CY2019 Greenhouse Gas Inventory: FHI 360 Global

Prepared for:

fhi360
THE SCIENCE OF IMPROVING LIVES

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Terminology

Term	Definition
Direct Greenhouse Gas Emissions	Greenhouse Gas emissions from Greenhouse Gas sources owned or controlled by the organization. Note 1 to entry: This document uses the concepts of equity share or control (financial or operational control) to establish organizational boundaries. [ISO 14064-1:2018]
Global Warming Potential (GWP)	An index that integrates the overall climate impacts of different pollutant emissions in terms of carbon dioxide equivalents.
Greenhouse gas (GHG)	A gas that contributes to the greenhouse effect by absorbing infrared radiation.
Greenhouse gas inventory	The total amount of GHG produced to directly and indirectly support human activities, usually expressed in terms of carbon dioxide equivalent (CO_2e). This is also known as GHG footprint.
Hotspot	A process which accounts for a significant proportion of the GHG inventory.
Indirect GHG Emissions	GHG emission that is a consequence of an organization's operations and activities, but that arises from GHG sources that are not owned or controlled by the organization. Note 1 to entry: These emissions occur generally in the upstream and/or downstream chain. [ISO 14064-1:2018]
Organizational boundaries	The boundaries that determine the operations owned or controlled by the reporting company, depending on the consolidation approach taken.

Executive Summary

FHI 360 commissioned SCS Global Services (SCS) to measure the company-wide greenhouse gas (GHG) inventory for its US and International business operations. This report outlines the GHG inventory for its US and international offices; namely emissions from 10 different countries representing 56% of FHI 360's international staff and operations in 2019. The 10 countries are as follows: DRC, Mozambique, Nepal, Nigeria, Philippines, South Africa, Tanzania, Thailand, Tunisia, and Vietnam.

The base year GHG inventory was evaluated for January 1, 2019 – December 31, 2019, according to the organizational and operational boundaries specified by The Greenhouse Gas Protocol.

Table 1. *Base year GHG inventory results and overall contribution for FHI 360 global in CY2019*

CY2019	Subcategory	GHG Emissions in MT CO_2e	% Contribution
Scope 1	Mobile Sources	1,241	5%
	Stationary Sources	244	1%
	Refrigeration	585	2%
	Scope 1 subtotal	**2,071**	**9%**
Scope 2	Purchased Electricity	3,040	13%
	Scope 2 subtotal	**3,040**	**13%**
Scope 3	Purchased Goods & Services	5,996	26%
	Capital Goods	32	1%
	Fuel and Energy Related Activities	944	4%
	Upstream Transportation & Distribution	549	2%
	Waste Generated in Operations	17	0%
	Business Travel	8,197	35%
	Employee Commuting	2,617	11%
	Scope 3 subtotal	**18,353**	**78%**
TOTAL		**23,464**	**100%**

Figure 2 illustrates the percentage contribution associated with Scope 1, Scope 2, and Scope 3 emissions, to the FHI 360 CY2019 GHG inventory. Figure 2 shows the total GHG emissions by all eleven countries assessed. United States clearly leads in its emissions contribution.

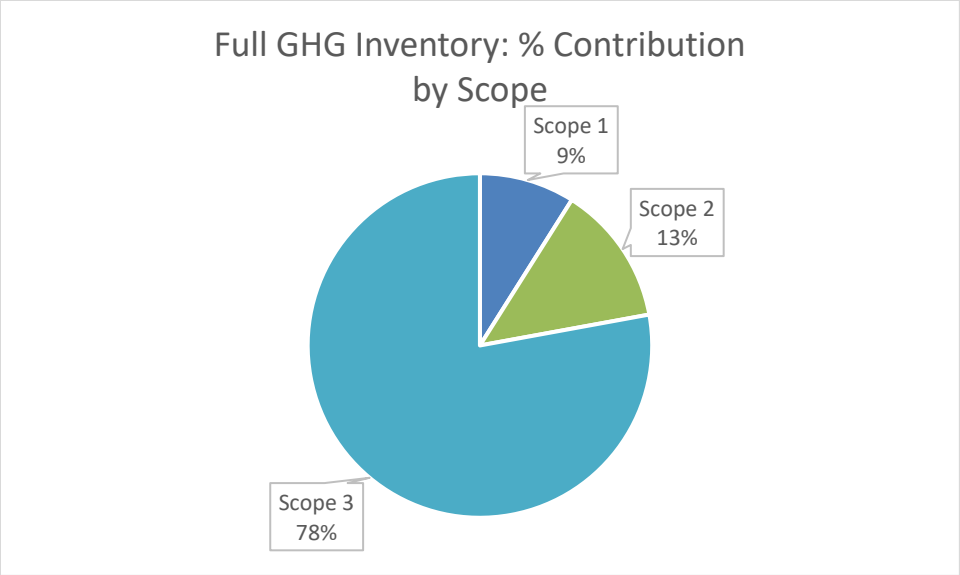

Figure 1. Percent breakdown by scope of total greenhouse gas emissions for FHI 360 in CY2019

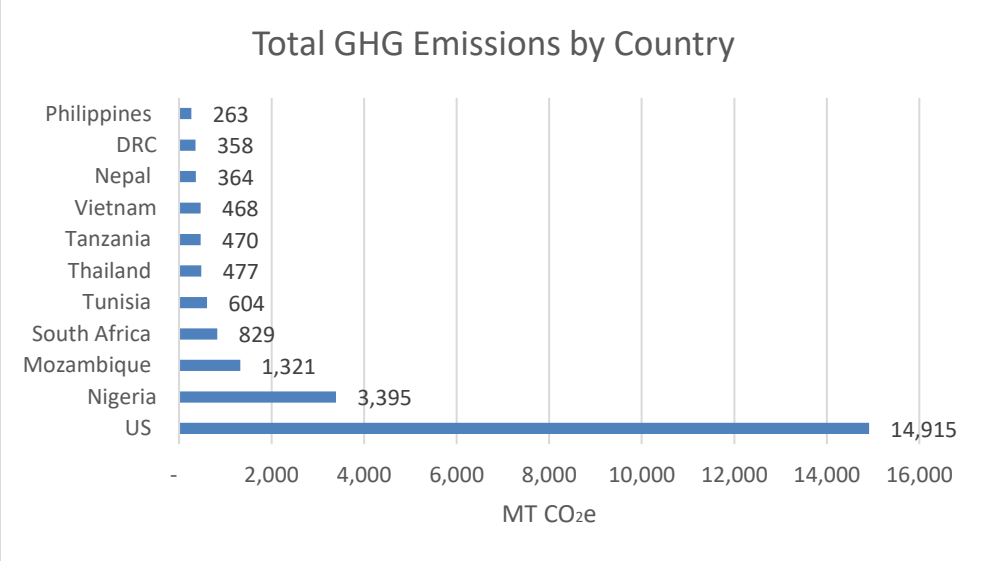

Figure 2. Total GHG emissions by Country in CY2019.

Based on the results from this comprehensive GHG inventory, it warrants FHI 360 to focus their data collection and efforts in consecutive years towards the key scope 3 categories (e.g., Business Travel, Purchased Goods and Services, Fuel and Energy Related Activities, and Employee Commuting) unless a significant change occurs.

Though measuring a company's carbon footprint is only the first step in an ongoing path towards emissions reductions, FHI 360 is now uniquely equipped with a full GHG inventory positioning them as a leader among humanitarian organizations. FHI 360 can use this quantitative analysis base year inventory to guide decisions towards efforts to decrease their carbon footprint going forward.

1. Introduction

FHI 360 is an international nonprofit organization working to improve the well-being of people within the United States and globally. The organization achieves this by partnering with government, private sector, and civil society to fund health care, quality education, and economic opportunities for communities. FHI 360 specializes in conducting research which unveils programs that will change behaviors and bring about real change and improvement in people's lives.

FHI 360 commissioned SCS Global Services (SCS) to measure the company-wide greenhouse gas (GHG) inventory for its US and International business operations. The scope of the GHG inventory assessment was set by organizational and operational boundaries defined by The Greenhouse Gas Protocol[1] and the identified business operations and emission sources for FHI 360 operations. This report outlines the GHG inventory for its US and international offices; namely emissions from 10 different countries representing approximately 56% of FHI 360's total staff in 2019. The 10 countries are as follows: DRC, Mozambique, Nepal, Nigeria, Philippines, South Africa, Tanzania, Thailand, Tunisia, and Vietnam.

For the purpose of tracking and comparing the environmental performance of the company over time, Calendar Year 2019 was chosen as the base year period for the GHG inventory. SCS determined the base year GHG inventory for FHI 360's operations. This report is intended for FHI 360 and focuses on summarizing its GHG inventory and is in accordance with ISO 14064-1 [2018].[2] Contents of this report are confidential and will only be provided to external audiences at the discretion of FHI 360.

2. Methodology

2.1 Carbon Footprint Methodology

The GHG quantification model was implemented via spreadsheet by combining activity data (data sourced from FHI 360 personnel and records) with emissions factors (value that relates amount of GHG emitted with any given activity data). Estimation uncertainty arising from parameter establishment is present but not quantified. The model was rigorous and comprehensive based on the activity data provided by FHI 360 with a high level of reproducibility assuming assumptions and exclusions are aligned.

The Global Climate Change impact category addresses the emissions of greenhouse gases (GHGs) that are responsible for radiative forcing (i.e., warming effects) from interactions in the Earth's atmosphere. All emissions are characterized using Global Warming Potentials (GWPs). GWP values describe the radiative forcing impact of one unit of a given climate pollutant relative to one unit of CO_2. GWP values

[1] World Business Council for Sustainable Development, and World Resources Institute. The Greenhouse Gas Protocol: a corporate accounting and reporting standard. World Resources Institute (Revised Edition).

[2] This document specifies principles and requirements at the organization level for the quantification and reporting of greenhouse gas (GHG) emissions and removals. https://www.iso.org/standard/66453.html

convert climate pollutant emissions data for non-CO_2 gases into units of CO_2 equivalents (CO_2e) as represented in the equation below:

$$\sum(Pollutant\ emissions\ x\ GWP\ of\ pollutant)\ =\ Total\ CO_2e$$

Total CO_2 equivalents represent emissions of all GHGs, aggregated and converted to units of CO_2e, using GWP values over a 100-year time horizon. All GHGs as directed by the Kyoto Protocol were assessed and measured in this GHG inventory. The 100-year GWP values used in evaluating the Global Climate Change impact category are shown in Table 1 below from Intergovernmental Panel on Climate Change (IPCC), Sixth Assessment Report (AR6).

Table 1. *List of Global Warming Potentials (GWPs) over a 100-year time horizon.*

GHGs	GWP (CO_2e)	Source
CO_2	1	IPCC AR6
CH_4	27.9	IPCC AR6
N_2O	273	IPCC AR6

2.2 Data Sources and Emission Factor Datasets

Primary data was obtained from FHI 360 for CY2019:

- Electricity usage (kWh) billed for all facilities for which data was available;
- Mobile and stationary fuel usage (not limited to gasoline, diesel, propane) for all relevant facilities;
- Refrigerant purchases for all relevant facilities;
- Spend amounts for Purchased Goods and Services for all facilities;
- Spend amounts for Upstream Transportation & Distribution for relevant facilities;
- Combination of spend and mass amounts of waste generated for facilities depending on availability of data;
- Spend amounts for all types of Business Travel for all relevant facilities;
- Employee commuting distance for each employee per facility;

Table 2. *Summary of secondary data sources.*

Component	Dataset/ Emission Factor Source	Source	Publication Date
Scope 1			
Mobile fuel sources	Gasoline	US EPA, GHG Emission Factors Hub[3]	2022
Refrigeration	GWP for Refrigerants	US EPA, GHG Emission Factors Hub	2022
Scope 2			
Electricity	Grid electricity emissions – US and international	US EPA eGRID2020[4]	2022 2022

[3] GHG Emission Factors Hub. US Environmental Protection Agency. Center for Corporate Climate Leadership. April 1, 2022. https://www.epa.gov/system/files/documents/2022-04/ghg_emission_factors_hub.pdf

[4] eGRID2020 Summary Data. US Environmental Protection Agency. Center for Corporate Climate Leadership. January 27, 2022. https://www.epa.gov/egrid/summary-data

Component	Dataset/ Emission Factor Source	Source	Publication Date
		IGES List of Grid Emission Factors v10.12	
Scope 3			
Purchased goods and services	Spend amounts per USD	US EPA Environmentally Extended Input Output Model (USEEIO)	2018
Fuel and Energy related activities	eGRID subregions and grid losses from eGRID2020	US EPA eGRID	2019
Upstream Transportation & Distribution	Spend amounts per USD	US EPA Environmentally Extended Input Output Model (USEEIO)	2018
Waste Generated in Operations	Spend amounts per USD	US EPA Environmentally Extended Input Output Model (USEEIO)	2018
	Mass amounts per kg	US EPA, GHG Emission Factors Hub	2022
Business Travel	Spend amounts per USD	US EPA Environmentally Extended Input Output Model (USEEIO)	2018
	Distance traveled via airplane	US EPA, GHG Emission Factors Hub	2022
	Hotel stays by country	UK Government GHG Conversion Factors for Company Reporting, BEIS	2021
Employee Commuting	Emissions from passenger car, bus	US EPA, GHG Emission Factors Hub	2022

2.3 Category-specific calculations

Scope 1

Mobile and Stationary Fuels

Scope 1 stationary emissions are primarily from natural gas heating. Mobile emissions arise from fuel consumption used for company vehicles. Below are the two equations used to calculate emissions. The first equation can substitute various types of fuel that are consumed such as diesel, propane, etc.

$$Emissions = gasoline\ consumption\ (\text{gal})\ x\ gasoline\ combustions\ emissions\ \left(\frac{kg\ CO_2e}{gal}\right)$$

Equation 1. *Formula used to calculate Scope 1 emissions from gasoline use.*

$$Emissions = natural\ gas\ use\ (\text{therms})\ x\ natural\ gas\ combustions\ emissions\ \left(\frac{kg\ CO_2e}{therms}\right)$$

Equation 2. *Formula used to calculate Scope 1 emissions from natural gas use.*

Refrigerant use

Emissions for refrigerants used in facilities were calculated using the amount of refrigerant recharge (equivalent to net refrigerant losses from leakage) during the given base year period. Equation is as follows:

$$Emissions = Refrigerant\ \text{recharge}\ \ (\text{lbs})\ x\ GWP100\ of\ refrigerant\ \left(\frac{kg\ CO_2e}{\text{lbs}}\right)$$

Equation 3. *Formula used to calculate Scope 1 emissions from refrigerant recharge.*

Table 3. Refrigerants in assessment and their associated GWP over 100-year time horizon

Refrigerant	Global Warming Potential (GWP) in CO_2e	Source
R-22	1,810	IPCC AR6
R-404A	3,922	US EPA, GHG Emission Factors Hub
R-410A	2,088	US EPA, GHG Emission Factors Hub

Scope 2

Purchased Electricity

Purchased electricity amounts (kWh) were multiplied by emission factors from US EPA eGRID 2020 or IGES for all US and international facilities, respectively.

$$Emissions\ for\ electricity\ use\ \ (kg\ CO_2e) = \sum kWh\ consumed\ by\ owned\ facilities * \frac{kg\ CO_2e}{kWh}$$

Equation 4. *Formula used to calculate Scope 2 emissions from electricity use.*

Scope 3

Purchased Goods and Services

A spend-based method was used for purchased goods and services (PG&S), whereby FHI 360 provided SCS with the total spend by category and by facility for the base year period. Calculations were done by applying emission factors from the most current United States Environmentally-Extended Input-Output (USEEIO) database.

$$Emissions\ (kg\ CO_2e)$$
$$= spend\ by\ category\ (\$)\ x\ Emission\ factor\ for\ Equivalent\ USEEIO\ category\ (kg\ CO_2e/\$)$$

Equation 5. *Spend-based formula used to calculate PG&S*

Capital Goods

A spend-based method was used for Capital Goods, whereby FHI 360 provided SCS with the total spend by category and by facility for the base year period. Calculations were done by applying emission factors from the most current USEEIO database.

$$Emissions\ (kg\ CO_2e)$$
$$= spend\ by\ category\ (\$)\ x\ Emission\ factor\ for\ Equivalent\ USEEIO\ category\ (kg\ CO_2e/\$)$$

Equation 6. *Spend-based formula used to calculate Capital Goods*

Fuel and energy related activities

Fuel and energy related activities consist of upstream impacts (not included in scopes 1 and 2) of fuels such as life cycle emissions from extraction, processing, and transportation of fuels, and grid losses from electricity use. Emissions from electricity transmission and distribution losses associated with the

electricity grid were calculated using percent grid loss data from US EPA. These calculations were done for the diesel, natural gas, and electricity data given for scope 1 and 2.

$$\begin{aligned}&Emissions\ from\ Upstream\ Fuels\ and\ Energy\ consumed\\&= \sum\left(kWh\ of\ electricity\ consumed \times electricity\ life\ cycle\ emission\ factor\ \left(kg\frac{CO_2e}{kWh}\right)\right.\\&\left.\times\ T\&D\ loss\ rate\ (\%)\right)\\&+\sum upstream\ impact\ of\ fuels\ for\ electricity\ \left(\frac{kg\ CO_2e}{kWh}\right)x\ electricity\ use\ (kWh)\\&+\sum upstream\ impact\ of\ natural\ gas\ \left(\frac{kg\ CO_2e}{gal}\right)x\ natural\ gas\ (gal)\end{aligned}$$

Equation 7. *Formula used to calculate scope 3 emissions from fuel and energy related activities*

Upstream Transportation & Distribution

Spend data from Upstream Transportation & Distribution was used to calculate emissions. Mode of transportation was determined with guidance from FHI 360 based on activity data. The emissions were calculated as follows:

$$\begin{aligned}&Emissions(kg\ CO_2e)\\&= spend\ by\ category\ (\$)\ x\ Emission\ factor\ for\ Equivalent\ USEEIO\ category\ (kg\ CO_2e/\$)\end{aligned}$$

Equation 8. *Formula used to calculate scope 3 emissions from mobile fuel use*

Waste Generated in Operations

Mass-based calculations were done for this category using mass of waste generated by type and method of waste management[5] (e.g., landfill, recycle, compost).

$$\begin{aligned}&Emissions\ (kg\ CO_2e)\\&= mass\ of\ waste\ type\ generated\ (kg)\ x\ Emission\ for\ waste\ management\\&\left(\frac{kg\ CO_2e}{\text{kg of waste type}}\right)\end{aligned}$$

Equation 9. Mass-based formula used to calculate Waste Generated

$$\begin{aligned}&Emissions\ (kg\ CO_2e)\\&= spend\ by\ disposal\ method\ (\$)\ x\ Emission\ factor\ for\ disposal\ method\ (kg\ CO_2e/\$)\end{aligned}$$

Equation 10. *Spend-based formula used to calculate PGS*

[5] Ingwersen, W. AND M. Li. Supply Chain Greenhouse Gas Emission Factors for US Industries and Commodities. U.S. Environmental Protection Agency, Washington, DC, EPA/600/R-20/001, 2020. https://cfpub.epa.gov/si/si_public_record_Report.cfm?dirEntryId=349324&Lab=CESER

Business Travel

Business travel emissions occur during hotel stays, air travel, and miscellaneous modes of travel.[6] FHI 360 provided a combination of nights stayed in hotels and distance traveled by air, or dollars spent on various types of business travel where distance data was not available.

$$Emissions\ for\ business\ travel\ (kg\ CO2e)$$
$$= \sum \#\ of\ nights\ hotel\ stayed\ in\ hotel \times emission\ factor\ for\ hotel\ stay\ \left(\frac{kg\ CO_2e}{nights}\right)$$
$$+\ distance\ traveled\ by\ airplane\ (mi)\ x\ emission\ factor\ for\ air\ travel\ (\frac{kg\ CO_2e}{mi})$$

Equation 11. *Day and Mileage-based formula used to calculate Business Travel*

$$Emissions\ for\ business\ travel\ (kg\ CO_2e)$$
$$= spend\ by\ mode\ of\ business\ travel\ (\$)\ x\ Emission\ factor\ for\ mode\ of\ business\ travel\ (kg\ CO_2e\ /\$)$$

Equation 12. *Spend-based formula used to calculate Business Travel*

Employee commuting

The employee commuting distances for all FHI 360 employees in international offices were determined by the FHI 360 team based on their knowledge of the facility, location, and average commuting patterns of local residents.[7]

$$Emissions\ for\ Employee\ Commute(kg\ CO_2e)$$
$$= \sum average\ one\ way\ distance\ (mi)\ x\ \frac{2\ trips}{day}$$
$$\times\ emission\ factor\ by\ vehicle\ type\ \left(\frac{kg\ CO_2e}{mi}\right) x\ (\text{number of working days per year})$$

Equation 13. Mileage-based formula used to calculate Employee commuting

[6] Ibid.

[7] https://www.epa.gov/sites/default/files/2021-04/documents/emission-factors_apr2021.pdf

3. Greenhouse Gas Inventory Analysis

3.1 Summary of Greenhouse Gas Inventory Assessment

The base year GHG inventory was evaluated for January 1, 2019 – December 31, 2019, according to the organizational and operational boundaries specified by The Greenhouse Gas Protocol. The GHG emissions from FHI 360 operations were calculated and converted to CO_2 equivalents using the Global Warming Potential (GWP100) metric, evaluated over a 100-year time horizon. GHG removals, also known as GHG sinks, for FHI 360 from vegetation and/or soils on site is minimal and was not quantified for this GHG inventory.

Sources of GHGs are classified into Scopes 1, 2, and 3. The inventory for scope 1 includes GHG emissions from on-site combustion natural gas, small amounts of gasoline for company vehicles as well as the recharge of refrigerants.

Scope 2 emissions arise with the generation of purchased electricity required for lighting, air-conditioning, and use of appliances. FHI 360 first assessed the emissions for their 5 small to mid-sized US offices, and later 10 of their international offices. The scope 2 footprint is material, but not the highest contributing category.

Scope 3 emissions include indirect emissions associated across the value chain. Of the 15 scope 3 categories, the following relevant categories primarily based on the industry and business operation were selected to constitute FHI 360's base year GHG inventory. These categories are: Purchased Goods and Services, Capital Goods, Fuel and Energy Related Activities, Upstream Transportation & Distribution, Waste Generated in Operations, Business Travel, and Employee Commuting. FHI 360 also had a high level of visibility and accuracy to the data required for these scope 3 categories.

Since FHI 360 is a nonprofit organization and does not have any manufacturing or transportation of finished goods, several scope 3 categories were deemed not relevant to the corporate footprint. These are the following: Upstream Leased Assets, Downstream Transportation & Distribution, Processing of Sold Products, Use of Sold Products, End-of-Life of Sold Products, Downstream Leased Assets, Franchises, and Investments. FHI 360 only had data relevant to Upstream Transportation & Distribution, not Downstream. All leased assets of FHI 360 were included within scope 1 and 2 emissions.

Table 4a on the next page summarizes total Scope 1, Scope 2, and Scope 3 emissions for US only in CY2019. Scope 3 emissions are disaggregated into the 6 subcategories aforementioned. Table 4b summarizes total Scope 1, Scope 2, and Scope 3 emissions for the 10 selected international offices in CY2019. Table 4c summarizes total Scope 1, Scope 2, and Scope 3 emissions in CO_2e for FHI 360 global in CY2019.

Table 4a. *Base year GHG inventory results, breakdown by pollutant, and overall contribution in CY2019 for US*

Category of Source	Subcategory	Total Results in MT CO_2e	Breakdown by component pollutant			% Contribution to overall footprint
			MT CO_2	MT CH_4	MT N_2O	
Scope 1	*Mobile Sources*	2	2	0.00	0.00	0.0%
	Stationary Sources	55	55	0.00	0.00	0.4%
	Refrigeration	13	-	-	-	0.1%
	SCOPE 1 TOTAL	**70**	**57**	**0.00**	**0.00**	**0.5%**
Scope 2	*Purchased Electricity*	2,034	2,028	0.09	0.00	14%
	SCOPE 2 TOTAL	**2,034**	**2,028**	**0.09**	**0.00**	**14%**
Scope 3	*Purchased Goods & Services*	3,259	3,083	6.3	-	22%
	Fuel and Energy Related Activities	513	513	-	-	3%
	Upstream Transportation & Distribution	531	480	1.1	0.00	4%
	Waste Generated in Operations	-	-	-	-	0%
	Business Travel	6,768	6,723	0.14	0.15	45%
	Employee commuting	1,741	1,729	0.06	0.04	12%
	SCOPE 3 TOTAL	**12,811**	**12,528**	**7.60**	**0.19**	**86%**
TOTAL (Scope 1 + Scope 2 + Scope 3)		**14,915**	**14,613**	**8.69**	**0.19**	**100.00%**

Table 4b. *Base year GHG inventory results, breakdown by pollutant, and overall contribution for 10 selected International offices in CY2019*

Category of Source	Subcategory	Total Results in MT CO_2e	Breakdown by component pollutant			% Contribution to overall footprint
			MT CO_2	MT CH_4	MT N_2O	
Scope 1	*Mobile Sources*	1,239	1,235	0.05	0.00	15%
	Stationary Sources	189	189	0.01	0.00	2%
	Refrigeration	572	-	-	-	7%
	SCOPE 1 TOTAL	**2,001**	**1,424**	**0.06**	**0.00**	**24%**
Scope 2	*Purchased Electricity*	1,006	1,001	0.04	0.01	12%
	SCOPE 2 TOTAL	**1,006**	**1,001**	**0.04**	**0.01**	**12%**
Scope 3	*Purchased Goods & Services*	2,737	2,228	16.60	-	28%
	Capital Goods	32	-	-	-	2%
	Fuel and Energy Related Activities	431	431	-	-	5%
	Upstream Transportation & Distribution	18	17	0.04	-	0.2%
	Waste Generated in Operations	17	4	0.41	0.00	0.2%
	Business Travel	1,429	1,338	2.99	0.01	17%
	Employee commuting	877	871	0.06	0.02	11%
	SCOPE 3 TOTAL	**5,541**	**4,889**	**20.11**	**0.03**	**63%**
TOTAL (Scope 1 + Scope 2 + Scope 3)		**8,548**	**7,314**	**20.21**	**0.05**	**100%**

Table 4c. *Base year GHG inventory results and overall contribution for FHI 360 global in CY2019*

CY2019	Subcategory	GHG Emissions in MT CO_2e	% Contribution
Scope 1	Mobile Sources	1,241	5%
	Stationary Sources	244	1%
	Refrigeration	585	2%
	Scope 1 subtotal	**2,071**	**9%**
Scope 2	Purchased Electricity	3,040	13%
	Scope 2 subtotal	**3,040**	**13%**
Scope 3	Purchased Goods & Services	5,996	26%
	Capital Goods	32	1%
	Fuel and Energy Related Activities	944	4%
	Upstream Transportation & Distribution	549	2%
	Waste Generated in Operations	17	0%
	Business Travel	8,197	35%
	Employee Commuting	2,617	11%
	Scope 3 subtotal	**18,353**	**78%**
TOTAL		**23,464**	**100%**

3.2 Contribution Analysis

Figure 2 illustrates the percentage contribution associated with Scope 1, Scope 2, and Scope 3 emissions, to the FHI 360 CY2019 GHG inventory. The graph indicates that Scope 1 emissions account for 9% of the total GHG inventory, Scope 2 emissions account for 13%, and scope 3 emissions account for the significant majority of the GHG inventory with a contribution of 78%.

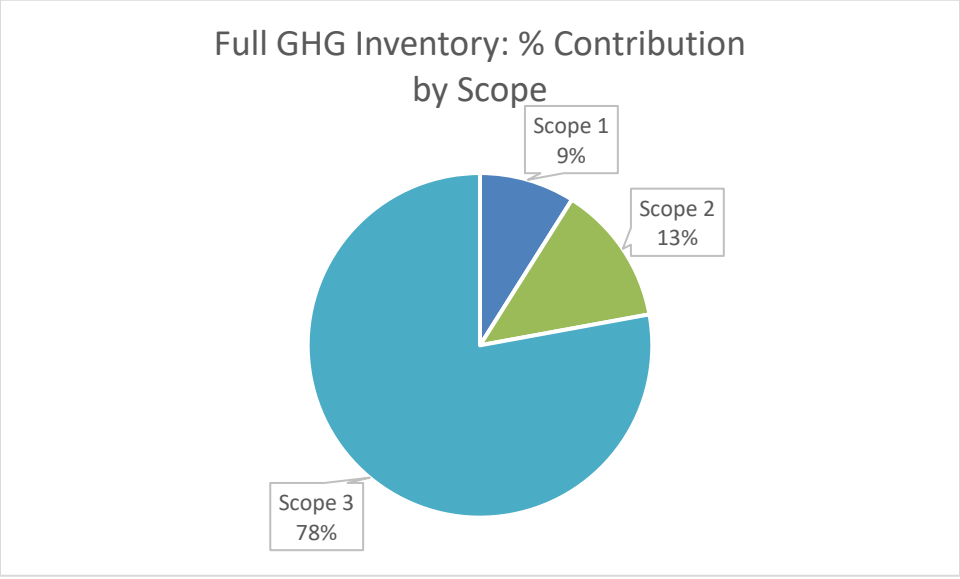

Figure 2. Percent breakdown by scope of total GHG emissions for FHI 360 in CY2019

Figures 2 shows all emissions sources for FHI 360 with Business Travel being the single highest contributing category throughout the inventory.

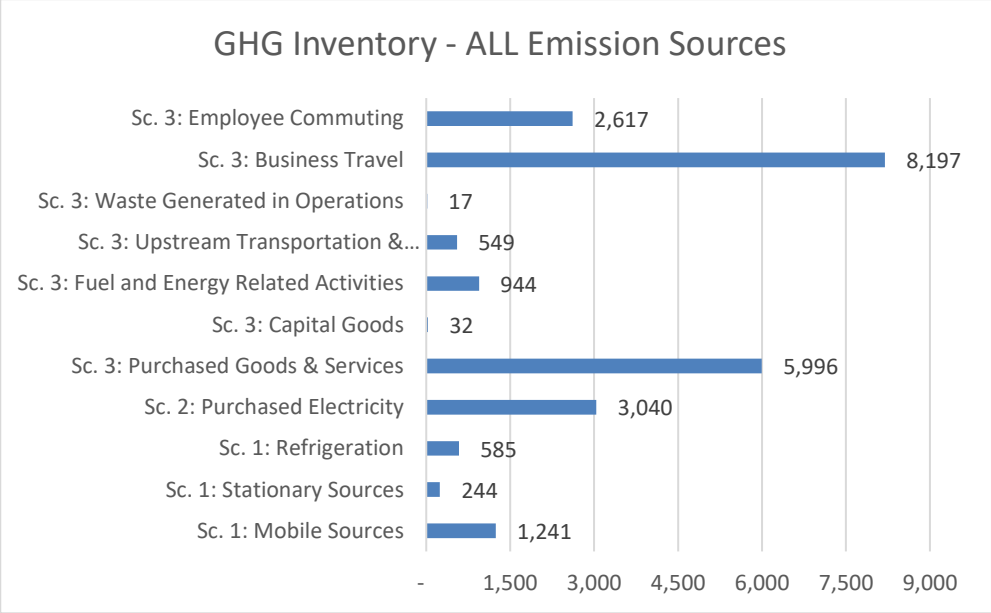

Figure 2. Total GHG emissions for FHI 360 global in CY2019.

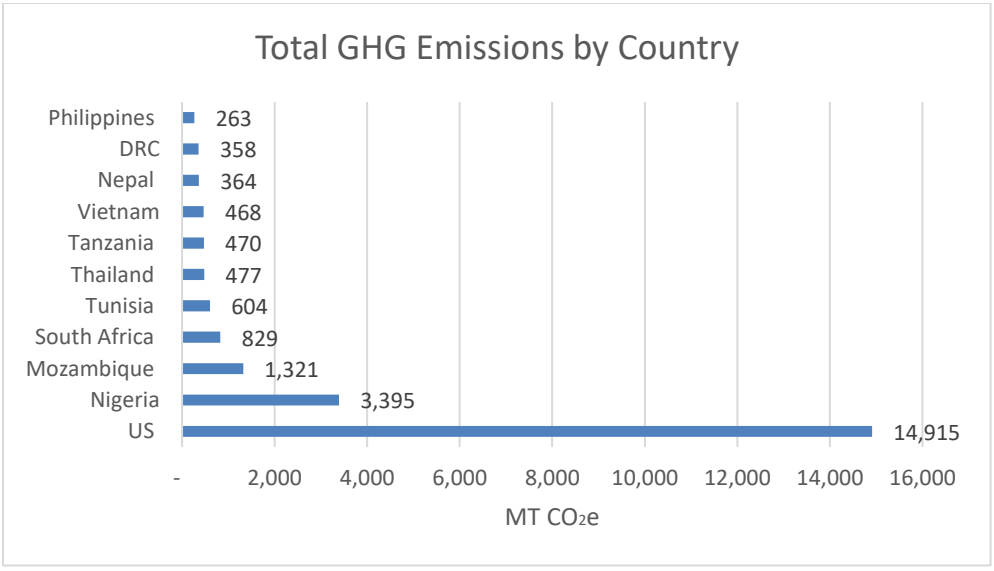

Figure 3. Total GHG emissions by Country in CY2019.

For a full breakdown in MT CO_2e of each scope category and for each country, please see Appendix A.

3.3 Summary of Hotspots for the Key GHG Contributors

Scope 1 emissions come from the combustion of fuels such as gasoline, diesel, or natural gas. Altogether, these mobile and stationary emissions sources for scope 1 resulted in 24% of the overall footprint for the international offices and 9% globally for FHI 360. Scope 2 emissions, those coming from purchased electricity, contributed 13% of the footprint globally. Thus, both of these scopes are material

contributions for FHI 360. Table 5 below shows the top 5 countries with the highest scope 1 emissions. We can see that Nigeria is at the top of the list contributing 56% to all scope 1 emissions. Table 5b shows all scope 1 emissions for Nigeria. This is due to the high consumption of diesel, gasoline, LPG, and engine oil. Nigeria is also the country with the highest emissions for refrigerants including the US.

Table 5. *Scope 1 emissions by country for CY2019*

Office	Scope 1 Emissions (MT CO2e)	% Contribution
Nigeria	1,155	56%
Mozambique	435	21%
DRC	137	7%
Tanzania	100	5%
Tunisia	84	4%
All other countries	160	8%
TOTAL	2,071	100%

Table 5b. *Scope 1 emissions breakdown for Nigeria for CY2019*

Scope 1 Emissions Source	MT CO_2e
Mobile Sources	663
Stationary Sources	83
Refrigeration	409
TOTAL	**1,155**

Table 6 shows scope 2 emissions for FHI 360 facilities measured in this project. Note that several international countries were met with challenges in acquiring utility information and this was estimated if needed. Asterisks indicate that electricity consumption was estimated either on historical data, square footage, or number of employees. Further description of all assumptions made can be found in the Assumptions section.

Table 6. *Scope 2 emissions from purchased electricity by country for CY2019*

Country	MT CO_2e	% Contribution
US	2,034	67%
Nigeria	394	13%
South Africa	228	8%
Thailand	90	3%
Vietnam*	81	3%
Tanzania	80	3%
Tunisia	54	2%
Mozambique	34	1.1%
Nepal*	23	0.8%
DRC*	19	0.6%

Philippines	3	0.1%
TOTAL	**3,040**	**100%**

Scope 3 contributes the remaining 78% towards the global GHG inventory. This skew towards scope 3 emissions is a trend that is common among organizations in the private and nonprofit sectors. Of the scope 3 categories, Business Travels contributes the most with 35% contribution, Purchased Goods and Services next with 24%, and Employee Commuting with 11%.

Business Travel emissions primarily comes from airfare and hotel stays. In addition, expenses towards car rentals or other business travel related expenses are also considered. Data for airfare and hotel stays can either be based on distance and number of nights respectively or an aggregate amount of spend. Table 7 below shows the total Business Travel emissions by country and notes whether a distance-based or spend-based approach or a mix was taken during data collection. As shown in the table, US contributes most materially to overall Business Travel emissions.

Table 7. *Scope 3 Business Travel emissions by country for CY2019*

Country	MT CO_2e	Air travel	Hotels
US	6,768	Distance	Nights
Mozambique	344	Spend	Spend
South Africa	216	Spend	Spend
Thailand	206	Distance	Nights
Vietnam	202	Distance	Nights
Nepal	148	Spend	Nights
Tanzania	133	Spend	Spend
Tunisia	89	Distance	Nights
Nigeria	48	Spend	Nights
Philippines	22	Distance	Nights
DRC	20	Distance	Nights

A further breakdown of US Business Travel can be found in tables 8a, 8b, and 8c. Note that long hauls are classified as routes over 2,300 miles, Medium as between 300 and 2300, and Short as 300 or less. FHI 360 employees most frequently travel long haul distances.

Table 8a. *Business Travel breakdown for US by type for CY2019*

Business Travel Type	MT CO_2e	% Contribution
Airfare	4,874	72%
Hotel stays	1,861	28%
Misc. Expenses	33	0%
TOTAL	**6,768**	**100%**

Table 8b. *Airfare haul breakdown by distance for CY2019*

Haul Type	MT CO_2e	% Contribution
Long	4,612	95%
Medium	245	5%
Short	16	0%
TOTAL	**4,874**	**100%**

Table 8c. *Hotel stays breakdown by location for CY2019*

Hotel Night Location	MT CO_2e	% Contribution
US	223	12%
Country-specific	762	41%
All other	876	47%
TOTAL	**1,861**	**100%**

Table 9. *Top two emitting PG&S categories by country for CY2019*

Country	MT CO_2e	#1 Emitting USEEIO Category	#2 Emitting USEEIO Category
US	3,259	Marketing	Software
Nigeria	1,470	Sanitary paper (tissues, napkins, diapers, etc.)	Office supplies (not paper)
Mozambique	375	Office supplies (not paper)	Telephones
Vietnam	361	Nonresidential maintenance and repair	Computers
Tunisia	205	Computer terminals and other computer peripheral equipment	Motor vehicle and motor vehicle parts and supplies
Nepal	136	Computers	Office supplies (not paper)
DRC	125	Computers	Office supplies (not paper)
South Africa	73	Postal service	Office supplies (not paper)
Thailand	64	Nonresidential maintenance and repair	Analytical laboratory instruments
Philippines	62	Computers	Air conditioning, refrigeration, and warm air heating equipment
Tanzania	21	Stationery	Office furniture etc.
TOTAL	6,151	-	-

Purchased Goods and Services accounts for just over a quarter of all GHG emissions for FHI 360 global at 26%. The above table shows the total emissions for this scope 3 category by country in descending order and the top two emitting categories for which money was spent. USEEIO is the database of any product, good, or service used to correlate a spend category with the emissions that result from its purchase.

Table 10. *Employee Commuting emissions breakdown by facility for CY2019*

Country	# Employees	MT CO2e	% Contribution
US	898	1,740	66%
South Africa	94	250	10%
Philippines	49	157	6%
Tunisia	99	145	6%
Tanzania	63	104	4%
All other countries	463	222	8%
TOTAL	**1,666**	**2,617**	**100%**

Employee Commuting contributed 11% to the overall GHG inventory. Above are the top 5 countries with the highest emissions from this scope 3 category. US contributes most significantly to this category due to the high number of employees, longer daily commutes, and high dependence on passenger cars.

Finally, the 24 remaining categories in scope 3 are Capital Goods, Fuel and Energy Related Activities, Waste Generated in Operations and Upstream Transportation & Distribution.

Capital Goods are calculated in the same manner as PG&S, but just allocated to a separate scope 3 category since the investment and spend amounts are typically of a higher magnitude. Fuel and energy related activities accounts for all upstream emissions associated with the fuel extraction, production, and transportation, in addition to the transmission and distribution losses that come from electricity. This category is directly related to the number of fuels consumed in scope 1 and electricity purchased in scope 2. Thus, minimizing diesel consumption or promoting energy efficient technologies within FHI 360 facilities will not only benefit (reduce) scope 1 and scope 2 emissions respectively, but also reduce emissions in this scope 3 category.

Waste Generated in Operations and Upstream Transportation & Distribution were both very minimal for FHI 360 global. It seems that the amount of waste generated is far less than average at less than 1% of the inventory, but this was also a scope 3 category with minimal data availability and visibility. Upstream T&D contributed 2% to overall emissions.

4. Qualitative Assessment of FHI 360's GHG Inventory

4.1 Assets

- ✓ Worked diligently to provide all data required for GHG inventory
- ✓ Was able to provide primary data for scopes 1 and 2 for most countries
- ✓ Strong visibility and communication with all international offices
- ✓ Fulfilled principles of GHG reporting and accounting: Relevance, Completeness, Accuracy

4.2 Limitations

Completion of a GHG inventory marks a great achievement for FHI 360 representing their operational transparency and commitment to measure and manage their environmental impacts. Even still, there are certain areas for improvement to better capture FHI 360's GHG emissions going forward.

Spend-based data (financial data that represents how much FHI 360 has spent on a specific good or service) tends to be lower quality due to the complex economic input-output models. These models tend to overestimate GHG emissions providing a conservative approach for companies who do not have robust data collection systems in areas outside of accounting. In FHI 360's GHG inventory, Upstream Transportation & Distribution exclusively used a spend-based approach. FHI 360 would benefit from some level of distance and mass data for this category. Two other scope 3 categories also reported spend data, but it was necessary for PG&S and minimal for Business Travel.

Modal assumptions for Employee Commuting were determined by SCS for all offices except North Carolina (NC). Employees that commute to this office were assumed to travel via passenger car. This assumption was supported by FHI 360 and their understanding of NC employees. Attempts to collect data on employee commuting patterns for DC, NYC, ATL, and NC should be made for future GHG inventories.

Additional limitations included the varying levels of understanding on GHG inventory analyses among the respondents providing data from domestic and international offices. Furthermore, while the offices included in the assessment account for a majority of 2019 staffing (56%), there was still a significant portion not included in the analysis. Subsequent GHG inventories will help FHI 360 better evaluate the suitability of the sample set of offices and baseline year.

4.3 Assumptions and Exclusions

<u>All Countries</u>

1. All spend-based calculations considered inflation by integrating Consumer Price Index (CPI) figures with spend data provided by FHI 360. CPI Figures were tabulated by U.S. Department of Labor Bureau and Labor Statistics. This step is required since the emissions factor database is based on 2018 US Dollars.
2. Biogenic emissions were assumed to be minimal for FHI 360 and excluded from this GHG inventory.
3. Descriptive data of FHI 360's spend for purchased goods and services was mapped to the appropriate USEEIO category. A separate spreadsheet will be provided to the FHI 360 team which denotes mapping done for all countries' PG&S.
4. International country spend information was typically provided in local currency but then converted to USD based on currency conversion rates from 2019.

5. Employee commuting data for all international countries was determined by the greater FHI 360 team based on knowledge of location and local commuting patterns. Employee commuting for Nigeria was excluded due to lack of data availability.
6. When air travel distances were unknown, it was assumed that routes were less than 1000 km (short haul) as this is the most conservative approach to calculate emissions.
7. An average, global emission factor was applied for hotel nights to calculate emissions from hotel stays where country specific information was not available. If country-specific information was provided, then the emission factor for that specific country was applied if available.

United States

1. Electricity consumption (kWh) was extrapolated to one facility (NYC) for which utility data was not available based on square footage. Descriptive data of FHI 360's spend for purchased goods and services was mapped to the appropriate USEEIO category. Appendix A further denotes this mapping.
2. Travel agency fees were excluded on the basis of materiality.
3. There was no visibility to the mode of transportation used for each logistics expense. Each supplier's headquarters was searched and noted. If the headquarters was domestic to the contiguous United States, truck transport was assumed. If the headquarters was international, air transport was assumed.
4. Routes traveled by various FHI 360 employees were provided for a single month out of the 12-month reporting period.
5. Each route distance was determined by using online calculators assessing air miles.
6. An aggregate measure of distance traveled by airplane was determined for long, medium, and short haul flights. These aggregate figures were annualized taking into consideration that the single month was a heavily traveled month. It was assumed that 6 months had a similar volume of airfare while the other 6 months had airfare at 75%.
7. Emissions per night for hotel stays for US and certain countries were available. Emissions factors for all other countries were aggregated, and an average emissions factor was applied.
8. A calculator was used to calculate distance between residence and office zip codes based on U.S. census data for latitude and longitudes of each zip code.
9. A factor was multiplied to the straight-line distances to account for curvature of roads.
10. An average distance was calculated for those employees who lived in the same zip code as the facility they commuted to.
11. Certain distances between residential and office zip codes were excluded as outliers. (>100 mi)
12. Modal assumptions for each office were supported from available data and surveys that each metroplex had conducted regarding commute behavior of residents.[8]

Mozambique

[8] Regional Commuter Survey Results. Technical Report. Georgia Commute Options Study. Atlanta Regional Commission. July 2020. https://cdn.atlantaregional.org/wp-content/uploads/rcs-c19-followup-2020.pdf

1. A combined country-level GHG inventory was generated rather than facility-specific due to data availability.

South Africa

1. Vehicle fuel for scope 1 was assumed to be gasoline.
2. No data was available for Waste generated in operations.
3. Domestic, Regional, International air travel was equated to short, medium, and long-haul flights, respectively.
4. Employees with an unknown mode of transportation were assumed to be using passenger car.
5. Only total spend was available for Upstream Transportation & Distribution. An 80%-20% split was applied to truck and air, respectively.

Tunisia

1. Mobile fuel consumption for diesel was combined into a single amount rather than broken out by facility.
2. Location of hotel stays was assumed to be within Tunisia.
3. Waste generated was estimated by the FHI 360 team based on the following: “3 Kg/day multiplied by 300 days as an average working days per person”.

Philippines

1. 17,725 km of business travel was excluded since this was done from company vehicles. It was assumed that this distance was included from the fuel consumption in scope 1.
2. Commuting distances were assumed to be round trip due to their magnitude.

Tanzania

1. Purchased electricity data is only available for the country office (Dar es Salaam) and one satellite office (Mwanza). Consumption data for the other two satellite offices was not available and was thus excluded. No estimations were made.
2. A very limited list of purchased goods and services was provided and accounted for in the scope 3 PG&S category.
3. No data was available for Waste generated in operations.

DRC

1. FHI 360 team determined a rate (kWh/$ value) for their utility bills and multiplied this amount by their spend to estimate kWh.

Nepal

1. Total kWh was available for office 1, but not for office 2. Office 2 electricity estimated using proportion of employees to office 1 (6/67) as square footage was not available. Additionally, no grid EF was available for Nepal, so an average of EFs was used as a proxy.
2. 50%-50% split assumed for truck and road transportation.

Nigeria

1. Researched average price of each fuel type from September 2019 and converted to volume of fuel for Nigeria.
2. Employee Commuting was excluded due to lack of data availability.

Thailand

1. Everything not listed under PQC facility in PO_PR 2019 categorized under APRO facility.

Vietnam

1. Total kWh for Hanoi office accounts for actual electricity outside 7AM-6PM on weekdays and an estimate of electricity during 7AM-6PM on weekdays, based on historical costs of the prior office with similar floor area. Total kWh for HCMC office is estimated based on July 2022 utility bills.

4.4 Recommendations

Table 11. *Summary of Recommendations for FHI 360* based on CY2019 GHG Inventory

Recommendation
1. Maintain thorough operational knowledge to successfully complete GHG inventories in consecutive years
2. Promote low-emitting modes of business travel across all operations
3. Initiate internal audits with procurement divisions to maximize sustainable purchases of goods and services
4. Initiate renewable energy generation at all FHI 360 facilities
5. Incentivize carpooling and remote working opportunities for staff

The recommendations highlight the top five meaningful strategies for FHI 360 to reduce its overall carbon footprint based on the hotspot analysis from the CY2019 GHG inventory. Recommendation 1, though void of any potency for emissions reduction, will ensure that FHI 360's keeps its data collection and data management systems as efficient as possible. The quality of data used to calculate a GHG inventory is directly proportional to the quality of the GHG inventory overall. Therefore, FHI 360 should maintain its high level of data quality to ensure that similar, valuable metrics can be generated in the future.

Recommendation 2 acknowledges that due to the business model of FHI 360, there will be a minimum level of business travel required in order to fulfill the mission of the organization. That said, SCS

encourages FHI 360 to explore alternative modes of transportation for FHI 360 employees or supporting airlines that have committed to emissions reductions targets by 2030 or 2040.

Recommendation 3 stems from the enormous contribution of FHI 360's annual expenditures (e.g., scope 3 category Purchased Goods and Services) to the GHG inventory. SCS encourages FHI 360 to conduct an audit against all annual expenditures to ensure that its funds are directed towards sustainable goods and services.

Recommendation 4 addresses a change at the infrastructure level to initiate renewable energy generation at FHI 360 offices. That said, building layout and location of facilities should be considered to maximize solar panel production.

Finally, Recommendation 5 suggests that FHI 360 can incentivize carpooling models or the use of public transportation for its employees (if not already doing so) in order to realize emissions reductions for employee commuting. Working from home for those employees with a flexible schedule could also be implemented to achieve emissions reductions. FHI 360 can consider and deliberate such options.

A comprehensive assessment to identify emissions reductions recommendations for FHI 360 will be conducted starting January 2023.

5. Conclusion

5.1 Conclusion

The base year GHG inventory was established for calendar year 2019 for FHI 360 Results of the GHG inventory are shown in Table 12 and disaggregated by Scope 1, Scope 2, and Scope 3 emissions.

Table 12. *Summary of GHG emissions for FHI 360 global in CY2019.*

Emissions Category	Scope	Greenhouse gas inventory (metric ton CO_2e)
Direct Emissions	Scope 1	2,071
Indirect GHG Emissions from imported energy	Scope 2	3,040
Indirect GHG Emissions from all other sources	Scope 3	18,353
Total GHG emissions	**(Scope 1 + Scope 2 + Scope 3)**	**23,464**

Scope 1 emissions primarily arise from diesel consumption and account for 9% of the full footprint. Scope 2 emissions come from the generation of all purchased electricity and represent 13% of the full footprint. Scope 3 emissions account for the remaining 78% of the total GHG inventory, with Business Travel contributing to 35%.

Based on the results from this comprehensive GHG inventory, it warrants FHI 360 to focus their data collection and efforts in consecutive years towards the key scope 3 categories (e.g., Business Travel, Purchased Goods and Services, Fuel and Energy Related Activities, and Employee Commuting) unless a significant change occurs. These categories appear to be the most material for FHI 360's operations and FHI 360 should prioritize obtaining the highest quality data possible for each of them so that emissions reductions efforts can be codified and prioritized in coming years. The inclusion of additional scope 3 categories exemplifies FHI 360's commitment to a challenging and commendable undertaking. FHI 360 can continue to monitor these categories using the GHG Tool provided by SCS for its internal reporting and documentation knowing that they will likely not contribute greatly to the overall footprint.

Though measuring a company's carbon footprint is only the first step in an ongoing path towards emissions reductions, FHI 360 is now uniquely equipped with a full GHG inventory positioning them as a leader among humanitarian organizations. FHI 360 can use this quantitative analysis base year inventory to guide purchasing and operational decisions in order towards efforts to decrease their carbon footprint going forward.

5.2 GHG Inventory Management

Base Year Recalculation Procedures

SCS will prompt a recalculation of the base year GHG inventory if:

- FHI 360 has any major change in organizational boundaries (i.e., merger, acquisition, divestiture)
- A change or update to GHG calculation methodologies or emissions factors is released
- SCS discovers an error among the calculation which substantially contributes to the results
- SCS will not recalculate the base year GHG inventory to account for changes at the facility level including the opening or closing of FHI 360 facilities.

GHG Inventory Quality Management

FHI 360 must establish and maintain GHG information management procedures that:

- ensure conformity with the principles of this document;
- ensure consistency with the intended use of the GHG inventory;
- provide consistent checks to ensure accuracy and completeness of the GHG inventory;
- identify and address errors and omissions;
- document and archive relevant GHG inventory records, including information management activities and GWPs.

Furthermore, FHI 360 should document their consideration of the following:

- identification and review of the responsibility and authority of those responsible for GHG inventory development;
- identification, implementation and review of appropriate training for members of the inventory development team;
- identification and review of organizational boundaries, GHG sources and sinks;
- selection and review of quantification approaches, including data used for quantification and GHG quantification models that are consistent with the intended use of the GHG inventory;
- review of the application of quantification approaches to ensure consistency across facilities;
- use, maintenance and calibration of measurement equipment (if applicable);
- development and maintenance of a robust data-collection system;
- regular accuracy checks; periodic internal audits and technical reviews;
- periodic review of opportunities to improve information management processes

FHI 360 must establish and maintain procedures for retention and record keeping for this GHG inventory document. By completing all aspects of the above GHG inventory management procedures, FHI 360 will ensure that the GHG inventory is conducted with a high level of confidence, accuracy, and completeness.

Appendix A. Full GHG Inventory Breakdown by Country

CY2019	Subcategory	US	Mozambique	South Africa	Thailand	Tunisia	Philippines	Tanzania	Nepal	Vietnam	Nigeria	DRC	FHI 360 - TOTAL
Scope 1	Mobile Sources	2	305	30	-	84	12	96	16	-	663	33	**1,241**
	Stationary Sources	55	3	-	-	-	-	-	1	-	83	103	**244**
	Refrigeration	13	127	-	-	-	-	4	32	-	409	-	**585**
Scope 2	Purchased Electricity	2,034	34	228	90	54	3	80	23	81	394	19	**3,040**
Scope 3	Purchased Goods & Services	3,259	350	73	64	205	65	21	106	154	1,575	124	**5,996**
	Capital Goods	-	24	-	-	-	-	-	-	-	4	4	**32**
	Fuel and Energy Related Activities	513	73	25	11	26	3	33	6	9	211	34	**944**
	Upstream Transportation & Distribution	531	0.4	6	5	-	-	-	4	-	-	3	**549**
	Waste Generated in Operations	-	3	-	2	1	1	-	0	-	8	2	**17**
	Business Travel	6,768	344	216	206	89	22	133	148	202	48	20	**8,197**
	Employee Commuting	1,740	56	250	100	145	157	104	28	21	-	16	**2,617**
TOTAL		**14,915**	**1,321**	**829**	**477**	**605**	**263**	**470**	**364**	**468**	**3,395**	**358**	**23,464**

Appendix B. FHI 360 Facilities

Table 14. FHI 360 facilities included in CY2019 GHG Inventory

#	Facility ID	Description	US State
1	ATL	Atlanta	GA
2	DC	Washington D.C.	DC
3	NC	North Carolina	NC
4	NYC	New York City	NY
5	PQC	Product Quality and Compliance	NC

Table 15. FHI 360 international facilities included in CY2019 GHG Inventory

#	Facility ID	Description	Country
1	DRC	Country Office	Democratic Republic of the Congo
2	Mozambique	All offices combined into one	Mozambique
3	Nepal - All Offices	Country and Field Offices	Nepal
4	Nigeria - All Offices	All offices combined into one	Nigeria
5	Philippines - Makati	Makati Office	Philippines
6	South Africa	Country Office	South Africa
7	Tanzania - Dar es Salaam	Dar es Salaam Office	Tanzania
8	Tanzania - Iringa	Iringa Office	Tanzania
9	Tanzania - Mwanza	Mwanza Office	Tanzania
10	Tanzania - Tabora	Tabora Office	Tanzania
11	Thailand - APRO	APRO Facility	Thailand
12	Thailand - Participant	Participant	Thailand
13	Thailand - PQC	PQC Facility	Thailand
14	Thailand - UPC Chiangmai	Work from Home Office	Thailand
15	Thailand - UPC Chiangrai	Work from Home Office	Thailand
16	Thailand - UPC Phayao	Work from Home Office	Thailand
17	Thailand - UPC Ubonratchathani	Work from Home Office	Thailand
18	Tunisia - ACEA	ACEA Office	Tunisia
19	Tunisia - Kef	Kef Office	Tunisia
20	Tunisia - Menzah	Menzah Office	Tunisia
21	Tunisia - Sidi Bouzid	Sidi Bouzid Office	Tunisia
22	Tunisia - Tunis	Tunis Office	Tunisia
23	Vietnam - AT&T	A&T Office in Hanoi	Vietnam
24	Vietnam - Hanoi	Hanoi Office	Vietnam
25	Vietnam - HCMC	HCMC Office	Vietnam