicate with the other districts. In addition, the green purchasing coordinator would spearhead SOP updates and facilitate green purchasing training for employees.

The Chugach' Contracting Officer is working to include stronger green purchasing requirements into contracts. For example, the cleaning contract, which is due for renewal, will include a requirement to use environmentally preferable cleaning products.

A useful tool for streamlining and improving the control of purchases would be the development of an approved products list. Forest employees can create an inventory of currently used products, evaluate whether there are environmentally preferable alternatives, cross reference between districts, and ultimately develop a list of products that can be purchased without further approval.

Additionally, purchases can be tracked using a simple table where purchasers list the product procured. Users indicate which environmental purchasing criteria specific products meet by checking a box next to the appropriate product requirement.

The Chugach Green Team will work with the USFS Sustainable Operations program and the Western Collective to ensure forest staff have the information, resources and tools necessary to become leaders in environmental purchasing.

PRODUCTS CURRENTLY IN USE ON THE FOREST THAT CAN BE REPLACED WITH ENVIRONMENTALLY FRIENDLY OPTIONS INCLUDE:

- Not all paper towels in use at all Chugach facilities contain recycled material
- Incandescent light bulbs in the Seward 5th and A residence
- Approximately 60 all-purpose spray cleaner bottles at the Seward Cabins Crew Cache
- Outdated appliances that are not energy or water efficient in multiple locations

Waste Prevention and Recycling

Regulatory Requirements

EO 13423 mandates that federal agencies implement and encourage recycling programs. It requires agencies to reuse, donate, sell, or recycle all old electronic products, and to reduce the quantity of toxic and hazardous chemicals and materials used.

EO 13514 EXPANDS UPON THESE REQUIREMENTS BY SPECIFYING THAT FEDERAL AGENCIES MUST ALSO:

- Divert at least 50 percent of non-hazardous solid waste from landfills by the end of fiscal year 2015 (including construction and demolition materials)
- Reduce printing paper use and purchase uncoated printing and writing paper containing at least 30 percent post-consumer fiber
- Increase the diversion of compostable and organic material from the landfill

CURRENT CONDITIONS

Forest operations, management and recreational activities result in the production of both solid waste (also known as household trash) and hazardous waste. Chugach staff, visitors and partners produce waste composed of plastics, glass, packaging, paper, food waste, construction debris, electronics, appliances and toxic and hazardous chemicals. Energy and natural resources are used to manufacture and transport products that are ultimately discarded. Once goods become waste products, additional energy and natural resources are required to then transport, dispose and process them as wastes. Storing and disposing of hazardous waste materials pose a threat to safety and health and require increased financial resources for proper handling and disposal. Given these environmental and health concerns, there is strong support among Chugach staff for reducing solid and hazardous waste generation and increasing recycling across the forest.

Solid waste is removed from the Chugach forest by municipal haulers or by forest employees, depending upon the district and location of waste collection sites. Waste from in-town facilities is primarily collected by the city or city contractor, baled and then disposed of in local landfills. Waste generated at remote facilities is carried out by forest employees and added to Chugach dumpsters, or disposed of directly at local landfills and recycling centers. Some campground dumpsters and trash cans are managed by concessionaires.

Solid waste pick-up rates vary by district. Solid waste collected in the Cordova Warehouse four-cubic yard dumpster is emptied by the City of Cordova three times per week during the summer and twice per week during winter. The Cordova Office four-cubic yard dumpster is emptied by the City once per week throughout the year.

Glacier district's three four-cubic yard dumpsters at the Portage Work Center are emptied weekly from May through September. The two four-cubic yard dumpsters at Glacier Office include waste from the bunkhouse residents and are emptied weekly throughout the year.

Seward district's six-cubic yard dumpster at Moose Pass is emptied weekly by contractors from Memorial Day through Labor day. During winter, the forest custodian hauls the waste to the landfill in Soldotna as needed.

The Chugach has not previously tracked waste amounts or composition. For this report, waste generation was estimated based on dumpster sizes and pick-up rates provided by Chugach staff and assuming 300 pounds

TABLE 6. ESTIMATED MUNICIPAL SOLID WASTE GENERATION BY DISTRICT

SOLID WASTE (POUNDS)	
CORDOVA	194,400
GLACIER	204,000
SEWARD	66,600
Total	465,000

of waste per cubic yard. Table 7 provides an estimate of solid waste generated by district. The total amount of municipal solid waste generated on the forest in one year is estimated to be 465,000 pounds. This estimated does not include recyclables, or waste collected by concessionaires or packed out by forest visitors.

Comprehensive waste minimization efforts are new to the Chugach as opportunities to recycle have been limited previously. However, recycling opportunities have expanded across the region in recent years, providing the forest with an increased ability to reduce its solid waste generation through source reduction and the reuse and recycling of waste products. Recycling programs and opportunities vary by district and by location within the district. All forest units recycle plastic, toner and fluorescent bulbs to some extent. Glass, paper, car batteries, aluminum, and monofilament (fishing line) are recycled at certain locations. Opportunities for recycling appliances and electronics are provided through municipal and private entities in local areas. Table 7 below lists recycling capabilities at each district.

Comprehensive data on the amount of waste recycled on the forest is not available. However, Glacier district staff estimate that they transport 300 pounds of recyclables generated by forest staff to Smurfit-Stone Recycling Center in Anchorage every two weeks. This amounts to 7,800 pounds of waste recycled per year. Staff note that they needed to add a secondary recyclables storage area because interest in recycling has grown recently.

TABLE 7. FY2008
RECYCLING CAPABILITIES BY DISTRICT

	WASTE MINIMIZATION ACTIVITIES	MATERIALS RECYCLED
CORDOVA	Active collaboration with community partners to support recycling.	Aluminum, batteries (car & alkaline), electronics, fluorescent bulbs, fuel oil, glass, plastic #1 and #2, toner
GLACIER	Recycling efforts improved quickly. Working to expand visitor-recycling opportunities.	Aluminum, cardboard, paper, plastic #1 and #2, scrap metal, toner
SEWARD	Recycling has been ongoing for 5 years+. Rechargeable battery use has reduced the volume of AA and other batteries discarded. Employees encouraged to set default to double sided printing.	Aluminum, cardboard, batteries (alkaline and lead acid), glass, fluorescent bulbs, monofilament, paper, plastic #1 and #2 copper



RECYCLING SIGN IN THE CORDOVA DISTRICT OFFICE

Each district has implemented additional strategies to minimize waste production. Each year, the Cordova district provides more than 15,000 gallons of waste motor oil to the Harbor Master's in-town facility, where it is recycled for use in the community. Glacier district personnel reuse paper that has printed materials on one-side only, referred to as "GOOS (Good On One Side) paper, and post signs on paper towel holders reminding visitors that "paper towels come from trees." Signage indicating where recycling bins are located and how to print on both sides has also been posted in the Glacier district as a friendly reminder to forest employees. Staff at the Seward District Office collect soda tabs for the local Elks chapter to help raise money for children with cancer.

Seward employees have sought to increase waste minimization by making it easier for staff to participate in recycling efforts. By establishing a recycling hub in a centralized location, the district has been able to implement a consistent recycling program and expand recycling opportunities throughout the area.

While Glacier district staff have also stepped up recycling efforts (see sidebox), recycling at Glacier district campgrounds has proven challenging. Bears are attracted to the waste and campers do not always follow instructions. However, recycling opportunities are being expanded for visitors: a new recycling bin has been made available at the Begich-Boggs Visitor Center, and Cordova has had success with bear-proof recycling bins at campgrounds.

To encourage waste reduction outside of work hours, the Chugach Green Team has provided a reusable shopping bag to all employees, helping staff to lead by example. These compact bags, often made with post-consumer recycled content, can be easily compressed and folded when not in use.

In addition to solid waste diversion efforts, reducing the use of toxic and hazardous materials within the forest is important to reducing overall waste production. Employees maintain inventories of hazardous materials for each district, and regularly dispose of hazardous wastes through designated collection points managed by local cities and municipalities.

Efforts to reduce the amount of hazardous materials onsite are already in place. For example, in Cordova, forest employees minimize hazardous waste production by purchasing only the amount of chemical products needed for use and avoiding leftover products. Seward district disposed of three pick-up truck loads of hazardous waste in the summer. In addition, all districts take forest vehicles offsite for maintenance and repair, which avoids accumulating hazardous waste materials such as used vehicle oil on-site.

Proper collection and management of used fluorescent lamps is evident across the forest. Used lamps are collected in sturdy boxes and labeled, ready for shipment to Total Reclaim in Anchorage.

While there is strong support from forest staff for waste reduction, specifically recycling, efforts are relatively new and in the growth stage. Recycling initiatives have been led by sustainability leaders and volunteers on each district. There are opportunities to expand and further encourage participation by all staff and forest visitors.

MOVING FORWARD

The Chugach Sustainability Action Plan will include Waste as a focus area and aim to continue the current momentum and expand existing waste reduction efforts across



RECYCLING BINS AT THE CORDOVA WAREHOUSE

the forest. In order to better understand solid waste disposal and recycling efforts, the Chugach intends to conduct a **waste assessment**. This will help to determine the composition of the forest's waste and allow for more robust data collection on waste generation amounts. The assessment will include an inventory of all waste and recycling collection bins and periodic checks of waste receptacle capacity.

Once waste composition and bin capacity is better understood, staff can then evaluate opportunities for establishing waste reduction goals and focusing waste reduction actions. Waste generation monitoring and reduction actions should include concessionaires and forest partners. The Chugach will incorporate solid waste minimization goals into all vendor and contractor agreements, including construction contracts. Chugach has found great success reducing waste through local partnerships, such as with the Native Village of Eyak and the Copper River Watershed Project in Cordova. These partnerships will be encouraged and expanded.

Education is a key component of increasing recycling efforts. Staff and visitors will be informed as to the location of recycling bins and the items that can be recycled, and also made aware of the forest's waste reduction goals. Staff will receive waste reduction information during the time of initial employment and visitors will be informed through signage. Chugach staff who reside in USFS housing will be encouraged to recycle.

Waste generation is closely tied to purchasing. The Chugach will minimize its demand for newly manufactured products by developing a program to reuse manufactured products internally or through donation. In addition, staff will explore opportunities to expand waste reduction efforts such as through composting.

Chugach staff will reduce, reuse and recycle to the extent possible.



Literature and Resources

CHUGACH NATIONAL FOREST ENERGY AUDIT REPORT, NOVEMBER 2010.

CHUGACH VISITOR GUIDE: CENTENNIAL ISSUE CELEBRATING 100 YEARS.

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THE ENERGY POLICY ACT OF 2005 (EPACT 2005).

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EPA CLIMATE LEADERS.

www.epa.gov/climateleaders/

EPA CLIMATE LEADERS AND THE US FOREST SERVICE.

www.fs.fed.us/sustainableoperations/climate-change-greenhouse-gas-inventories.shtml

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www.fs.fed.us/ems/

USFS FY 2007 NATIONAL ENVIRONMENTAL FOOTPRINT REPORT. MAY 2008.

www.fs.fed.us/sustainableoperations/documents/fy2007-environmental-footprint.pdf

USFS 2009 FLEET MANAGEMENT IMPLEMENTATION PLAN.

<https://fs.usda.gov/wps/myportal>

USFS SUSTAINABLE OPERATIONS.

www.fs.fed.us/sustainableoperations/

Appendix I: In-Town Facilities

GLACIER DISTRICT

GRANITE CR GUARD STN DWELLING	0
WHITTIER FIRE STATION	6400
WHITTIER FIRE STATION TRANSFORMER BUILDING	165
GLACIER DISTRICT WAREHOUSE	2455
WHITTIER APARTMENT L	0
PWC BUNKHOUSE	1200
GLACIER DISTRICT BUNKHOUSE	2720
GLACIER DISTRICT OFFICE	7448
PWC WAREHOUSE	1856
GLACIER DISTRICT WAREHOUSE	3512
KODIAK TRIPLEX	3400
PWC POWDER HOUSE	96
BBVC BEGICH BOGGS VISITOR CTR	17020
BBVC PORTAGE BARRACKS	3200
TOTAL GRD SQUARE FOOTAGE	36956

CORDOVA DISTRICT

REDWOOD BAY ADM. CABIN	192
REDWOOD BAY 2 SEAT TOILET	20
ROCKY BAY 1 HOLE PIT TOILET	10
CORDOVA RESIDENCE #1	1356
CORDOVA RESIDENCE #2	1356
CWC FOURPLEX	3240
CWC 8 PERSON CREWHOUSE #1	1560
CWC 12 PERSON CREWHOUSE #2	3150
CORDOVA DISTRICT OFFICE	8925
CWC BOAT STORAGE	2300

CWC FOURPLEX CARPORT	1340
CWC WAREHOUSE	3104
CORDOVA MARINE WAREHOUSE	884
TOTAL CRD SQUARE FOOTAGE	27215

SEWARD DISTRICT

KLWC YCC CABIN #1	240
KLWC YCC CABIN #2	240
KLWC YCC CABIN #3	240
KLWC YCC CABIN #4	240
KLWC YCC CABIN #5	240
KLWC YCC CABIN #6	240
KLWC YCC CABIN #13	240
KLWC YCC STORAGE SHED	384
STORAGE BLDG	3500
KLWC YCC STORAGE #14	140
KENAI LAKE OFFICE	5358
KLWC MODULAR OFFICE	1248
KLWC FLEXIBLE HOUSING #1	8052
KLWC RESIDENCE	2533
SEWARD RESIDENCE #1 4TH & A	1518
SEWARD RESIDENCE #2 5TH & A	1368
KLWC 12 PERSON CREWHOUSE	4400
KLWC SOUTH DORMITORY	4581
KLWC CARPENTER SHOP	2271
KLWC EQUIP STORAGE & SHOP	2934
KLWC WAREHOUSE	3104

TOTAL SRD SQUARE FOOTAGE 37367

TOTAL CHUGACH NATIONAL
FOREST SQUARE FOOTAGE 101538

Appendix II



CHUGACH NATIONAL FOREST FY2008 Greenhouse Gas Inventory



The inventory was developed using the *Environmental Protection Agency (EPA) Climate Leaders Program Inventory Guidance* documents and technical assistance, and follows the example inventory developed for the National Forests of the Greater Yellowstone Area and the Tongass National Forest. It covers emissions from all activities over which the Forest Service has operational control within the Forest's geographical boundaries (with the exception of wildfire suppression). These are referred to as direct emissions or Scope 1 emissions. Indirect emissions or Scope 2 emissions, from purchased electricity, are also included in the inventory. Additionally, optional emissions (Scope 3) from chartered small aircraft business travel and employee commuting are included. Detailed information on each source category is provided below.

Data was collected from key personnel such as the Facilities Managers, Fleet Manager and Aviation Manager. District representatives completed a questionnaire and provided data requested.

For questions regarding the inventory or to comment on possible inconsistencies or errors you notice in the data, please contact Heather Gott, Environmental Specialist, at hgott@fs.fed.us, or Vanessa MacLeod, Facilities Engineer, at valeomacleod@fs.fed.us. Details regarding management of the inventory are in the Inventory Management Plan.

Stationary

Stationary combustion sources on the Chugach include boilers and water heaters fueled by propane and diesel fuel (fuel oil #2).

Natural gas, propane and fuel oil data was obtained from the National Financial Center (NFC) and confirmed again monthly receipts and input provided by facility managers Dana Smyke and Tanya Zastrow (Cordova), Danial Keeler (Glacier) and Mark Kromrey (Seward).

Mobile

This category includes emissions from both WCF and GSA road vehicles listed in the Chugach fleet inventory provided by the Fleet Manager, Roy Mitchell.

Vehicle miles traveled (VMT) and vehicle type were provided by Shannon Smith, Fleet Assistant.

Fuel use data was not documented for FY2008. Therefore, fuel usage was estimated based on average fuel economy values, or miles per gallon (MPG).

Where fuel economy values were not available for particular vehicles, values from similar vehicles were entered (e.g. Ford F250 entered for Ford F350).

The vast majority of the vehicles are fueled by gasoline.

Most vehicles are light duty trucks or heavy duty trucks. Vehicles are classified as heavy duty trucks according to their exemption from testing based on a gross vehicle weight rating (GVWR) over 8,500 pounds. (The list of these vehicles is available from www.fueleconomy.gov/feg/which_tested.shtml.)

Only a few passenger cars are in the Chugach fleet.

Emissions from watercraft and project vehicles (e.g. snowmobiles, trail bikes and all-terrain vehicles) are not included in this baseline inventory since fuel usage data was not available and this tool does not currently include calculation methodology. It is recommended that these sources are included in the future.

Electricity

Electricity usage data in kilowatt-hours (kWh) per month was obtained from NFC and checked against invoices from the utility provider.

The EPA Climate Leaders Program provided the inventory team with the 2005 eGRID tool, which was used to determine the appropriate eGRID subregion to input for each District. All Districts fall into the AKMS (ASCC Miscellaneous) subregion. (Note: Chugach utility providers are hydroelectric power plants. AKMS (ASCC Miscellaneous) provides regional emissions factors.)

Refrigeration and Air Conditioning

Emissions from refrigeration and air conditioning are at most de minimis and not worth pursuing at this time. Refrigeration equipment is minimal and regularly maintained on the Chugach, so leakage is extremely unlikely. Air conditioning is used only to cool the computer server during the summer months, and is also regularly maintained, so leakage is extremely unlikely.

Fire Extinguishers

Emissions from fire extinguishers are at most de minimis and not worth pursuing at this time. Fire extinguishers are regularly maintained on the Chugach, so leakage is extremely unlikely.

Optional Charter Air Travel and Business Travel on Commercial Aircraft

Chugach staff decided to include this optional category because their unique geography requires that staff travel between islands and remote locations on small aircraft frequently.

Small aircraft trips are flights on either fixed wing aircraft (Beaver and Cessna) and helicopters (AS350B2, AS350BA, 206Biii, 206L3, 407, UH1H).

The aviation manager provided data on the duration (in hours) of each trip by either fixed wing or rotor wing, and by District.

Fuel usage data was estimated based on trip durations and fuel economy factors. Fuel economy factors (in gallons per hour) for each aircraft type were provided by Ken Schlee, Aviation Manager.

Flights on large commercial aircraft are not included in the inventory at this time since data was not available. The inventory team assume this would be a significant source of Scope 3 emissions, however, and recommend that this category be included in future inventories.

Employee Commuting

Employee commuting data from Chugach employee commuting to work is extrapolated from the Region 10 data collected for the 2010 USFS Employee Commuting Survey. The relative proportions of each transportation category from all Region 10 respondents are applied to the population of Chugach employees: 256 staff members. It is recommended that Chugach specific data is used for greater accuracy in future inventories.

Summary Page



Instructions:

- (A) Use this summary sheet to fill out the Annual GHG Inventory Summary and Goal Tracking Form.
- (B) The total GHG emissions from each source category are provided below. Enter the data below into the appropriate cell of the Annual GHG Inventory Summary and Goal Tracking Form (page 1 - Corporate Inventory - U.S.)
- (C) If using this tool for a single facility or source, you can save the files under the facility or source name and you must sum all of the emission categories (e.g. Stationary Combustion) for each facility or source to a corporate total which then can be entered into the Annual GHG Inventory Summary and Goal Tracking Form.

Company Information:

Company Name:	Chugach National Forest
Company Address:	3301 C. Street, Suite 300 Anchorage AK 99503-3958
Name of Preparers:	Heather Gott/Chugach NF Carol Guy/ PRIZIM Inc.
Phone Number:	907.743.9505
Date Prepared:	December 1, 2010

Summary of Company Emissions:

Direct Emissions

Stationary Combustion	361	CO ₂ -e (metric tons)
Mobile Sources	347	CO ₂ -e (metric tons)

Indirect Emissions

Purchased and Consumed Electricity	131	CO ₂ -e (metric tons)
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Optional Emissions

Employee Commuting	146	CO ₂ -e (metric tons)
Chartered Air Travel	116	CO ₂ -e (metric tons)

Total Company Emissions

Total GHG Emissions (not including Optional Emissions)	839	CO ₂ -e (metric tons)
Total Optional Emissions	262	CO ₂ -e (metric tons)

Appendix II

1.0. Direct Emissions from Stationary Combustion Sources (Standard)



Instructions:

(A) Enter fuel data for each unit, facility or site in ORANGE cells of Table 1. Company-wide fuel use is reported in Table 2. Company-wide emissions is reported in Table 3, biomass emissions are reported separately.

- Step 1.** Enter the total fuel combusted for each unit, facility or site (by fuel type) in Table 1.
- Select "Fuel Combusted" from drop down box. Enter "Quantity Combusted" in appropriate units.
 - Appropriate units for "Quantity Combusted" is listed under "Units" in Table 1 and also summarized in Table 2.
 - See example entry in first row (RED Italics).

Table 1. Stationary Source Fuel Combustion

Source ID	Source Description	Fuel Combusted	Quantity Combusted	Units
<i>BLR-012</i>	<i>East Power Plant</i>	<i>Bituminous Coal</i>	<i>500</i>	<i>tons</i>
NFC	Cordova	Propane	250	gallons
Utility Recor	Cordova	Distillate Fuel Oil (#1, 2 & 4)	11,234	gallons
NFC	Glacier	Natural Gas	1,443,201	scf
NFC	Glacier	Propane	2,633	gallons
Utility Recor	Glacier	Distillate Fuel Oil (#1, 2 & 4)	0	gallons
NFC	Seward	Natural Gas	0	scf
NFC	Seward	Propane	400	gallons
Utility Recor	Seward	Distillate Fuel Oil (#1, 2 & 4)	14,578	gallons

Table 2. Total Company-Wide Stationary Source Fuel Combustion

Fuel Type	Quantity Combusted	Units
Anthracite Coal	0	tons
Bituminous Coal	0	tons
Sub-bituminous Coal	0	tons
Lignite Coal	0	tons
Natural Gas	1,443,201	scf
Distillate Fuel Oil (#1, 2 & 4)	25,812	gallons
Residual Fuel Oil (#5 & 6)	0	gallons
Kerosene	0	gallons
LPG	0	gallons
Propane	3,283	gallons
Wood and Wood Waste	0	tons
Landfill Gas (50%CH ₄ , 50%CO ₂)	0	scf

Table 3. Total Company-wide CO₂, CH₄ and N₂O Emissions from Stationary Source Fuel Combustion

Fuel Type	CO ₂ (kg)	CH ₄ (g)	N ₂ O (g)
Anthracite Coal	0.0	0.0	0.0
Bituminous Coal	0.0	0.0	0.0
Sub-bituminous Coal	0.0	0.0	0.0
Lignite Coal	0.0	0.0	0.0
Natural Gas	78,798.8	7,425.3	148.5
Distillate Fuel Oil (#1, 2 & 4)	261,868.9	39,378.7	2,147.9
Residual Fuel Oil (#5 & 6)	0.0	0.0	0.0
Kerosene	0.0	0.0	0.0
LPG	0.0	0.0	0.0
Propane	18,851.5	3,288.0	179.3
Total Fossil Fuel Emissions	359,519.1	50,091.9	2,475.8
Wood and Wood Waste	0.0	0.0	0.0
Landfill Gas (50%CH ₄ , 50%CO ₂)	0.0	0.0	0.0
Total Non-Fossil Fuel Emissions	0.0	0.0	0.0
Total Emissions for all Fuels	359,519.1	50,091.9	2,475.8
Total CO₂ Emissions - Equivalent (metric tons)			361.3
Total Biomass CO₂ Emissions - Equivalent (metric tons)			0.0

Notes:

- CO₂ emissions estimated using emission factors provided in Tables B-5 and B-6 of the *Climate Leaders Greenhouse Gas Inventory Protocol - Direct Emissions from Stationary Combustion Sources (May 2008)*.
- CH₄ and N₂O emissions estimated using emission factors provided in Tables A-1 (commercial sector values), B-1 and B-2 of the *Climate Leaders Greenhouse Gas Inventory Protocol - Direct Emissions from Stationary Combustion Sources (May 2008)*.
- CH₄ and N₂O factors for "commercial petroleum" used for kerosene, LPG and propane. CH₄ and N₂O factors for "natural gas" used for landfill gas.

2.0. Direct Emissions from Mobile Sources



Instructions:

(A) Enter data in ORANGE cells in proper units as appropriate in Table 1. Final emissions data is provided in Table 6. Biomass emissions are not reported in the total CO₂ emissions, but are reported separately in Table 6.

Step 1. Enter Biodiesel and Ethanol percentages if known, or leave default values.

- Biodiesel assumed to be mix of biofuel and diesel (GHG emissions from biofuel need not be reported)
- Ethanol assumed to be mix of ethanol and gasoline (GHG emissions from ethanol need not be reported).

Biofuel Percent:	20	%
Ethanol Percent:	80	%

Step 2. Enter "Vehicle Year", "Fuel Usage" and "Miles Traveled" for each vehicle or group of vehicles (by vehicle type, vehicle year and fuel type) in Table 1.

- Select "Vehicle Type" from drop down box (closest type available). Enter "Fuel Used" in appropriate units.
- If mileage or amount of fuel used unknown, estimate using approximate fuel economy values (see Table 7).
- See example entry in first row (RED Italics).

Table 1. Mobile Source Fuel Combustion and Miles Traveled

ID	Description	Type	Year	Usage	Units	Traveled
<i>Fleet-012</i>	<i>HQ Fleet</i>	<i>Gasoline Heavy-Duty Vehicles</i>	<i>1990</i>	<i>500</i>	<i>gal</i>	<i>15,000</i>
G43-10747	CRD	Gasoline Heavy-Duty Vehicles	2001	173	gal	2,422
G43-4457B	CRD	Gasoline Heavy-Duty Vehicles	2006	219	gal	3,070
G63-06658	CRD	Gasoline Heavy-Duty Vehicles	2000	266	gal	2,773
G63-08947	CRD	Gasoline Heavy-Duty Vehicles	2001	220	gal	3,082
G63-08961	CRD	Gasoline Heavy-Duty Vehicles	2001	497	gal	6,960
G63-12372	CRD	Gasoline Heavy-Duty Vehicles	2002	230	gal	3,028
G63-12378	CRD	Gasoline Heavy-Duty Vehicles	2002	480	gal	6,324
G63-16299	CRD	Gasoline Heavy-Duty Vehicles	2003	398	gal	4,146
G71-02214	CRD	Gasoline Heavy-Duty Vehicles	2002	222	gal	2,220
G43-11160	GRD	Gasoline Heavy-Duty Vehicles	2001	160	gal	2,241
G63-06654	GRD	Gasoline Heavy-Duty Vehicles	2000	573	gal	5,975
G63-1688D	GRD	Gasoline Heavy-Duty Vehicles	2006	510	gal	7,927
G63-2946B	GRD	Gasoline Heavy-Duty Vehicles	2006	483	gal	6,756
G63-2947B	GRD	Gasoline Heavy-Duty Vehicles	2006	510	gal	7,140
G71-02793	GRD	Gasoline Heavy-Duty Vehicles	2003	311	gal	3,107
G63-1640D	SO	Gasoline Heavy-Duty Vehicles	2006	898	gal	11,848
G63-2150A	SO	Gasoline Heavy-Duty Vehicles	2004	293	gal	4,100
G63-29143	SO	Gasoline Heavy-Duty Vehicles	1999	420	gal	5,874
G43-10748	SRD	Gasoline Heavy-Duty Vehicles	2001	466	gal	6,529
G43-1364B	SRD	Gasoline Heavy-Duty Vehicles	2005	764	gal	7,962
G62-3105A	SRD	Gasoline Heavy-Duty Vehicles	2004	379	gal	5,004
G63-05687	SRD	Gasoline Heavy-Duty Vehicles	2001	267	gal	3,417
G63-06655	SRD	Gasoline Heavy-Duty Vehicles	2000	244	gal	3,791
G63-1093B	SRD	Gasoline Heavy-Duty Vehicles	2005	299	gal	4,647
G63-12379	SRD	Gasoline Heavy-Duty Vehicles	2002	444	gal	6,214
G63-16298	SRD	Gasoline Heavy-Duty Vehicles	2003	337	gal	4,720
G63-2158A	SRD	Gasoline Heavy-Duty Vehicles	2004	661	gal	9,251
G13-00472	SO	Other Gasoline Sources	2004	136	gal	5,553
G61-1801B	SO	Other Gasoline Sources	2006	522	gal	14,129
G41-71705	CRD	Gasoline Light-Duty Trucks	2003	92	gal	1,434
G62-07895	CRD	Gasoline Light-Duty Trucks	2001	230	gal	3,585
G41-66653	GRD	Gasoline Light-Duty Trucks	2004	181	gal	3,001
G42-40652	GRD	Gasoline Light-Duty Trucks	2001	247	gal	3,836
G61-2017B	GRD	Gasoline Light-Duty Trucks	2006	284	gal	5,259
G62-05267	GRD	Gasoline Light-Duty Trucks	2000	306	gal	4,765
G62-3083A	GRD	Gasoline Light-Duty Trucks	2004	322	gal	4,890
G62-3089A	GRD	Gasoline Light-Duty Trucks	2004	510	gal	7,417
G63-2945B	GRD	Gasoline Light-Duty Trucks	2006		gal	8,552
G41-66655	SO	Gasoline Light-Duty Trucks	2004	132	gal	2,590
G42-40671	SO	Gasoline Light-Duty Trucks	2003	305	gal	4,948
G61-1645A	SO	Gasoline Light-Duty Trucks	2004	290	gal	4,605
G62-1612B	SO	Gasoline Light-Duty Trucks	2004	520	gal	7,914
G42-0914B	SRD	Gasoline Light-Duty Trucks	2005	116	gal	1,800
G42-40653	SRD	Gasoline Light-Duty Trucks	2002	198	gal	3,087
G42-40917	SRD	Gasoline Light-Duty Trucks	2003	85	gal	1,374
G61-08748	SRD	Gasoline Light-Duty Trucks	2000	244	gal	4,044
G61-14550	SRD	Gasoline Light-Duty Trucks	2002	55	gal	856
G61-2127A	SRD	Gasoline Light-Duty Trucks	2005	265	gal	5,555
G61-2128A	SRD	Gasoline Light-Duty Trucks	2005	328	gal	6,867
G62-0619A	SRD	Gasoline Light-Duty Trucks	2004	482	gal	7,323
G62-07566	SRD	Gasoline Light-Duty Trucks	2000	403	gal	6,136
G62-07888	SRD	Gasoline Light-Duty Trucks	2001	461	gal	7,170
G62-13888	SRD	Gasoline Light-Duty Trucks	2000	504	gal	7,154
G62-13897	SRD	Gasoline Light-Duty Trucks	2003	524	gal	8,501

Appendix II

ID	Description	Type	Year	Usage	Units	Traveled
G62-1583B	SRD	Gasoline Light-Duty Trucks		2005	706 gal	
G62-1597B	SRD	Gasoline Light-Duty Trucks		2005	266 gal	
G62-23973	SRD	Gasoline Light-Duty Trucks		2004	696 gal	
G62-3097A	SRD	Gasoline Light-Duty Trucks		2004	640 gal	
G62-3103A	SRD	Gasoline Light-Duty Trucks		2004	213 gal	
G13-00471	SO	Gasoline Passenger Cars		2004	176 gal	
G13-00489	SO	Gasoline Passenger Cars		2004	264 gal	
1510		Gasoline Heavy-Duty Vehicles		1997	0 gal	
1511		Gasoline Heavy-Duty Vehicles		1997	170 gal	
1547		Gasoline Heavy-Duty Vehicles		1998	0 gal	
1548		Gasoline Light-Duty Trucks		1998	0 gal	
1567		Gasoline Light-Duty Trucks		1999	729 gal	
1579		Gasoline Light-Duty Trucks		2000	518 gal	
1580		Gasoline Light-Duty Trucks		2000	139 gal	
1581		Gasoline Passenger Cars		2000	0 gal	
1606		Gasoline Light-Duty Trucks		2001	206 gal	
1607		Gasoline Light-Duty Trucks		2001	336 gal	
1608		Gasoline Light-Duty Trucks		2001	612 gal	
1609		Gasoline Light-Duty Trucks		2001	118 gal	
1610		Gasoline Light-Duty Trucks		2001	0 gal	
1611		Gasoline Light-Duty Trucks		2001	72 gal	
1614		Gasoline Light-Duty Trucks		2001	461 gal	
1635		Gasoline Light-Duty Trucks		2002	1,506 gal	
1636		Gasoline Light-Duty Trucks		2002	788 gal	
1637		Gasoline Light-Duty Trucks		2002	399 gal	
1639		Gasoline Passenger Cars		2002	0 gal	
1641		Gasoline Light-Duty Trucks		2002	454 gal	
1642		Gasoline Passenger Cars		2002	112 gal	
1643		Gasoline Light-Duty Trucks		2002	256 gal	
1646		Gasoline Heavy-Duty Vehicles		2003	227 gal	
1647		Gasoline Light-Duty Trucks		2003	247 gal	
1648		Gasoline Heavy-Duty Vehicles		2003	678 gal	
1671		Gasoline Heavy-Duty Vehicles		2003	124 gal	
1678		Gasoline Heavy-Duty Vehicles		2004	117 gal	
1722		Gasoline Heavy-Duty Vehicles		2005	328 gal	
1725		Gasoline Light-Duty Trucks		2005	80 gal	
1726		Gasoline Heavy-Duty Vehicles		2005	91 gal	
1727		Gasoline Heavy-Duty Vehicles		2005	353 gal	
1728		Gasoline Heavy-Duty Vehicles		2005	1,502 gal	
1730		Gasoline Light-Duty Trucks		2000	663 gal	
1731		Gasoline Light-Duty Trucks		2005	369 gal	
1734		Gasoline Heavy-Duty Vehicles		2006	336 gal	
1746		Gasoline Light-Duty Trucks		2006	975 gal	
1747		Gasoline Light-Duty Trucks		2006	829 gal	
1748		Gasoline Light-Duty Trucks		2006	761 gal	
1762		Gasoline Light-Duty Trucks		2007	1,688 gal	
1763		Gasoline Light-Duty Trucks		2007	391 gal	
1775		Gasoline Heavy-Duty Vehicles		2008	163 gal	
1776		Gasoline Heavy-Duty Vehicles		2008	465 gal	
1778		Gasoline Heavy-Duty Vehicles		2008	144 gal	
1971		Gasoline Light-Duty Trucks		1996	0 gal	

Table 2. Total Company-Wide Mobile Source Fuel Usage and CO₂ Emissions

Fuel Type	Fuel Usage	Units	CO ₂ (kg)
Motor Gasoline	38,834	gallons	342,127.5
Diesel Fuel	0	gallons	0.0
Residual Fuel Oil (#5, & 6)	0	gallons	0.0
Avgas	0	gallons	0.0
Jet Fuel	0	gallons	0.0
LPG	0	gallons	0.0
Ethanol (gasoline component only)	0	gallons	0.0
Biodiesel (diesel component only)	0	gallons	0.0
Liquefied Natural Gas (LNG)	0	gallons	0.0
Compressed Natural Gas (CNG)	0	scf	0.0

Table 3. Total Company-Wide Highway Gasoline Mobile Source Mileage and CH₄/N₂O Emissions

Vehicle Type	Vehicle Year	Mileage (miles)	N ₂ O (g)	CH ₄ (g)
Gasoline Passenger Cars	1984-1993	0	0.0	0.0
	1994	0	0.0	0.0
	1995	0	0.0	0.0
	1996	0	0.0	0.0
	1997	0	0.0	0.0
	1998	0	0.0	0.0
	1999	0	0.0	0.0
	2000	0	0.0	0.0
	2001	0	0.0	0.0
	2002	0	0.0	0.0
	2003	0	0.0	0.0
	2004	10,551	87.6	153.0
	2005-present	0	0.0	0.0
Gasoline Light-Duty Trucks (Vans, Pickup Trucks, SUVs)	1987-1993	0	0.0	0.0
	1994	0	0.0	0.0
	1995	0	0.0	0.0
	1996	0	0.0	0.0
	1997	0	0.0	0.0
	1998	0	0.0	0.0
	1999	0	0.0	0.0
	2000	22,099	1,372.3	764.6
	2001	14,591	239.3	220.3
	2002	3,943	89.9	70.2
	2003	16,257	185.3	252.0
	2004	61,859	816.5	940.3
	2005-present	42,670	431.0	669.9
Gasoline Heavy-Duty Vehicles	1985-1986	0	0.0	0.0
	1987	0	0.0	0.0
	1988-1989	0	0.0	0.0
	1990-1995	0	0.0	0.0
	1996	0	0.0	0.0
	1997	2,373	409.6	219.3
	1998	0	0.0	0.0
	1999	5,874	842.9	339.5
	2000	12,539	1,369.3	618.2
	2001	24,651	3,044.4	1,301.6
	2002	17,786	2,324.6	971.1
	2003	11,973	1,484.7	638.2
	2004	18,355	523.1	625.9
2005-present	49,350	873.5	1,608.8	

Table 4. Total Company-Wide Highway non-Gasoline Mobile Source Mileage and CH₄/N₂O Emissions

Vehicle Type	Vehicle Year	Mileage (miles)	N ₂ O (g)	CH ₄ (g)
Diesel Passenger Cars	1960-1982	0	0.0	0.0
	1983-present	0	0.0	0.0
Diesel Light-Duty Trucks	1960-1982	0	0.0	0.0
	1983-1995	0	0.0	0.0
	1996-present	0	0.0	0.0
Diesel Heavy-Duty Vehicles	1960-present	0	0.0	0.0
Motorcycles	Non-Catalyst Control	0	0.0	0.0
	Uncontrolled	0	0.0	0.0
CNG Light-Duty Vehicles		0	0.0	0.0
CNG Heavy-Duty Vehicles		0	0.0	0.0
CNG Buses		0	0.0	0.0
LPG Light-Duty Vehicles		0	0.0	0.0
LPG Heavy-Duty Vehicles		0	0.0	0.0
LNG Heavy-Duty Vehicles		0	0.0	0.0
Ethanol Light-Duty Vehicles		0	0.0	0.0
Ethanol Heavy-Duty Vehicles		0	0.0	0.0
Ethanol Buses		0	0.0	0.0

Appendix II

Table 5. Total Company-Wide Non-Highway Mobile Source Mileage and CH₄/N₂O Emissions

Vehicle Type	Fuel Usage (gallons)	N ₂ O (g)	CH ₄ (g)
Residual Oil Ships and Boats	0	0.0	0.0
Diesel Ships and Boats	0	0.0	0.0
Gasoline Ships and Boats	0	0.0	0.0
Diesel Locomotives	0	0.0	0.0
Gasoline Agricultural Equip.	0	0.0	0.0
Diesel Agricultural Equip.	0	0.0	0.0
Gasoline Construction Equip.	0	0.0	0.0
Diesel Construction Equip.	0	0.0	0.0
Jet Fuel Aircraft	0	0.0	0.0
Avgas Aircraft	0	0.0	0.0
Biofuel Vehicles (diesel component only)	0	0.0	0.0
Other Diesel Sources	0	0.0	0.0
Other Gasoline Sources	658	147.3	331.3

Table 6. Total CO₂ Emissions from Mobile Sources

Total CO₂ Emissions - Equivalent (metric tons)	346.7
Total Biomass CO₂ Emissions - Equivalent (metric tons)	0.0

Notes:

1. CO₂, CH₄ and N₂O emission factors for vehicles from Tables 2 and 3, A-6 and A-7, and B-1 through B-7 of the *Climate Leaders Greenhouse Gas Inventory Protocol - Direct Emissions from Mobile Combustion Sources (May 2008)*.
2. Emission factors updated with latest values from *U.S. Greenhouse Gas Emissions and Sinks: 1990 - 2005* as needed.
3. Average mpg values from the U.S. Department of Transportation, Federal Highway Administration, Highway Statistics 2005, Table VM-1.
4. Bus mpg values from American Public Transportation Association, Public Transportation Fact Book, Page 23, April 2006.
5. Densities of fuels from Table A-36, *U.S. Greenhouse Gas Emissions and Sinks: 1990 - 2005*.

Table 7. Average Fuel Economy by Vehicle Type

Vehicle Type	Average Fuel Economy (mpg)
Passenger Cars	22.5
Motorcycles	50
Diesel Buses (Diesel Heavy-Duty Vehicles)	3.7
CNG Buses	2.4
LNG Buses (LNG Heavy-Duty Vehicles)	1.8
Other 2-axle, 4-tire Vehicles	16.2
Single unit 2-axle 6-tire or more Trucks	8.8
Combination Trucks	5.9

1.0. Indirect Emissions from Purchase of Electricity

Instructions:

(A) Enter total electricity purchased (kWh) for each unit, facility or site in ORANGE cells of Table 1 for each eGRID subregion. Final emissions data is provided in Table 2.

- Step 1.** Select eGRID "Subregion" from drop box and enter "Electricity Purchased" for each unit, facility or site.
- Use map (Figure 1) at bottom of sheet to determine appropriate eGRID subregion.
 - Emission rates for each eGRID subregion are provided in Table 3.
 - See example entry in first row (RED Italics).

Table 1. Total Amount of Electricity Purchased by eGRID Subregion

Source ID	Source Description	eGRID Subregion	Electricity Purchased (kWh)	CO ₂ Emissions (lb)	CH ₄ Emissions (lb)	N ₂ O Emissions (lb)
<i>Bldg-012</i>	<i>East Power Plant</i>	<i>AKMS (ASCC Miscellaneous)</i>	<i>10,000</i>	<i>4,801.0</i>	<i>0.2</i>	<i>0.0</i>
NFC	Cordova	AKMS (ASCC Miscellaneous)	127,962	61,434.4	3.0	0.6
NFC	Glacier	AKMS (ASCC Miscellaneous)	303,494	145,707.2	7.2	1.3
NFC	Seward	AKMS (ASCC Miscellaneous)	167,033	80,192.4	4.0	0.7
Total Emissions for All Subregions			598,489	287,334.0	14.3	2.6

Table 2. Total Emissions from Electricity Purchases

Total CO₂ Emissions - Equivalent (metric tons)	130.8
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Notes:

1. CO₂, CH₄ and N₂O emissions estimated using methodology provided in *Climate Leaders Greenhouse Gas Inventory Protocol - Indirect Emissions from Purchase/Sales of Electricity and Steam (July 2008)*.
2. Emission factors in Table 3 are from eGRID2006, which represents 2004 national data.

Table 3. CO₂, CH₄ and N₂O eGRID2006 Emission Factors by Subregion (2004 Data)

Subregion	CO ₂ Factor (lb CO ₂ /MWh)	CH ₄ Factor (lb CH ₄ /MWh)	N ₂ O Factor (lb N ₂ O/MWh)
AKGD (ASCC Alaska Grid)	1,257.19	0.0266	0.0064
AKMS (ASCC Miscellaneous)	480.10	0.0238	0.0044
AZNM (WECC Southwest)	1,254.02	0.0175	0.0148
CAMX (WECC California)	878.71	0.0366	0.0085
ERCT (ERCOT All)	1,420.56	0.0214	0.0148
FRCC (FRCC All)	1,327.66	0.0528	0.0150
HIMS (HICC Miscellaneous)	1,456.17	0.0999	0.0182
HIOA (HICC Oahu)	1,728.12	0.0911	0.0212
MORE (MRO East)	1,858.72	0.0314	0.0289
MROW (MRO West)	1,813.81	0.0264	0.0287
NEWE (NPCC New England)	908.90	0.0795	0.0152
NWPP (WECC Northwest)	921.10	0.0217	0.0140
NYCW (NPCC NYC/Westchester)	922.22	0.0384	0.0060
NYLI (NPCC Long Island)	1,412.20	0.0684	0.0117
NYUP (NPCC Upstate NY)	819.68	0.0242	0.0114
RFCE (RFC East)	1,095.53	0.0244	0.0168
RFCM (RFC Michigan)	1,641.41	0.0340	0.0253
RFCW (RFC West)	1,556.39	0.0196	0.0244
RMPA (WECC Rockies)	2,035.81	0.0241	0.0302
SPNO (SPP North)	1,971.42	0.0236	0.0303
SPSO (SPP South)	1,761.14	0.0301	0.0230
SRMV (SERC Mississippi Valley)	1,135.46	0.0413	0.0132
SRMW (SERC Midwest)	1,844.34	0.0214	0.0288
SRSO (SERC South)	1,490.37	0.0388	0.0248
SRTV (SERC Tennessee Valley)	1,494.89	0.0233	0.0237
SRVC (SERC Virginia/Carolina)	1,146.39	0.0291	0.0191

Appendix II

Figure 1. eGRID2006 Subregions (2004 Data)



3.0. Optional Emissions from Employee Commuting



Table 1. Vehicle (i.e. Personal Car, Taxi) Employee Commuting by Vehicle Miles Traveled (CO₂, CH₄ and N₂O)

Source ID	Source Description	Vehicle Type	Vehicle Miles (miles)	CO ₂ Emissions (kg)	CH ₄ Emissions (g)	N ₂ O Emissions (g)
JD-001	John Doe 1	Passenger Car	100	23	2.0	2.1
USFS Survey	Chugach Employee	Light-Duty Truck	144,520	75,006	5,202.7	6,792
USFS Survey	Chugach Employee	Passenger Car	138,938	50,573	4,307.1	4,446.0
USFS Survey	Chugach Employee	Motorcycle	4,849	810	339.4	33.9
USFS Survey	Chugach Carpool Es	Light-Duty Truck	9,192	4,771	330.9	432.0
USFS Survey	Chugach Carpool Es	Passenger Car	19,832	7,219	614.8	634.6
Total for all Vehicle Employee Commuting				138,379	10,794.9	12,339.0

Table 2. Employee Rail Employee Commuting by Passenger Miles Traveled (CO₂, CH₄ and N₂O)

Source ID	Source Description	Rail Type	Passenger Miles (miles)	CO ₂ Emissions (kg)	CH ₄ Emissions (g)	N ₂ O Emissions (g)
JD-001	John Doe 1	Intercity Rail (i.e. Amtrak)	100	19	0.2	0.1
USFS Survey	Chugach Employee	Commuter Rail	1,051	181	2.1	1.1
Total for all Rail Employee Commuting				181	2.1	1.1

Table 3. Bus Employee Commuting by Passenger Miles Traveled (CO₂, CH₄ and N₂O)

Source ID	Source Description	Bus Type	Passenger Miles (miles)	CO ₂ Emissions (kg)	CH ₄ Emissions (g)	N ₂ O Emissions (g)
<i>JD-001</i>	<i>John Doe 1</i>	<i>Diesel Urban</i>	<i>100</i>	<i>26</i>	<i>0.1</i>	<i>0.1</i>
USFS Survey	Chugach Employee Estimate		35,554	3,804	21.3	17.8
Total for all Bus Employee Commuting				3,804	21.3	17.8

Table 4. Total CO₂ Emissions from Employee Commuting

Total CO₂ Emissions - Equivalent (metric tons)	146.4
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Notes:

- CO₂, CH₄ and N₂O emission factors for all employee commuting from *Climate Leaders Greenhouse Gas Inventory Protocol Core Module Guidance, Optional Emissions from Employee Commuting, Business Travel and Product Transport (January 2008)*.
- CH₄ and N₂O emission factors for bus employee travel from Table A-7 of the *Climate Leaders Greenhouse Gas Inventory Protocol - Direct Emissions from Mobile Combustion Sources (October 2004)*.

3.0. Optional Emissions from Chartered Air Travel

Instructions:

(A) Enter data in ORANGE cells in proper units as appropriate in Table 1. Final emissions data is provided in Table 6. Biomass emissions are not reported in the total CO₂ emissions, but are reported separately in Table 6.

- Step 1.** Enter Biodiesel and Ethanol percentages if known, or leave default values.
 - Biodiesel assumed to be mix of biofuel and diesel (GHG emissions from biofuel need not be reported)
 - Ethanol assumed to be mix of ethanol and gasoline (GHG emissions from ethanol need not be reported).

Biofuel Percent:	<input type="text" value="20"/> %
Ethanol Percent:	<input type="text" value="80"/> %

- Step 2.** Enter "Vehicle Year", "Fuel Usage" and "Miles Traveled" for each vehicle or group of vehicles (by vehicle type, vehicle year and fuel type) in Table 1.
 - Select "Vehicle Type" from drop down box (closest type available). Enter "Fuel Used" in appropriate units.
 - If mileage or amount of fuel used unknown, estimate using approximate fuel economy values (see Table 7).
 - See example entry in first row (RED Italics).

Table 1. Mobile Source Fuel Combustion and Miles Traveled

Source ID	Source Description	Vehicle Type	Fuel Usage	Units	Miles Traveled
<i>Fleet-012</i>	<i>HQ Fleet</i>	<i>Avgas Aircraft</i>	<i>500</i>	<i>gal</i>	<i>15,000</i>
Aviation Reg	Beaver	Avgas Aircraft	4,278	gal	NA
Aviation Reg	Cessna	Avgas Aircraft	2,506	gal	NA
Aviation Reg	AS350B2	Jet Fuel Aircraft	1,575	gal	NA
Aviation Reg	AS350BA	Jet Fuel Aircraft	1,120	gal	NA
Aviation Reg	206B111	Jet Fuel Aircraft	2,340	gal	NA
Aviation Reg	206L3	Jet Fuel Aircraft	455	gal	NA
Aviation Reg	407	Jet Fuel Aircraft	90	gal	NA
Aviation Reg	UH1H	Jet Fuel Aircraft	400	gal	NA

Table 2. Total Company-Wide Mobile Source Fuel Usage and CO₂ Emissions

Fuel Type	Fuel Usage	Units	CO ₂ (kg)
Motor Gasoline	0	gallons	0.0
Diesel Fuel	0	gallons	0.0
Residual Fuel Oil (#5, & 6)	0	gallons	0.0
Avgas	6,784	gallons	56,442.9
Jet Fuel	5,980	gallons	57,228.6
LPG	0	gallons	0.0
Ethanol (gasoline component only)	0	gallons	0.0
Biodiesel (diesel component only)	0	gallons	0.0
Liquefied Natural Gas (LNG)	0	gallons	0.0
Compressed Natural Gas (CNG)	0	scf	0.0

Appendix II

Table 5. Total Company-Wide Non-Highway Mobile Source Mileage and CH₄/N₂O Emissions

Vehicle Type	Fuel Usage (gallons)	N ₂ O (g)	CH ₄ (g)
Jet Fuel Aircraft	5,980	1,842.5	1,603.0
Avgas Aircraft	6,784	723.5	47,750.5

Table 6. Total CO₂ Emissions from Mobile Sources

Total CO₂ Emissions - Equivalent (metric tons)	115.5
Total Biomass CO₂ Emissions - Equivalent (metric tons)	0.0

Notes:

- CO₂, CH₄ and N₂O emission factors for vehicles from Tables 2 and 3, A-6 and A-7, and B-1 through B-7 of the *Climate Leaders Greenhouse Gas Inventory Protocol - Direct Emissions from Mobile Combustion Sources (May 2008)*.
- Emission factors updated with latest values from *U.S. Greenhouse Gas Emissions and Sinks: 1990 - 2005* as needed.
- Average mpg values from the U.S. Department of Transportation, Federal Highway Administration, Highway Statistics 2005, Table VM-1.
- Bus mpg values from American Public Transportation Association, Public Transportation Fact Book, Page 23, April 2006.
- Densities of fuels from Table A-36, *U.S. Greenhouse Gas Emissions and Sinks: 1990 - 2005*.

Table 7. Average Fuel Economy by Vehicle Type

Vehicle Type	Average Fuel Economy (mpg)
Passenger Cars	22.5
Motorcycles	50
Diesel Buses (Diesel Heavy-Duty Vehicles)	3.7
CNG Buses	2.4
LNG Buses (LNG Heavy-Duty Vehicles)	1.8
Other 2-axle, 4-tire Vehicles	16.2
Single unit 2-axle 6-tire or more Trucks	8.8
Combination Trucks	5.9

Conversion Factors



Mass			
1 pound (lb)	453.6 grams (g)	0.4536 kilograms (kg)	0.0004536 metric tons (tonne)
1 kilogram (kg)	2,205 pounds (lb)		
1 short ton (ton)	2,000 pounds (lb)	907.2 kilograms (kg)	
1 metric ton (tonne)	2,205 pounds (lb)	1,000 kilograms (kg)	1.102 short tons (tons)

Volume			
1 cubic foot (ft ³)	7.4805 US gallons (gal)	0.1781 barrel (bbl)	
1 cubic foot (ft ³)	28.32 liters (L)	0.02832 cubic meters (m ³)	
1 US gallon (gal)	0.0238 barrel (bbl)	3.785 liters (L)	0.003785 cubic meters (m ³)
1 barrel (bbl)	42 US gallons (gal)	158.99 liters (L)	0.1589 cubic meters (m ³)
1 liter (L)	0.001 cubic meters (m ³)	0.2642 US gallons (gal)	
1 cubic meter (m ³)	6.2897 barrels (bbl)	264.2 US gallons (gal)	1,000 liters (L)

Energy			
1 kilowatt hour (kWh)	3,412 Btu (Btu)	3,600 kilojoules (KJ)	
1 megajoule (MJ)	0.001 gigajoules (GJ)		
1 gigajoule (GJ)	0.9478 million Btu (mmBtu)	277.8 kilowatt hours (kWh)	
1 Btu (Btu)	1,055 joules (J)		
1 million Btu (mmBtu)	1.055 gigajoules (GJ)	293 kilowatt hours (kWh)	
1 therm (therm)	100,000 Btu (Btu)	0.1055 gigajoules (GJ)	29.3 kilowatt hours (kWh)
100 ft ³ of natural gas (scf)	1.03 therm (therm)	1,030 Btu (Btu)	

Distance	
1 land mile	1.609 land kilometers
1 nautical mile	1.15 land miles

Other	
Kilo	1,000
Mega	1,000,000
Giga	1,000,000,000
Tera	1,000,000,000,000
Molecular Weigh of C	12
Molecular Weight of CO ₂	44