

Appendix A

Scope 1 & 2 Emissions Assumptions & Methodology

ASSUMPTIONS AND METHODOLOGY

The following subsections contain information on data collection, emissions factors, and other assumptions and methodologies for each of Inventory for Scope 1 & 2 Emissions Reporting.

DIRECT EMISSIONS FROM MOBILE SOURCES

Direct emissions from mobile sources include the combustion of fuels in vehicles that are owned and controlled by MSS. The MSS fleet consists largely of trucks for collection and transport of waste and recyclables and off-road equipment used to manage the recycling facility.

Source Identification

MSS provided fuel purchase information for their three on-site bulk tanks and their offsite Chevron credit card usage.

Data Collection and Management

All diesel, gasoline and propane use is tracked by purchase records and card-lock. All stationary fuel usage was backed out of the direct mobile category by estimates from handwritten fuel logs.

Quantification Method

Carbon Dioxide

Carbon dioxide (CO₂) emissions from mobile sources are calculated by applying the CO₂ emissions factors for diesel, motor gasoline, and propane based on total annual fuel consumption, following the methodology in The Climate Registry (TCR), General Reporting Protocol (GRP), Version 2.0. The following emission factors are used:

Diesel: 10.21 kg CO₂/gallon

Motor Gasoline: 8.78 kg CO₂/gallon

Propane: 5.59 kg CO₂/gallon

CH₄ and N₂O Emissions

Simplified Estimation Methods were used to calculate emissions of CH₄ and N₂O because verifiable mileage data for all vehicles was not available for all years. This methodology is provided in the updated 2014 Climate Registry Default Emissions Factors, Table 13.9.

CH₄ Emissions: 4.93 x 10⁻⁰⁵ metric tons CH₄/metric tons CO₂

N₂O Emissions: 4.07 x 10⁻⁰⁵ metric tons N₂O/metric tons CO₂

DIRECT EMISSIONS FROM STATIONARY SOURCES

Direct emissions from stationary sources included imported natural gas, diesel used for welders, compressors and the shop and acetylene used for welding torches.

Emissions from Imported Natural Gas

Natural gas purchase information was provided by PG&E invoices. The total therms were reconciled at year beginning and end for mid-month billing to ensure that only fuel used within the calendar year was included in the inventory.

Emissions from Compressed Gases

MSS identified welding torches which combusted acetylene and gas grills which combusted propane.

Emissions from Liquid Fuels

MSS identified stationary equipment which combusted diesel and gasoline which are tracked by fuel logs and backed out of bulk tank purchases.

Source Identification

Stationary sources of emissions were identified through consultation with MSS staff familiar with their facilities.

Data Collection & Management

Imported Natural Gas:

Imported natural gas quantities were obtained from PG&E invoices. Original invoices are on file at MSS.

Compressed Gases:

Total acetylene and propane usage information was gathered from vendor invoices. Original invoices are on file at MSS.

Liquid Fuels:

Total diesel and gasoline usage information was gathered from fuel logs. Original logs are on file at MSS.

Quantification Method

Imported Natural Gas

Emissions were quantified using the methodol

Emissions due to imported natural gas are calculated using the following emission factors:

CO₂ Emissions: 53.02 kg CO₂/MMBtu

CH₄ Emissions: 5.0 g CH₄/MMBtu

N₂O Emissions: 0.1 g N₂O/MMBtu

Compressed Gases

Emissions were quantified using the methodol

Emissions due to combusted acetylene are calculated using the following emission factors:

Acetylene

CO₂ Emissions: 71.42 kg CO₂/MMBtu

Propane

CO₂ Emissions: 5.59 kg CO₂/gallon

CH₄ Emissions: 11 g CH₄/MMBtu

N₂O Emissions: 0.6 g N₂O/MMBtu

Liquid Fuels

Emissions were quantified using the methodol

Emissions due to combusted diesel are calculated using the following emission factors:

Diesel

CO₂ Emissions: 10.21 kg CO₂/gallon

CH₄ Emissions: 10 g CH₄/MMBtu

N₂O Emissions: 0.6 g N₂O/MMBtu

Gasoline

CO₂ Emissions: 8.78 kg CO₂/gallon

CH₄ Emissions: 10 g CH₄/MMBtu

N₂O Emissions: 0.6 g N₂O/MMBtu

INDIRECT EMISSIONS FROM PURCHASED AND CONSUMED ELECTRICITY

Electricity is purchased from PG&E. Total purchased electricity was summarized in the data collection tool from the invoices. The total kWhs were reconciled at year beginning and end for mid-month billing to ensure that only electricity used within the calendar year was included in the inventory.

Source Identification

The accounts department was able to provide electricity invoices for all facilities.

Data Collection and Management

Purchased electricity quantities were obtained from invoices. Original invoices are on file at MSS.

Quantification Method

Emissions were quantified using the methodology described in the TCR GRP Version 2.0 and using the eGRID emission factors, detail below.

eGRID Emission Factors

CO₂ Emissions: 658.68 lbs CO₂/MWh

CH₄ Emissions: 28.94 lbs CH₄/GWh

N₂O Emissions: 6.17 lbs N₂O/GWh

FUGITIVE EMISSIONS

Fugitive Leakage from Argon/CO₂:

MSS identified they had Argon/CO₂ usage for welding and cutting torches. The compressed gas comes as 75% Argon and 25% CO₂. As an upper bound assumption, we assume that all of the 25% CO₂ is lost into the atmosphere.

Source Identification

MSS staff identified welding and cutting torches which used Argon/CO₂.

Data Collection and Management

Total Argon/CO₂ usage information was gathered from vendor invoices. Original invoices are on file at MSS.

Quantification Method

The mixed CO₂ gases are not combusted therefore there is no emission factor. Specific volume of CO₂ is 8.741 ft³/lb according to the MSDS of Argon/CO₂. The conversion used is = 1/(8.741) = 0.1144 lb/ft³.

SIMPLIFIED ESTIMATION METHODS AND EXCLUDED SOURCES

TCR recognizes that for many organizations, identifying, quantifying, and reporting the entirety of GHG emissions is expensive and burdensome, especially for those with many small facilities that represent a small fraction of their total emissions. Additionally, those emissions that were calculated using non-GRP methods must be shown under a simplified estimation method.

TCR allows the simplified estimation of emissions sources that when summed together result in less than 5% of the sum of Scope 1 and Scope 2 emissions for the organization. The 5% threshold can represent any combination of sources or gases.

In addition, TCR has approved a list of sources to be excluded outright from the inventories, since they are consistently a ve do not represent a material (above 5%) amount of emissions. A list of approved bpage (www.theclimateregistry.org).

MSS has chosen to exclude emissions from vehicle and building refrigeration. In addition, simplified estimation methods were used to quantify emissions of methane and nitrous oxide from fleet vehicles and diesel and gasoline usage from stationary equipment. The excluded emissions form can be found in **Appendix F**.

Appendix B

Scope 3 Emissions Assumptions & Methodology

ASSUMPTIONS AND METHODOLOGY

AVOIDED EMISSIONS FROM WASTE RECYCLING, COMPOSTING, AND COMBUSTION

Marin Sanitary Services (MSS) facilitates GHG emission reductions by recycling the waste it manages, furnishing feedstock for biomass energy, and composting. Recycling reduces the demand for raw or virgin materials, while re-manufacturing with recycled materials generally reduces overall energy use. Recycling also results in increased carbon sequestration by forests since fewer trees need to be harvested for wood and paper products. Additionally, well-managed composting ultimately results in increased soil carbon storage, and end use of compost results in reduced demand for water, fertilizer, and other soil inputs. Organic woody materials that MSS does not use for composting are used in the production of biomass energy, which reduces the demand for fossil fuels. Measuring the positive impacts of these endeavors, in metric tons of carbon dioxide equivalent reductions (MTCO₂e), is the focus of this report.

GREENHOUSE GAS ESTIMATION METHODOLOGY

Greenhouse gas emissions, both generated and avoided emissions, are estimated using two sources: 1) California Air Resources Board-developed emission reduction factors for recyclables and compost (CARB 2011), and the U.S. EPA WARM model. The CARB Compost Emissions Reduction Factor (CERF) and Recycling Emissions Reduction Factors (RERFs) are used nearly exclusively to estimate emissions impacts from organics management and recycling. The WARM model is used to estimate emissions from landfill disposal. Both of these sources use a life-cycle approach.

It should be noted that CARB and WARM estimates of actual or avoided emissions for a given solid waste management scenario are assigned on an annual basis. For instance, all avoided emissions from recycling are reported in the current year, even though they may not enter the manufacturing process in the same year that they enter the recyclables market. Likewise, the total amount of landfill gas emissions that would occur from a given amount of landfilled organic waste are reported in the current year, even though it may take many years for the decomposition of the organic material to reach completion.

BIOGENIC VS. ANTHROPOGENIC EMISSIONS

Biogenic emissions are plant derived emissions, such as decay or combustion of plant based materials. The perspective is that plant based energy and waste materials are part of a short-term carbon cycle of harvest and regrowth and concentration of the atmosphere. On the other hand, burning fossil fuels that have been stored for millennia does increase the atmospheric greenhouse gas concentration and is an anthropogenic emission. Anthropogenic emissions occur because of human activities. Anthropogenic emissions are counted as part of biogenic emissions are not. For instance, burning fossil fuels is anthropogenic, but burning

biodiesel is biogenic (i.e. B20 is 20% biogenic). Landfill methane is considered an anthropogenic emission, but if burned and converted to carbon dioxide it is considered biogenic because the natural decomposition of the organic waste would have resulted in carbon dioxide emissions anyway. Methane is 21 times more powerful as a greenhouse gas than carbon dioxide, so this distinction is important.

AVOIDED EMISSIONS VS. GENERATED EMISSIONS

WARM assigns a negative number to avoided emissions, such as fossil fuel emissions that are offset by biomass energy generation or soil carbon storage from compost use. Emissions that enter the atmosphere are given a positive number, such as transportation fuel combustion or fugitive landfill methane. Therefore, the net result may be either positive or negative depending on whether the total avoided emissions are greater or less than the total generated emissions. In this report, avoided emissions are presented in parentheses.

CALIFORNIA AIR RESOURCES BOARD EMISSION REDUCTION FACTORS

The California Air resources Board prepared two documents presenting the development of GHG emission reduction factors, one for compost and the other for recyclables.

Compost:

CARB uses a life-cycle method to quantify the California-specific greenhouse gas emission reductions from using compost and the greenhouse gas emissions associated with compost management. Compost application to agricultural fields increases soil health while providing multiple co-benefits. Compost application reduces the amount of synthetic fertilizer needed, reduces the amount of water used, decreases soil erosion, increases soil carbon storage and reduces the use of herbicides. Composting material also causes greenhouse gas emissions during the collection of the initial feedstock and delivery of the compost, the use of energy and water to manage the compost pile, and as microorganisms convert the initial feedstock to compost. It is generally accepted that methane and nitrous oxide emissions are generated during composting; however, WARM does not include these emissions but CARB does, for the specific case of open windrow composting. The CARB method also includes GHG benefits from RM Model, which only included GHG benefits

from soil carbon storage.

The following equation is used to calculate the compost emission reduction factor (CERF):

$$\text{CERF} = (\text{CSb} + ((\text{Wb} + \text{Eb} +$$

Where:

CERF =	Compost emission reduction factor (MTCO ₂ e/ton of feedstock)
CSb =	Emission reductions associated with the increased carbon storage in soil (MTCO ₂ e/ton of feedstock)
Wb =	Emission reductions due to decreased water use (MTCO ₂ e/ton of compost)
Eb =	Emission reduction associated with decreased soil erosion (MTCO ₂ e/ton of compost)

F_b = Factor to account for the reduced fertilizer use (MTCO₂e/ton of compost)
 H_b = Factor to account for the reduced herbicide use (MTCO₂e/ton of compost)
 C_{use} = Conversion factor used to convert from tons of compost to tons of feedstock
 E_{total} = Emissions due to the composting process (MTCO₂e/ton of feedstock)

Recyclables:

CARB developed emission reduction factors to quantify the benefits associated with recycling. The life-cycle approach used in this method incorporates avoided emissions from manufacturing using recyclables, the use of raw materials in the manufacturing process (e.g., harvested wood), transportation emissions, and recycling efficiency. The following equation is used to calculate each recycling emission reduction factor (except dimensional lumber; RERF):

Where:

$RERF$ = Recycling emission reduction factor (MTCO₂e/ton of material)
 MS_{virgin} = Emissions associated with using 100% virgin inputs for manufacturing the material (MTCO₂e/ton of material)
 $MS_{recycled}$ = Emissions associated with using 100% recycled inputs for manufacturing the material (MTCO₂e/ton of material)
 FCS = Forest carbon sequestration (MTCO₂e/ton of material)
 $T_{remanufacture}$ = Transportation emissions associated with remanufacture destination (MTCO₂e/ton of material)
 R_{use} = Recycling efficiency (fraction of material remanufactured from ton of recycled material)

The above equation uses an approach similar to one established by the United States Environmental Protection Agency

California-specific data and added a model to evaluate forest carbon sequestration. Emissions from the landfilled fraction of waste are estimated using the WARM Model. Emissions from recycling and composting are estimated using both methods for comparison purposes.

US EPA WARM MODEL

a life-cycle analysis approach that considers emissions associated with acquisition of raw materials, emissions during the manufacturing process, and transportation emissions. GHG emissions reductions are calculated by comparing the emissions from an alternative scenario with the emissions associated with the baseline Scenario. In this way, the reduction in GHG emissions from increasing the recycling rates of various commodities can be estimated.

Landfilled Organics in WARM: Since many organic materials do not completely decompose in landfills, some of the biogenic carbon is stored there; thus, WARM credits landfilling as a biogenic carbon sink for such materials. WARM provides an estimate of the amount of biogenic carbon stored through landfilling organic material. It then subtracts the amount of stored biogenic carbon in the landfill from the landfill emission generation. For some materials (notably, wood, yard trimmings, leaves, branches, mixed organics, newspaper, and phone books), the result is that WARM GHG impacts for organic materials are often negative, masking the GHG impact of landfill gas emissions.

Because the policy of the State of California is to reduce and minimize the amount of waste that is landfilled (Assembly Bill 341 and Assembly Bill 939 (1989), et al). It is a core value of CalRecycle that all materials be properly managed in order to minimize the generation of waste (source reduction), maximize the diversion of materials from landfills, and manage all materials to their highest and best use, in accordance with the waste management hierarchy and in support of the California Global Warming Solutions Act of 2007. It is also a strategic directive of CalRecycle to assist in the development of viable, sustainable markets to divert materials from landfills and encourage source reduction and recycling. Specifically, CalRecycle intends to reduce the amount of organics in the waste stream by 50% by 2020 (adopted February 13, 2007, California Integrated Waste Management Board meeting). While it is technically correct to quantify and report the amount of carbon stored in a landfill; however, it should not be interpreted as offsetting landfill methane emissions. Therefore, in this analysis the biogenic storage is factored out in the interpretation of the WARM model results.

APPROACH OF THIS GHG ASSESSMENT

The intent of this portion of the GHG emissions inventory is to quantify the GHG emissions reductions that occur as a result of recycling materials from the solid waste stream, providing biomass feedstock for energy generation, and/or the provision of compost or mulch for soil application. To achieve this, the biogenic carbon storage is factored out in the interpretation of the WARM Model results. Essentially, the WARM Model approach to calculating landfill emissions is the following:

Net WARM calculated landfill emissions = Landfill fugitive and operational emissions (positive) + avoided fossil fuel emissions from energy generation (negative)

Since carbon storage and avoided fossil fuel emissions are negative, the net emissions from WARM are often negative for organics. The approach used by this GHG assessment tool is to remove the biogenic carbon storage from the calculation. To arrive at actual landfill GHG emissions from WARM, the energy offsets would also have to be removed. However, they are much less significant than the carbon storage amount and represent a reduction of fossil fuel emissions.

The biogenic carbon storage is factored out by:

1. Starting with the WARM-calculated emissions for the organic tonnages landfilled.
2. Using the WARM biogenic carbon storage factors (WARM model version 13, USEPA 2014. Available at <http://epa.gov/epawaste/conserve/tools/warm/pdfs/Landfilling.pdf>) to calculate the amount of biogenic carbon storage that WARM attributes to each organic material.
3. Subtracting the biogenic carbon storage amount from the WARM output to remove it from the net emissions estimate.

WARM has a material category called Mixed Municipal Solid Waste (MSW); whose material characteristics match the national landfilled solid waste profile from 2003. To improve accuracy, this analysis uses the most recent solid waste characterization information (2008) for the State of California as the basis of the WARM analysis.

SITE SPECIFIC INFORMATION

For MSS, WARM inputs for each category (tonnage) were based on annual 2013 tonnages from accounting spreadsheets provided by MSS. Table 1 summarizes the WARM categories that were included in the analysis for MSS, along with a listing of materials that were included in each category.

Additional information used in the model include:

- MSS sends its waste to the Redwood Landfill, which collects landfill gas and uses it to generate electricity. The landfill gas collection efficiency chosen in the WARM model is for the typical efficiency scenario, which assumes zero percent efficiency for the first two years, 50% in the third, fourth, and fifth years, 75% in years six through 15, 82.5% after 15 years, and 90% once final cover is in place. The Redwood Landfill is in an area with less than 25 inches of rainfall annually; therefore, the dry landfill option is chosen in WARM.
- Round-trip transport distances are:
 - Redwood Landfill = 32 miles;
 - Recycling Management Facility (Port of Oakland) = 44 miles;
 - Combustion Facility = 150 miles;

- o Composting Facility = 174 miles;

MATERIAL CATEGORIES FOR GHG EMISSION MODELING

The material inputs to the WARM and CARB model are shown in Table 1, where the correlation RM material categories is presented.

Table 1: Material Inputs to the WARM and CARB Models

WARM Category	Categories	Management Scenario
Aluminum Cans	Aluminum	Recycled
Steel Cans	Metal Logs	Recycled
Glass	Glass	Recycled
HDPE	HDPE	Recycled
PET	PET	Recycled
Corrugated Containers	Cardboard	Recycled
Newspaper	Newspaper	Recycled
Yard Trimmings	Green Waste	Composted
Dimensional Lumber	Biomass	Combusted
Magazines 8%, CC 48%, Office Paper 20%, Newspaper 24% (distribution)	Mixed Paper	Recycled
Mixed Plastics	Mixed Plastics	Recycled
Aluminum 39% Steel 61%	Mixed Metal	Recycled
Mixed Paper (office)	Office Pack	Recycled
Tires	Tires	Recycled
Drywall	Drywall	Recycled
MSW	Trash	Landfilled
Concrete	Road Base	Recycled
Concrete	Dirt (mixed inerts)	Landfilled (beneficial)

Note: Construction and demolition waste fines are used at the landfill for alternative daily cover, but are conservatively modeled as being landfilled rather than as offsetting other construction materials. Inert dirt is the category of best fit.

COMPOST EMISSIONS

MSS sends its organic waste to a composting facility in Zamora for processing. To calculate the emissions associated with composting food waste, greenhouse gas (GHG) emission factors

developed by CARB for open windrow composting were used. Transportation emissions assume a 174 mile round trip to the Zamora facility.

PRESENTATION OF RESULTS

The approach taken in this report is to categorize the waste managed by MSS as waste that is either landfilled or recovered. The recovered group includes compost and biomass energy feedstock in addition to recyclables. Estimates for GHG reductions for recovered materials were made using emissions factors published by the California Air Resources Board (CARB). WARM emissions estimates are used for those materials processed by MSS which CARB has no published emission factor. Emissions associated with the landfilling of materials are also calculated using WARM as CARB does not provide estimates for landfill emissions. The presentation of results proceeds as follows:

- The emissions that would have occurred if the recycled material had been landfilled instead of recycled are presented (Table 2);
- The avoided emissions from the use of the recycled materials are presented (Table 3)
- The emissions from landfilling the solid waste and residuals that are currently landfilled are presented (Table 4).
- The summary of the avoided emissions by category (Table 5)

From this information, the overall emissions reduction from recycling can be ascertained, as well as the benefits from increasing the recycling rate of specific materials.

The emissions that would have resulted if the currently recycled material were landfilled rather than recycled are presented in Table 2. The tonnages shown in the second column of Table 2 are equal to the tonnages currently recycled, but the destination is assumed to be landfilling. The total emissions avoided by recycling are the avoided landfill emissions plus the emissions avoided by the use of recycled materials (Table 3).

The values presented in the third column of Table 2 are the direct WARM results, including the reduction in emissions that WARM attributes to the stored biogenic carbon in the landfill. The amount of stored biogenic carbon calculated by WARM is shown in the fourth column, and the adjusted results, shown in the fifth column, are the WARM generated emissions with the biogenic carbon storage benefit factored out. Therefore, the values in the fifth column are the landfill emissions that would have occurred if the tonnages shown in the second column had been landfilled rather than recycled.

**Table 2: Emissions if the Recycled Material Had Been Landfilled Instead
(WARM)**

Commodity	Tons Recycled	WARM Emissions if Landfilled MTCO ₂ e	WARM Landfill Carbon Storage Adjustment MTCO ₂ e	Landfill Emissions w/o CS MTCO ₂ e
Aluminum Cans	1,185	48	0	48
Steel Cans	2,515	102	0	102
Glass	5,355	217	0	217
HDPE	228	9	0	9
PET	344	14	0	14
Corrugated Containers	7,257	(1,194)	(5,225)	4,030
Newspaper	6,339	(6,066)	(7,544)	1,477
Office Paper	1,383	907	(166)	1,073
Drywall (as soil amendment)	1,655	(68)	(132)	65
Dimensional Lumber	35,894	(36,578)	(39,125)	2,547
Yard Trimmings	19,370	(6,569)	(10,460)	3,891
Magazines	111	10	(50)	60
Mixed Plastics	1,557	63	0	63
Carpet	931	38	0	38
Concrete	40,219	1,627	0	1,627
Tires	426	17	0	17
Total	124,771	(47,424)	(62,702)	15,278

Notes:

- MTCO₂e is metric tons carbon dioxide equivalence.
- Numbers in parentheses represent avoided emissions.
- CS = Carbon Storage

The overall avoided emissions from recycling are presented in Table 3. The values in the third column are the avoided emissions from the use of recycled materials. The fourth column is carried over from Table 2 and the fifth column is the sum of the third and fourth columns.

Table 3: Avoided Emissions from Materials that are Currently Recycled, Composted or Used for Biomass Electricity Generation

Commodity	Tons Recycled	Avoided Emissions from use of Recycled Materials MTCO ₂ e	Emissions if Material had been Landfilled MTCO ₂ e	Overall Avoided Emissions from Recycling MTCO ₂ e
Aluminum Cans	1,185	(15,357)	48	(15,405)
Steel Cans	2,515	(3,795)	102	(3,897)
Glass	5,335	(848)	217	(1,065)
HDPE	228	(177)	9	(186)
PET	344	(489)	14	(503)
Corrugated Containers	7,257	(37,118)	4,030	(41,148)
Newspaper	6,339	(22,004)	1,477	(23,481)
Office Paper	1,383	(5,976)	1,073	(7,049)
Magazines	111	(45)	60	(105)
Dimensional Lumber	35,894	(36,578)	2,547	(7,538)
Yard Trimmings	19,730	(8,310)	3,891	(12,201)
Mixed Plastics	1,557	(1,882)	63	(1,945)
	931	(2,194)	38	(2,232)
	40,219	(184)	1,627	(1,812)
	1,655	79	65	14
	426	(163)	17	(180)
Total	124,771	(106,002)	15,278	(121,281)

Notes:

- Materials calculated using WARM Emissions factors shown in *Italics*.
- MTCO₂e is metric tons carbon dioxide equivalence.
- Numbers in parentheses represent avoided emissions.

In addition to providing materials for recycling, composting, and biomass energy feedstock, MSS disposed of 97,078 tons of solid waste in 2013 in various landfills. The emissions generated by the landfilling of this material are presented in Table 4. The tonnages shown in the second column are distributed according to the California Statewide Waste Characterization (2008).

Table 4: Emissions from the Landfilled Waste Assuming a California Waste Profile (WARM)

Commodity	Tons Landfilled	WARM Landfill Emissions MTCO ₂ e	Carbon Storage Adjustment MTCO ₂ e	Actual Landfill Emissions MTCO ₂ e
Glass	1,365	55	0	55
Corrugated Cardboard	4,678	(770)	(3,368)	2,599
Newspaper	1,267	(1,213)	(1,508)	295
Dimensional Lumber	14,133	(14,402)	(15,405)	1,003
Food Scraps	15,107	4,805	(1,058)	5,862
Yard Trimmings	2,632	(892)	(1,421)	529
Grass	1,852	89	(259)	348
Leaves	1,852	(1,134)	(1,463)	329
Branches	585	(499)	(620)	121
Mixed Paper, Broad	10,916	(1,874)	(7,532)	5,658
Mixed Metals	4,484	181	0	181
Mixed Plastics	9,357	379	0	379
Mixed Organics	6,433	69	(1,930)	1,998
Mixed MSW	780	102	(164)	266
Carpet	3,119	126	0	266
Personal Computers	487	20	0	20
Concrete	18,032	730	0	730
Total	97,078	(14,229)	(34,728)	20,499

Notes:

- MTCO₂e is metric tons carbon dioxide equivalence.
- Numbers in parentheses represent avoided emissions.

NOTE ON ALTERNATE DAILY COVER

Alternate daily cover, which is made up of mixed inerts is modelled separately. In total 55,505 tons of C&D fines were used producing an estimated GHG impact of 2,246 MTCO₂e.

SUMMARY OF RESULTS (WARM w/ CARB)

The GHG impacts are provided by category in Table 5.

Table 5: GHG Emissions by Category (WARM w/ CARB)

End Use	Tons	Landfill Emissions	Avoided Emissions From End Use	Total Avoided Emissions
Recycled	69,506	(8,840)	(90,155)	(98,995)
Composted	19,370	(3,891)	(8,310)	(12,201)
Combusted	35,894	(2,547)	(7,538)	(10,085)
Landfill Beneficial Reuse	55,505	2,246	NA	2,246
Landfilled Waste	97,078	20,499	NA	20,499
Total	277,354	7,466	(106,002)	(98,536)

Notes:

- Numbers in parentheses represent avoided emissions.
- Negative landfill emissions are avoided by not landfilling materials; the positive landfill emissions are actual emissions generated by landfilling waste, alternative daily cover, and the residual fraction.

Avoided emissions from use of recovered materials (MTCO₂e): (90,155) + (8,310) + (7,538)
= (106,002) MTCO₂e

Avoided landfill emissions from avoided landfill disposal = (8,840) + (3,891) + (2,547)
= (15,278) MTCO₂e

Total Avoided Emissions: (106,002) + (15,278)
= (121,281) MTCO₂e

Net Emissions = (121,281) + 2,246 + 20,499
= (98,536) MTCO₂e

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Appendix C

2013 CRIS Report

CRIS: Climate Registry Information System

Entity Emissions Detailed Report

Marin Sanitary Service

(Private)

12/23/2014 18:5:27 VET



Entity Information

Entity Name	Marin Sanitary Service
Entity Address	1050 Andersen Drive San Rafael California 94901 United States
Entity Website	
Entity Contact	Evan W. R. Edgar
Contact Email	evan@edgarinc.org
Contact Phone	9167391200
Entity Type	Commercial & Industrial
Description	

2013 Emissions Information

Reporting Protocol	The Climate Registry's General Reporting Protocol and associated updates and clarifications
Consolidation Methodology	Operational Control Only
Reporting Status	Verification Accepted

Assurance Level	This report has been verified to a reasonable level of assurance. A reasonable assurance opinion is generally considered to generate the highest possible level of confidence. For more information about the difference between reasonable and limited assurance, please see the Assurance section of the CRIS User Guide.
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CRIS: Climate Registry Information System

Entity Emissions Detailed Report

Marin Sanitary Service

(Private)

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Operational Control: National - US

DIRECT EMISSIONS (metric tons)		CO2e	CO2	CH4	N2O	HFCs (CO2e)	PFCs (CO2e)	SF6
Stationary Combustion - Scope 1		140.15392	139.71936	0.01427	0.00043	0	0	0
Mobile Combustion - Scope 1		4,513.67121	4,442.62221	0.239	0.213	0	0	0
Process - Scope 1		0	0	0	0	0	0	0
Fugitive - Scope 1		0.06	0.06	0	0	0	0	0
TOTAL DIRECT EMISSIONS		4,653.88513	4,582.40157	0.25327	0.21343	0	0	0
INDIRECT EMISSIONS (metric tons)		CO2e	CO2	CH4	N2O	HFCs (CO2e)	PFCs (CO2e)	SF6
Purchased Electricity - Scope 2		445.94402	444.24412	0.01952	0.00416	0	0	0
Purchased Heating - Scope 2		0	0	0	0	0	0	0
Purchased Cooling - Scope 2		0	0	0	0	0	0	0
Purchased Steam - Scope 2		0	0	0	0	0	0	0
TOTAL INDIRECT EMISSIONS		445.94402	444.24412	0.01952	0.00416	0	0	0
BIOGENIC EMISSIONS (metric tons)		CO2						
Stationary Biomass Combustion - Biomass		0						
Mobile Biomass Combustion - Biomass		0						
TOTAL BIOGENIC EMISSIONS		0						

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SIMPLIFIED ESTIMATION METHODS (metric tons)

SEMS Total (CO2e): 130.2844

%: 2.55468

OPTIONAL EMISSIONS (metric tons)

Scope 1 (Optional)

Scope 2 (Optional)

Scope 3 (Optional)

Biomass (Optional)

TOTAL Optional EMISSIONS

	CO2e	CO2	CH4	N2O	HFCs (CO2e)	PFCs (CO2e)	SF6
Scope 1 (Optional)	0	0	0	0	0	0	0
Scope 2 (Optional)	0	0	0	0	0	0	0
Scope 3 (Optional)	0	0	0	0	0	0	0
Biomass (Optional)	0	0	0	0	0	0	0
TOTAL Optional EMISSIONS	0	0	0	0	0	0	0

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TOTAL EMISSIONS: Fleet

Does the Entity control the Facility's emissions? Yes

Equity Share (%) N/A

DIRECT EMISSIONS (metric tons)		CO2e	CO2	CH4	N2O	HFCs (CO2e)	PFCs (CO2e)	SF6
Stationary Combustion - Scope 1		0	0	0	0	0	0	0
Mobile Combustion - Scope 1	4,513.67121	4,442.62221		0.239	0.213	0	0	0
Process - Scope 1	0	0	0	0	0	0	0	0
Fugitive - Scope 1	0	0	0	0	0	0	0	0
TOTAL DIRECT EMISSIONS	4,513.67121	4,442.62221		0.239	0.213	0	0	0

INDIRECT EMISSIONS (metric tons)		CO2e	CO2	CH4	N2O	HFCs (CO2e)	PFCs (CO2e)	SF6
Purchased Electricity - Scope 2		0	0	0	0	0	0	0
Purchased Heating - Scope 2		0	0	0	0	0	0	0
Purchased Cooling - Scope 2		0	0	0	0	0	0	0
Purchased Steam - Scope 2		0	0	0	0	0	0	0
TOTAL INDIRECT EMISSIONS	0	0		0	0	0	0	0

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BIOGENIC EMISSIONS (metric tons)									
	CO2e	CO2	CH4	N2O	HFCs (CO2e)	PFCs (CO2e)	SF6		
Stationary Biomass Combustion - Biomass	0	0	0	0	0	0	0		
Mobile Biomass Combustion - Biomass	0	0	0	0	0	0	0		
TOTAL BIOGENIC EMISSIONS	0	0	0	0	0	0	0		
Optional EMISSIONS (metric tons)									
	CO2e	CO2	CH4	N2O	HFCs (CO2e)	PFCs (CO2e)	SF6		
Scope 1 (Optional)	0	0	0	0	0	0	0		
Scope 2 (Optional)	0	0	0	0	0	0	0		
Scope 3 (Optional)	0	0	0	0	0	0	0		
Biomass (Optional)	0	0	0	0	0	0	0		
TOTAL Optional EMISSIONS	0	0	0	0	0	0	0		

SIMPLIFIED ESTIMATION METHODS (metric tons)	
SEMS Total (CO2e):	71.049
%:	1.57408

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Source Name	Activity Type	GHG	Amount	CO2-e	Calc Method	Technology	End Use Sector	Fuel Type	Fuel	Fuel Quantity	Emission Factor	Heat Content	Carbon Content	OX	Coefficient Perform	Efficiency Factor	SEM	Reference
Combustion Engines (Diesel)	Mobile Combustion - Scope 1	CO2	4,114.99756	4,114.99756	Emission Factor	Uncontrolled	Diesel Light Trucks	Diesel Fuel	All	403.036 gal	10.21 kg/gal							2014 Default Emission Factors - Table #13.1
Combustion Engines (Diesel)	Mobile Combustion - Scope 1	CH4	0.219	4.599	PreCalculated	Uncontrolled	Diesel Light Trucks	Diesel Fuel	All	0 mi							Y	2014 Default Emission Factors - Table #13.4
Combustion Engines (Diesel)	Mobile Combustion - Scope 1	N2O	0.193	59.83	PreCalculated	Uncontrolled	Diesel Light Trucks	Diesel Fuel	All	0 mi							Y	2014 Default Emission Factors - Table #13.4
Combustion Engines (Gasoline)	Mobile Combustion - Scope 1	CO2	327.62465	327.62465	Emission Factor	Uncontrolled	Gasoline Light Trucks (Vans, Pickup Trucks, SUVs)	Motor Gasoline	All	37.314.88 gal	8.78 kg/gal							2014 Default Emission Factors - Table #13.1
Combustion Engines (Gasoline)	Mobile Combustion - Scope 1	CH4	0.02	0.42	PreCalculated	Uncontrolled	Gasoline Light Trucks (Vans, Pickup Trucks, SUVs)	Motor Gasoline	All	0 mi							Y	2014 Default Emission Factors - Table #13.4
based on total CO2																		
Combustion Engines (Gasoline)	Mobile Combustion - Scope 1	N2O	0.02	6.2	PreCalculated	Uncontrolled	Gasoline Light Trucks (Vans, Pickup Trucks, SUVs)	Motor Gasoline	All	0 mi							Y	2014 Default Emission Factors - Table #13.4
based on total CO2																		



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TOTAL EMISSIONS: Marin Recycling Center (MRR)

Does the Entity control the Facility's emissions? Yes

Equity Share (%) N/A

DIRECT EMISSIONS (metric tons)	CO2e	CO2	CH4	N2O	HFCs (CO2e)	PFCs (CO2e)	SF6
Stationary Combustion - Scope 1	2,43719	2,43009	0.0002	0	0	0	0
Mobile Combustion - Scope 1	0	0	0	0	0	0	0
Process - Scope 1	0	0	0	0	0	0	0
Fugitive - Scope 1	0	0	0	0	0	0	0
TOTAL DIRECT EMISSIONS	2,43719	2,43009	0.0002	0	0	0	0

INDIRECT EMISSIONS (metric tons)	CO2e	CO2	CH4	N2O	HFCs (CO2e)	PFCs (CO2e)	SF6
Purchased Electricity - Scope 2	54,40185	54,19448	0.00238	0.00051	0	0	0
Purchased Heating - Scope 2	0	0	0	0	0	0	0
Purchased Cooling - Scope 2	0	0	0	0	0	0	0
Purchased Steam - Scope 2	0	0	0	0	0	0	0
TOTAL INDIRECT EMISSIONS	54,40185	54,19448	0.00238	0.00051	0	0	0

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BIOGENIC EMISSIONS (metric tons)									
	CO2e	CO2	CH4	N2O	HFCs (CO2e)	PFCs (CO2e)	SF6		
Stationary Biomass Combustion - Biomass	0	0	0	0	0	0	0		
Mobile Biomass Combustion - Biomass	0	0	0	0	0	0	0		
TOTAL BIOGENIC EMISSIONS	0	0	0	0	0	0	0		
Optional EMISSIONS (metric tons)									
	CO2e	CO2	CH4	N2O	HFCs (CO2e)	PFCs (CO2e)	SF6		
Scope 1 (Optional)	0	0	0	0	0	0	0		
Scope 2 (Optional)	0	0	0	0	0	0	0		
Scope 3 (Optional)	0	0	0	0	0	0	0		
Biomass (Optional)	0	0	0	0	0	0	0		
TOTAL Optional EMISSIONS	0	0	0	0	0	0	0		

SIMPLIFIED ESTIMATION METHODS (metric tons)

SEMS Total (CO2e): 1.90199

%; 3.34627

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Source Name	Activity Type	GHG	Amount	CO2-e	Calc Method	Technology	End Use Sector	Fuel Type	Fuel	Fuel Quantity	Emission Factor	Heat Content	Carbon Content	OX	Coefficient Pattern	Efficiency Factor	SEM	Reference
Furnaces	Stationary Combustion - Scope 1	CO2	2.14529	2.14529	Emission Factor	Unspecified Technology	Commerc..Natural Gas	Unspecified (Weighted U.S. Average)	Unspecified	40.46193 MMBtu	53.02 kg/MMBtu							2014 Default Emission Factors - Table #12.1
Furnaces	Stationary Combustion - Scope 1	CH4	0.0002	0.00425	Emission Factor	Unspecified Technology	Commerc..Natural Gas	Unspecified (Weighted U.S. Average)	Unspecified	40.46193 MMBtu	5 g/MMBtu							2014 Default Emission Factors - Table #12.9
Furnaces	Stationary Combustion - Scope 1	N2O	0	0.00125	Emission Factor	Unspecified Technology	Commerc..Natural Gas	Unspecified (Weighted U.S. Average)	Unspecified	40.46193 MMBtu	0.1 g/MMBtu							2014 Default Emission Factors - Table #12.9
Imported Electricity	Purchased Electricity - Scope 2	CO2	52.58504	52.58504	Emission Factor	Unspecified Technology	All	WECC California All	All	176.00358 MWh	658.68 lb/MWh							2014 Default Emission Factors - Table #14.1
Imported Electricity	Purchased Electricity - Scope 2	CH4	0.00231	0.04852	Emission Factor	Unspecified Technology	All	WECC California All	All	176.00358 MWh	28.94 lb/GWh							2014 Default Emission Factors - Table #14.1
Imported Electricity	Purchased Electricity - Scope 2	N2O	0.00049	0.1527	Emission Factor	Unspecified Technology	All	WECC California All	All	176.00358 MWh	6.17 lb/GWh							2014 Default Emission Factors - Table #14.1
Imported Electricity (SEMs)	Purchased Electricity - Scope 2 SEMs used for missing December data.	CO2	1.60944	1.60944	Emission Factor	Unspecified Technology	All	WECC California All	All	5.38684 MWh	658.68 lb/MWh						Y	2014 Default Emission Factors - Table #14.1
Imported Electricity (SEMs)	Purchased Electricity - Scope 2 SEMs used for missing December data.	CH4	0.00007	0.00148	Emission Factor	Unspecified Technology	All	WECC California All	All	5.38684 MWh	28.94 lb/GWh						Y	2014 Default Emission Factors - Table #14.1
Imported Electricity (SEMs)	Purchased Electricity - Scope 2	N2O	0.00002	0.00467	Emission Factor	Unspecified Technology	All	WECC California All	All	5.38684 MWh	6.17 lb/GWh						Y	2014 Default Emission Factors - Table #14.1

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SEMs used for missing December data.



Purchased Natural Gas (SEMs)	Stationary Combustion - Scope 1	CO2	0.2848	0.2848	Emission Factor	Boilers	Commerc..Natural Gas	Unspecified (Weighted U.S. Average)	5.37148 MMBtu	53.02 kg/MMBtu	Y	2014 Default Emission Factors - Table #12.1
SEMs used to estimate usage in months with no data.												
Purchased Natural Gas (SEMs)	Stationary Combustion - Scope 1	CH4	0	0.0001	Emission Factor	Boilers	Commerc..Natural Gas	Unspecified (Weighted U.S. Average)	5.37148 MMBtu	0.9 g/MMBtu	Y	2014 Default Emission Factors - Table #12.8
Purchased Natural Gas (SEMs)	Stationary Combustion - Scope 1	N2O	0	0.0015	Emission Factor	Boilers	Commerc..Natural Gas	Unspecified (Weighted U.S. Average)	5.37148 MMBtu	0.9 g/MMBtu	Y	2014 Default Emission Factors - Table #12.8

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TOTAL EMISSIONS: Marin Resource Recovery Center (MRRRC)

Does the Entity control the Facility's emissions? Yes

Equity Share (%) N/A



DIRECT EMISSIONS (metric tons)									
	CO2e	CO2	CH4	N2O	HFCs (CO2e)	PFCs (CO2e)	SF6		
Stationary Combustion - Scope 1	126.33824	125.94798	0.01286	0.00039	0	0	0		
Mobile Combustion - Scope 1	0	0	0	0	0	0	0		
Process - Scope 1	0	0	0	0	0	0	0		
Fugitive - Scope 1	0.053	0.053	0	0	0	0	0		
TOTAL DIRECT EMISSIONS	126.39124	126.00098	0.01286	0.00039	0	0	0		
INDIRECT EMISSIONS (metric tons)									
	CO2e	CO2	CH4	N2O	HFCs (CO2e)	PFCs (CO2e)	SF6		
Purchased Electricity - Scope 2	244.77846	243.84538	0.01072	0.00228	0	0	0		
Purchased Heating - Scope 2	0	0	0	0	0	0	0		
Purchased Cooling - Scope 2	0	0	0	0	0	0	0		
Purchased Steam - Scope 2	0	0	0	0	0	0	0		
TOTAL INDIRECT EMISSIONS	244.77846	243.84538	0.01072	0.00228	0	0	0		

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BIOGENIC EMISSIONS (metric tons)									
	CO2e	CO2	CH4	N2O	HFCs (CO2e)	PFCs (CO2e)	SF6		
Stationary Biomass Combustion - Biomass	0	0	0	0	0	0	0		
Mobile Biomass Combustion - Biomass	0	0	0	0	0	0	0		
TOTAL BIOGENIC EMISSIONS	0	0	0	0	0	0	0		
Optional EMISSIONS (metric tons)									
	CO2e	CO2	CH4	N2O	HFCs (CO2e)	PFCs (CO2e)	SF6		
Scope 1 (Optional)	0	0	0	0	0	0	0		
Scope 2 (Optional)	0	0	0	0	0	0	0		
Scope 3 (Optional)	0	0	0	0	0	0	0		
Biomass (Optional)	0	0	0	0	0	0	0		
TOTAL Optional EMISSIONS	0	0	0	0	0	0	0		

SIMPLIFIED ESTIMATION METHODS (metric tons)	
SEMS Total (CO2e):	45.92249
%:	12.37237

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Source Name	Activity Type	GHG	Amount	CO2-e	Calc Method	Technology	End Use Sector	Fuel Type	Fuel	Fuel Quantity	Emission Factor	Heat Content	Carbon Content	OX	Coefficient	Efficiency Factor	SEM	Reference
Fugitive CO2 emissions from cutting/welding torches	Fugitive - Scope 1	CO2	0.053	0.053	PreCalculated	Unspecified Technology	ALL	N/A	N/A	0 GL								null
Furnaces	Stationary Combustion - Scope 1	CO2	95.37668	95.37668	Emission Factor	Unspecified Technology	Commerc. Natural Gas	Unspecified (Weighted U.S. Average)	Unspecified	1,798.8812553.02 MMBtu	kg/MMBtu							2014 Default Emission Factors - Table #12.1
Furnaces	Stationary Combustion - Scope 1	CH4	0.00899	0.18888	Emission Factor	Unspecified Technology	Commerc. Natural Gas	Unspecified (Weighted U.S. Average)	Unspecified	1,798.881255 MMBtu	g/MMBtu							2014 Default Emission Factors - Table #12.9
Furnaces	Stationary Combustion - Scope 1	N2O	0.00018	0.05577	Emission Factor	Unspecified Technology	Commerc. Natural Gas	Unspecified (Weighted U.S. Average)	Unspecified	1,798.881250.1 MMBtu	g/MMBtu							2014 Default Emission Factors - Table #12.9
Imported Electricity	Purchased Electricity - Scope 2	CO2	227.49553	227.49553	Emission Factor	Unspecified Technology	ALL	WECC California All	Unspecified	761.43377 MWh	lb/MWh							2014 Default Emission Factors - Table #14.1
Imported Electricity	Purchased Electricity - Scope 2	CH4	0.01	0.2099	Emission Factor	Unspecified Technology	ALL	WECC California All	Unspecified	761.43377 MWh	lb/GWh							2014 Default Emission Factors - Table #14.1
Imported Electricity	Purchased Electricity - Scope 2	N2O	0.00213	0.66061	Emission Factor	Unspecified Technology	ALL	WECC California All	Unspecified	761.43377 MWh	lb/GWh							2014 Default Emission Factors - Table #14.1
Machining and Welding (Acetylene)	Stationary Combustion - Scope 1	CO2	1.20684	1.20684	Emission Factor	Unspecified Technology	ALL	Fossil Fuel-derived Fuels (gaseous)	Acetylene	11.461 scf	0.1053 kg/scf							2014 Default Emission Factors - Table #12.1
Purchased	Purchased	CO2	16.34985	16.34985	Emission Factor	Unspecified	ALL	WECC California All	Unspecified	54.72341	658.68							2014 Default

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Electricity -
Scope 2
SEMS used for periods with no available usage data.



Purchased Electricity (SEMS)	CH4	0.00072	0.01509	Emission Factor	Unspecified Technology	All	WECC California All	MWh	lb/MWh	Emission Factors - Table #14.1
Purchased Electricity (SEMS)	CH4	0.00072	0.01509	Emission Factor	Unspecified Technology	All	WECC California All	54.72341 MWh	28.94 lb/GWh	2014 Default Emission Factors - Table #14.1
Purchased Electricity (SEMS)	N2O	0.00015	0.04748	Emission Factor	Unspecified Technology	All	WECC California All	54.72341 MWh	6.17 lb/GWh	2014 Default Emission Factors - Table #14.1
Purchased Natural Gas (SEMS)	CO2	6.49256	6.49256	Emission Factor	Boilers	Commerce..Natural Gas	Unspecified (Weighted U.S. Average)	122.45484 MMBtu	53.02 kg/MMBtu	2014 Default Emission Factors - Table #12.1
Missing utility invoice for natural gas from 12/31/14 to 13/31/14 at MRRC. Using SEMs to estimate emissions.										
Purchased Natural Gas (SEMS)	CH4	0.00061	0.01286	Emission Factor	Boilers	Commerce..Natural Gas	Unspecified (Weighted U.S. Average)	122.45484 MMBtu	5 g/MMBtu	2014 Default Emission Factors - Table #12.8
Missing utility invoice for natural gas from 12/31/14 to 13/31/14 at MRRC. Using SEMs to estimate emissions.										
Purchased Natural Gas (SEMS)	N2O	0.00001	0.0038	Emission Factor	Boilers	Commerce..Natural Gas	Unspecified (Weighted U.S. Average)	122.45484 MMBtu	0.1 g/MMBtu	2014 Default Emission Factors - Table #12.8
Missing utility invoice for natural gas from 12/31/14 to 13/31/14 at MRRC. Using SEMs to estimate emissions.										
Stationary Equipment (Gasoline)	CO2	22.8719	22.8719	Emission Factor	Unspecified Technology	Commerce..Petroleum Products	Motor Gasoline	2.605 gal	8.78 kg/gal	2014 Default Emission Factors - Table #12.1
Stationary Equipment (Gasoline)	CH4	0.00326	0.06838	Emission Factor	Unspecified Technology	Commerce..Petroleum Products	Motor Gasoline	2.605 gal	10 g/MMBtu	2014 Default Emission Factors - Table #12.9
Stationary Equipment (Gasoline)	N2O	0.0002	0.06057	Emission Factor	Unspecified Technology	Commerce..Petroleum Products	Motor Gasoline	2.605 gal	0.6 g/MMBtu	2014 Default Emission Factors - Table #12.9



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TOTAL EMISSIONS: Offices, Shop, Transfer Station (MSS)

Does the Entity control the Facility's emissions? Yes

Equity Share (%) N/A

DIRECT EMISSIONS (metric tons)									
	CO ₂ e	CO ₂	CH ₄	N ₂ O	HFCs (CO ₂ e)	PFCs (CO ₂ e)	SF ₆		
Stationary Combustion - Scope 1	11.37849	11.34129	0.00121	0.00004	0	0	0		
Mobile Combustion - Scope 1	0	0	0	0	0	0	0		
Process - Scope 1	0	0	0	0	0	0	0		
Fugitive - Scope 1	0.007	0.007	0	0	0	0	0		
TOTAL DIRECT EMISSIONS	11.38549	11.34829	0.00121	0.00004	0	0	0		

INDIRECT EMISSIONS (metric tons)									
	CO ₂ e	CO ₂	CH ₄	N ₂ O	HFCs (CO ₂ e)	PFCs (CO ₂ e)	SF ₆		
Purchased Electricity - Scope 2	146.76371	146.20426	0.00642	0.00137	0	0	0		
Purchased Heating - Scope 2	0	0	0	0	0	0	0		
Purchased Cooling - Scope 2	0	0	0	0	0	0	0		
Purchased Steam - Scope 2	0	0	0	0	0	0	0		
TOTAL INDIRECT EMISSIONS	146.76371	146.20426	0.00642	0.00137	0	0	0		

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BIOGENIC EMISSIONS (metric tons)									
	CO2e	CO2	CH4	N2O	HFCs (CO2e)	PFCs (CO2e)	SF6		
Stationary Biomass Combustion - Biomass	0	0	0	0	0	0	0		
Mobile Biomass Combustion - Biomass	0	0	0	0	0	0	0		
TOTAL BIOGENIC EMISSIONS	0	0	0	0	0	0	0		
Optional EMISSIONS (metric tons)									
	CO2e	CO2	CH4	N2O	HFCs (CO2e)	PFCs (CO2e)	SF6		
Scope 1 (Optional)	0	0	0	0	0	0	0		
Scope 2 (Optional)	0	0	0	0	0	0	0		
Scope 3 (Optional)	0	0	0	0	0	0	0		
Biomass (Optional)	0	0	0	0	0	0	0		
TOTAL Optional EMISSIONS	0	0	0	0	0	0	0		
SIMPLIFIED ESTIMATION METHODS (metric tons)									
SEMS Total (CO2e): 11,41092									
%: 7.21529									

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Source Name	Activity Type	GHG	Amount	CO2-e	Calc. Method	Technology	End Use Sector	Fuel Type	Fuel	Fuel Quantity	Emission Factor	Heat Content	Carbon Content	OX	Coefficient Perform	Efficiency Factor	SEM	Reference
Fugitive CO2 from welding/cutting torches	Fugitive - Scope 1	CO2	0.007	0.007	PreCalculated	Unspecified Technology	ALL	N/A	N/A	0 GL								null
Furnaces	Stationary Combustion - Scope 1	CO2	9.07443	9.07443	Emission Factor	Unspecified Technology	Commerc..Natural Gas	Unspecified (Weighted U.S. Average)		171.151 MMBtu	53.02 kg/MMBtu							2014 Default Emission Factors - Table #12.1
Furnaces	Stationary Combustion - Scope 1	CH4	0.00086	0.01797	Emission Factor	Unspecified Technology	Commerc..Natural Gas	Unspecified (Weighted U.S. Average)		171.151 MMBtu	5 g/MMBtu							2014 Default Emission Factors - Table #12.9
Furnaces	Stationary Combustion - Scope 1	N2O	0.00002	0.00531	Emission Factor	Unspecified Technology	Commerc..Natural Gas	Unspecified (Weighted U.S. Average)		171.151 MMBtu	0.1 g/MMBtu							2014 Default Emission Factors - Table #12.9
Imported Electricity	Purchased Electricity - Scope 2	CO2	134.83684	134.83684	Emission Factor	Unspecified Technology	ALL	WECC California All		451.30261 MWh	658.68 lb/MWh							2014 Default Emission Factors - Table #14.1
Imported Electricity	Purchased Electricity - Scope 2	CH4	0.00592	0.12441	Emission Factor	Unspecified Technology	ALL	WECC California All		451.30261 MWh	28.94 lb/GWh							2014 Default Emission Factors - Table #14.1
Imported Electricity	Purchased Electricity - Scope 2	N2O	0.00126	0.39154	Emission Factor	Unspecified Technology	ALL	WECC California All		451.30261 MWh	6.17 lb/GWh							2014 Default Emission Factors - Table #14.1
Machining and Welding (Acetylene)	Stationary Combustion - Scope 1	CO2	0.10856	0.10856	Emission Factor	Unspecified Technology	ALL	Fossil Fuel-derived Fuels (gaseous)	Acetylene	1.031 scf	0.1053 kg/scf							2014 Default Emission Factors - Table #12.1
Purchased Electricity	Purchased Electricity	CO2	11.36742	11.36742	Emission Factor	Unspecified Technology	ALL	WECC California All		38.04706 MWh	658.68 lb/MWh						Y	2014 Default Emission Factors -

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Entity Emissions Detailed Report

Marin Sanitary Service

(Private)

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(SEMs)

Simplified estimation used for months with no available data.

Table #14.1

Purchased Electricity (SEMs)	Purchased Electricity - Scope 2	CH4	0.0005	0.01049	Emission Factor	Unspecified Technology	All	WECC California All	38.04706 MWh	28.94 lb/GWh	Y	2014 Default Emission Factors - Table #14.1
Purchased Electricity (SEMs)	Purchased Electricity - Scope 2	N2O	0.00011	0.03301	Emission Factor	Unspecified Technology	All	WECC California All	38.04706 MWh	6.17 lb/GWh	Y	2014 Default Emission Factors - Table #14.1
Stationary Equipment (Propane)	Stationary Combustion - Scope 1	CO2	2.1583	2.1583	Emission Factor	Unspecified Technology	Commerce, Petroleum Products	Propane (Liquid)	386.1 gal	5.59 kg/gal		2014 Default Emission Factors - Table #12.1
Stationary Equipment (Propane)	Stationary Combustion - Scope 1	CH4	0.00035	0.00738	Emission Factor	Unspecified Technology	Commerce, Petroleum Products	Propane (Liquid)	386.1 gal	10 g/MMBtu		2014 Default Emission Factors - Table #12.9
Stationary Equipment (Propane)	Stationary Combustion - Scope 1	N2O	0.00002	0.00654	Emission Factor	Unspecified Technology	Commerce, Petroleum Products	Propane (Liquid)	386.1 gal	0.6 g/MMBtu		2014 Default Emission Factors - Table #12.9

CRIS: Climate Registry Information System

Entity Emissions Detailed Report

Marin Sanitary Service

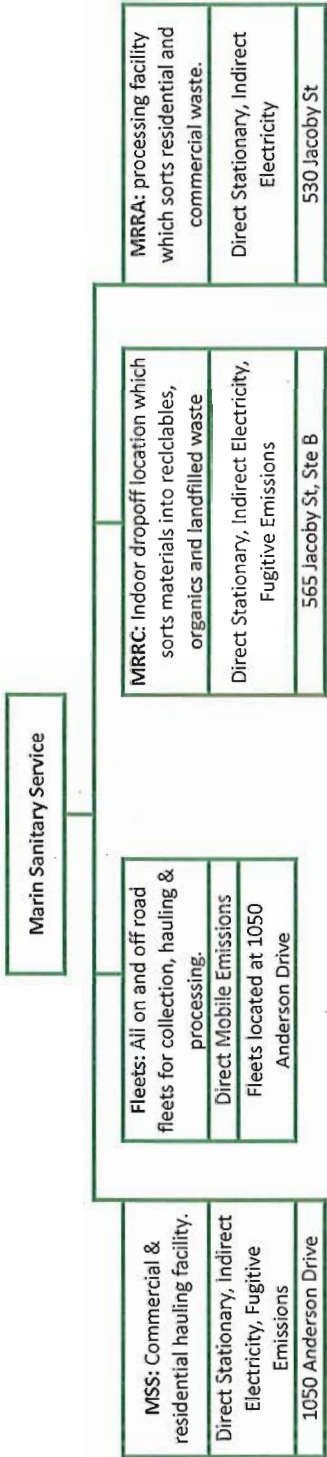
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Appendix D

MSS Organizational Chart



Appendix E

MSS Fleet List

EQ #	MAKE	MODEL	NUM	LICENSE	FUEL	DIVISION DEPT	VEHICLE LOCATION
02	700YT	S1654 / FORKTRK	02	2E85519	D	700 YT	DEBRIS
03	MITSUBISHI	FH-211 / 2 PACK	03	6D04078	D	100	MSS
04	GMC	SIERRA 1500	04	8H36294	1	100	M.S.S.
06	ISUZU	NPR	06	8R86317	D	800	MS
07	VOLVO	WX42 / 2 ROLLOF	07	6J57064	D	200	DEBRIS
08	GMC	2500 / PICKUP	08	6H56337	1	400	SHOP
09	MITSUBISHI	FH-100 / 2 PACK	09	4M62304	D	100	GARBAGE
10	INTERNATIONAL	4900 / GRAPPLE	10	6S81324	D	100	MR
11	CCC	LDT2-26	11	8S83857	N	100	MSS
12	CCC	LDT2-26	12	8S83785	N	100	MSS
13	CCC	LDT2-26	13	8S90109	N	100	MSS
14	CCC	LET2-26	14	8G44583	D	100	MSS
15	CHEVY	TAHOE	15	5U97137		500	MSS
16	VOLVO	WX42/ROLLOFF	16	5X00611	D	200	DEBRIS
17	CCC	LET2-26 PACK	17	7V96432	D	100	GARBAGE
18	AUTOCAR	WX42 / 2 ROLLOF	18	8D95860	D	200	DEBRIS
18X	INTERNATIONAL	CO1950B/ROLLOFF	18X	2N89110	D	900 YT	DEBRIS
19	ISUZU/CHEVY	W5500	19	8X64137	D	100	GARBAGE
20	MITSUBISHI	FH-211 / 2 PACK	20	7C03308	D	100	MSS
21	CHEVY	C-20 / PICKUP	21	2F37064	R	700	GARBAGE
22	DODGE	1500 / PICKUP	22	5J86508	G	100	MSS
23	INTERNATIONAL	S-1854 /SERVICE	23	2N79514	D	700	
24	FORD	F250 / PICKUP	24	5W72050	G	100	M.S.S.
25	CCC	LDT2-26	25	8L87318	N	100	MSS
26	VOLVO	WX42 / 2 ROLLOF	26	6Y05598	D	200	DEBRIS
27	INTERNATIONAL	4700 / FORK TRU	27	5W90380	D	200	MS
28	FORD	F350 SERVICE	28	6H06319	1	700	
29	AUTOCAR	WX64 / FEL	29	7R59550	D	100	GARBAGE
30	WHITE	WX42 / 2 PACK	30	6M12761	D	101	GARBAGE
31	CCC	LET-26/3 PACK	31	6U43323	D	101	GARBAGE
33	WHITE	WX42 / ROLLOFF	33	4F78437	D	200	DEBRIS
34	CCC	LDT2-26	34	8L87319	N	100	MSS
35	CCC	LET-26/3 PACK	35	6M05099	D	100	GARBAGE
36	GMC	2500 / PICKUP	36	5J00797	N	100	MSS
38	WHITE EXPIDITER	WX64/ROLLOFF	38	6Y15397	D	700	MSS
39	GMC	1500 4X4/PICKUP	39	5J00798	R	400	MSS
40	WHITE	WX42 / 2 PACKER	40	4F78383	D	101	MS
41	WHITE	WX-42 / 2PACKER	41	4F78385	D	100	MS
42	CCC	LET 21C/2PACKER	42	4W78862	D	100	MS
43	AUTOCAR	WX64 / FEL	43	8L96192	D	100	GARBAGE
44	CCC	LDT2-26	44	8L87321	N	100	MSS
45	AUTOCAR	WX64 / FEL	45	8D96041	D	100	GARBAGE
46	VOLVO	WX64 / ROLLOFF	46	8U94372	D	200	DEBRIS
47	INTERNATIONAL	4300M7 / FORK T	47	8J95313	D	200	MS
49	GMC	SIERRA/ PICKUP	49	5J82776	R	100	M.S.S.
50	CCC	IRL 20S/2PACKER	50	5U65901	D	100	GARBAGE
51	CCC	IRL 22SP/3PACKE	51	5T10799	D	100	GARBAGE
53	WHITE	WX42/ 2 PACKER	53	4F78382	D	100	MS
54	VOLVO	WX64 / FEL	54	6C15730	D	100	GARBAGE
55	CHEVY	1500 / SERVICE	55	6K68004	1	700	MRRC
56	WHITE	WX42/2PACKER	56	7G39019	D	100	MS
57	CCC	IRL 20S/2PACKER	57	6D89706	D	100	GARBAGE
58	INTERNATIONAL	4200 FORK TRUC	58	7V17408	D	200	MS
59	WHITE	WX64 / FEL	59	5K41698	D	100	GARBAGE
60	GMC	1500 / PICKUP	60	5J45390	R	400	MSS
61	CCC	LDT2-26	61	8L87320	N	100	MSS
64	CCC	LET-26/3 PACK	64	7V96411	D	100	GARBAGE
65	CCC	LET-2-40 PACK	65	7V96410	D	100	GARBAGE
66	CCC	LET-26/3 PACK	66	6X46466	D	100	GARBAGE
67	CHEVY	C20 / PICKUP	67	2E85459	N	100	MS
68	VOLVO	WX64 / ROLLOFF	68	7V93886	D	200	DEBRIS
69	FORD	PICKUP	69	5X29439	1	400	
70	GMC	PICKUP	70	GARBGMN	1	100	M.S.S.

EQ #	MAKE	MODEL	NUM	LICENSE	FUEL	DIVISION DEPT	VEHICLE LOCATION
71	CHEV.	1500 / PICKUP	71	5X49577	G	100	M.S.S.
72	CCC	LET2-26	72	7S86143	D	100	MSS
73	CCC	LET2-26	73	8G44582	D	100	MSS
74	GMC	SLX SERRA	74	4F82703	N	100	MSS
75	CCC	LET2-26	75	8G44584	D	100	MSS
76	AUTOCAR	WX42 / 2 ROLLOF	76	8D96040	D	200	DEBRIS
77	CCC	LDT2-26	77	8S83906	N	100	MSS
79	GMC	1500 / PICKUP	79	6S93980	1	100	M.S.S.
80	CCC	LET-26/3 PACK	80	6X55456	D	100	GARBAGE
81	CCC	LET-26/3 PACK	81	6X55457	D	100	GARBAGE
82	CCC	LET2-26	82	7J09626	D	100	MSS
83	CCC	LDT2-40	83	7F50454	D	100	MSS
84	CCC	LDT2-40	84	7F50453	D	100	MSS
85	CCC	LDT2-26	85	7M84847	D	100	MSS
86	AUTOCAR	WX64 / ROLLOFF	86	7R78552	D	200	DEBRIS
87	FORD	F 150 SUPER	87	5YZM951	1	800	M.S.S.
88	GMC	2500	88	8L33308	1	700	MRR
89	GMC	DENALI	89	UZITAGAN	1	700	MRR
90	CHEVY	COLORADO	90	8V05769	1	100	MRR
91	GMC	DENALI	91	6BZC201	1	700	MRR
R-01	GMC	1500 4X4/PICKUP	R-01	5J00802	R	900	MR
R-02	CCC	LET2-26/CURBSIE	R-02	6X46464	D	600	CURB SIDE
R-03	CCC	LDT2-26	R-03	8K71040	N	600	MSS
R-04	CCC	LDT2-26	R-04	8R38896	N	600	MSS
R-05	CCC	LET2-26	R-05	8J85802	N	600	MSS
R-06	CCC	LT-23 /CURBSIDE	R-06	6X37129	D	600	CURB SIDE
R-08	CHEVY	SILVERADO	R-08	8M36180	1	700	JOHN O
R-10	CCC	LDT2-26	R-10	8R38897	N	600	MSS
R-11	CCC	LET2-26	R-11	8F96777	N	600	MSS
R-12	CCC	LET2-26	R-12	8G44510	N	600	MSS
R-13	CCC	LET2-26	R-13	8C38640	N	600	MSS
R-14	CCC	LDT2-26	R-14	8K71041	N	600	MSS
R-15	WHITE	WX64 / ROLLOFF	R-15	6W16390	D	900	MR
R-16	FORD	F250 / PICKUP	R-16	4C79158	R	900	MR
R-17	INTERNATIONAL	4700 / FORK TRU	R-17	6F03076	D	900	MR
R-18	INTERNATIONAL	S1954/FORK TRUC	R-18	5U97066	D	900	MR
R-19	CCC	LDT2-26	R-19	8L64326	N	600	MSS
R-20	INTERNATIONAL	CF600	R-20	8G43040	D	600	CURB SIDE
R-21	CCC	LDT2-26	R-21	8R85674	N	600	MSS
R-22	CCC	LDT2-26	R-22	8K71042	N	600	MSS
R-23	WHITE	WXLL-42/2PACKER	R-23	4F78408	D	600	MR
R-24	CCC	LDT2-40	R-24	8C38638	N	600	MSS
R-25	CCC	LDT2-40	R-25	8C38639	N	600	MSS
R-26	INTERNATIONAL	4400 / SHREDDER	R-26	7G39184	D	800	
R-27	INTERNATIONAL	CO1950B/FLATBED	R-27	5W90301	D	900	MS
R-28	VOLVO	WX64 / ROLLOFF	R-28	5Z72167	D	700	MRR
R-29	CCC	LET2-26/CURBSIE	R-29	6X46465	D	600	CURB SIDE
R-30	AUTOCAR	WX64 / ROLLOFF	R-30	8D96039	D	700	MRR
R-31	MITSUBISHI	FH211 SPLIT/SID	R-31	7S85510	D	600	RECYCLE
R-32	FORD	F-550	R-32	6E06628	R	700	MRRRC
R-33	CHEV	1500 PUP	R-33	8J57424	1	700	M.S.S.
R-34	CHEV	C2500	R-34	5T90957	1	700	MRR/BLD
R-35	CCC	LDT2-26	R-35	8L87317	N	600	MSS
S2	FORD	LN 7000/SWEEPER	S2	4L76379	D	300	
S3	FORD/700YT	CF 7000/SWEEPER	S3	5G61910	D	800	
S4	FREIGHTLINER	FL70 / SWEEPER	S4	6E10029	D	800	M.S.S.
S5	INTERNATIONAL	4300 / SWEEPER	S5	8P91277	D	800	M.S.S.
S6	INTERNATIONAL	4300 / SWEEPER	S6	8Z76430	D	800	M.S.S.
T-1	PETERBUILT	367	T-1	9D70375	D	300	TRANS.
T-2	PETERBUILT	357 / TRANSFER	T-2	9A67029	D	300	TRANS.
T-3	PETERBUILT	378 / TRANSFER	T-3	9B26800	D	300	TRANS.
T-4	PETERBUILT	378 / TRANSFER	T-4	9D02961	D	300	TRANS.
T-6	PETERBUILT	378 / TRANSFER	T-6	9D56839	D	300	TRANS.

EQ #	MAKE	MODEL	NUM	LICENSE	FUEL	DIVISION DEPT	VEHICLE LOCATION
T-8	PETERBUILT	378 / TRANSFER	T-8	9A99243	D	300	TRANS.
Y-1	WHITE	WX42 / ROLLOFF	Y-1	4Z75432	D	700 YT	DEBRIS

Appendix F

Excluded Emissions Form



The Climate Registry

Exclusion of Miniscule Sources Form

In order to simplify the reporting process, Members may opt to exclude miniscule sources from their inventory. The Registry has determined that the miniscule sources listed on this form are justified exclusions because of their insignificant impact on overall emissions and because of the excessive burden associated with compiling the associated site-specific data.

The Registry recognizes that a Member may identify additional miniscule sources that are not itemized on The Registry's *Exclusion of Miniscule Sources Form*. In this case, the Member must submit a request to The Registry (help@theclimateregistry.org) to make a determination as to whether the source is eligible for exclusion.

The Registry expects that exclusion of miniscule sources will not:

- Compromise the relevance of the reported inventory;
- Significantly reduce the combined quantity of scope 1, scope 2, and biogenic CO₂-e emissions reported;
- Impact ability to identify the Member's viable opportunities for emissions reductions projects;
- Impact the ability to ascertain whether the Member has achieved a reduction (of five percent or greater) in total entity emissions from one year to the next;
- Impact ability to assess the Member's climate change related risk exposure; or,
- Impact the decision-making needs of users (i.e. is not expected to be deemed critical by key stakeholders).

Members that choose to exclude miniscule sources from their inventory must publicly disclose these sources by uploading this completed form as a public, entity-level document in CRIS.

Whenever possible, Members are encouraged to report emissions from miniscule sources using Registry-approved methods or Simplified Estimation Methods.

Organization:	<u>Marin Sanitary Service</u>
Contact Submitting Form:	<u>Monica Needoba, Technical Assistance Provider</u>
Date Submitted:	<u>6/9/11</u>
First Emissions Year to Take Effect:	<u>CY2010</u>

Please identify the miniscule sources excluded from your inventory:

Check box if source is excluded	Source	GHGs excluded from your inventory (check all that apply)						Notes (e.g. optionally disclose approximate number of facilities at which this source is present)
		CO ₂	CH ₄	N ₂ O	HFCs	PFCs	SF ₆	
Sources eligible for exclusion by all organizations								
<input checked="" type="checkbox"/>	Handheld fire extinguishers	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	Refrigerant in office water coolers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	Calibration gases	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	CO ₂ from soda fountains and soda dispensers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	Gas or charcoal BBQ grills for recreational use	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	Gun fire / ammunition use by security / emergency management and/or police stations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Sources eligible for exclusion by organizations that combust fuel onsite for manufacturing/industrial operations								
<input checked="" type="checkbox"/>	Refrigerant leaks from vehicles air conditioning systems	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	Refrigerant leaks from domestic refrigerators, ice machines, mini-fridges	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	Grounds keeping equipment (lawn mowers, leaf blowers, weed whackers)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	Welding gases (e.g. argon/CO ₂ mix, MAPP gas, propane, propylene)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	Propane-driven forklifts	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Sources eligible for exclusion by the pulp and paper industry sector								
<input type="checkbox"/>	Combustion of non-condensable gases and turpentine (consistent with U.S. EPA exclusions)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	