Addressing Climate Change and Global Health: Baselining Greenhouse Gas Emissions in the USAID Global Health Supply Chain

Chris Steuer, ICF
Overview

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  - Metrics and Calculations
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- Broader Value Chain
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Background and Context
Background: USAID Climate Strategy

USAID established a target to reduce its operational greenhouse gas (GHG) emissions by 65 percent by FY 2030 from a FY 2008 baseline and to be net-zero by 2050.
- Also working to reduce global supply chain carbon footprint.

GHG Accounting: Emission Scopes and Source Categories

GHG emission inventories account for GHG emissions from different emission sources organized into three scopes.

Scope 3: Upstream Activities
1. Purchased Goods and Services
2. Capital Goods
3. Fuel- and Energy-Related Activities
4. Upstream Transportation and Distribution
5. Waste Generated in Operations
6. Business Travel
7. Employee Commuting
8. Upstream Leased Assets

Scope 2: Reporting Company
9. Purchased Electricity
10. Purchased Steam

Scope 1: Direct
- Company Facility Fuel Use
- Company Vehicle Fuel Use
- Company Facility Fugitive Emissions

Scope 3: Downstream Activities
9. Downstream Transportation and Distribution
10. Processing of Sold Products
11. Use of Sold Products
12. End-of-Life Treatment of Sold Products
13. Downstream Leased Assets
14. Franchises
15. Investments

Federal Agency GHG Accounting

Historically federal agencies have focused on Scope 1 and 2 emissions and a limited group of Scope 3 sources.

Supply Chain GHG Emissions

- 2021 CDP Report, Transparency to Transformation: A Chain Reaction
- Surveyed 154 organizations involved in the CDP Supply Chain Program, representing $4.3 trillion in annual procurement spend
- Found that supply chain emissions are on average 11.4 times greater than operational (Scope 1 and 2) emissions

Executive Order 14057, Supply Chain Sustainability

Executive Order 14057: Catalyzing Clean Energy Industries and Jobs through Federal Sustainability:

- Section 301: Federal Supply Chain Sustainability. Federal supply chains should a Government and economy that services all Americans by…reducing greenhouse gas emissions and building resilience to climate change. Consistent with applicable law, agencies shall pursue procurement strategies to reduce contractor emissions and embodied emissions in products acquired or used in Federal projects.

Disclosure of GHG Emissions and Climate-Related Financial Risk

November 2022 proposed amendment to the Federal Acquisition Regulation (FAR) would require certain suppliers of the US Federal Government to publicly disclose their GHG information, climate-related financial risks, and set science-based emission reduction targets.

<table>
<thead>
<tr>
<th>Federal Contractor Type</th>
<th>Annual Federal Contract Obligation</th>
<th>Proposed Rule Requirements</th>
</tr>
</thead>
</table>
| Major Contractors       | >=$50 million                     |  • Contractors must disclose emissions from Scopes 1 and 2 and relevant Scope 3 categories from the previous fiscal year in alignment with the GHG Protocol Corporate Accounting and Reporting Standard through CDP.  
  • Contractors must address climate risks in alignment with the recommendations of TCFD.  
  • Contractors must validate their emissions reductions targets with the Science Based Targets Initiative (SBTi). |
| Significant Contractors | >=$7.5 million - $50 million      |  • Contractors must disclose emissions from Scopes 1 and 2 from the previous fiscal year in alignment with the GHG Protocol Corporate Accounting and Reporting Standard through CDP. |
| Other Contractors       | <=$7.5 million                    |  • No requirements.          |
Port-to-Port (P2P) Analysis
P2P Analysis

- Account for transportation-related GHG emissions associated with USAID Global Health shipments from USAID custody to in-country port-of-entry.
- Air, land, and sea shipments.
- Falls within Scope 3 Category 4: Upstream Transportation and Distribution
  - Outbound transportation and distribution services that are purchased by the reporting entity.
Data Collection and Cleansing
Data Collection Methodology

- **Shipments:** USAID GH made shipments by air, land, and sea in 2019
- **Shipment weight:** Total shipment weight exceeded 43,000 tonnes
- **Shipment volume:** Available for sea shipments
- **Route Information:** Over 700 unique shipment routes with origin and destination locations.
- **Refrigerated or Non-refrigerated**
Methodology Selection

The Corporate Value Chain (Scope 3) Accounting and Reporting Standard provides three methods to account for transportation-related emissions—fuel based, distance-based, and spend-based.

<table>
<thead>
<tr>
<th>Minimum Boundary</th>
<th>Upstream Type</th>
<th>Calculation Methods</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scope 1 and 2 emissions of purchased products.</td>
<td>Transportation • Air transport • Rail transport • Road transport • Marine transport</td>
<td><strong>Fuel-Based Method:</strong> Determine the amount of fuel consumed.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Distance-Based Method:</strong> Determine the mass, distance, and mode of each shipment.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Spend-Based Method:</strong> Determine amount of money spent on each mode of business travel.</td>
</tr>
<tr>
<td>Distribution</td>
<td>Site-Specific Method: Site-specific fuel, electricity, and fugitive emissions data.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Average-Data Method: Estimate emissions for each distribution activity, based on average data.</td>
<td></td>
</tr>
</tbody>
</table>
Shipping Distances

Shipment dataset included origin-destination information for each shipment, but did not include travel distances.

<table>
<thead>
<tr>
<th>Shipment Mode</th>
<th>Distance Calculations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air</td>
<td>Applied the U.S. Department of Transportation (DOT) Statistics Inter-Airport Distance database to estimate flight distances by airport code for over 9,500 flights. ¹</td>
</tr>
<tr>
<td>Sea</td>
<td>Estimated shipping distance using Shipping Distance Calculator. ²</td>
</tr>
<tr>
<td>Land</td>
<td>Estimated shipping distance using Google Maps.³</td>
</tr>
</tbody>
</table>

Sources:
1 - https://www.transstats.bts.gov/Distance.aspx
2 - http://www.shiptrafic.net/2001/05/sea-distances-calculator.html
3 - https://www.google.com/maps
# Data Cleansing and Considerations

<table>
<thead>
<tr>
<th>Shipment Mode</th>
<th>Distance Calculations</th>
</tr>
</thead>
</table>
| Air           | - DOT dataset accounted for 75% of flights.  
               | - Remaining flights included 395 unique flight paths. Of which 55 accounted for 80% of remaining shipment weight. Estimated distance using air miles calculator.  
               | - Applied average distance by product type to remaining flights. |
| Sea           | - Identified 728 unique sea shipment routes.  
               | - 273 accounted for 97% of shipped product weight.  
               | - Remainder were estimated using average shipping distance by product weight. |
| Land          | - Approximately 200 shipments occurred over land.  
               | - 100% of shipping distances calculated using Google Maps. |
Metrics and Calculations
Air Freight Methodology

- Applied UK Department for Business, Energy & Industrial Strategy emission factors (kg GHG/tonne-km) to flights by flight length.
- 95% of flights were long-haul flights.

<table>
<thead>
<tr>
<th>Length</th>
<th>KgCO₂e/Tonne-Km</th>
<th>KgCH₄/Tonne-Km</th>
<th>KgN₂O/Tonne-Km</th>
<th>KgCO₂e/Tonne-Km</th>
</tr>
</thead>
<tbody>
<tr>
<td>Short Flights (&lt;460 Kms)</td>
<td>2.35236</td>
<td>0.00188</td>
<td>0.02226</td>
<td>2.3765</td>
</tr>
<tr>
<td>Medium Flights (&gt;460 &amp; &lt;3,700 Kms)</td>
<td>1.70568</td>
<td>0.00008</td>
<td>0.01141</td>
<td>1.71717</td>
</tr>
<tr>
<td>Long Flights (≥3,700 Kms)</td>
<td>0.53358</td>
<td>0.00004</td>
<td>0.00505</td>
<td>0.53867</td>
</tr>
</tbody>
</table>

Sea Freight Methodology

- Aligned shipment routes with trade lane emission factors provided in BSR’s 2019 Global Container Shipping Trade Lane Emission Factors report.

<table>
<thead>
<tr>
<th>Trade Lanes</th>
<th>2019 TTW CO₂ Emission Factors (g CO₂ per TEU Km)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Dry</td>
</tr>
<tr>
<td>Asia to-from Africa</td>
<td>47.1</td>
</tr>
<tr>
<td>Asia to-from Mediterranean/Black Sea</td>
<td>31.8</td>
</tr>
<tr>
<td>Asia to-from Middle East/India</td>
<td>35.5</td>
</tr>
<tr>
<td>Asia to-from North America East Coast/Gulf</td>
<td>37.9</td>
</tr>
<tr>
<td>Asia to-from North America West Coast</td>
<td>42.2</td>
</tr>
<tr>
<td>Asia to-from North Europe</td>
<td>26.7</td>
</tr>
</tbody>
</table>

Land Freight Methodology

- Applied UK Department for Business, Energy & Industrial Strategy emission factors (kg GHG/tonne-km) for heavy goods vehicles.

<table>
<thead>
<tr>
<th>Activity</th>
<th>Type</th>
<th>% Laden</th>
<th>KgCO₂/Tonne-Km</th>
<th>KgCH₄/Tonne-Km</th>
<th>KgN₂O/Tonne-Km</th>
<th>KgCO₂e/Tonne-Km</th>
</tr>
</thead>
<tbody>
<tr>
<td>HGV</td>
<td>All HGVs</td>
<td>Average</td>
<td>0.10580</td>
<td>0.00002</td>
<td>0.00167</td>
<td>0.10749</td>
</tr>
<tr>
<td>HGV Refrigerated</td>
<td>All HGVs</td>
<td>Average</td>
<td>0.12419</td>
<td>0.00002</td>
<td>0.00167</td>
<td>0.12588</td>
</tr>
</tbody>
</table>


Source: USAID Flickr, Available under Creative Commons, BY-NC 2.0
Assumptions and Proxies
## Assumptions and Proxies

| Fuel Data                                      | Preferred methodologies for estimating transport GHG emissions rely on fuel use.  
|                                               | Used distance-based methods since fuel data were unavailable. |
| Distances                                      | Actual distance traveled was unavailable.  
|                                               | Distance estimates are based on origin-destination information and average travel distances. |
| Emission Factors                               | Emission factors are based on average emissions by mode and do not reflect the actual characteristics (e.g., combustion efficiency) of individual vessels, aircraft, or vehicles. |
Preliminary Findings
Preliminary Findings

- While activity-based (e.g., mass-distance) emission estimates have inherent uncertainties, the estimates can still provide valuable insights into the scale of shipping-related emission relative to other sources.
- Moving freight by air is significantly more emission intensive than moving freight by sea.
- Efforts such as those by the International Maritime Organization to collect vessel fuel consumption via the Global Integrated Shipping Information System may improve access to fuel consumption data.

Source: Illustrative based on UK DEFRA emission factors for long-haul freight flights (0.649 kgCO2/tonne.km) and container ships (0.016 kgCO2/tonne.km).
Broader Value Chain
Regional Distribution Centers
Category 4: Upstream Transportation and Distribution

- USAID GH is assessing Scope 1 and 2 emissions associated with warehousing products at Regional Distribution Centers (RDCs).
  - Belgium, Dubai, South Africa
- Obtain primary data (e.g., fuel and electricity consumption) directly from RDCs.
- Considering use of offsets and energy attribute certificates.
- Calculate emissions using Intergovernmental Panel on Climate Change (IPCC) and other publicly-available emission factors.
- Allocate emissions to USAID GH based on shared warehouse space.
Upstream Pharmaceutical Manufacturing
Category 1: Purchased Goods and Services

- Emissions associated with the extraction, production and transportation of goods and services purchased or acquired by USAID.
- Engaging product suppliers to understand their efforts to account for GHGs and broader sustainability efforts.
Primary and Secondary Data

Four methods are available to account for Scope 3 emissions from Category 1: Purchased Goods and Services: 1) supplier-specific, 2) hybrid, 3) average data, and 4) spend-based. These methods use either primary or secondary data.

### Primary Data
Data provided directly by suppliers related to specific activities (e.g., emissions, fuel consumption) in the reporting company's value chain.

### Secondary Data
Financial data, units, mass, or other proxy data on purchases or other industry average data (e.g., published datasets, industry association data).

#### Supplier-specific method
- Collect product-level cradle-to-gate GHG inventory data from suppliers.

#### Hybrid method
- Collect allocated Scope 1 and 2 emissions data directly from suppliers.
- Calculate upstream emissions of goods and services from supplier activity data.
- Use secondary data to calculate upstream emissions wherever supplier-specific data is not available.

#### Average-data method
- Estimate emissions for goods and services by collecting product information (e.g., mass, units) and industry-average emission factors.

#### Spend-based method
- Estimate emissions by collecting product spend data and industry-average emission factors.


The European Union’s Corporate Sustainability Reporting Directive (CSRD) requires companies to disclose the percentage of primary data used to calculate scope 3 emissions.
GHGs from the Supplier’s Perspective

- A product carbon footprint (PCF) considers cradle-to-gate emissions associated with material acquisition and pre-processing, production, distribution and storage, product use, and end-of-life.

- A life-cycle GHG analysis (LCA) considers the full life-cycle (cradle-to-grave) GHGs of a product including material acquisition and pre-processing, production, distribution and storage, product use, and end-of-life.

- Steps included within LCAs and PCFs map to emission source categories within each scope of a corporate GHG emission inventory.

Illustration of a product’s (Product X) life-cycle GHGs attributed to scopes within a supplier’s GHG inventory. Adapted by ICF from the Product Life-Cycle Accounting and Reporting Standard, Figure 1.
Opportunities for Mitigation
Opportunities for Mitigation

- **Category 1: Purchased Goods and Services**
  - Continue to increase visibility into GHG emissions across the value chain
  - Encourage operational improvements (e.g., energy efficiency > electrification > renewable energy)
  - Understand regional regulatory context
    - European Union, Corporate Sustainability Reporting Directive (CSRD)
    - India, Business Responsibility and Sustainability Report (BRSR)
    - United States, SEC Proposed on the Enhancement and Standardization of Climate-Related Disclosures

- **Category 4: Upstream Transportation and Distribution**
  - Shipping by sea rather than air where operationally viable.
  - Reduce freight weight (e.g., reduced packaging) and encourage low-carbon alternatives
  - Continue to move toward collecting primary data from vessels