

APPENDIX

*City of San Rafael – Initial Study/Mitigated Negative Declaration
Marin Sanitary Services Facility Project – 1050 Andersen Drive/535-565 Jacoby Street, San
Rafael, CA*

Source Reference 22

Marin Sanitary Service Climate Action
Management Plan: Climate Registry & Avoided
Emissions Reporting Calendar Year 2013
March 5, 2015 prepared by Edgar & Associates



**CLIMATE ACTION MANAGEMENT PLAN:
CLIMATE REGISTRY & AVOIDED EMISSIONS REPORTING**

CALENDAR YEAR 2013

March 5, 2015

Prepared by:



**1822 21st Street
Sacramento, CA 95811**

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INTRODUCTION

Marin Sanitary Service (MSS) is a privately owned solid waste and recycling company that specializes in the collection and processing of residential and commercial trash, yard trimmings, curbside recyclables, food waste and construction and demolition debris.

MSS is a multi-faceted waste management operation located on a 103-acre land holding in east San Rafael. MSS provides weekly garbage and recycling collection services to more than 33,000 residential customers, or one third of the population of Marin. MSS also offers complete garbage and recycling collection for its many commercial customers. MSS is dedicated to a better Marin, and actively works to promote recycling and diverting waste from our landfills in order to help the Marin County JPA reach their goal of zero waste by 2025.

COMPANY INFORMATION

Company Name: Marin Sanitary Service

Corporate Address: 1050 Andersen Drive
San Rafael, CA 94901

Inventory Contact: Patty Garbarino, President
(415) 456-2601

Mardell Sarkela, CAO
(415) 456-2601

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GEOGRAPHIC SCOPE AND REPORTED GASES

MSS has committed to voluntarily estimate its greenhouse gas (GHG) emissions beginning with base year 2006 and continuing to this report in years (CY2006-2012) have been successfully verified. Understanding the greenhouse gas impacts from these activities, and how those impacts are mitigated, will allow greenhouse gas emissions to be considered in a quantifiable manner when implementing future programs and management strategies.

The geographic scope of this inventory is North America. However the entire operation is limited to the state of California. MSS operates three facilities which are located in San Rafael. MSS has chosen to report emissions of all gases from all sources within its operational control, management control boundary, except fugitive emissions from refrigeration. All direct and indirect emissions (Scope 1 and Scope 2 Emissions) have been included in this inventory, following The Climate Registry (TCR) General Reporting Protocol, Version 2.0.

TCR does not require the reporting of avoided emissions from recycling or composting (Scope 3 Emissions) for verification. However, MSS voluntarily tracks and calculates their Scope 3 Emissions in order to provide a complete picture of their carbon management.

Appendix D provides an overview of the facilities, their locations and their sources.

ORGANIZATIONAL BOUNDARY

This report provides estimates of all the associated GHG emissions for the operations and facilities that MSS wholly owns, and the indirect emissions associated with landfilling and recycling activities. Only sources under the operation control of the subsidiary have been included in these emissions inventories. For operations in which MSS has partial ownership or working interest, or holds an operating lease, there are two accounting options for reporting GHG emissions:

1. Management control:

Participant has operational or financial control;
Participant does not have operational or financial control.

2. Equity share: Percentage of emissions accounted for as proportionate to ownership.

MSS has chosen to delineate its organizational boundary using the operational criteria under management control, and MSS has 100% management and operational control over all the facilities included in this inventory.

CATEGORIES OF EMISSIONS AND SOURCE IDENTIFICATION

The General Reporting Protocol of The Climate Registry (TCR GRP, Version 2.0) is being followed in the preparation of this greenhouse gas emissions inventory. Emissions in the following categories are being accounted for:

Scope 1: Direct emissions from sources owned or controlled by the member:

1. Mobile combustion sources (fleets). These types of emissions are principally from collection vehicles (on-road) and equipment (off-road) used at the Material Recovery Facility.
2. Stationary combustion sources Non-mobile fuel consuming sources, such as: natural gas from utility provider (i.e. water heaters, drying facilities), diesel-powered generators/compressors, oxy-acetylene torches, etc.
3. Process functions Some manufacturing processes produce emissions, e.g. MSW combustion, cement production. There are no known process function emissions from these facilities.
4. Fugitive emissions This includes fugitive emissions of hydrofluorocarbons from vehicle and building cooling systems and from carbon dioxide used in welding torches. Emissions from hydrofluorocarbons have been excluded from the emission inventory.

Scope 2: Indirect emissions from sources that o

1. Purchased and consumed electricity. This is derived from utility invoices.
2. Purchased and consumed heat, steam or coolin used by these facilities.

Scope 3: Optionally reported indirect emission

1. Biogenic emissions resulting from the use of biofuels fuels.
2. Avoided emissions from diverting waste from a landfill.
3. Life cycle analysis of materials recycled.

EMISSIONS AND SOURCES

The emission source identification procedure involved a systematic review of company facilities and operations by the MSS GHG Inventory Management Team and their technical assistance providers. Emissions from each source are discussed below. Global Warming Potentials (GWP) used in the analysis are 21 for methane and 310 for nitrous oxide. GWPs for other gases are stated in the relevant section of this document.

Scope 1

Direct emissions from mobile combustion

es contributed an approximately **88.5%** of the 2013 inventory. The MSS fleet list is included in **Appendix D**.

Direct emissions from stationary combustion

These emissions represent approximately **2.7%** for the reporting year. The primary source is natural gas purchased from PG&E and acetylene used in welding torches.

Fugitive Emissions

Fugitive emissions are made up of carbon dioxide used in welding torches. This category on average for all reporting years makes up less than **1%** of the inventory.

Scope 2

Indirect emissions from imported electricity

Electricity is purchased from PG&E. Electricity represents approximately **8.7%** of the emissions inventory.

A summary and further analysis of Scope 1 and 2 Emissions is included later in this report. A full description of the assumptions and methodology used to calculate these emissions can be found in **Appendix A**.

Scope 3

Recycling and Composting (Optional Reporting)

In the optional reporting category, MSS is including avoided indirect emissions from compost production and from recycling other components of the waste stream from the material recovery facility operations. Recycling reduces the demand for raw or virgin materials while remanufacturing 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. The best practice estimation method for greenhouse gas impacts from recycling and composting is the Environmental Model¹ (WARM), which provides emission factors for a broad spectrum of recycled and composted commodities that are derived from comprehensive life-cycle assessment methodologies. The WARM model estimates overall avoided emissions due to recycling and composting, but it does not apportion those emissions across the waste management value chain.

In 2013 the WARM model result is a net total of **98,536** metric tons of carbon dioxide equivalent emissions **avoided**

A summary of these avoided emissions is included in the Scope 3 Emissions section of this report, and a more detailed technical report is included in **Appendix B**.

SCOPE 1 & 2 EMISSIONS SUMMARY AND ANALYSIS

A summary of emissions for each category for all years is on the next page in **Table 1**. On average, the emission categories are weighted the same year over year, with the majority of the emissions coming from direct mobile combustion. Note: Emission factors have changed as protocols have been updated and the emissions inventory has switched from reporting through the California Climate Action Registry (CCAR) for years 2006-2008, to TCR for years 2009 onwards. These numbers represent reported emissions, and may not reflect exact changes in activity data.

We saw a small increase in emissions last year (less than 2%). Overall, emissions have risen slightly (9.5%) since the CY2006 base year. This is primarily due to an increase in overall fuel usage used to operate the collection fleet and tractors used to process the materials.

Table 2 (also on next page) compares the activity data from major sources.

Diesel gallons have grown 8% since 2006, which has caused the emissions inventory to grow overall. However, diesel usage went down slightly last year from the previous year (1%). The next largest source of emissions is purchased electricity which has decreased by 8% since 2006, but has shown an increase (6%) from the previous year.

¹ All updated guidance as relevant was used in addition to the most recent WARM.

Table 1: CO2 (metric tons) Emission Summary- CY2006 - CY2013

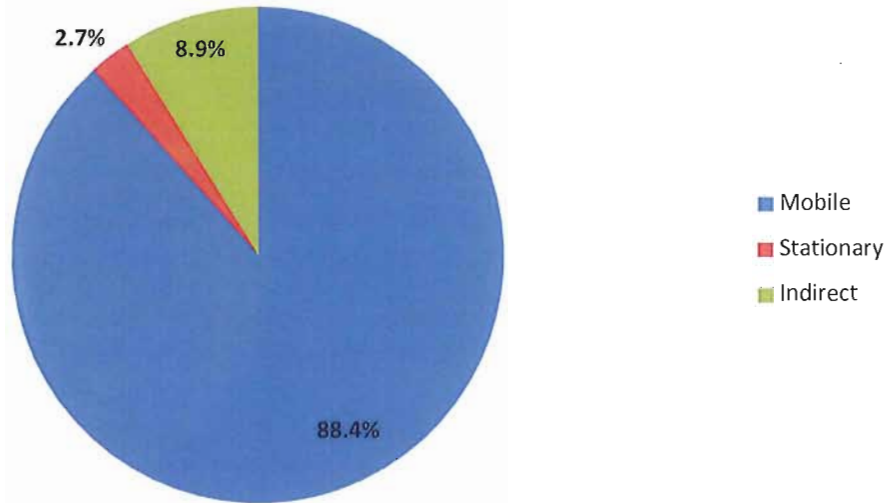
	2006	2007	2008	2009	2010	2011	2012	2013	2013 % of Inventory
	MTCO2	MTCO2	MTCO2	MTCO2	MTCO2	MTCO2	MTCO2	MTCO2	
<u>Mobile Emissions</u>	4,134	4,320	4,316	4,204	4,187	4,323	4,540	4,514	90.5%
<u>Non-Mobile Emissions</u>	447	416	653	418	585	505	479	586	9.5%
Total	4,581	4,736	4,969	4,622	4,771	4,828	5,019	5,100	100%
<u>Change from 2006</u>	-	3.4%	8.5%	0.9%	4.2%	5.4%	9.5%	9.5%	-
<u>Change from Previous Year</u>	-	3.4%	4.9%	-7.0%	3.2%	1.2%	4.0%	1.6%	-

Table 2: Fuel and Energy Usage Summary- CY2006 - CY2013

Product	Unit	2006	2007	2008	2009	2010	2011	2012	2013
<u>Natural Gas</u>	<u>Therm</u>	5,965	6,738	7,781	4,679	5,828	6,324	6,047	21,383
<u>Elect</u>	<u>kWh</u>	1,616,830	1,647,674	1,706,764	1,278,433	1,438,153	1,472,020	1,402,808	1,486,897
<u>Diesel</u>	<u>gal</u>	326,970	376,405	389,879	367,623	359,346	366,580	357,600	353,969
<u>Gasoline</u>	<u>gal</u>	49,285	56,661	37,299	48,587	46,285	55,073	39,643	37,315

Figure 1 provides a visual representation of the 2013 emissions summary. The fleet is by far the largest source of emissions for MSS, followed by purchased electricity and consumed natural gas.

Figure 1: Emissions Summary by Category, 2013



can be found in **Appendix C**. e CRIS Report, verifying Scope 1 and 2 emissions

CRIS: Climate Registry Information System



Entity Emissions Detailed Report
Marin Sanitary Service
 (Private)
 10/21/2014 10:52:17 VET

Entity Information

Entity Name	Marin Sanitary Service
Entity Address	1020 Andersen Drive San Rafael California 94901 United States
Entity Website	
Entity Contact	Evan W. R. Edgar
Contact Email	evan@edgahnc.org
Contact Phone	9167361208
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...

SCOPE 3 EMISSIONS SUMMARY AND ANALYSIS

The Climate Registry classifies emissions that are direct control (i.e., not included chain is responsible management of materials and waste and are evaluated in this Section. This provides a complete evaluation of how much greenhouse gas (GHG) a company has prevented through the responsible management of its waste. These calculations include considerations for the entire life cycle of discarded material, and thereby provide a more complete analysis of these benefits above and beyond reporting operational emissions through platforms like The Climate Registry.

Although the GHG benefits of recycling, composting, and repurposing waste are substantial, they are often not immediately visible and easily quantifiable. The calculations included in this report make these benefits more tangible by offering an accurate and salient estimation of the GHG benefits of recycling and composting. As the legislative environment changes in California, these calculations will become instrumental in the evaluation of progress towards a number of State goals which include:

AB 32 Scoping Plan - Avoided Emissions Goals

AB 32 was signed into law in 2006, and is a statewide goal of reducing greenhouse gas emissions to 1990 levels by the year 2020. The AB 32 Scoping Plan, adopted in 2008 by CARB, included mandatory commercial recycling with a target of avoiding 5 MMTCO₂ in 2020. AB 341 (Chesbro, 2011) was adopted into law which requires recycling services be offered for businesses with more than 4 cubic yards of solid waste services per week, and for multi-family residencies with more than 5 units. 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 are not use for composting are used in the production of biomass energy, which reduces the demand for fossil fuels.

The AB 32 Scoping Plan First Update was adopted on May 15, 2014 by the California Air Resource Board and includes the Net-Zero concept as copied below. Net-Zero has been defined by the California Air Resource Board as when an organi operational emissions. By reporting the progression of operational vs avoided emissions, it is possible to evaluate the achievement of this goal now, already showing compliance. To meet Net-

Achieving Net-Zero GHG Emissions from the Waste Sector by Mid-term

Beyond 2020, additional reductions in GHG emissions from the Waste Sector will be needed to achieve a Net-Zero GHG emissions goal. To achieve these reductions, even greater diversion of organics and other recyclable commodities from landfills must be realized and further expansion and enhancement of the alternative non-disposal pathways must be developed. In addition, greater emphasis will need to be placed on reducing the volume of waste generated, recycling/reusing products at the end-of-life and remanufacturing these materials into beneficial products. To achieve Net-Zero, the direct GHG emissions from the Waste Sector would have to be fully offset by avoided GHG emissions. Avoided GHG emissions are reductions in life-cycle GHG emissions that would occur because waste is shifted from landfilling to alternative non-disposal pathways.

AB32 Scoping Plan – First Update May 2014

Net-Zero Equation:

MSS has been tracking its avoided emissions annually since 2009, and has fully offset its direct emissions, on average, **19** times - **well beyond Net-Zero!** **Figure 2** and **Table 3** below depicts

steadily improving. A detailed report on how these avoided emissions from recycling, composting, and avoided landfill disposal are calculated is provided in the full report found in **Appendix B**.

Figure 2: Operational vs. Avoided Emissions

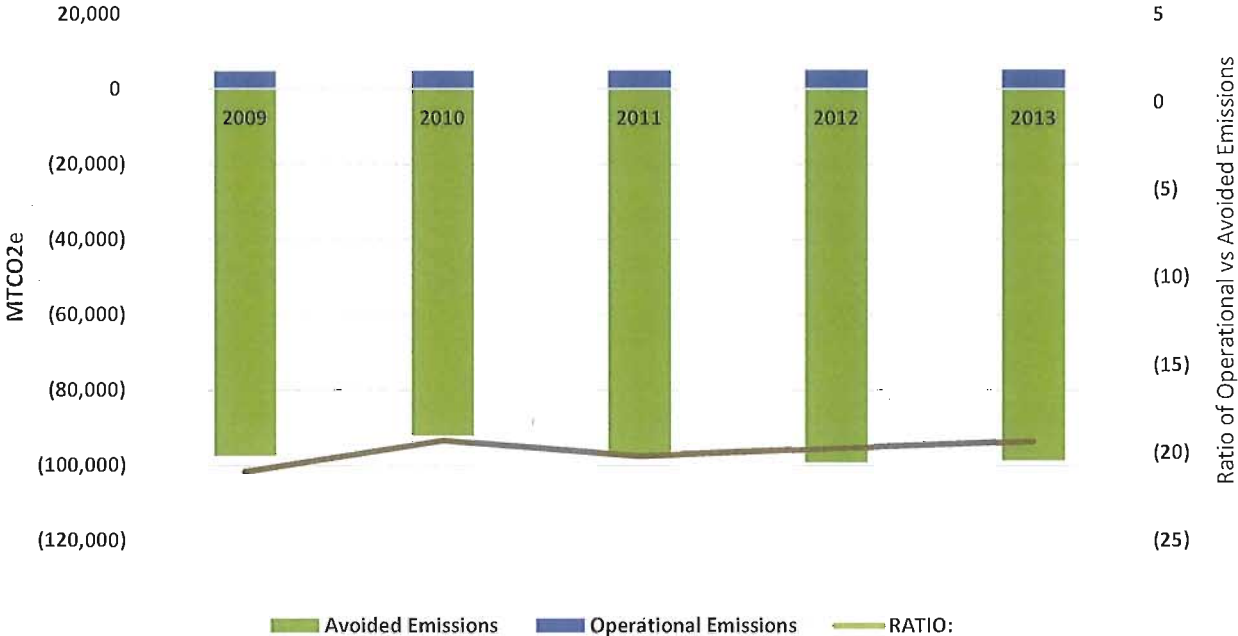


Table 3: Operational vs. Avoided Emissions, MTCO_{2e}

Emissions	2009	2010	2011	2012	2013
Operational	4,622	4,771	4,828	5,019	5,100
Avoided	(97,312)	(91,976)	(97,334)	(99,051)	(98,536)
Ratio	(21)	(19)	(20)	(20)	(19)

Eliminate the Disposal of Organic Materials at Landfills

The AB 32 Scoping Plan First Update included a series of waste management activity as listed which includes the elimination of organic material at landfills and developing the compost and anaerobic digestion infrastructure.

Waste Management Actions	Lead Agency	Expected Completion Date
Eliminate the disposal of organic materials at landfills.	CalRecycle ARB	2016
Implement financing or incentive mechanisms for in-State infrastructure development to support Waste Sector goals.	CalRecycle ARB	TBD
Develop actions to address cross-California agency and federal permitting and siting challenges associated with composting and anaerobic digestion.	ARB	2014
Identify opportunities for additional methane control at new and existing landfills, and use of captured methane as a fuel source for stationary and mobile applications.	ARB	TBD in the SLCP Plan
Develop new emission reduction factors to estimate GHG emission reduction potential for various recycling and remanufacturing strategies.	ARB CalRecycle	TBD
Identify improvements to the procurement of recycled-content materials through the State Agency Buy Recycled Campaign reform.	CalRecycle DGS	2014

AB 32 Scoping Plan – First Update May 15, 2014

AB 1826 (Chesbro, 2014) was signed into law on September 29, 2014 to phase in the collection of commercial organic waste, which begins to address the AB 32 Scoping Plan target of eliminating the disposal of organic material at landfills. AB 1826 was chaptered into law with the following threshold rates and dates of compliance:

(1) On and after April 1, 2016, a business that generates eight cubic yards or more of organic waste per week shall arrange for recycling services specifically for organic waste in the manner specified in subdivision (b).

(2) On and after January 1, 2017, a business that generates four cubic yards or more of organic waste per week shall arrange for recycling services specifically for organic waste in the manner specified in subdivision (b).

(3) On and after January 1, 2019, a business that generates four cubic yards or more of commercial solid waste, as defined in Section 42649.1, per week, shall arrange for recycling services specifically for organic waste in the manner specified in subdivision (b).

(4) On or after January 1, 2020, if the department determines that statewide disposal of organic waste has not been reduced to 50 percent of the level of disposal during 2014, a business that generates two cubic yards or more per week of commercial solid waste shall arrange for the organic waste recycling services specified in paragraph (3), unless the department determines that this requirement will not result in significant additional reductions of organics disposal.

RECYCLING & COMPOSTING PROGRAM RESULTS

MSS has active programs in place to divert organics from landfilling, and has plans to expand those services to 2020. Through its composting activities in 2013, MSS has provided alternatives for **19,370 tons** of such organic waste, and in the process avoided **12,201 MTCO₂e**.

Table 4 summarizes the emissions MSS was able to avoid through its composting and recycling programs. **Table 5** shows the tonnage changes over the years.

Table 4: Avoided Emissions by Category

<u>End Use</u>	<u>Tons</u>	<u>Avoided Landfill Emissions</u>	<u>Avoided Emissions from End-Use</u>	<u>Total Avoided Emissions</u>
<u>Recycled</u>	69,506.27	(8,840.19)	(90,154.72)	(98,994.92)
<u>Composted*</u>	19,370.37	(3,890.74)	(8,309.89)	(12,200.63)
<u>Combusted</u>	35,894.47	(2,547.34)	(7,537.84)	(10,085.18)
<u>Landfill Beneficial Reuse</u>	55,505.47	2,245.98	NA	2,245.98
<u>Landfill Waste</u>	97,077.81	20,498.73	NA	20,498.73
<u>Total</u>	277,354.39	7,466.44	(106,002.45)	(98,536.01)

- Numbers in parentheses represent avoided emissions (MTCO₂e).
- Negative landfill emissions are avoided by not landfilling materials; the positive landfill emissions are actual emissions (MTCO₂e) generated by landfilling waste, alternative daily cover, and the residual fraction.

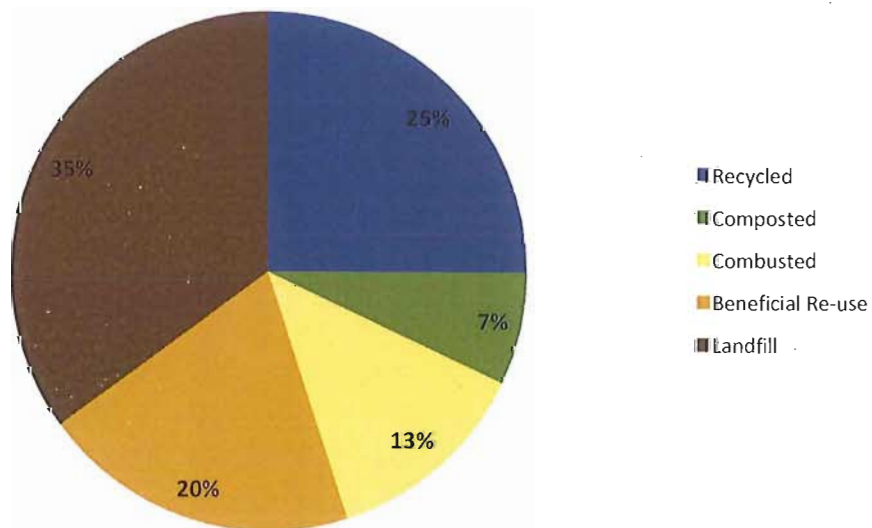
Table 5: Tonnage Trend by Category 2008-2013

<u>End Use</u>	2008 Tons	2009 Tons	2010 Tons	2011 Tons	2012 Tons	2013 Tons
<u>Recycled</u>	39,943	41,024	72,641	63,057	58,796	69,506
<u>Composted</u>	15,451	18,481	22,785	22,785	23,429	19,370
<u>Combusted</u>	32,232	23,153	28,942	28,942	26,464	35,894
<u>Landfill Beneficial Reuse</u>	107,013	68,255	48,265	57,848	64,328	55,505
<u>Landfill Waste</u>	119,819	97,630	101,287	99,048	99,645	97,078
<u>Total</u>	314,458	248,543	273,920	271,680	272,662	277,353
<u>Recycling Rate:</u>	62%	61%	63%	64%	63%	65%

MATERIALS DIVERSION

In 2013, MSS recovered **124,770 tons** of material, which is **16,081** more than it did in 2012. On a ton-per-ton basis, MSS diverted **65%** of the waste it collects. diversion of materials away from landfills and toward composting, combustion, and recycling.

Figure 3: Material End-Use by Category



On a jurisdictional level with respect to AB 939, MSS has assisted Marin JPA in obtaining a landfill diversion rate of 74%.

METHODOLOGY

This report uses the most up-to-date scientifically and legislatively accepted methods to calculate life-cycle greenhouse gas emissions. Both the California Air Resources Board (CARB) model and complementary basis for these calculations. Those emissions that are avoided through the prevention of virgin resource use are modeled best with CARB, which has the additional benefit of using California-specific data in its calculations. WARM calculations are able to model the avoided emissions at the other half of the product life cycle by accurately tabulating the emissions that would have occurred under a landfilling scenario. The synthesis of these two models allow for a complete and unbiased measurement of the greenhouse gas prevented through resource recovery programs. A more detailed description of the methodology and assumptions used to calculate the avoided indirect emissions can be found in **Appendix B**.

INVENTORY MANAGEMENT

Edgar & Associates, Inc. (Technical Assistance Provider) relied on information and activity data provided by Marin Sanitary Service to calculate GHG emissions.