
Greenhouse Gas Emissions Inventory Management Plan

Natural Resource Stewardship and Science Directorate, National Park Service

Prepared for:



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ABBREVIATIONS, ACRONYMS, AND SYMBOLS

Acronym	Definition
CBECS	Commercial Buildings Energy Consumption Survey
CFP	Climate Friendly Parks
CH ₄	Methane
CLIP	Climate Leadership in Parks
CO ₂	Carbon dioxide
DOE	Department of Energy
EV	Electric vehicle
FAST	Federal Automotive Statistical Tool
FEMP	Federal Energy Management Program
GHG	Greenhouse gas
GSA	General Services Administration
HFC	Hydrofluorocarbon
IMP	Inventory Management Plan
kWh	Kilowatt-hours
MBS	Management Business Solutions
MPG	Miles per gallon
N ₂ O	Nitrous oxide
NPS	National Park Service
POV	Privately owned vehicle
NRSS	Natural Resource Stewardship and Science Directorate
SOMB	Sustainable Operations and Maintenance Branch
WWTP	Wastewater treatment plant

INTRODUCTION

The Natural Resource Stewardship and Science (NRSS) Directorate of the National Park Service (NPS) provides scientific, technical, and administrative support to national parks to assist in the management of natural resources. NRSS develops, utilizes, and distributes science and tools that support park efforts to protect resources and values unimpaired for future generations.

But NRSS also aspires to lead by example. Through its operations, NRSS strives to advance servicewide goals for sustainability, as outlined in the 2016 NPS Green Parks Plan. Thus—to better understand the environmental footprint of operations and identify opportunities for improvement—the NRSS initiated a Climate Friendly Parks effort.

The NPS Climate Friendly Parks (CFP) Program is managed by the NPS's Sustainable Operations and Maintenance Branch (SOMB). To join the CFP program, NPS parks or organizations are required to develop a baseline greenhouse gas (GHG) emissions inventory.

This Inventory Management Plan (IMP) is meant to transparently detail the scope, data sources, emissions calculation methodologies, and other pertinent information to accompany the 2020 NRSS GHG emissions inventory. This IMP also serves as a possible framework for subsequent NRSS GHG emissions inventories, if so desired. Future GHG inventories should be accompanied by an IMP that documents any revisions to methods described herein.

1. ROLES AND RESPONSIBILITIES

A GHG emissions inventory is an intensive process that requires a motivated team of active participants. The NRSS GHG emissions inventory benefitted from involvement by a large group of individuals, including a long list of primary and secondary divisional representatives. Table 1 identifies key roles occupied during the 2020 NRSS GHG emissions inventory.

Table 1. Key Roles and Responsibilities

Role	Lead for Base Year Inventory	Responsibilities
NRSS GHG emissions inventory lead	Larry Perez	• Lead planning meetings with other NRSS GHG emissions inventory stakeholders • Oversee and coordinate collection of all required data • Distribute commuting survey to NRSS employees and to NRSS partners/contractors/volunteers • Populate CLIP Tool and supporting calculation tools/files • Update IMP as needed
NRSS GHG emissions inventory support	Danielle Butke	• Participate in planning meetings • Assist with data collection
Data stewards ¹	Jim Cheatham Brinkley Faulcon Susan Griffin	• Provide data elements requested from NRSS GHG emissions inventory lead and support staff

¹ See Appendix A for additional details about the data elements each data steward is responsible for providing.

	Chris Havermann Robert Kirkpatrick Kirk Longstein Stephani Schubach	
SOMB CFP representative	Shawn Norton	• Provide programmatic and technical support

2. ORGANIZATIONAL/OPERATIONAL BOUNDARIES

NRSS employs staff and manages operations in numerous locations across the United States. The wide spatial distribution of NRSS operations presents a significant challenge for conducting a comprehensive, directorate-wide GHG inventory.

The majority of NRSS staff and operations, however, are based in Colorado. Consequently, NRSS elected to structure a GHG emissions inventory to account for Colorado-based NRSS operations and those NRSS employees, contractors, partners, and volunteers specifically affiliated with two Colorado-based NRSS offices. This section provides additional details about the operational activities included—and explicitly not included—in the NRSS GHG emissions inventory.

2.1 Activities Included in the NRSS GHG Emissions Inventory

The NRSS GHG emissions inventory accounts for GHG emissions associated with the following activities:

- Operations in leased NRSS office space within two separate buildings, as noted in Table 2;

Table 2. NRSS-Occupied Buildings in Colorado

Building Name	Building Address	Building Owner	Building Lessor	Type of Lease	Total Building Square Footage	NPS-Occupied Square Footage
Academy Place	7333 W Jefferson Ave, Lakewood, Colorado 80235	Renco Properties	General Services Administration (GSA)	Full service	85,376	40,953 ²
Oakridge	1201 Oakridge Dr, Fort Collins, Colorado 80525	Carrington Holding Company	GSA	Full service	68,756	51,004

- Operations of fleet vehicles specifically assigned to NRSS's Colorado facilities;
- Commuting by NRSS employees, NRSS partners, NRSS contractors, and NRSS volunteers (as defined in Table 3, and collectively referred to hereafter as "NRSS Staff"); and

² While inventorying stationary refrigerant equipment, NRSS's Larry Perez discovered that some of the NPS-occupied space in Academy Place is occupied by NPS staff affiliated with other non-NRSS divisions/organizations. NRSS does not currently have precise data to more specifically allocate NPS-occupied space in Academy Place to just NRSS. As a result, the emissions captured in the baseline inventory are likely overestimated.

Table 3. NRSS Staff Definitions

Staff Group	Inventory Definition
NRSS Employees	National Park Service employees assigned to the NRSS organizational structure assigned a permanent duty station at either of the facilities in Table 2. permanent duty stations are at either of NRSS's two Colorado facilities.
NRSS Partners	Individuals employed through partner organizations operating under financial assistance agreements with the National Park Service that support Colorado-based NRSS operations, and are assigned NRSS Colorado office space.
NRSS Contractors	Individuals employed through organizations under contract with the National Park Service that support Colorado-based NRSS operations and are assigned NRSS Colorado office space.
NRSS Volunteers	Individuals volunteering under a formal Volunteer-in-Parks agreement in support of Colorado-based NRSS operations and are assigned NRSS Colorado office space.

- Business air and ground travel by NRSS staff

2.2 Activities Not Included in the Inventory

The NRSS GHG emissions inventory does not currently include the following activities:

- **Invitational travel:** Invitational travel is defined as travel by non-NRSS personnel that is paid for by NRSS.³ Similarly, invitational travel by NRSS personnel and paid for by non-NRSS operations is not included.
- **Scope 3 emissions associated with the disposal of municipal solid waste in leased space:** Because NRSS has full service leases in its Colorado office space, it does not manage the contract for waste hauling in either facility and therefore does not have operational control or access to waste data.
- **Carbon offset purchases:** In the past, some NRSS divisions and programs purchased carbon offsets to match NRSS employee air travel emissions. These purchases are excluded from the baseline inventory so NRSS can get a clear picture of its current baseline emissions and identify opportunities for emissions reduction across all sources moving forward.
- **Ground travel using subway, light rail, buses and trains:** This category of emissions is currently excluded due to the likely negligible impact on total NRSS emissions and the current inability to access the appropriate data elements from the NPS travel management system.

³ For NRSS's baseline GHG emissions inventory, GHG emissions associated with invitational air travel represents a very small portion (2.7 percent) of the total GHG emissions associated with the combined NRSS employee/invitational air travel; for ground business travel, the baseline inventory includes only five instances of invitational travel using privately owned vehicles and four instances of invitation travel using rental cars.

3. GHG LIST

Where available, the NRSS GHG emissions inventory calculates carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), and hydrofluorocarbon (HFC) emissions associated with NRSS operations.

4. BASELINE YEAR

The baseline year for the NRSS GHG emissions inventory is the 12-month period spanning from March 2019 to February 2020. NRSS selected this time period to ensure data covered a consecutive 12-month period reflecting standard/normal operations.

The selection of fiscal year (FY) 2019 (October 2018 through September 2019) as the baseline year would likely have provided a misrepresentation of NRSS's baseline operations due to the 2018-19 federal government shutdown (December 22, 2018 to January 25, 2019). Similarly, the selection of FY 2020 (October 2019 through September 2020) would have provided a misrepresentation of baseline operations due to widespread teleworking and long-distance travel stoppage in response to the COVID-19 pandemic beginning the week of March 16, 2020.⁴

Both major disruptions were also preceded and/or followed by gradual declines and increases in operation spanning days or weeks. Thus, the inventory team selected the sample period to provide the maximum amount of buffer against disruption effects. Though GHG inventories are customarily tied to fiscal or calendar year operations, the inventory team felt this attempt to "thread the needle" between disruptions was warranted and justifiable.

5. EMISSIONS SOURCES INCLUDED

The sources of emissions included in NRSS's GHG emissions inventory are outlined in Table 4. Check marks denote a source was included in the inventory. Dashes (-) signify a source was not included in the inventory.

Table 4. NRSS GHG Emissions Sources

Emissions Source Included in Inventory	Buildings		NRSS Staff			
	Academy Place	Oakridge	Employees	Partners	Contractors	Volunteers
Scope 1						
Mobile fuel combustion from fleet vehicles	✓	✓	-	-	-	-
Fugitive refrigerants from mobile equipment (associated with air conditioning in fleet vehicles)	✓	✓	-	-	-	-

⁴ Should NRSS staff elect to prepare subsequent inventories for future years, NRSS is not limited to a similar March-February time period. Absent any significant deviations from standard/normal operations, the conventional approach is to align GHG emissions inventories with the federal government FY (October through September). The most important factor is to ensure that future inventories cover a consecutive 12-month period.

Emissions Source Included in Inventory	Buildings		NRSS Staff			
	Academy Place	Oakridge	Employees	Partners	Contractors	Volunteers
Scope 2						
None (see Scope 2 GHG Emissions)	-	-	-	-	-	-
Scope 3						
Purchased electricity consumption	✓	✓	-	-	-	-
Natural gas consumption	-	✓	-	-	-	-
Contracted wastewater treatment	✓	✓	-	-	-	-
Fugitive refrigerants from stationary equipment	✓	✓	-	-	-	-
Air business travel	-	-	✓	✓	✓	✓
Ground business travel	-	-	✓	✓	✓	✓
Employee commuting	-	-	✓	✓	✓	✓

6. DATA MANAGEMENT AND EMISSIONS QUANTIFICATION

This section first provides an overview of the various files and tools used to prepare the NRSS GHG emissions inventory, followed by a description of the process for configuring two separate instances of the NPS Climate Leadership in Parks (CLIP) Tool. Sections 6.2 through 6.4 then provide, for each emissions source category, a discussion of the data sources, calculations/methodology, and the flow of data entry within and between the various files/tools. Appendix A provides a comprehensive listing of all data sources and their respective reporting points of contact (i.e., the entities from whom NRSS requested data).

6.1 Files and Tools Used to Prepare NRSS GHG Emissions Inventory

Preparation of the NRSS GHG emissions inventory required access to—and the use of—numerous files and calculation tools, as noted in Table 5.

Table 5. Files/Tools Used for NRSS GHG Emissions Inventory

File/Tool Name	Relevant Emission Source Categories	Description
NRSS Staff Inventory (Excel File)	- Employee commuting (NRSS employees, partners, contractors, and volunteers) - Air business travel (NRSS employees, partners, contractors, and volunteers) - Ground business travel (NRSS employees,	List and breakout of all NRSS employees, partners, contractors, and volunteers formally affiliated with one of the NRSS's Colorado-based facilities at the close of the inventory year

File/Tool Name	Relevant Emission Source Categories	Description
	partners, contractors, and volunteers)	
Federal Automotive Statistics Tool (FAST)	• Mobile Fuel Combustion in Fleet Vehicles • Fugitive Refrigerants from Mobile Equipment	Maintained by the Idaho National Laboratory, this web-based data-reporting system (found at: https://fastweb.inl.gov) collects information on the U.S. government's nearly 650,000 vehicles.
NRSS Fleet Vehicle Inventory (Excel File)	• Mobile Fuel Combustion in Fleet Vehicles • Fugitive Refrigerants from Mobile Equipment	Extraction of NRSS-specific fleet composition and mileage data from FAST covering the inventory year
Concur (NPS Travel Management System)	• Air business travel (NRSS employees) • Ground business travel (NRSS employees)	Commercial-off-the-shelf travel management software provided by SAP and used by NPS to track and manage employee business travel
NRSS Air Travel Report (Excel File)	• Air business travel (NRSS employees)	Extraction of NRSS employee air business travel data from Concur during the inventory year
NRSS Voucher Data (Excel File)	• Ground business travel (NRSS employees)	Extraction of NRSS employee business travel expense data from Concur during the inventory year
MBS Contractor Travel (Excel File)	• Air business travel (NRSS Contractors) • Ground business travel (NRSS Contractors)	File summarizing individual air and ground business travel segments conducted by NRSS contractors employed by MBS during the inventory year
Partner travel spreadsheet (Excel file)	• Air business travel (NRSS partners) • Ground business travel (NRSS partners)	Serves as both a survey tool (to request business travel data from NRSS partners) and a compilation of business travel data for all NRSS partners
Federal Energy Management Program (FEMP) Energy Management Data Report (version 8.1)	• Air business travel (NRSS employees)	The GHG emissions accounting tool that all federal agencies were required to use to compile and report GHG emissions for FY 2017. This was the last year that federal agencies were required to report Scope 3 GHG emissions, include those associated with business air travel. NRSS uses this tool to calculate CH ₄ and N ₂ O emissions from air travel and supplement the calculated CO ₂ emissions calculated in Concur.
NRSS Staff commuting survey (MS Forms)	• NRSS Staff commuting (NRSS employees, partners, contractors, and volunteers)	One-time survey tool to request quantitative and qualitative information about annual commuting behavior (see Appendix B to view the NRSS Employee Commuting Survey used for the base year GHG emissions inventory).
Primary Climate Leadership in Parks (CLIP) File	• All	The NPS has developed the CLIP Tool specifically for use by NPS parks participating in the CFP Program. This is the primary tool that stores activity data, performs a majority of GHG emissions calculations, and summarizes the total GHG footprint for NRSS.
Secondary CLIP File	• Purchased electricity	

File/Tool Name	Relevant Emission Source Categories	Description
	• Purchased natural gas • Ground business travel by NRSS employees using rental cars • Ground business travel by NRSS employees using POVs • Ground business travel by NRSS contractors • Ground business travel by NRSS partners • Employee commuting by NRSS employees • employee commuting by NRSS contractors, partners, and volunteers • refrigerant from stationary equipment	Note: The CLIP Tool was historically designed for the calculation of GHG emissions associated with operations and activities within NPS parks, and not originally intended to be used for office-based organizations such as NRSS. There are several emission source categories within the NRSS GHG emissions inventory where it is not practical to enter data directly into the primary CLIP File. For example, because NRSS occupies full service leased space in its two Colorado buildings, the emissions associated with purchased electricity are categorized as Scope 3 emissions (rather than Scope 2 emissions, which the CLIP Tool assumes as default). NRSS uses a second instance of the CLIP Tool to calculate the emissions associated with purchased electricity, but then manually imports these calculated emissions back into the Primary CLIP File so they can be properly categorized as Scope 3 and not Scope 2 emissions. In other instances, the Secondary CLIP File is needed to calculate emissions in a module that has already been populated in the Primary CLIP File.
Inventory Prep File	• All	Filed used to transparently organize and document the activity data that serves as input into the Primary and Secondary CLIP File
NRSS Stationary Refrigerant Inventory (Excel)	• Fugitive Refrigerant in Stationary Equipment	Inventory of stationary equipment containing refrigerant in NRSS Colorado office space

6.1.1 Configuring the Primary CLIP File

Table 6 outlines the steps for properly configuring the Primary CLIP File for the preparation of NRSS's GHG emissions inventory.

Table 6. Procedure for Configuring Primary CLIP File

Location	Action
Emissions Inventory Module: Control Sheet	
Prepare the Emissions Inventory Module: Step 1	Enter the following parameters • Step 1 dropdown: Other <enter name, state and ZIP below> • Park Name: Natural Resource Stewardship and Science Directorate • Select State: Colorado • ZIP: 80525
Prepare the Emissions Inventory Module: Step 2	Enter the fiscal year that most closely aligns with the time period of the respective inventory year
Prepare the Emissions Inventory Module:	Select the following park units to include in the inventory: • Park Operations

Location	Action
Step 3	• Concessioner (in the yellow box, rename as “Partners and Contractors”) • Other Concessioners (in the yellow box, rename as “NRSS Operations Cont.”) • Other Permitted Activities
Prepare the Emissions Inventory Module: Step 4	Select the following emission sources to include in the inventory: • Mobile Combustion • Wastewater Treatment • Refrigerant Use • Park Employee Commuting • Other GHG Sources
Begin Estimating Emissions	Click the “Estimate Current Emissions” button
Emissions Inventory Module: Current Emissions and Activities, General Information	
“Filled, full-time employee population” field,	Enter the sum of the number of NRSS employees, partners, contractors, and volunteers as documented in the NRSS Employee Inventory (at the close of the given inventory year)
“Length of Peak Season” field	Enter “12”

6.1.2 Configuring the Secondary CLIP File

Table 7 outlines the steps for properly configuring the Secondary CLIP File for the preparation of NRSS’s GHG emissions inventory.

Table 7. Procedure for Configuring Secondary CLIP File

Location	Action
Emissions Inventory Module: Control Sheet	
Prepare the Emissions Inventory Module: Step 1	Enter the following parameters • Step 1 dropdown: Other <enter name, state and ZIP below> • Park Name: Natural Resource Stewardship and Science Directorate • Select State: Colorado • ZIP: 80525
Prepare the Emissions Inventory Module: Step 2	Enter the fiscal year that most closely aligns with the time period of the respective inventory year
Prepare the Emissions Inventory Module: Step 3	Select the following park units to include in the inventory: • Park Operations • Visitors⁵ • Concessioner (in the yellow box, rename as “Partners and Contractors”) • Other Concessioners (in the yellow box, rename as “Employee EVs (elec)/ Partner rental car”) • Other Permitted Activities
Prepare the Emissions Inventory Module: Step 4	Select the following emission sources to include in the inventory: • Stationary Combustion • Purchased Electricity • Mobile Combustion

⁵ The “Visitors” park unit category is used to separately track emissions associated with NPS staff use of personally owned vehicles for business ground travel.

Location	Action
	• Refrigerant Use • Park Employee Commuting
Begin Estimating Emissions	Click the “Estimate Current Emissions” button
Emissions Inventory Module: Current Emissions and Activities, General Information	
“Filled, full-time employee population” field,	Enter the sum of the number of NRSS partners, contractors, and volunteers as documented in the NRSS Employee Inventory (at the close of the given inventory year)
“Length of Peak Season” field	Enter “12”

6.2 Scope 1 GHG Emissions

6.2.1 *Mobile Fuel Combustion in Fleet Vehicles*

6.2.1.1 Data Sources

Table 8 outlines the data sources for calculating GHG emissions associated with mobile fuel combustion in NRSS fleet vehicles.

Table 8. Data Sources for Mobile Fuel Combustion in Fleet Vehicles

Name of Data Source	Data Provided	Notes
FAST (primary source)	Composition of the NRSS vehicle fleet by: • Unique vehicle identifier • Type • Make • Model • Year • Fuel type Data for each vehicle: • Distance traveled (miles) • Fuel purchased (gallons)	NRSS leases a number of vehicles used by Inventory and Monitoring networks outside Colorado. These vehicles were not included in the 2020 inventory. Thus for future inventories, it is important to only include data for vehicles specifically stationed at one of NRSS’s Colorado-based facilities.
NRSS Fleet Vehicle Inventory (Excel File)	Summary of NRSS-specific data extracted from FAST	N/A
www.fueleconomy.gov	Vehicle miles per gallon (MPG) figures	Data from this website must be utilized to calculate an average MPG figure for each unique vehicle make/model/year in NRSS’s vehicle fleet.

6.2.1.2 Calculations/Methodology

Following is a summary of the calculations/methodology used to process the data associated with mobile fuel combustion in fleet vehicles for entry into the CLIP Tool:

1. In the “NRSS CO Vehicle Data” tab of the NRSS Fleet Vehicle Inventory Excel file, add a new column for documenting the average miles per gallon (MPG) figures for each NRSS fleet vehicle make, model and year. Populate this column by averaging the “EPA Fuel Economy” values for the different vehicle types (i.e., engine size, 2WD or FWD) within the make and model for that year using data from: www.fueleconomy.gov.
2. In the “NRSS CO Vehicle Data” tab of the NRSS Fleet Vehicle Inventory Excel file, add a second new column for documenting the single “Fuel Type” category to which each unique NRSS fleet vehicle category is mapped to (e.g., gasoline, diesel, hybrid).
3. In the NRSS Fleet Vehicle Inventory Excel file, create a PivotTable to summarize the miles traveled and average MPG for each NRSS fuel and vehicle type.

6.2.1.3 Assumptions/Other Items of Note

Following are assumptions and other items of note related to the calculation of NRSS GHG emissions associated with mobile fuel combustion in fleet vehicles:

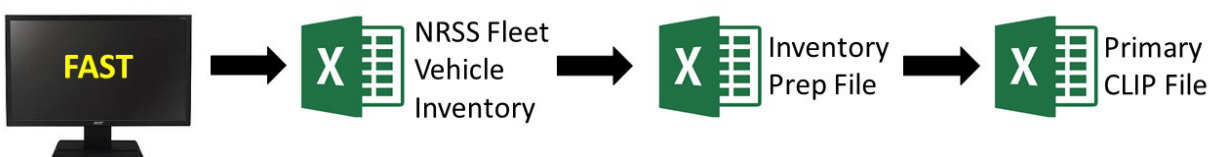
- All NRSS fleet vehicles labeled as “Ethanol/flexfuel” are assumed to use gasoline as their primary fuel.

6.2.1.4 Flow of Data Entry

This section outlines the process and flow of data entry into and between the various files used to calculate NRSS GHG emissions associated with mobile fuel combustion in fleet vehicles. See Figure 1 for a visualization of the data entry process.

1. Extract the appropriate data from FAST and save the data into a new NRSS Fleet Vehicle Inventory Excel file.
2. Enter the summed vehicle miles traveled and average MPG figures by fuel and vehicle type from the NRSS Fleet Vehicle Inventory Excel file into the “Mobile Fuel” tab of the Inventory Prep File.
3. Enter the summed vehicle miles traveled by fuel and vehicle type from the Inventory Prep File into the Primary CLIP File, “Mobile Combustion” tab under the Park Operations park unit beneath the “DATA INPUTS” header.
4. Enter the average MPG figures from the Inventory Prep File into the corresponding cells beneath the “FACTORS” header in the Primary CLIP File.

Figure 1. Mobile Fuel Combustion in Fleet Vehicles Data Flow



6.2.2 Fugitive Refrigerants from Mobile Equipment

6.2.2.1 Data Sources

Table 9 outlines the data sources for calculating GHG emissions associated with fugitive refrigerants from mobile equipment.

Table 9. Data Sources for Fugitive Refrigerants from Mobile Equipment

Name of Data Source	Data Provided	Notes
FAST (primary source)	Composition of the NRSS vehicle fleet by: • Unique vehicle identifier • Type • Make • Model • Year • Fuel type	NRSS leases a number of vehicles used by Inventory and Monitoring networks outside Colorado. These vehicles were not included in the 2020 inventory. Thus for future inventories, it is important to only include data for vehicles specifically stationed at one of NRSS's Colorado-based facilities.
NRSS Fleet Vehicle Inventory (Excel File)	Summary of NRSS-specific data extracted from FAST	N/A

6.2.2.2 Calculations/Methodology

Following is a summary of the calculations/methodology used to process the data associated with fugitive refrigerants from mobile equipment for entry into the CLIP Tool:

1. In the NRSS Fleet Vehicle Inventory Excel file, create a PivotTable to count the NRSS fleet vehicles by fuel and vehicle type (this is the same PivotTable referenced in Section 6.2.1.2.)

6.2.2.3 Assumptions/Other Items of Note

Following are assumptions and other items of note related to the calculation of NRSS GHG emissions associated with fugitive refrigerants from mobile equipment:

- Hybrids and flex fuel vehicles are categorized in the Gas [Vehicle Type] to calculate refrigerant emissions from mobile sources.

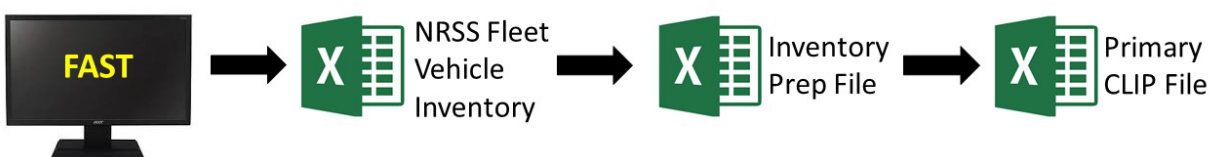
6.2.2.4 Flow of Data Entry

This section outlines the process and flow of data entry into and between the various files used to calculate NRSS GHG emissions associated with fugitive refrigerants from mobile equipment. See Figure 2 for a visualization of the data entry process.

1. Extract the appropriate data from FAST and save the data into a the NRSS Fleet Vehicle Inventory Excel file (same file referenced in 6.2.1.4).
2. Enter the count of vehicles by fuel and vehicle type from the NRSS Fleet Vehicle Inventory Excel file into the Inventory Prep File, "Refrigerants – Mobile" tab.

3. Within the Primary CLIP File:
 - a. Once in the opening “Emissions Inventory Module: Control Sheet,” scroll to the bottom and click the “Unlock Admin Features” button. When prompted for the admin feature password, enter “NationalParks” and click “OK.”
 - b. Once unlocked,⁶ navigate to the “Refrigerant” tab and manually update the age distribution of NRSS fleet vehicles in cell G35 to allocate all NRSS fleet vehicles to be newer than model year 1993.⁷
 - c. Enter the total count of vehicles grouped by fuel and vehicle type from the NRSS Fleet Vehicle Inventory Excel file into the Primary CLIP Tool, “Refrigerant Use” tab, “Mobile A/C Use” section under the Park Operations park unit.

Figure 2. Fugitive Refrigerants from Mobile Equipment Data Flow



6.3 Scope 2 GHG Emissions

Because NRSS has full service leases for both of its Colorado facilities (and therefor does not pay directly for any utilities or have operational control of mechanical systems that consume utilities), NRSS does not have any sources of Scope 2 emissions.

6.4 Scope 3 GHG Emissions

Important note: Data for all Scope 3 emissions categories are entered into the “Other Emissions Sources” tab of the Primary CLIP Tool.

6.4.1 *Purchased Electricity*

6.4.1.1 **Data Sources**

Table 10 outlines the data sources for calculating GHG emissions associated with purchased electricity.

⁶ Unlocking the admin features within the CLIP Tool enables users to still use the functionality of the CLIP Tool, but also enables users to see “under the hood” and make changes to underlying code. When done using the CLIP Tool, upon closing the file, the tool will automatically “relock” the admin functions such that when re-opening the file upon next use, the admin features will be locked.

⁷ Without making this manual change to the underlying code, the CLIP Tool defaults to distributing the total reported quantity of vehicles to different assumed model years, including assigning some to model years prior to 1993, which impacts the assumptions about the type and quantity of refrigerant emitted into the atmosphere during operation of vehicle air conditioning.

Table 10. Data Sources for Purchased Electricity

Name of Data Source	Data Provided	Notes
Academy Place electricity data (Excel File)	Metered monthly electricity data for the entire Academy Place building	N/A
Oakridge electricity data (Excel File)	Metered monthly electricity data for the entire Oakridge building	N/A
Academy Place property appraisal	Gross building area of Academy Place	N/A
Oakridge Place property appraisal	Gross building area of Oakridge	N/A
Occupancy agreement for Academy Place	Square footage occupied by NPS in Academy Place	N/A
Occupancy agreement for Oakridge	Square footage occupied by NPS in Oakridge	N/A

6.4.1.2 Calculation/Methodology

Following is a summary of the calculations/methodology used to process the data associated with purchased electricity for entry into the CLIP Tool:

1. In the GHG Inventory Prep File for CLIP Tool, Electricity tab:
 - a. For each NRSS building, document the rentable square footage of NPS occupied space, the total building square footage, and the resulting percent of the total building occupied by NPS.
 - b. For each NRSS building, sum the monthly electricity consumption for the 12-month period associated with the inventory year.
2. Multiply the summed 12-months of electricity consumption data for each building by the respective NPS percentage of total building square footage to prorate building-wide electricity consumption and estimate NRSS's portion.

6.4.1.3 Assumptions/Other Items of Note

Following are assumptions and other items of note related to the calculation of NRSS GHG emissions associated with purchased electricity:

- The two NRSS Colorado buildings are not sub-metered for electricity consumption by tenant. The NPS's rentable square footage noted in the respective occupancy agreements is used to calculate NRSS's percentage occupancy of the total building space. This percentage is used to prorate and estimate NRSS's portion of building-wide electricity consumption in the absence of sub-metering.
- The NPS-occupied space in the Academy Place building houses NPS employees affiliated with other non-NRSS NPS Divisions/organizations. Thus far, the inventory assumes 100 percent of NPS-occupied space is assigned to NRSS due to a current lack of precise data about the allocation of total NPS-occupied square footage to the various NPS divisions/organizations.
- The NRSS GHG emissions inventory assumes that NPS is not making renewable energy certificate purchases for its leased facilities.

6.4.1.4 Flow of Data Entry

This section outlines the process and flow of data entry into and between the various files used to calculate NRSS GHG emissions associated with purchased electricity. See Figure 3 for a visualization of the data entry process.

1. Enter metered monthly electricity consumption data from the building-specific Excel files into the Inventory Prep File.
2. Enter the total kilowatt-hours (kWh) of electricity consumed by the NRSS Colorado facilities calculated in the GHG Inventory Prep File for CLIP Tool into the Secondary CLIP Tool, "Purchased Electricity" tab, under the Park Operations park unit.
3. From the "Purchased Electricity" tab in the Secondary CLIP File, copy the CO₂, CH₄, and N₂O emissions values into a new entry (labeled "purchased electricity – NRSS CO bldgs") in the Primary CLIP File, "Other GHG Sources" tab under the Park Operations park unit.

Figure 3. Purchased Electricity Data Flow



6.4.2 Purchased Natural Gas

6.4.2.1 Data Sources

Table 11 outlines the data sources for calculating GHG emissions associated with purchased natural gas.

Table 11. Data Sources for Purchased Natural Gas

Name of Data Source	Data Provided	Notes
U.S. Energy Information Administration's 2012 Commercial Building Energy Consumption Survey (CBECS), Table C30 (Natural gas consumption and conditional energy intensity by climate region, page 2). ⁸ Parameters assumed: - Building category: Nongovernment owned, leased to tenant(s) - Climate category: Very cold/cold	Annual natural gas energy intensity (cubic foot per square foot per year)	Of the two NRSS buildings leased in Colorado, only Oakridge uses natural gas for heating. Natural gas data for the Oakridge Building is currently not available from GSA or the building owner. As a result, the NRSS GHG emissions inventory estimates annual natural gas data using the intensity factor provided by CBECS.

⁸ <https://www.eia.gov/consumption/commercial/data/2012/c&e/pdf/c30.pdf>

6.4.2.2 Calculation/Methodology

Following is a summary of the calculations/methodology used to process the data associated with purchased natural gas for entry into the CLIP Tool:

1. Multiply the CBECS annual natural gas energy intensity by NRSS rentable square footage at Oakridge to estimate the annual natural gas consumption in NPS portion of space occupied at Oakridge.

6.4.2.3 Assumptions/Other Items of Note

Following are assumptions and other items of note related to the calculation of NRSS GHG emissions associated with purchased natural gas:

- The NRSS GHG emissions inventory uses the CBECS annual natural gas energy intensity factor for nongovernment-owned buildings leased to tenant(s) in very cold/cold climates (39.6 cubic feet per square foot).

6.4.2.4 Flow of Data Entry

This section outlines the process and flow of data entry into and between the various files used to calculate NRSS GHG emissions associated with purchased natural gas. See Figure 4 for a visualization of the data entry process.

1. Enter the estimated cubic feet of natural gas purchased for the NPS portion of space occupied in the Oakridge Building from the Inventory Prep File into the Secondary CLIP File, “Stationary Combustion” tab, under the Park Operations park unit.
2. From the Stationary Combustion tab in the Secondary CLIP File, copy the CO₂, CH₄, and N₂O emissions values into a new entry (labeled “Natural gas consumption – Oakridge”) in the Primary CLIP Tool, “Other GHG Sources” tab, under the NRSS Operations Cont. park unit.

Figure 4. Purchased Natural Gas Data Flow



6.4.3 Air Business Travel (NRSS Employees)

6.4.3.1 Data Sources

Table 12 outlines the data sources for calculating GHG emissions associated with NRSS employee air business travel.

Table 12. Data Sources for NRSS Employee Air Business Travel

Name of Data Source	Data Provided	Notes
NRSS Staff Inventory	Complete list of names of all NRSS employees with permanent duty stations in NRSS's Colorado buildings	N/A
Concur/NRSS Air Travel Report	• Pounds of CO₂ associated with air business travel conducted by NRSS employees during the inventory year • Short, medium, and long-haul miles traveled during air business travel conducted by NRSS employees during the inventory year	• Concur calculates CO₂ emissions directly within the travel management system software. • The NRSS Inventory Lead executes a report within Concur and exports data into a separate NRSS Air Travel Report Excel file.

6.4.3.2 Calculation/Methodology

Following is a summary of the calculations/methodology used to process the data associated with NRSS employee air business travel for entry into the CLIP Tool:

1. Sum the CO₂ emissions in pounds in the NRSS Air Travel Report across all NRSS employees conducting air travel in the inventory year.
2. In the NRSS Air Travel Report Excel file, use a PivotTable to sum the short, medium, and long-haul miles traveled across all NRSS employees conducting air travel in the inventory year.

6.4.3.3 Assumptions/Other Items of Note

Following are assumptions and other items of note related to the calculation of NRSS GHG emissions associated with air business travel by NRSS employees:

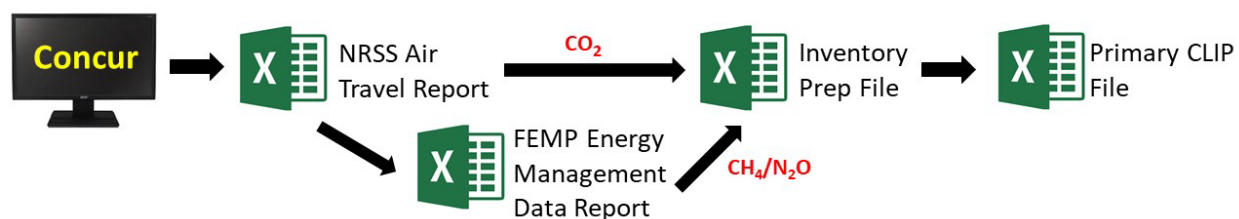
- When querying the Concur database for NRSS employee air travel data, the "Overall Trip Return Date" is the field that determines which trips are included within an inventory year (i.e., an NRSS employee business trip using air travel is considered to occur within the inventory year if the overall trip return date is within the 12-month period defining the inventory year).
- Concur only calculates CO₂ emissions associated with air travel and does not calculate CH₄ or N₂O emissions. To provide an inventory that is more complete, the NRSS inventory makes use of the FEMP Energy Management Data Report (version 8.1) to separately calculate CH₄ and N₂O emissions associated with NRSS employee air travel, for subsequent input into the Primary CLIP File (see the next section for more details).

6.4.3.4 Flow of Data Entry

This section outlines the process and flow of data entry into and between the various files used to calculate NRSS GHG emissions associated with air business travel by NRSS employees. See Figure 5 for a visualization of the data entry process.

1. Generate the NRSS Travel Report Excel file from within Concur.
2. Enter the short, medium and long-haul miles traveled from the NRSS Air Travel Report Excel file into the FEMP Annual Energy Management Data Report (version 8-1), tab 3.14 SCOPE 3_Air_Bus_Travel to calculate the CH₄ and N₂O emissions associated with air business travel by NRSS employees.
3. Copy the CH₄ and N₂O emissions results from cells M7:N9 in the FEMP Energy Management Data Report and the total CO₂ emissions from the NRSS Air Travel Report Excel file into the Inventory Prep File, “Air Travel – Employees” tab.
4. From the Inventory Prep File, copy the CO₂, CH₄ and N₂O emissions values into a new entry (labeled “NRSS employee air travel” in the Primary CLIP File, “Other GHG Sources” tab, under the Park Operations park unit.

Figure 5. NRSS Employee Air Business Travel Data Flow



6.4.4 Air Business Travel (NRSS Contractors)

6.4.4.1 Data Sources

Table 13 outlines the data sources for calculating GHG emissions associated with NRSS contractor air business travel.

Table 13. Data Sources for NRSS Contractor Air Business Travel

Name of Data Source	Data Provided	Notes
MBS Contractor Travel Data	Data for each travel segment conducted by MBS contractor in support of NRSS (Colorado) during the inventory year: • Date • Miles • Travel mode • Length of haul (if flight)	

6.4.4.2 Calculation/Methodology

Following is a summary of the calculations/methodology used to process the data associated with NRSS contractor air business travel for entry into the CLIP Tool:

1. Within the MBS Contractor Travel Data Excel file, categorize and sum the MBS air travel data by short, medium and long-haul using the definitions provided in the FEMP Energy Management Data Report. The flight distances types are defined as:
 - a. Short-haul: a flight less than 300 miles.
 - b. Medium-haul: a flight equal to or greater than 300 miles and less than 700 miles.
 - c. Long-haul: a flight equal to or greater than 700 miles.
2. Calculate a per capita total miles traveled by flight distance type for MBS contractors, and multiply the per capita distances by the number of other contractors who support NRSS but do not work for MBS.
3. Sum the miles traveled by flight distance type across MBS and other NRSS contractors.

6.4.4.3 Assumptions/Other Items of Note

Following are assumptions and other items of note related to the calculation of NRSS GHG emissions associated with air business travel by NRSS contractors:

- NRSS has identified additional contractors not employed by MBS, but travel data is currently unable for these contractors. To strive for an inventory that is as complete as possible, NRSS estimates the air travel conducted by these additional non-MBS contractors. To estimate air travel conducted by these other non-MBS contractors, NRSS calculates per capita miles traveled by flight type for MBS employees and multiplies this by the number of other non-MBS contractors.
- The inventory assumes that MBS contractors' air travel is representative of all other non-MBS contractors.

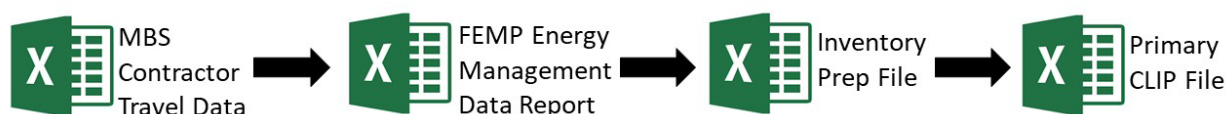
6.4.4.4 Flow of Data Entry

This section outlines the process and flow of data entry into and between the various files used to calculate NRSS GHG emissions associated with air business travel by NRSS contractors. See Figure 6 for a visualization of the data entry process.

1. Enter the total air miles traveled by flight distance type from the MBS Travel Data Excel file into a new copy of the FEMP Energy Management Data Report (version 8-1), tab 3.14 SCOPE 3_Air_Bus_Travel.
2. Copy the CO₂, CH₄ and N₂O emissions results from cells L7:N9 in the FEMP Energy Management Data Report into the Inventory Prep File, "Air Travel – Contractors" tab.

- From the GHG Inventory Prep File for CLIP Tool tab, copy the CO₂, CH₄ and N₂O emissions values into a new entry (labeled “Contractor Air Travel”) in the Primary CLIP File, “Other GHG Sources” tab, under the Partners and Contractors parkunit.

Figure 6. NRSS Contractor Air Travel Data Flow



6.4.5 Air Business Travel (NRSS Partners)

6.4.5.1 Data Sources

Table 14 outlines the data sources for calculating GHG emissions associated with NRSS partner air business travel.

Table 14. Data Sources for NRSS Partner Air Business Travel

Name of Data Source	Data Provided	Notes
N/A	N/A	Air travel data for NRSS partners are currently not available.

6.4.5.2 Calculation/Methodology

Following is a summary of the calculations/methodology used to process the data associated with NRSS partner air business travel for entry into the CLIP Tool:

- Calculate per capita CO₂, CH₄ and N₂O emissions from NRSS employee air travel.
- Multiply the per capita GHG emissions by the number of NRSS partners to estimate the emissions from partner air travel.

6.4.5.3 Assumptions/Other Items of Note

Following are assumptions and other items of note related to the calculation of NRSS GHG emissions associated with air business travel by NRSS partners:

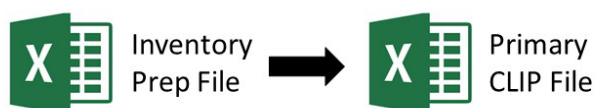
- Because data for air travel by NRSS partners is currently not available, the NRSS inventory calculates a per capita emissions value associated with NRSS employee air travel and applies this scaling factor to the total quantity of NRSS partners during the inventory year to estimate GHG emissions associated with NRSS partner air travel.
- The NRSS inventory assumes that NRSS employee air travel is more representative of NRSS partner air travel as compared to NRSS contractor air travel.

6.4.5.4 Flow of Data Entry

This section outlines the process and flow of data entry into and between the various files used to calculate NRSS GHG emissions associated with air business travel by NRSS partners. See Figure 7 for a visualization of the data entry process.

1. Perform the NRSS employee air travel per capita calculation and extrapolate to the number of NRSS partners in the Inventory Prep File, “Air Travel – Partners” tab.
2. From the Inventory Prep File, copy the CO₂, CH₄ and N₂O emissions values into a new entry (labeled “Partner air travel”) in the Primary CLIP File, Other GHG Sources tab, under the Partners and Contractors park unit.

Figure 7. NRSS Partner Air Travel Data Flow



6.4.6 Ground Business Travel (NRSS Employees) – Rental Cars

6.4.6.1 Data Sources

Table 15 outlines the data sources for calculating GHG emissions associated with NRSS employee ground business travel using rental cars.

Table 15. Data Sources for NRSS Employee Ground Business Travel Using Rental Cars

Name of Data Source	Data Provided	Notes
NRSS Voucher Data	Details of expenses included in vouchers submitted into the Concur travel management system for NRSS employees during the inventory year	The Excel file should be filtered by Expense Category (Column O) to show rows populated with “Rental Car” and “Fuel-Rental Vehicle.”
U.S. Energy Information Administration’s Weekly Retail Gasoline and Diesel Prices data	\$/gal for gasoline	Reference the “Gasoline – All Grades” category

6.4.6.2 Calculation/Methodology

Following is a summary of the calculations/methodology used to process the data associated with NRSS employee ground business travel using rental cars for entry into the CLIP Tool:

1. Use the EIA’s Weekly Retail Gasoline and Diesel Prices monthly average cost per gallon of gasoline over the period of the inventory year.

2. In the NRSS Voucher Data Excel file, divide each Fuel-Rental Vehicle allocation amount (column P) by the nationwide average cost per gallon to calculate the estimated number of gallons consumed during each respective rental car instance.
3. Identify Rental Car rows of data that do not have a corresponding Fuel-Rental Vehicle row for that trip using a concatenation of the NPS employee name and trip start date.
4. For each Rental Car and Fuel-Rental Vehicle pair, calculate the number of gallons used per day. Determine the average gallons/day for this subset of entries. For each trip that has a Rental Car row with no accompanying Fuel-Rental Vehicle row, multiply the previously calculated average gallons/day for paired Rental Car and Fuel-Rental Vehicle rows by the number of rental car days to estimate the associated quantity of gasoline used during each of these trips.
5. Sum the entire dataset to calculate the total fuel consumed.

6.4.6.3 Assumptions/Other Items of Note

Following are assumptions and other items of note related to the calculation of NRSS GHG emissions associated with ground business travel by NRSS employees using rental cars:

- 100% of the NPS employee rental car trips are using gasoline-powered cars.
- The duration (in number of days) of car rental is equal to the total duration of the trip (End Date [column L] minus Begin Date [column K]).

6.4.6.4 Flow of Data Entry

This section outlines the process and flow of data entry into and between the various files used to calculate NRSS GHG emissions associated with ground business travel by NRSS employees using rental cars. See Figure 8 for a visualization of the data entry process.

1. Enter the total fuel consumed by NRSS employee rental car trips into from the NRSS Voucher Data Excel file into the Inventory Prep File, "Ground Travel – Employees" tab.
2. Enter the total fuel consumed into the Secondary CLIP File, "Mobile Combustion" tab under the Park Operations park unit. Enter all fuel consumed in the "Gasoline – Car" field and use the default average miles per gallon provided by the tool.
3. Enter the resulting calculated emissions from the Secondary CLIP File into the Primary CLIP File, "Other Emissions Sources tab" under the Park Operations park unit (labeled as "NRSS employee ground travel – rental car trips").

Figure 8. Employee Ground Business Travel, Rental Cars Data Flow

6.4.7 Ground Business Travel (NRSS Employees) – Privately Owned Vehicles (POVs)

6.4.7.1 Data Sources

Table 16 outlines the data sources for calculating GHG emissions associated with NRSS employee ground business travel using POVs.

Table 16. Data Sources for NRSS Employee Ground Business Travel Using POVs

Name of Data Source	Data Provided	Notes
NRSS Voucher Data	Details of expenses included in vouchers submitted into the Concur travel management system for NRSS employees during the inventory year	The Excel file should be filtered by Expense Category (Column O) to show rows populated with "Mileage."

6.4.7.2 Calculation/Methodology

Following is a summary of the calculations/methodology used to process the data associated with NRSS employee ground business travel using POVs for entry into the CLIP Tool:

1. Divide the Mileage expense allocation amount (column P) by \$0.37 per mile to calculate the corresponding number of miles traveled during each respective trip.
2. Sum the number of miles traveled.

6.4.7.3 Assumptions/Other Items of Note

Following are assumptions and other items of note related to the calculation of NRSS GHG emissions associated with ground business travel by NRSS employees using POVs:

- The NRSS inventory applies an average reimbursement rate of \$0.37/mile to all mileage expense entries in Concur, which is an average of the GSA mileage per diem rates when an employee elects to use their own vehicle instead of an available government vehicle (\$0.17 per mile) and the rate when a government vehicle is not available (\$0.57 per mile).
- All privately owned vehicle trips by NPS employees are taken in gasoline-powered cars.

6.4.7.4 Flow of Data Entry

This section outlines the process and flow of data entry into and between the various files used to calculate NRSS GHG emissions associated with ground business travel by NRSS employees using POVs. See Figure 9 for a visualization of the data entry process.

1. Enter the total miles traveled by NRSS employee privately owned vehicles into the Inventory Prep File, “Ground Travel – Employees” tab.
2. Enter the total miles traveled from the Inventory Prep File into the Secondary CLIP File, “Mobile Combustion” tab under the Visitors park unit. Enter all miles traveled in the “Gasoline – Car” field.
3. Enter the resulting calculated emissions from the Secondary CLIP File into the primary CLIP File, “Other Emissions Sources” tab under the Park Operations park unit (labeled as “NRSS employee ground travel – privately owned vehicles”).

Figure 9. Employee Ground Travel, Privately Owned Vehicles Data Flow



6.4.8 Ground Business Travel (NRSS Contractors)

6.4.8.1 Data Sources

Table 17 outlines the data sources for calculating GHG emissions associated with NRSS contractor ground business travel.

Table 17. Data Sources for NRSS Contractor Ground Business Travel

Name of Data Source	Data Provided	Notes
MBS Contractor Travel Data	Data for each travel segment conducted by MBS contractor in support of NRSS (Colorado) during the inventory year: • Date • Miles • Travel mode • Length of haul (if flight)	N/A

6.4.8.2 Calculation/Methodology

Following is a summary of the calculations/methodology used to process the data associated with NRSS contractor ground business travel for entry into the CLIP Tool:

1. Sum the reported mileage for ground travel by MBS employees.
2. Calculate per capita mileage for MBS employees and apply to other non-MBS contractors.
3. Sum the two mileage amounts.

6.4.8.3 Assumptions/Other Items of Note

Following are assumptions and other items of note related to the calculation of NRSS GHG emissions associated with ground business travel by NRSS contractors:

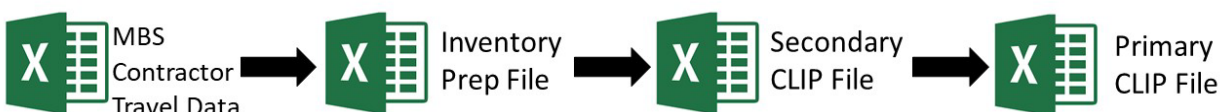
- NRSS has identified additional contractors not employed by MBS, but travel data is currently unable for these contractors. To strive for an inventory that is as complete as possible, NRSS estimates the ground travel conducted by these additional non-MBS contractors. To estimate ground travel conducted by these other non-MBS contractors, NRSS calculates per capita ground miles traveled for MBS employees and multiples this by the number of other non-MBS contractors.
- The inventory assumes that MBS contractors' ground travel is representative of all other non-MBS contractors.
- 100 percent of the contractor ground business travel is done in gasoline-powered cars.
- Used default MPG figures in the CLIP Tool.

6.4.8.4 Flow of Data Entry

This section outlines the process and flow of data entry into and between the various files used to calculate NRSS GHG emissions associated with ground business travel by NRSS contractors. See Figure 10 for a visualization of the data entry process.

1. Calculate the total miles traveled by all contractors in the Inventory Prep File, "Ground Travel – Contractors" tab.
2. Enter total contractor mileage into the Secondary CLIP File, "Mobile Combustion" tab under the Partners and Contractors park unit. Use the default MPG provided by the CLIP Tool.
3. Enter resulting emissions into the Primary CLIP File, "Other GHG Sources" tab under the Partners and Contractors park unit (labeled as "Contractor ground travel").

Figure 10. Contractor Ground Travel Data Flow



6.4.9 Ground Business Travel (NRSS Partners)

6.4.9.1 Data Sources

Table 18 outlines the data sources for calculating GHG emissions associated with NRSS partner ground business travel.

Table 18. Data Sources for NRSS Partner Ground Business Travel

Name of Data Source	Data Provided	Notes
N/A	N/A	Ground travel data for NRSS partners are currently not available.

6.4.9.2 Calculation/Methodology

Following is a summary of the calculations/methodology used to process the data associated with NRSS partner ground business travel for entry into the CLIP Tool:

1. Calculate per capita NRSS employee rental car fuel consumption and miles traveled by privately owned vehicles.
2. Multiply the per capita fuel consumption and miles traveled by the number of NRSS partners to estimate emissions from both rental cars and privately owned vehicles.

6.4.9.3 Assumptions/Other Items of Note

Following are assumptions and other items of note related to the calculation of NRSS GHG emissions associated with ground business travel by NRSS partners:

- Because data for ground travel by NRSS partners is currently not available, the NRSS inventory calculates per capita fuel consumption and miles traveled values associated with NRSS employee ground travel and applies these scaling factors to the total quantity of NRSS partners during the inventory year to estimate GHG emissions associated with NRSS partner ground travel.
- The NRSS inventory assumes that NRSS employee ground travel is more representative of NRSS partner ground travel as compared to NRSS contractor ground travel.
- All partner ground travel is conducted in gasoline-powered cars.

6.4.9.4 Flow of Data Entry

This section outlines the process and flow of data entry into and between the various files used to calculate NRSS GHG emissions associated with ground business travel by NRSS partners. See Figure 11 for a visualization of the data entry process.

1. Extrapolate per capita fuel gallons consumed and total miles traveled in privately owned vehicles by NRSS employees to the number of NRSS partners in the Inventory Prep File, “Ground Travel – Partners” tab.
2. Enter fuel consumption into the Secondary CLIP File, “Mobile Combustion” tab under Employee EVs (elec)/ Partner rental car park unit, using the CLIP default for average MPG.
3. Enter vehicle miles traveled into the Secondary CLIP File, “Mobile Combustion” tab under Other Permitted Activities park unit, using the CLIP default for average MPG.

4. Enter each resulting emissions value from the Secondary CLIP File into the Primary CLIP File, “Other GHG Sources” tab under the Partners and Contractors and Other Permitted Activities park units, respectively.

Figure 11. Partner Ground Travel Data Flow



6.4.10 NRSS Staff Commuting: NRSS Employees

6.4.10.1 Data Sources

Table 19 outlines the data sources for calculating GHG emissions associated with commuting by NRSS employees.

Table 19. Data Sources for Employee Commuting by NRSS Employees

Name of Data Source	Data Provided	Notes
NRSS staff commuting survey (MS Forms)	Qualitative and quantitative information about each employee's commuting behavior in a typical work week	N/A
www.fueleconomy.gov	kWh/100 miles for EVs	N/A

6.4.10.2 Calculation/Methodology

Following is a summary of the calculations/methodology used to process the data associated with employee commuting by NRSS employees for entry into the CLIP Tool:

1. The NRSS Inventory Lead prepares an NRSS staff commuting survey in Microsoft Forms and distributes the survey to all NRSS employees associated with target Colorado offices; when the survey period is closed, the NRSS Inventory Lead exports the survey results to Microsoft Excel.
2. If necessary, perform clean-up of the employee commuting survey results Excel file, including general clean-up to remove text in numeric-only fields, converting all Excel cell types from text to values, and converting transportation mode cells to decimals so the CLIP Tool calculates the correct percentage.
3. For NRSS employees who drive all electric vehicles:
 - a. Calculate their commuting days per year by multiplying their average number of days commuting per week times 52 weeks, then subtracting out the number of potential commuting days they would miss in one year that was reported in the survey.

- b. Multiply the days commuting per year times the average round-trip commute distance reported in the survey, then multiply this result by the percent the employee commutes to work in their electric vehicle.
- c. Multiply the total commuting miles in electric vehicles by the average kWh per 100 miles across all reported types of all-electric EVs from fueleconomy.gov to calculate the total electricity in kilowatt hours need to charge the NRSS employees' EVs.

6.4.10.3 Assumptions/Other Items of Note

Following are assumptions and other items of note related to the calculation of NRSS GHG emissions associated with employee commuting by NRSS employees:

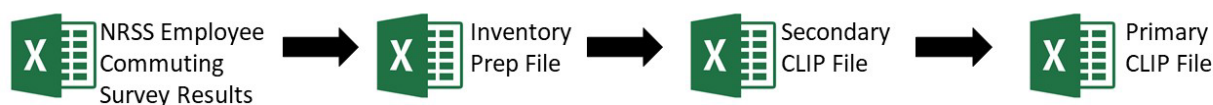
- All EVs are charged using grid-provided electricity because they are charged at night when residential solar resources are not available (assuming that batteries are not yet broadly in use in residential applications).

6.4.10.4 Flow of Data Entry

This section outlines the process and flow of data entry into and between the various files used to calculate NRSS GHG emissions associated with employee commuting by NRSS employees. See Figure 12 for a visualization of the data entry process.

1. Enter employee commuting EV data into the Inventory Prep File, "Commuting – Employees" tab and perform calculations described above. Also enter the number of survey responses to calculate the survey completion rate.
2. Enter the kWh consumed to charge employee EVs in the Purchased Electricity tab of the Secondary CLIP File, "Purchased Electricity" tab under the Employee EVs (elec) / Partner rental car park unit.
3. Enter the emissions associated with electricity generation to charge NRSS employee EVs from the Secondary CLIP File into the Primary CLIP File, "Other GHG Sources" tab under the Park Operations park unit.
4. In the Primary CLIP File, "Employee Commuting" tab, enter the survey completion rate and the commuting survey data.

Figure 12. Employee Commuting Data Flow



6.4.11 NRSS Staff Commuting: NRSS Partners, Contractors, and Volunteers

6.4.11.1 Data Sources

Table 20 outlines the data sources for calculating GHG emissions associated with employee commuting by NRSS partners, contractors, and volunteers.

Table 20. Data Sources for Employee Commuting by NRSS Partners, Contractors, and Volunteers

Name of Data Source	Data Provided	Notes
NRSS staff commuting survey for NRSS Partners, Contractors, and Volunteers (MS Forms)	Qualitative and quantitative information about commuting behavior in a typical work week for each partner, contractor, and volunteer	This version of the employee commuting survey is sent to no more than nine (9) individuals to remain under the threshold that requires the submission of a formal information collection request to the Office of Management and Budget.

6.4.11.2 Calculation/Methodology

Following is a summary of the calculations/methodology used to process the data associated with commuting by NRSS partners, contractors, and volunteers for entry into the CLIP Tool:

1. The NRSS Inventory Lead prepares an NRSS staff commuting survey for NRSS partners/contractors/volunteers in Microsoft Forms and distributes the survey to nine randomly selected NRSS partners and contractors; when the survey period is closed, the NRSS Inventory Lead exports the survey results to Microsoft Excel.
2. If necessary, perform clean-up of the survey results Excel file, including general clean-up to remove text in numeric-only fields, converting all Excel cell types from text to values, and converting transportation mode cells to decimals so the CLIP Tool calculates the correct percentage.

6.4.11.3 Assumptions/Other Items of Note

Following are assumptions and other items of note related to the calculation of NRSS GHG emissions associated with employee commuting by NRSS contractors, partners, and volunteers:

- For the base year, no NRSS contractors, partners, or volunteers reported driving full electric vehicles. If NRSS prepares a future inventory and NRSS contractors, partners, and/or volunteers report the use of all-electric vehicles, NRSS will follow the methodology outlined for NRSS employee commuting in Section 6.4.10.

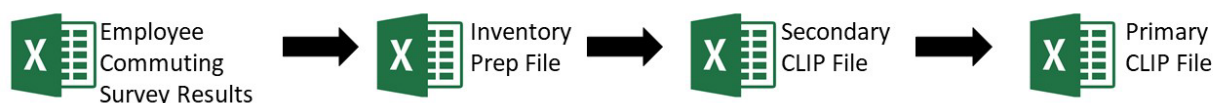
6.4.11.4 Flow of Data Entry

This section outlines the process and flow of data entry into and between the various files used to calculate NRSS GHG emissions associated with commuting by NRSS contractors, partners, and volunteers. See Figure 13 for a visualization of the data entry process.

1. Enter the number of partner and contractor survey responses in the Inventory Prep File to calculate the commuting survey completion rate.
2. In the Secondary CLIP File:
 - a. Enter 49 as the number of “park” employees in the “General Information” tab for the nine survey responses to be extrapolated to all partners and contractors.

- b. Enter the processed partner, contractor and volunteer commuting survey results into the “Park Employee Commuting” tab.
3. Enter the calculated emissions from the Secondary CLIP File into the Primary CLIP File, “Other GHG Sources” tab under the Partners and Contractors park unit.

Figure 13. Partner, Contractor and Volunteer Commuting Data Flow



6.4.12 Contracted Wastewater Treatment

6.4.12.1 Data Sources

Table 21 outlines the data sources for calculating GHG emissions associated with contracted wastewater treatment.

Table 21. Data Sources for Contracted Wastewater Treatment

Name of Data Source	Data Provided	Notes
Water Consumption data for Academy Place	Metered monthly water consumption data for the entire Academy Place building	N/A
Water Consumption data for Oakridge	Metered monthly water consumption data for the entire Oakridge building	N/A
Academy Place property appraisal	Gross building area of Academy Place	N/A
Oakridge Place property appraisal	Gross building area of Oakridge	N/A
Occupancy agreement for Academy Place	Square footage occupied by NPS in Academy Place	N/A
Occupancy agreement for Oakridge	Square footage occupied by NPS in Oakridge	N/A

6.4.12.2 Calculation/Methodology

Following is a summary of the calculations/methodology used to process the data associated with contracted wastewater treatment for entry into the CLIP Tool:

1. Sum the monthly water consumption totals for each building.
2. Multiply the summed 12-months of water consumption data for each building by the respective NPS percentage of total building square footage to prorate building-wide water consumption and estimate NRSS's portion of total wastewater sent to the wastewater treatment plant (WWTP).

6.4.12.3 Assumptions/Other Items of Note

Following are assumptions and other items of note related to the calculation of NRSS GHG emissions associated with contracted wastewater treatment:

- Oakridge water consumption data provided does not explicitly list the consumption units. The NRSS inventory assumes the unit for water consumption is gallons.
- During the base year, despite being 19 percent smaller in total footprint, the Oakridge Building consumed more than twice as much water as Academy Place. It is likely this disparity results from differences in landscaping and irrigation use at each facility.
- For both facilities, assumed that the total wastewater sent to the WWTP was equal to the water consumption over the baseline year.
- With respect to Academy Place:
 - Wastewater is treated by the Metro Wastewater Reclamation District:
 - <https://www.lakewood.org/files/assets/public/public-works/pdfs/engineering/sewer-districts-map.pdf>
 - <http://www.metrowastewater.com/aboutus/Pages/customersservice.aspx>
 - Metro Wastewater Reclamation District performs methane recovery to power its onsite digesters (<http://www.metrowastewater.com/know/BenReuse/Pages/whatwedo.aspx>); the confirmed volume of methane recovered annually is, however, not currently available. Given that the NRSS operations at Academy Place are an insignificant percentage of the district's overall wastewater treated, the NRSS inventory does not currently calculate any emissions associated with methane recovered at the plant.
- With respect to the Oakridge Building:
 - Wastewater is treated by the City of Fort Collins (see: <https://gisweb.fcgov.com/HTML5Viewer/index.html?Viewer=Utility%20Districts>).
 - At the time of the development of NRSS's base year inventory, the type of digestion and amount of methane recovery (if any) occurring at the Mulberry Water Reclamation Facility could not be confirmed with the City of Fort Collins Utilities; the NRSS inventory currently assumes that the WWTP performs anaerobic digestion and recovers no methane during the wastewater treatment process.

6.4.12.4 Flow of Data Entry

This section outlines the process and flow of data entry into and between the various files used to calculate NRSS GHG emissions associated with contracted wastewater treatment. See Figure 14 for a visualization of the data entry process.

1. Sum and prorate the total gallons sent to the WWTP from Academy Place and Oakridge in the Inventory Prep File, "Wastewater" tab.
2. Enter the summed and prorated total wastewater values into the primary CLIP Tool, "Wastewater Treatment tab" under the Park Operations and NRSS Operations Cont. park units for Academy Place and Oakridge, respectively.

Figure 14. Contracted Wastewater Treatment Data Flow

6.4.13 Fugitive Refrigerants from Stationary Equipment

6.4.13.1 Data Sources

Table 22 outlines the data sources for calculating GHG emissions associated with Fugitive Refrigerants from Stationary Equipment.

Table 22. Data Sources for Fugitive Refrigerants from Stationary Equipment

Name of Data Source	Data Provided	Notes
NRSS Stationary Refrigerant Inventory	For each of the NRSS Colorado buildings: • Equipment Type • Building Location • Make • Mode • Refrigerant Type • Refrigerant Quantity • Affiliation (i.e., whether equipment is in NRSS-occupied space, non NRSS-occupied space, or serves entire building)	The inventory is compiled through in-person observations of stationary equipment containing refrigerant

6.4.13.2 Calculation/Methodology

Following is a summary of the calculations/methodology used to process the data associated with fugitive refrigerants from stationary equipment for entry into the CLIP Tool:

1. In the NRSS Stationary Refrigerant Inventory file, add PivotTable to summarize equipment in NRSS space by refrigerant and equipment type.
2. For the Academy Place chiller, which serves the entire building, multiply the emissions associated with the chiller by NPS's percentage occupancy of the building.

6.4.13.3 Assumptions/Other Items of Note

Following are assumptions and other items of note related to the calculation of NRSS GHG emissions associated with fugitive refrigerants in stationary equipment:

- Emissions associated with equipment within NRSS-occupied space was allocated 100% to NRSS.

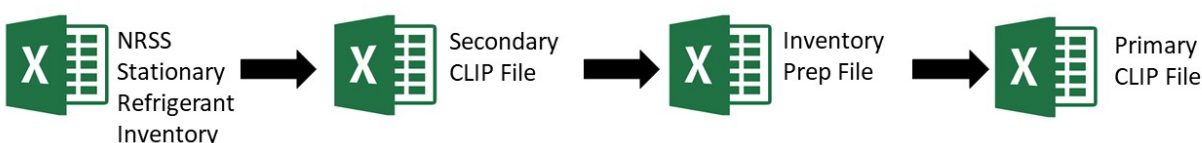
- Emissions associated with equipment in the mechanical room that serves the entire building is prorated based on NRSS's percent square footage occupied of the total building square footage.
- Assumed that Academy Place's chiller maps to the "large commercial unitary" category of air conditioning in the CLIP Tool.
- Excluded Oakridge's chiller from the inventory because it uses R-11, which is being phased out under the Montreal Protocol and not accounted for in the CLIP Tool.
- Numerous refrigerated and air conditioning appliances at Academy Place were excluded from the inventory because they did not use HFC-134 or R-410, which are the only two refrigerants accounted for in the CLIP Tool.

6.4.13.4 Flow of Data Entry

This section outlines the process and flow of data entry into and between the various files used to calculate NRSS GHG emissions associated with refrigerant from stationary equipment. See Figure 15 for a visualization of the data entry process.

1. Enter the Academy Place chiller into the Secondary CLIP File, "Refrigerant Use" tab under the Park Operations park unit to calculate emissions for the whole building.
2. In the Inventory Prep File, "Refrigerants – Stationary" tab, prorate the emissions based on NPS' percent occupancy of the building.
3. Enter the prorated emissions associated with the Academy Place chiller in the Primary CLIP Tool, "Other GHG Sources" tab under the NRSS Operations Cont. park unit.
4. Enter the remaining stationary equipment counts only associated with NRSS space in the Primary CLIP Tool, "Refrigerant Use" tab under the Park Operations park unit.

Figure 15. Fugitive Refrigerants from Stationary Equipment



7. QUALITY ASSURANCE

To help ensure completeness and quality in the NRSS GHG emissions inventory, it is important to have multiple individuals review inventory calculations, including individuals not directly responsible for leading the calculations. For the base year inventory, a team of support contractors led the preparation of the necessary calculations and data entry into the CLIP Tool, and performed extensive quality assurance of data entry. The NRSS Inventory Lead subsequently reviewed the CLIP Tool inventory and IMP holistically.

8. FREQUENCY

NRSS intends to periodically compile future GHG emissions inventories to track and assess progress in reducing its operational footprint.

APPENDIX A: DATA SOURCE CONTACTS

Emissions Category	Data Element	Data Source	Compiler(s)
Mobile fuel combustion from fleet vehicles	Vehicle miles traveled by fuel and vehicle type	FAST	Larry Perez (NRSS) and Chris Havermann (NPS)
	Average MPG by vehicle and fuel type	FuelEconomy.gov	Contractor
Fugitive refrigerants from mobile equipment	Number and age of NRSS fleet vehicles	FAST	Larry Perez and Chris Havermann
Purchased electricity	Academy Place building-wide electricity consumption	Brinkley Faulcon (GSA) and Susan Griffin (Building Lessor)	Larry Perez
	Oakridge building-wide electricity consumption	Kirk Longstein (City of Fort Collins)	Larry Perez
Purchased electricity, purchased natural gas, fugitive emissions from stationary equipment, contracted wastewater treatment	Total Academy Place building square footage	County Appraisal Office Online Portal	Larry Perez
	NPS-occupied Academy Place building square footage	Brinkley Faulcon and Susan Griffin	Larry Perez
	Total Oakridge building square footage	County Appraisal Office Online Portal	Larry Perez
	NPS-occupied Oakridge building square footage	Robert Kirkpatrick (GSA)	Larry Perez
Purchased natural gas	Oakridge building-wide natural gas consumption	CB ECS	Contractor
Air business travel	Employee air business miles traveled	Concur	Larry Perez
	Partner air business travel miles traveled	Extrapolated from NRSS employee air travel	Contractor
Air business travel, ground business travel	Contractor air and ground miles traveled	Stephani Schubach (MBS)	Larry Perez
Ground business travel	Employee rental car and POV voucher data	Concur	Larry Perez
	Average weekly gasoline prices in the U.S.	U.S. Energy Information Administration's Weekly Retail Gasoline and Diesel Prices data	Contractor
	Partner rental car and POV data	Extrapolated from NRSS employee ground travel	Contractor
Employee Commuting	Employee commuting data	NRSS Commuting Survey	Larry Perez
	Partner/contractor/volunteer commuting data	NRSS Commuting Survey	Larry Perez
	Average kWh per 100 miles for the three 2020 all-electric EVs	FuelEconomy.gov	Contractor

Emissions Category	Data Element	Data Source	Compiler(s)
Contracted wastewater treatment	Academy Place building-wide water consumption	Brinkley Faulcon and Susan Griffin	Larry Perez
	Oakridge building-wide water consumption	Kirk Longstein (City of Fort Collins)	Larry Perez
Fugitive refrigerants from stationary equipment	Academy Place count by type of stationary equipment	In-person inventory conducted by Jim Cheatham and Larry Perez	Larry Perez
	Oakridge count by type of stationary equipment	In-person inventory conducted by Larry Perez	Larry Perez

APPENDIX B: NRSS STAFF COMMUTING SURVEY

As part of our NRSS Climate Friendly Parks effort, we hope to inventory emissions and opportunities related to employee commuting. The total time to complete this survey is estimated at approximately five minutes. Though most of us are currently teleworking, PLEASE COMPLETE THIS SURVEY ASSUMING A TYPICAL WORK WEEK UNDER NORMAL OPERATIONS. To obtain the clearest picture possible of NRSS operations, your response to this survey is highly encouraged and very appreciated!

- 1) In your normal routine, HOW MANY DAYS PER WEEK do you commute (travel to the office from home*)? Please include ALL forms of travel to the office, including walking, biking, riding, etc. FOR THOSE ON ALTERNATIVE WORK SCHEDULES: Please indicate your AVERAGE number of commuting days per week.
- 2) In your normal routine, how many potential commuting days would you typically miss during one year? Please estimate this number considering unexpected telecommuting, business travel, sick leave, vacation leave, etc.
- 3) How far is your commute to and from work (total round-trip) in miles?
- 4) Modes of Transportation: Many people use multiple modes of travel in a single commute, or different modes on different days. What percentage of your commuting do you do in the following modes? (For example, 80% Train and 20% Bike would be entered as "80" and "20" for those modes, respectively.) Please ensure your total does not exceed 100%
 - a) Automobile (solo)
 - b) Carpool (yourself +1 other person, including a family member or coworker)
 - c) Carpool (yourself +2 other people, including family members or coworkers)
 - d) Carpool (yourself +3 other people, including family members or coworkers)
 - e) Carpool (yourself +4 other people, including family members or coworkers)
 - f) Commuter Bus
 - g) Train
 - h) Bike/Walk/Run
 - i) Other (assumed to be non-GHG emitting)
- 5) If you drive and/or carpool to work, what kind of vehicle do you use to commute to/from the office? If you own more than one vehicle and/or use both a personal vehicle and a carpool, please select the vehicle you use MOST OFTEN to commute to/from the office.
 - a) Small Gasoline Car
 - b) Medium Gasoline Car
 - c) Large Gasoline Car
 - d) Diesel Car
 - e) Gasoline Light Truck
 - f) Gasoline Heavy Truck
 - g) Diesel Light Truck
 - h) Diesel Heavy Truck
 - i) Motorcycle
 - j) Hybrid Car
 - k) Full Electric Vehicle
- 6) Do you have the option to take public transportation?
- 7) If applicable, what barriers exist to your using public transportation, carpool, walking, biking, etc. to work? (Optional)
- 8) How would you like to see NRSS become more sustainable? Do you have any project ideas? (Optional)