

2023 Initial WARM Tool Analysis

[The U.S. EPA's Waste Reduction Model \(WARM\) Tool](#) was developed to estimate greenhouse gas (GHG) reductions, energy savings, and economic impacts from various waste management practices like source reduction, recycling, anaerobic digestion, combustion, composting, and landfilling.

The WARM Tool can be used to better illustrate the environmental impacts of properly dealing with recyclables and compostables instead of sending these items to landfills. For example, one could use the tool to show that diverting and recycling X tons of fiber reduces GHG emissions by as much as taking Y cars off the road.

By using existing annual tonnage estimates for the CNMI (see **Table 7**), comparing them against the waste type percentages collected in March 2023 (see **Chart 1**), applying these percentages to the annual tonnage estimates, and putting these figures into the WARM Tool, it becomes clear that diverting the CNMI's recyclables and compostables is a worthwhile endeavor.

- Saipan

The Marpi Landfill in Saipan receives approximately **31,431 tons** of waste per year.

The waste percentages for several material types on Saipan as per the March 2023 Waste Characterization Study are as follows:

- Plastics: 17.6%
- Organics (Grass, Leaves, Branches, Clean Wood, Food): 15.6%
- Metals: 5.9%
- Glass: 4.8%

Assuming that the percentages are representative of what comprises a year's worth of waste at the landfill, the approximate tons per material are as follows:

- Plastics: ~5,532 tons
- Organics (Grass, Leaves, Branches, Clean Wood, Food): ~4,903 tons
- Metals: ~1,854 tons
- Glass: ~1,509 tons

When inputted into the WARM Tool with the "ideal" behavior for plastics, metals, and glass being recycling and the "ideal" behavior for organics being composting, if Saipan was to divert all its recyclables and compostables away from the landfill, the reduction in GHG emissions would be equal to **taking 3,893 passenger vehicles off the road and conserving 2,063,720 gallons of gasoline.**

The WARM Tool Report for Saipan is included here.



Waste Reduction Model (WARM) Summary Report (MTCO2E)

GHG Emissions Analysis - Summary Report

GHG Emissions Waste Management Analysis for **Office of Planning and Development**
 Prepared by: **Saipan**
 Project Period for this Analysis: to

Material	Baseline Scenario						Alternative Scenario						Change (Alt-Base) MTCO2E	
	Tons Recycled	Tons Landfilled	Tons Combusted	Tons Composted	Tons Anaerobically Digested	Total MTCO2E	Tons Source Reduced	Tons Recycled	Tons Landfilled	Tons Combusted	Tons Composted	Tons Anaerobically Digested		Total MTCO2E
Mixed Plastics	0.00	5532.00	0.00	N/A	N/A	112.05	0.00	5532.00	0.00	0.00	N/A	N/A	-5119.45	-5231.50
Mixed Metals	0.00	1854.00	0.00	N/A	N/A	37.55	0.00	1854.00	0.00	0.00	N/A	N/A	-8141.21	-8178.76
Glass	0.00	1509.00	0.00	N/A	N/A	30.56	0.00	1509.00	0.00	0.00	N/A	N/A	-416.62	-447.18
Mixed Organics	N/A	4903.00	0.00	0.00	0.00	4136.44	N/A	N/A	0.00	0.00	4903.00	0.00	-346.40	-4482.84
						4316.60							-14023.68	

a) For explanation of methodology, see the [EPA WARM Documentation](#)

b) Emissions estimates provided by this model are intended to support voluntary GHG measurement and reporting initiatives.

c) The GHG emissions results estimated in WARM indicate the full life-cycle benefits waste management alternatives. Due to the timing of the GHG emissions from the waste management pathways, (e.g., avoided landfilling and increased recycling), the actual GHG implications may accrue over the long-term. Therefore, one should not interpret the GHG emissions implications as occurring all in one year, but rather through time.

d) The equivalency values included in the box to the right were developed based on the EPA [Greenhouse Gas Equivalencies Calculator](#) and are presented as an example of potential equivalencies. Additional equivalencies can be calculated using WARM results at the Greenhouse Gas Equivalencies Calculator website or using alternative data sources.

Total Change in GHG Emissions (MTCO2E): -18340.29

This is equivalent to...

- Removing annual emissions from **3893** Passenger Vehicles
- Conserving **2063720** Gallons of Gasoline
- Conserving **764178** Cylinders of Propane Used for Home Barbeques
- 0.00001%** Annual CO2 emissions from the U.S. transportation sector
- 0.00001%** Annual CO2 emissions from the U.S. energy sector

- Tinian

The dump site at Puntan Diablo on Tinian receives approximately **1,400 tons** of waste per year.

The waste percentages for several material types on Tinian as per the March 2023 Waste Characterization Study are as follows:

- Plastics: 23.9%
- Organics (Grass, Leaves, Branches, Clean Wood, Food): 14.9%
- Metals: 9.6%
- Glass: 6.7%

Assuming that the percentages are representative of what comprises a year's worth of waste at the dump site, the approximate tons per material are as follows:

- Plastics: ~335 tons
- Organics (Grass, Leaves, Branches, Clean Wood, Food): ~209 tons
- Metals: ~134 tons
- Glass: ~94 tons

When inputted into the WARM Tool with the "ideal" behavior for plastics, metals, and glass being recycling and the "ideal" behavior for organics being composting, if Tinian was to divert all its recyclables and compostables away from the landfill, the reduction in GHG emissions would be equal to **taking 239 passenger vehicles off the road and conserving 127,155 gallons of gasoline.**

The WARM Tool Report for Tinian is included here.



Waste Reduction Model (WARM) Summary Report (MTCO2E)

GHG Emissions Analysis - Summary Report

GHG Emissions Waste Management Analysis for {organization}
 Prepared by: {name}
 Project Period for this Analysis: {from} to {to}

Material	Baseline Scenario					
	Tons Recycled	Tons Landfilled	Tons Combusted	Tons Composted	Tons Anaerobically Digested	Total MTCO2E
Mixed Plastics	0.00	335.00	0.00	N/A	N/A	6.79
Mixed Metals	0.00	134.00	0.00	N/A	N/A	2.71
Glass	0.00	94.00	0.00	N/A	N/A	1.90
Mixed Organics	N/A	209.00	0.00	0.00	0.00	176.32
						187.73

Material	Alternative Scenario						Change (Alt-Base) MTCO2E	
	Tons Source Reduced	Tons Recycled	Tons Landfilled	Tons Combusted	Tons Composted	Tons Anaerobically Digested		Total MTCO2E
Mixed Plastics	0.00	335.00	0.00	0.00	N/A	N/A	-310.02	-316.80
Mixed Metals	0.00	134.00	0.00	0.00	N/A	N/A	-588.42	-591.13
Glass	0.00	94.00	0.00	0.00	N/A	N/A	-25.95	-27.86
Mixed Organics	N/A	N/A	0.00	209.00	0.00	0.00	-17.92	-194.24
							-942.30	

- a) For explanation of methodology, see the [EPA WARM Documentation](#)
- b) Emissions estimates provided by this model are intended to support voluntary GHG measurement and reporting initiatives.
- c) The GHG emissions results estimated in WARM indicate the full life-cycle benefits waste management alternatives. Due to the timing of the GHG emissions from the waste management pathways, (e.g., avoided landfilling and increased recycling), the actual GHG implications may accrue over the long-term. Therefore, one should not interpret the GHG emissions implications as occurring all in one year, but rather through time.
- d) The equivalency values included in the box to the right were developed based on the EPA [Greenhouse Gas Equivalencies Calculator](#) and are presented as an example of potential equivalencies. Additional equivalencies can be calculated using WARM results at the Greenhouse Gas Equivalencies Calculator website or using alternative data sources.

Total Change in GHG Emissions (MTCO2E): -1130.03

This is equivalent to...

- Removing annual emissions from **239** Passenger Vehicles
- Conserving **127155** Gallons of Gasoline
- Conserving **47084** Cylinders of Propane Used for Home Barbeques

- Rota

The dump site at Tatachok on Rota receives approximately **1,300 tons** of waste per year.

The waste percentages for several material types on Tinian as per the March 2023 Waste Characterization Study are as follows:

- Plastics: 17.9%
- Organics (Grass, Leaves, Branches, Clean Wood, Food): 12.4%
- Metals: 10.7%
- Glass: 4.3%

Assuming that the percentages are representative of what comprises a year's worth of waste at the dump site, the approximate tons per material are as follows:

- Plastics: ~233 tons
- Organics (Grass, Leaves, Branches, Clean Wood, Food): ~161 tons
- Metals: ~139 tons
- Glass: ~56 tons

When inputted into the WARM Tool with the "ideal" behavior for plastics, metals, and glass being recycling and the "ideal" behavior for organics being composting, if Rota was to divert all its recyclables and compostables away from the landfill, the reduction in GHG emissions would be equal to **taking 211 passenger vehicles off the road** and **conserving 112,223 gallons of gasoline**.

The WARM Tool Report for Rota is included here.



Waste Reduction Model (WARM) Summary Report (MTCO2E)

GHG Emissions Analysis - Summary Report

GHG Emissions Waste Management Analysis for {organization}
 Prepared by: {name}
 Project Period for this Analysis: {from} to {to}

Material	Baseline Scenario						Total MTCO2E
	Tons Recycled	Tons Landfilled	Tons Combusted	Tons Composted	Tons Anaerobically Digested		
Mixed Plastics	0.00	233.00	0.00	N/A	N/A	4.72	
Mixed Metals	0.00	139.00	0.00	N/A	N/A	2.82	
Glass	0.00	56.00	0.00	N/A	N/A	1.13	
Mixed Organics	N/A	161.00	0.00	0.00	0.00	135.83	
						144.50	

Material	Alternative Scenario						Total MTCO2E	Change (Alt-Base) MTCO2E
	Tons Source Reduced	Tons Recycled	Tons Landfilled	Tons Combusted	Tons Composted	Tons Anaerobically Digested		
Mixed Plastics	0.00	233.00	0.00	0.00	N/A	N/A	-215.62	-220.34
Mixed Metals	0.00	139.00	0.00	0.00	N/A	N/A	-610.37	-613.19
Glass	0.00	56.00	0.00	0.00	N/A	N/A	-15.46	-16.60
Mixed Organics	N/A	N/A	0.00	0.00	161.00	0.00	-11.37	-147.20
							-852.83	

- a) For explanation of methodology, see the [EPA WARM Documentation](#)
- b) Emissions estimates provided by this model are intended to support voluntary GHG measurement and reporting initiatives.
- c) The GHG emissions results estimated in WARM indicate the full life-cycle benefits waste management alternatives. Due to the timing of the GHG emissions from the waste management pathways, (e.g., avoided landfilling and increased recycling), the actual GHG implications may accrue over the long-term. Therefore, one should not interpret the GHG emissions implications as occurring all in one year, but rather through time.
- d) The equivalency values included in the box to the right were developed based on the EPA [Greenhouse Gas Equivalencies Calculator](#) and are presented as an example of potential equivalencies. Additional equivalencies can be calculated using WARM results at the Greenhouse Gas Equivalencies Calculator website or using alternative data sources.

Total Change in GHG Emissions (MTCO2E): **-997.33**

This is equivalent to...

- Removing annual emissions from **211** Passenger Vehicles
- Conserving **112223** Gallons of Gasoline
- Conserving **41555** Cylinders of Propane Used for Home Barbeques