The Carbon Accounting Company™

The Museum of Contemporary Art in Los Angeles

Base Year Greenhouse Gas Emissions Report for the period January 1st to December 31st, 2019

October 20, 2021

The Carbon Accounting Company™

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Simone Paz
Sustainability Consultant
The Museum of Contemporary Art
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Los Angeles, CA 90012

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Dear Ms. Paz,

It is my pleasure to present this quantification of greenhouse gas emissions resulting from operations during the period January 1st to December 31st, 2019.

Our review of the data is based solely on our assessment of the information provided to us by MOCA.

Based on the information provided, the emissions as reported in this document are credible and defensible as an attempt to quantify the emissions sources and resultant emissions levels for the sources provided.

If you have any questions, please do not hesitate to contact me at 416.494.9999 ext.15 or ian@thecarbonaccountingcompany.com.

Yours sincerely,

Ian Lipton
President & CEO

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1 Introduction

The Museum of Contemporary Art in Los Angeles (MOCA) was established in 1979 with the mission of presenting, collecting, preserving, and interpreting contemporary art. Over time, it has come to house over 7,000 pieces created in a variety of media.

The museum operates two venues in Los Angeles: The MOCA Grand Avenue (MOCA Grand), and The Geffen Contemporary at MOCA (Geffen). The museum also operates a much smaller remote exhibit in the Nevada desert (Double Negative) which consists of land art accessible only by four-wheel drive vehicle or motorcycle.

In addition to regular museum operations and exhibitions, MOCA offers a series of events, performances, and education initiatives, as well as a travel program for donors to accompany curators on various excursions around the world.

The museum leases space in several offsite storage facilities.

The purpose of this greenhouse gas emissions report is to establish a base year carbon inventory against which subsequent inventories will be compared. This initiative was encouraged and supported by artist Haley Mellin and the Art to Acres non-profit.

It is our understanding that the results of this report will be used by MOCA in their voluntary efforts to reduce the organization's environmental impact and to neutralize its carbon footprint going forward.

2 Scope of the Study

2.1 Quantification Boundaries

This carbon inventory follows the operational control approach. The operational control approach covers emissions generated from activities for which MOCA has operational control, including control over policy and management practices such as purchasing decisions.

An example of emissions-generating activities that would fall outside operational control are the business operations of a supplier that is neither owned nor operated by MOCA. However, if that supplier is hired to provide services onsite at MOCA, the carbon associated from those activities would be included in this inventory. An example would be emissions from energy used by a supplier, such as a carpenter, while working onsite to install an exhibition. However, the energy used in the carpenter's workshop would not be included.

This carbon inventory consists of emissions generated from operational activities classified as Scope 1, 2 or 3. These standard classification categories refer to the direct or indirect nature of the emissions causality.

Scope 1 activities are those that create emissions directly within the operational boundaries. Examples include the combustion of natural gas in the museum's boiler, or the fuel used in vehicles operated by the museum.

Scope 2 activities are those that create emissions indirectly from the use of energy within the operational boundaries. An example is the emissions generated from the use of electricity. While the actual emissions occur at the electricity generating facility, which is outside MOCA's operational control, the electricity is used by MOCA within their operational control.

Scope 3 activities are all other activities that create emissions indirectly within the operational boundary. For example, employees traveling to and from work generate indirect emissions. The employees are required by MOCA to travel to work, even though the vehicles themselves are not operated by MOCA. As such, the emissions caused by the travelling to and from work are those indirectly within MOCA's control and therefore are included in the inventory as Scope 3.

Table 1 lists all activities included in this inventory.

Table 1. GHG Inventory Boundaries and Activities

	Base Year 2019
Scope 1	Stationary combustion of fossil fuels (natural gas, heating oil, propane, etc.) for heating buildings and water Mobile combustion of fossil fuels (gasoline, diesel, propane, etc.) used in MOCA operated road vehicles and off-road vehicles (e.g., forklifts) Combustion of fossil fuels used in backup generators Fugitive emissions from air conditioning and refrigeration units
Scope 2	Purchased electricity Purchased district energy (e.g., hot water, chilled water, steam)
Scope 3	Commute to and from work by employees Transportation of employees and guests to and from offsite events

2.2 Exclusions

It is standard practice in carbon accounting to set a de-minimis threshold below which certain activities are excluded from the inventory. In this case, activities that were deemed to contribute less than 1% of the overall carbon footprint were excluded. See Table 2 for a list of de-minimis activities.

Table 2. De-Minimis Activities Excluded from the Emissions Inventory

Scope 1	None
Scope 2	None
Scope 3	Double Negative Desert Exhibit: The only emissions from this remote permanent installation in the Nevada Desert are from fossil fuel powered off-road vehicles visitors use to access the site. It is deemed that these visits are few and infrequent, and therefore the emissions are well below the de-minimis threshold of 1%. Rentals of furniture and other supplies Purchase and consumption of supplies Marketing material including website Waste disposal

Other activities, which were initially intended to be included because they likely would have contributed more than 1% to the overall carbon footprint, were excluded for the following reasons:

Freight:

Carbon emissions from the transportation of exhibition materials, including art pieces, generally account for a significant contribution to the overall carbon footprint of museums and galleries. In some cases, freight emissions can account for more than 50% of the total footprint depending on the quantities, distances, and modes of transportation involved.

Unfortunately, freight data for the MOCA base year were not available. Therefore, these emissions were excluded from the inventory.

Going forward MOCA intends to track freight emissions. If an accurate proxy can be created based on the freight data contained in inventories for subsequent years, the base year inventory may be restated to include estimated freight emissions for comparative purposes.

Business Travel:

Emissions from business travel (transportation and hotel use) were excluded due to lack of data. The exception to this was transportation to offsite events, which is included under emissions from offsite events.

Going forward, MOCA intends to track all business travel data. If an accurate proxy can be created based on travel data contained in inventories from subsequent years, the base year inventory may be restated to include estimated business travel emissions for comparative purposes.

Exhibition Construction and Fabrication Materials:

Carbon emissions from the lifecycle of materials can be significant, depending on the type of material used. For example, the cement manufacturing industry is one of the highest emitting sources of greenhouse gas emissions in the world. Ideally, the Scope 3 lifecycle emissions associated with any carbon-intensive material used in the construction and fabrication of exhibitions, including in any art pieces specifically created for the museum, would be included in the inventory. Unfortunately, these materials were not tracked by MOCA.

Transportation of Visitors to the Museum:

Emissions from visitors' travel to and from the museum were excluded due to lack of data.

Offsite Storage Facilities:

Offsite storage facility operators did not provide energy data. If this data can be retrieved at a later date, or if proxy data can be used, this base year inventory may be restated.

Pacific Design Center:

MOCA holds regular exhibitions at the Pacific Design Center, a 1.6 million square foot multi-use facility in Los Angeles. Unfortunately, the Pacific Design Center did not provide energy data. If this data can be retrieved at a later date, or if proxy data can be used, this base year inventory may be restated.

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3 Methodology and Assumptions

3.1 General Methodology

This emissions quantification follows the principles and methods of The GHG Protocol Corporate Accounting and Reporting Standard (https://ghgprotocol.org/corporate-standard).

Emissions were calculated as follows:

Stationary combustion of fossil fuels, mobile combustion of fossil fuels, and combustion of fossil fuels in backup generators

Three main greenhouse gases from stationary combustion – carbon dioxide (CO2), methane (CH4), and nitrous oxide (N2O) – were quantified and converted into carbon dioxide equivalents (CO2e) as follows:

$$CO2e = \sum [\, Q_{ft} \times (CO2_{EF\,ft} + (CH4_{EF\,ft})(CH4_{GWP}) + (N2O_{EF\,ft})(N2O_{GWP})) \,]_{ft}$$

where,

Q_{ft} = quantity of fuel type used

$CO2_{EF\,ft}$ = carbon dioxide emissions factor for fuel type

$CH4_{EF\,ft}$ = methane emissions factor for fuel type

$CH4_{GWP}$ = methane global warming potential

$N2O_{EF\,ft}$ = nitrous oxide emissions factor for fuel type

$N2O_{GWP}$ = nitrous oxide global warming potential

ft = fuel type

Fugitive emissions from air conditioning and refrigeration units

Greenhouse gases from air conditioning and refrigeration units (see Table 4) were quantified and converted into carbon dioxide equivalents (CO2e) following the US EPA Source Level Refrigeration Gas CO2 Equivalent Emissions - Screening Method.

Purchased electricity

MOCA purchases electricity from the local utility grid. They do not engage in electricity purchase agreements with providers sourcing electricity from other markets. Therefore, the location-based electricity emissions method was used.

Three main greenhouse gases from the generation of electricity – carbon dioxide (CO2), methane (CH4), and nitrous oxide (N2O) – were quantified and converted into carbon dioxide equivalents (CO2e) as follows:

$$CO2e = \sum [E_{local\ grid} \times (CO2_{EF\ local\ grid} + (CH4_{EF\ local\ grid})(CH4_{GWP}) + (N2O_{EF\ local\ grid})(N2O_{GWP}))]_{local\ grid}$$

where,

$E_{local\ rid}$ = kilowatt-hours (kWh) of electricity purchased from local grid

$CO2_{EF\ local\ grid}$ = carbon dioxide emissions factor for local grid

$CH4_{EF\ local\ grid}$ = methane emissions factor for local grid

$CH4_{GWP}$ = methane global warming potential

$N2O_{EF\ local\ grid}$ = nitrous oxide emissions factor for local grid

$N2O_{GWP}$ = nitrous oxide global warming potential

local grid = electricity grid on which each building is located

Purchased district energy (i.e., hot water, chilled water)

MOCA purchases hot water and chilled water from the local utility for the MOCA Grand.

Three main greenhouse gases from the generation of hot water – carbon dioxide (CO2), methane (CH4), and nitrous oxide (N2O) – were quantified and converted into carbon dioxide equivalents (CO2e) as follows:

$CO2e = [HW \times (CO2_{EF\ HW} + (CH4_{EF\ HW})(CH4_{GWP}) + (N2O_{EF\ HW})(N2O_{GWP}))]$

where,

HW = quantity of hot water purchased

$CO2_{EF\ HW}$ = carbon dioxide emissions factor for purchased hot water (reference US EPA Emissions Factors)

$CH4_{EF\ HW}$ = methane emissions factor for purchased hot water (reference US EPA Emissions Factors)

$CH4_{GWP}$ = methane global warming potential

$N2O_{EF\ HW}$ = nitrous oxide emissions factor for purchased hot water (reference US EPA Emissions Factors)

$N2O_{GWP}$ = nitrous oxide global warming potential

Three main greenhouse gases from the generation of chilled water – carbon dioxide (CO2), methane (CH4), and nitrous oxide (N2O) – were quantified and converted into carbon dioxide equivalents (CO2e) as follows:

$CO2e = [CW \times (CO2_{EF\ CW} + (CH4_{EF\ CW})(CH4_{GWP}) + (N2O_{EF\ CW})(N2O_{GWP}))]$

where,

CW = quantity of chilled water purchased

$CO2_{EF\ CW}$ = carbon dioxide emissions factor for purchased chilled water (reference Energy Star Portfolio Manager, District Chilled Water)

$CH4_{EF\ CW}$ = methane emissions factor for purchased chilled water (reference Energy Star Portfolio Manager, District Chilled Water)

$CH4_{GWP}$ = methane global warming potential

$N2O_{EF\ CW}$ = nitrous oxide emissions factor for purchased chilled water (reference Energy Star Portfolio Manager, District Chilled Water)

$N2O_{GWP}$ = nitrous oxide global warming potential

Commute to and from work by employees, and transportation of employees and guests to and from offsite events

Three main greenhouse gases from employee commute and other forms of transportation – carbon dioxide (CO2), methane (CH4), and nitrous oxide (N2O) – were quantified and converted into carbon dioxide equivalents (CO2e) as follows:

$$CO2e = \sum [\ D_{mode} \times (CO2_{EF\ mode} + (CH4_{EF\ mode})(CH4_{GWP}) + (N2O_{EF\ mode})(N2O_{GWP}))\ ]_{mode}$$

where,

D_{mode} = distance travelled by mode of transportation

$CO2_{EF\ mode}$ = carbon dioxide emissions factor for mode of transportation (reference US EPA Emissions Factors)

$CH4_{EF\ mode}$ = methane emissions factor for mode of transportation (reference US EPA Emissions Factors)

$CH4_{GWP}$ = methane global warming potential

$N2O_{EF\ mode}$ = nitrous oxide emissions factor for mode of transportation (reference US EPA Emissions Factors)

$N2O_{GWP}$ = nitrous oxide global warming potential

mode = mode of transportation

3.2 Emissions Factors

Unless otherwise stated, all emissions calculations were based on the April 1, 2021 version of the US EPA GHG Emissions Factors.

3.3 Assumptions

Data Collection:

Utility bills were provided to The Carbon Accounting Company. All other data were collected and entered by MOCA personnel directly in the data collection workbook provided by The Carbon Accounting Company (see file: "MOCA Data Collection Form – 2019.xlsx"). It is assumed that the data entered by MOCA personnel were accurate and complete.

Employee Commute:

"Passenger car" includes passenger cars, minivans, SUVs, and small pickup trucks (vehicles with wheelbase less than 121 inches). It is assumed each passenger car commute contained one vehicle occupant (i.e., no car-pooling).

Offsite Event Transportation:

It is assumed that the mode of transportation to events of less than 200 miles return distance was single occupant passenger car, and that transportation to events greater than 200 miles return was by air.

All distances travelled were provided by MOCA personnel.

4 Results

Table 3. Emissions Sources for Base Year 2019

	MOCA Grand	MOCA Geffen	Total
Scope 1			
Stationary Combustion: Natural Gas	0	10,620 therms	10,620 therms
Stationary Combustion: Diesel	24 gallons	0	24 gallons
Mobile Combustion: Gasoline	504 gallons	0	504 gallons
Mobile Combustion: Propane	60 gallons	60 gallons	120 gallons
Air Conditioning & Refrigeration	See Table 4	See Table 4	
Scope 2			
Grid Electricity	1,235,360 kWh	415,160 kWh	1,650,520 kWh
Purchased Hot Water	37,130 therms	0	37,130 therms
Purchased Chilled Water	523,777 ton-hours	0	523,777 ton-hours
Scope 3			
Employee Commute	See Table 5	See Table 5	
Offsite Events: Transportation	See Table 6	See Table 6	

Table 4. Air Conditioning and Refrigeration for Base Year 2019

	MOCA Grand	MOCA Geffen
Scope 1		
Refrigerant	R-410A	R-410A
	R-410A	R-410A
	R-410A	R-410A
	R-410A	R-410A
	R-410A	R-410A
	R-600A	R-410A
	HFC-134a/R-134a	R-410A
	HFC-134a/R-134a	R-410A
	HFC-134a/R-134a	R-410A
	CFC-12/R-12	R-410A
	HFC-134a/R-134a	R-410A
	HFC-134a/R-134a	R-410A
	CFC-12/R-12	CFC-12/R-12
	R-600A	HFC-134a/R-134a
	HFC-134a/R-134a	HFC-134a/R-134a

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Table 5. Employee Commute for Base Year 2019

		Total
Scope 3		
Employee Commute	Walking (miles)	48
	Biking (miles)	0
	Motorcycle (miles)	0
	Bus (passenger miles)	924
	Commuter train (passenger miles)	0
	Subway/Tram (passenger miles)	1,068
	Passenger car (passenger miles)	9,546

Table 6. Offsite Events for Base Year 2019

		Total
Scope 3		
Offsite Events: Transportation	Passenger car (vehicle-miles)	14,620
	Air (passenger-miles)	229,254

Table 7. Greenhouse Gas Emissions for Base Year 2019

	MOCA Grand	MOCA Geffen	Total
Scope 1	kg CO2e	kg CO2e	kg CO2e
Stationary Combustion: Natural Gas	0	56,408	56,408
Stationary Combustion: Diesel	246	0	246
Mobile Combustion: Gasoline	4,442	0	4,442
Mobile Combustion: Propane	345	345	690
Air Conditioning & Refrigeration	3,090	11,390	14,480
Total Scope 1	8,123	68,143	76,266
Scope 2	kg CO2e	kg CO2e	kg CO2e
Grid Electricity	255,081	86,167	341,248
Purchased Hot Water	246,537	0	246,537
Purchased Chilled Water	368,544	0	368,544
Total Scope 2	870,162	86,167	956,329
Scope 3	kg CO2e	kg CO2e	kg CO2e
Employee Commute	-	-	17,162
Offsite Events: Transportation	-	-	41,271
Total Scope 3	-	-	58,433
		Total Emissions (kg CO2e)	1,091,028
		Total Emissions (tonnes CO2e)	**1,091**

Figure 1. Emissions by Scope for Base Year 2019

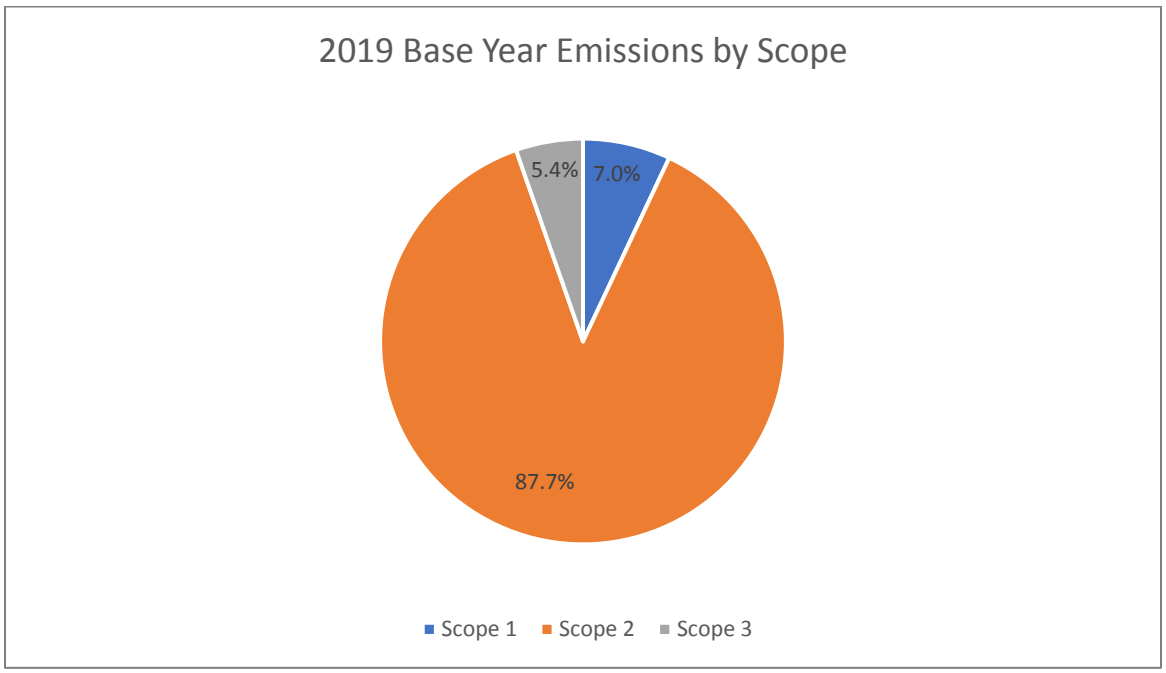


Figure 2. Emissions by Activity Source for Base Year 2019

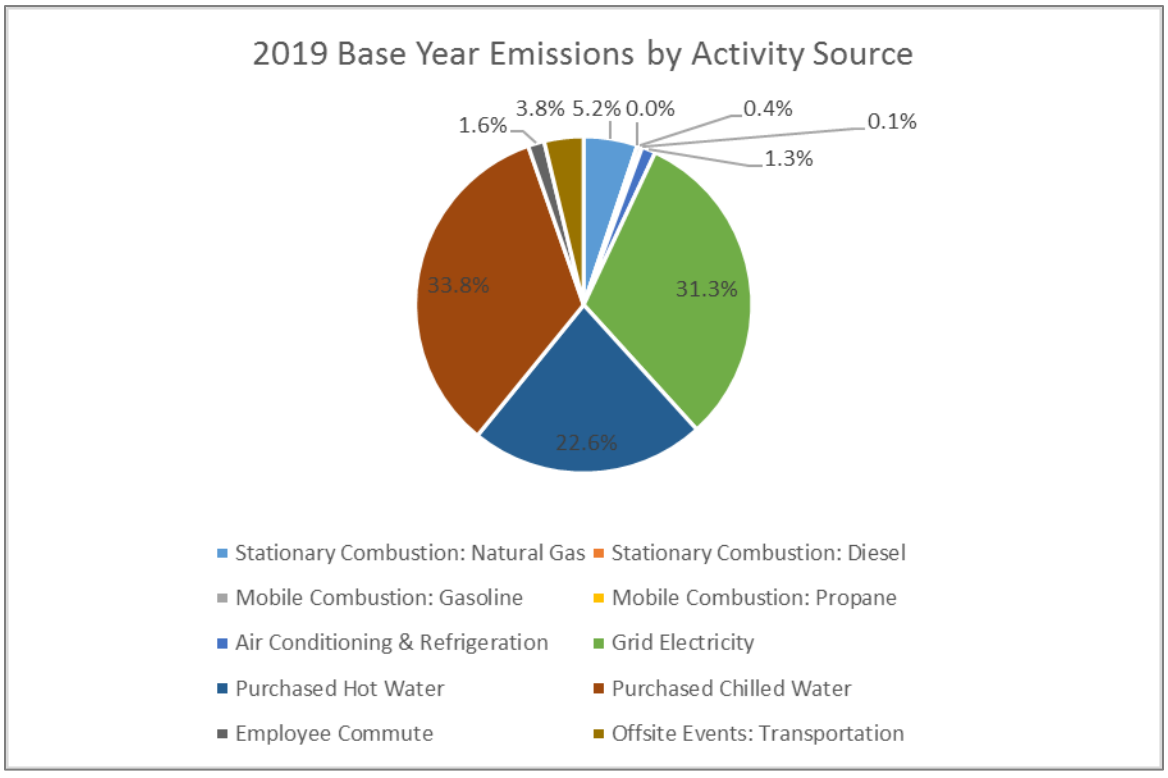
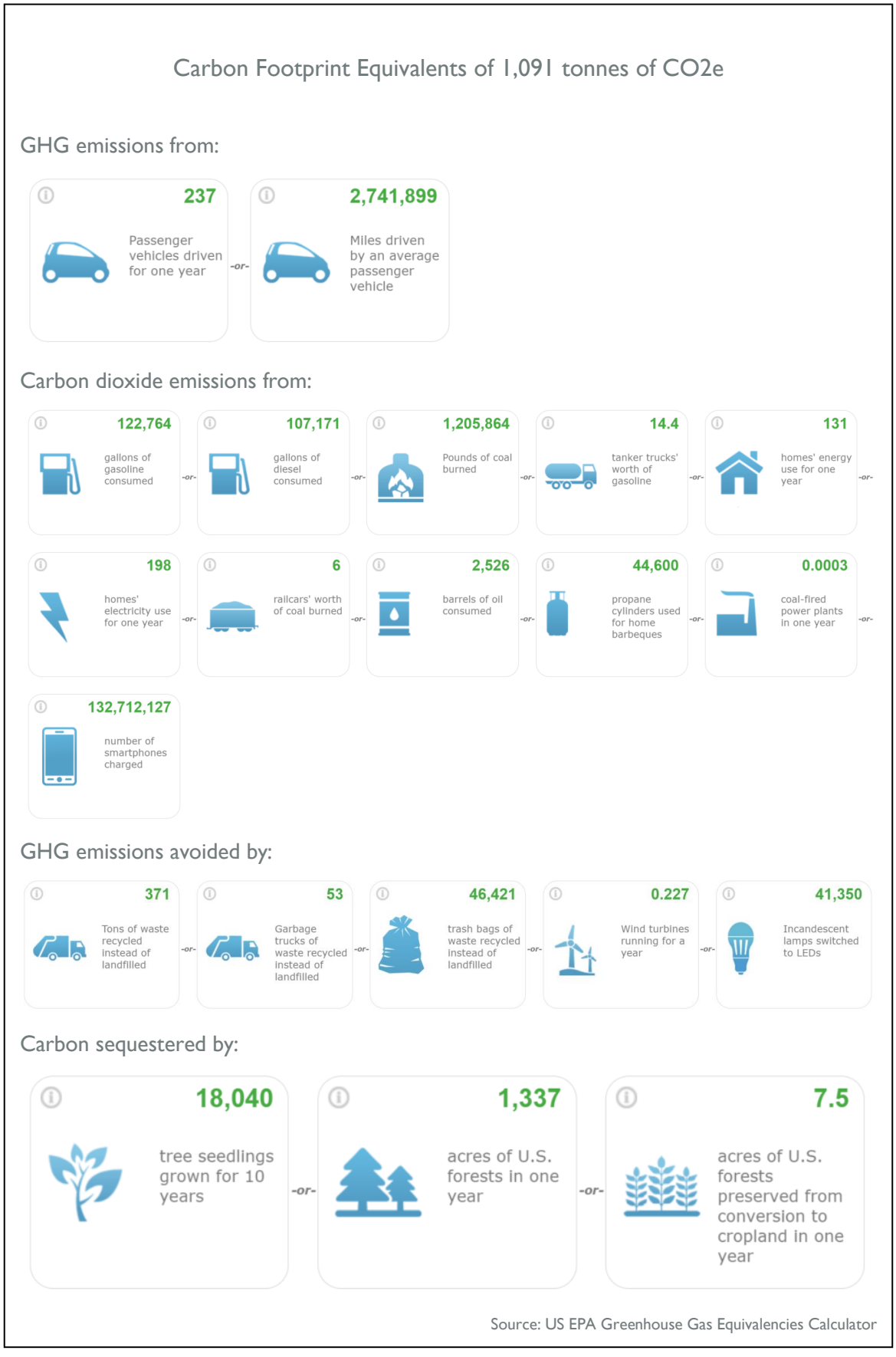


Figure 3. Carbon Footprint Equivalents for Base Year 2019



5 Statement of Accuracy

The Carbon Accounting Company states that, based on the information provided, MOCA's emissions as reported in this document are credible and defensible as an attempt to quantify the emissions sources and resultant emissions levels for the sources provided.

For more information regarding this report, please contact:

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