# Greenhouse Gas (GHG) Supplier Training

June 2025

# KLA Climate Goals

KLA strives to reduce the carbon emissions from our operations and encourage emissions reductions in our supply chain.

In 2023, we submitted our climate goals to the Science Based Targets initiative (SBTi), including a quantifiable Scope 3 reduction target alongside our existing 2030 Scope 1 and Scope 2 emissions goals. In 2024, our near-term, science-based targets were approved by SBTi.

Below are our SBTi approved near-term science-based targets:

- Reduce absolute Scope 1 and 2 emissions by 50% by 2030 from our 2021 baseline
- Reduce Scope 3 GHG emissions from the use of sold products 52% per billion transistors inspected, measured, or processed within the same timeframe

In addition, we have established the following climate-related goals:

- Achieve net-zero Scope 1 and Scope 2 emissions by 2050
- Use 100% renewable electricity across our global operations by 2030
- Report climate-related governance, strategy, risk management, metrics and targets to our stakeholders annually, following recommendations of the Task Force on Climate-Related Financial Disclosures (TCFD)

To address emissions in our supply chain, we work with suppliers representing the highest-impact emissions to set their own climate goals.

We will continue to disclose our progress toward these climate goals and will remain transparent about our energy consumption and carbon footprint.

> "We're proud to announce our near-term, science-based targets are SBTi-approved. This milestone reinforces our commitment to climate and energy action, paving the way for a sustainable future."
>
> *— Rick Wallace*
> *President and Chief Executive Officer*

# Agenda

- KLA's Supplier Engagement Program & Supplier Expectations
- Section 1: GHG Inventory Overview
- Section 2: Understanding your Emission Sources
- Section 3: Incorporating Emission Factors & Calculations
- Section 4: Methodology Tacking and Data Quality
- Section 5: Rolling up Results
- Section 6: Emissions Reduction Opportunities & Supporting Resources
- Section 7: Next Steps and QA
- Section 8: Appendix

**Learning Objectives:**

Understand KLA's supplier expectations

Identify and categorize your GHG emissions by Scope

Apply common calculation methodologies with confidence

Understand emission factors, and how to apply them

Clearly report summarized results for energy and emissions

# KLA's Supplier Expectations

**Step 1: Track emissions:** Develop a greenhouse gas emissions (GHG) inventory of your annual emissions from across all your owned and operated facilities and fleet (representing scope 1 and 2).
*Note: Tracking scope 3 value chain emissions is highly encouraged. Please start with scope 1 & 2 if building a GHG inventory is new to your organization.*

**Step 2: Set a science-based target:** Establish a baseline for your annual emissions and set a reduction target in line with science-based criteria from SBTi. It does not need to be verified by SBTi.

**Step 3: Begin reducing your emissions:** Start implementing projects and initiatives that reduce your emissions in line with your reduction goal (e.g. energy efficiency, sourcing renewable energy, electrifying fleet, etc.).

**Step 4: Track progress annually:** Report your progress through the CDP each year. (ongoing)

# Why Build a GHG Inventory– Stakeholder Expectations

## Investors

Investors are looking to consider climate risk and opportunities as they make decisions.

## Customers

Large brand retailers, such as Walmart, Target, and HP, are demanding insights into their upstream Scope 3 emissions and engaging with their supply chain to set emission targets.

## Governments

Government agencies in certain jurisdictions are requiring GHG emissions disclosure.

## Employees

Integrating GHG performance and good governance into business-as-usual can help attract the next generation of talent.

## Consumers

Consumer want to purchase from companies who are looking to minimize their climate impact.

**Companies are facing a new operating environment, one in which stakeholder expectations of business have shifted and traditional corporate social responsibility engagement approaches are inadequate. As a result, leaders are rethinking how business drives change in the world.**

# GHG Inventory

## Value of a GHG Inventory

GHG inventories help quantify, understand, and assess emissions associated with a company's activities. Companies must be able to understand and manage GHG risks if they are to ensure long-term success in a competitive business environment.

- **Save money and improve energy efficiency:** Measuring emissions helps identify where efficiency and reduction opportunities lie, and thus, operational and energy cost savings.
- **Manage risks:** Measuring emissions helps prepare for risks (e.g., energy cost increases, new regulations, evolving customer expectations).
- **Develop an effective corporate strategy:** Use inventory to establish performance goals, develop business continuity planning, location strategy, and operational improvements.
- **Build competitive advantage:** GHG inventories help identify opportunities to re-design business operations/processes, implement technological innovations, improve products & services, and build sustainable competitive advantage.
- **Protect and build your reputation:** Demonstrating leadership and environmental stewardship are integral to maintaining your social license to operate.

# KLA Supplier Climate Maturity Matrix (CMM) 2025

## A supplier's climate maturity score informs their performance and engagement

| | GHG Inventory | Climate Reporting | Target setting |
|---|---|---|---|
| **No Data- 0** | • No emissions data | • No CDP reporting | • No climate commitments |
| **Low-1** | • Scope 1 & 2 emissions only (no scope 3 or limited categories) | • Reported to CDP | • Some limited targets set (e.g., scope 2 only, or energy efficiency targets) |
| **Medium-2** | • Scope 1 and 2 emissions + relevant scope 3 categories | • Partial response CDP SC* with some relevant data points | • Comprehensive scope 1 and 2 targets, and may include scope 3, but not aligned with SBT criteria** |
| **High- 3** | • 3rd party verified scope 1 and 2 emissions; + relevant scope 3 categories | • Complete CDP SC* response with all relevant data points | • Has set SBT-aligned goals or committed or set SBTi goals** |

Weighted average score:
**0=** No Data
**1 - 1.9** = Low
**2 - 2.9** = Medium
**3** = High

**Methodology:**
Suppliers are evaluated against the three categories GHG inventory, climate reporting and target setting and based on the three scores given a weighted average score.

# Section 1: GHG Inventory Overview

# Introduction to Greenhouse Gas Emissions (GHGs)

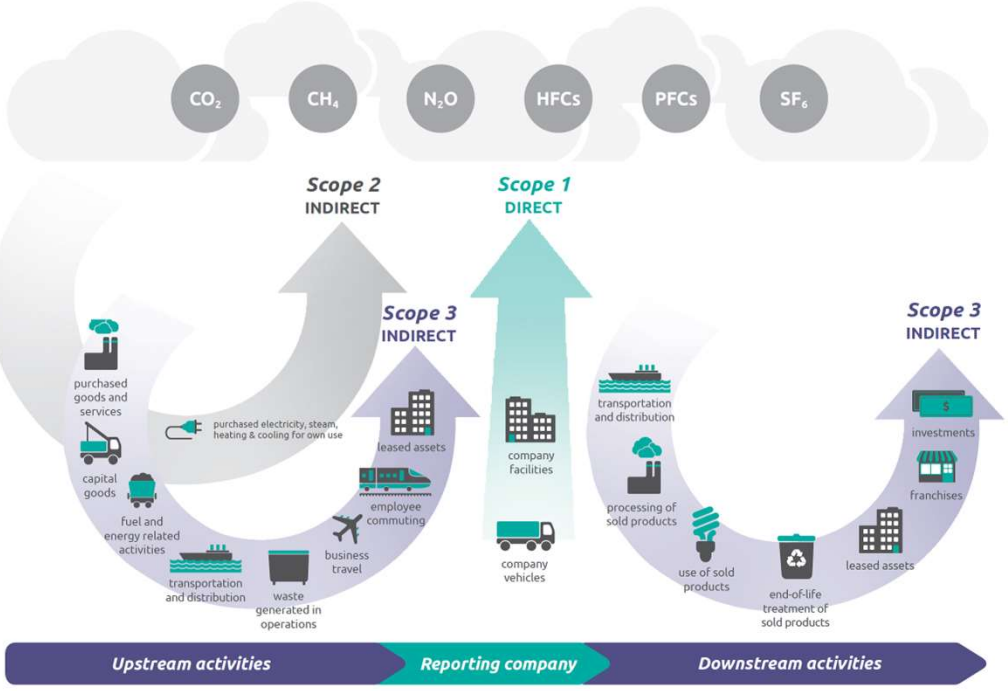
- Greenhouse gases trap heat from the sun and warm the planet's surface
- Primary human-derived sources of GHG emissions are the burning of fossil fuels for electricity, heat and transportation


- Greenhouse gases are composed of 7 types of gases:
  - CO2 (Carbon Dioxide)
  - CH4 (Methane)
  - N2O (Nitrous Oxide)
  - SF6 (Sulfur hexafluoride)
  - NF3 (Nitrogen trifluoride)
  - HFCs (Hydrofluorocarbons)
  - PFCs (Perfluorocarbons)
- GHG emissions are often tracked in terms of CO2e (CO2 equivalent), which is a factor that incorporates the seven gases' impacts into a single figure (CO2 is used as the primary term as it's the largest source of the seven).

Overview of Greenhouse Gases | US EPA

# Greenhouse Gas (GHG) Emissions Boundaries

## GHG emissions are broken down into three scopes:




GHG Protocol

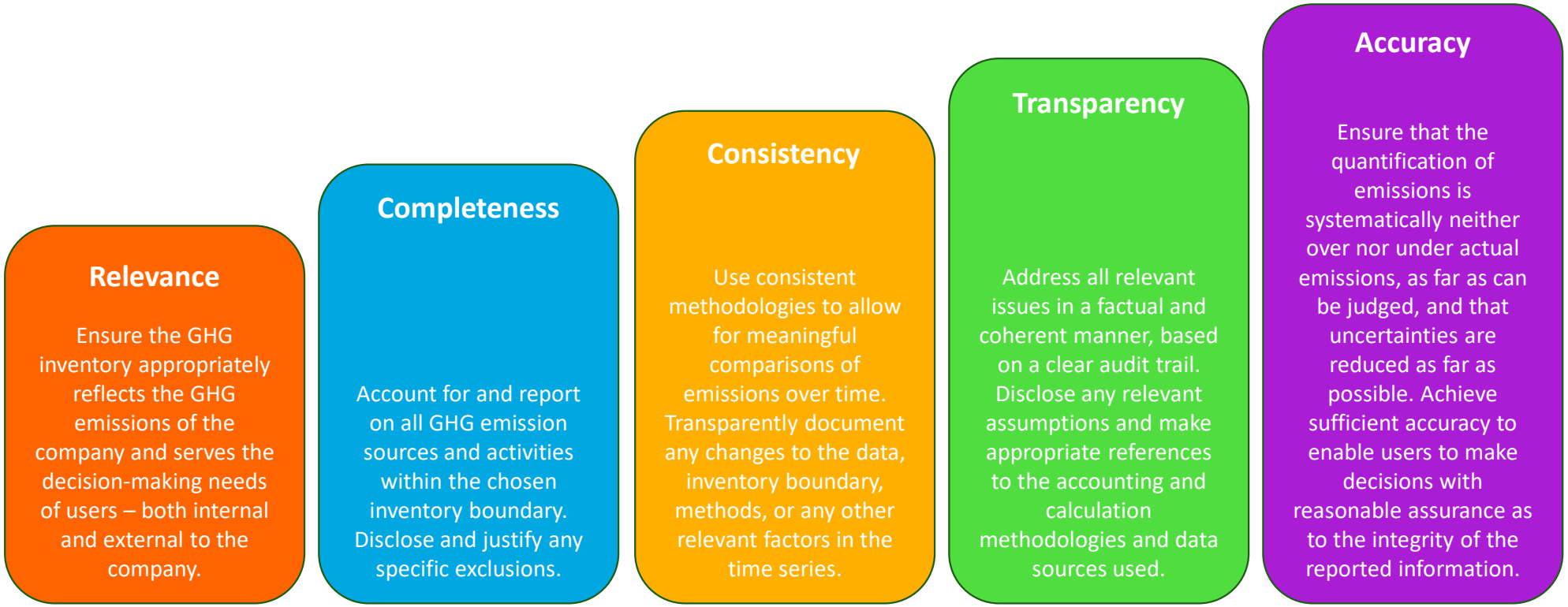
**Scope 1:** Direct emissions from fuel/energy used across *owned or controlled* operations or from refrigerant leaks.

**Scope 2:** Indirect emissions from *purchased* electricity, heating, steam or cooling that is used across owned or controlled operations.

**Scope 3:** All other indirect emissions from your businesses' value chain (raw materials, contract manufacturing, transportation & distribution, use of our products, etc.). There are **15** subcategories to help calculation and reporting:

# GHG Accounting Principles (GHG Protocol)

The principles from the globally recognized GHG Protocol should be followed as you develop your GHG inventory. They help to ensure that you create a comprehensive and accurate estimation of your inventory and a repeatable process for annual tracking.



# Identifying Roles and Stakeholders to Build Inventory

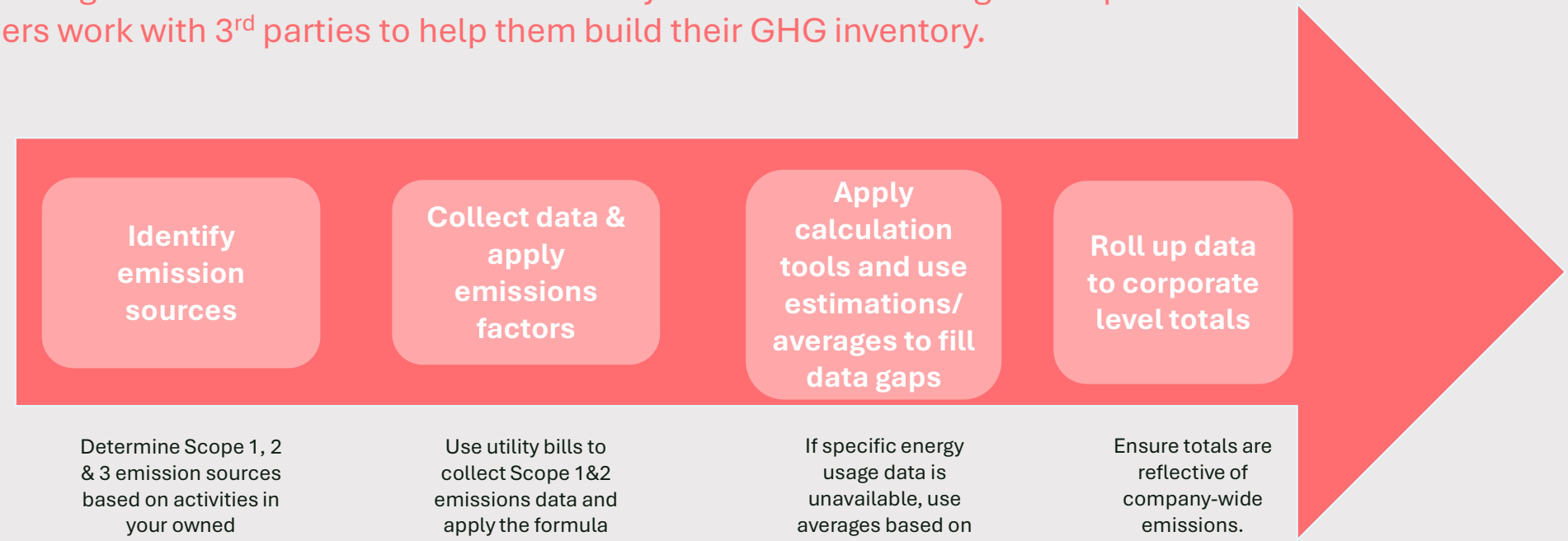
It is best practice to have one person in your organization manage the GHG inventory development. This person will work with different business functions across the organization to collect and manage the data.

| Inventory Step & Responsibility | Business Function |
|---|---|
| 1. Define boundaries and methodology (Org/Op boundaries, scopes, updates) | Sustainability, Legal, EHS |
| 2. Collect data across all scopes (Fuel, electricity, suppliers, logistics, etc.) | Facilities, Procurement, Supply Chain, Finance |
| 3. Calculate and assure data quality (Apply emission factors, QA/QC, tool management) | Sustainability, Data Analytics, Consultants |
| 4. Review, validate, and report (Internal validation, CDP/SEC/ESG reports) | Sustainability, Legal, Investor Relations |
| 5. Use inventory insights for action (Target tracking, strategy alignment, engagement) | Strategy, Operations, Sustainability |

EPA Inventory Management Plan Guidance

# High Level Overview: Steps to Identify and Calculate GHG Emissions

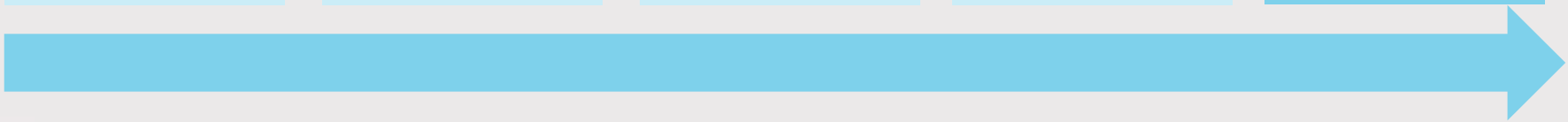
Some organizations build their GHG inventory 100% in-house using online public tools and others work with 3rd parties to help them build their GHG inventory.




Scopes 1, 2 and 3 Emissions Inventorying and Guidance | US EPA

# Example of a Data Collection Timeline

| 2-4 Weeks | 4-10 Weeks | 4 Weeks | 1-2 Weeks | |
|---|---|---|---|---|
| Identify potential data owners and send out first request<br><br>Allow for some time to respond or set up a call to discuss! | Work with first contact to find the right data, or right point of contact.[13]<br><br>Record process and data owners for next year! | Review data for completeness, quality, and gaps. Make assumptions, as necessary.<br><br>Record gaps in an inventory management plan! | Store collected data in a centralized location for easy access and calculation. | **Ready for Calculation** |



# Supplier Inventory Development: In-House vs. Consultant Support

Tailoring the Approach Based on Inventory Complexity and Internal Capacity

| Approach | Pros | Cons |
|---|---|---|
| **In-House** | • Greater control and integration with internal systems<br>• Cost-effective if internal expertise exists<br>• Builds internal GHG knowledge | • Resource-intensive<br>• Requires GHG accounting expertise<br>• May extend timeline if team is bandwidth-constrained |
| **Consultant Support** | • Access to expertise and streamlined methodology<br>• Faster turnaround<br>• Credibility with third-party reviewers or customers | • Higher cost<br>• Less direct control<br>• May require onboarding to company-specific context |

# Section 2: Understanding your Emission Sources and data collection

LG0

# Common Sources of GHG Emissions

| Your Own Operations | | Your Value Chain | |
|---|---|---|---|
| **Scope 1** | **Scope 2** | **Scope 3 – upstream** | **Scope 3 - downstream** |
| • Fuels used in operations (Natural gas, fuel oil, diesel, gasoline, propane, etc.)<br>• Refrigerants and process gases<br>• Mobile fuels used in vehicles (Gasoline, diesel, etc.)<br>• Think "*Is my company directly burning fuel or releasing gases from sources we own*"? | • Purchased utilities:<br>  ○ Electricity<br>  ○ Steam/heat<br>  ○ Chilled water | 1. Purchased goods and services<br>2. Capital goods<br>3. Fuel and Energy Related Activities<br>4. Upstream transportation and distribution<br>5. Waste generated from operations<br>6. Business travel<br>7. Employee commuting<br>8. Upstream leased assets | 9. Downstream transportation and distribution<br>10. Processing of sold products<br>11. Use of sold products<br>12. End-of-life treatment of sold products<br>13. Downstream leased assets<br>14. Franchises<br>15. Investments |

**Note:** Please only report to Scope 1, 2 and 3 emissions that are relevant to your operations.

Standards & Guidance | GHG Protocol

## Slide 17

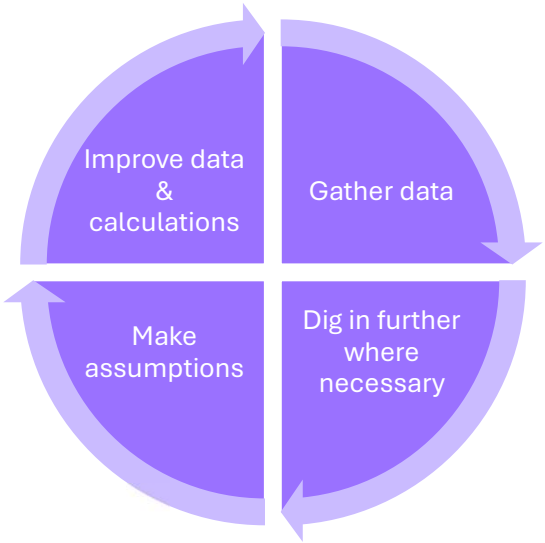
**LG0** Should add some slides on assumptions when you dont have data
Lukas Gutierrez, 2025-05-20T18:45:56.003

**KO0 0** [@Lukas Gutierrez] checking to see if those slides on assumptions were added?
Kathleen O'Melinn, 2025-06-18T18:46:07.795

**LG0 1** Added!
Lukas Gutierrez, 2025-06-26T15:50:00.376

# Data Quality

When developing your GHG inventory, data collected in the early years is often of lower quality, with the expectation that it will improve over time as your methodologies and processes are refined within your organization.




| Categories | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 |
|---|---|---|---|---|---|
| 1 | | | | | |
| 2 | | | | | |
| 3 | | | | | |
| 4 | | | | | |
| 5 | | | | | |
| 6 | | | | | |
| 7 | | | | | |
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| 9 | | | | | |
| 10 | | | | | |
| 11 | | | | | |
| 12 | | | | | |
| 13 | | | | | |
| 14 | | | | | |
| 15 | | | | | |

**Specific Method** (e.g. supplier-specific method, fuel-based method)
**Average Method** (e.g. average-data method, spend-based method)
**Lack of Data**, cannot report
**Not Relevant**

Anthesis

# Data Collection

## Scopes 1-2

Since we are looking primarily for utility provider data (therms of natural gas or kwh of electricity), you will need to collect **utility bills** for all your sites for the **entire** reporting year.

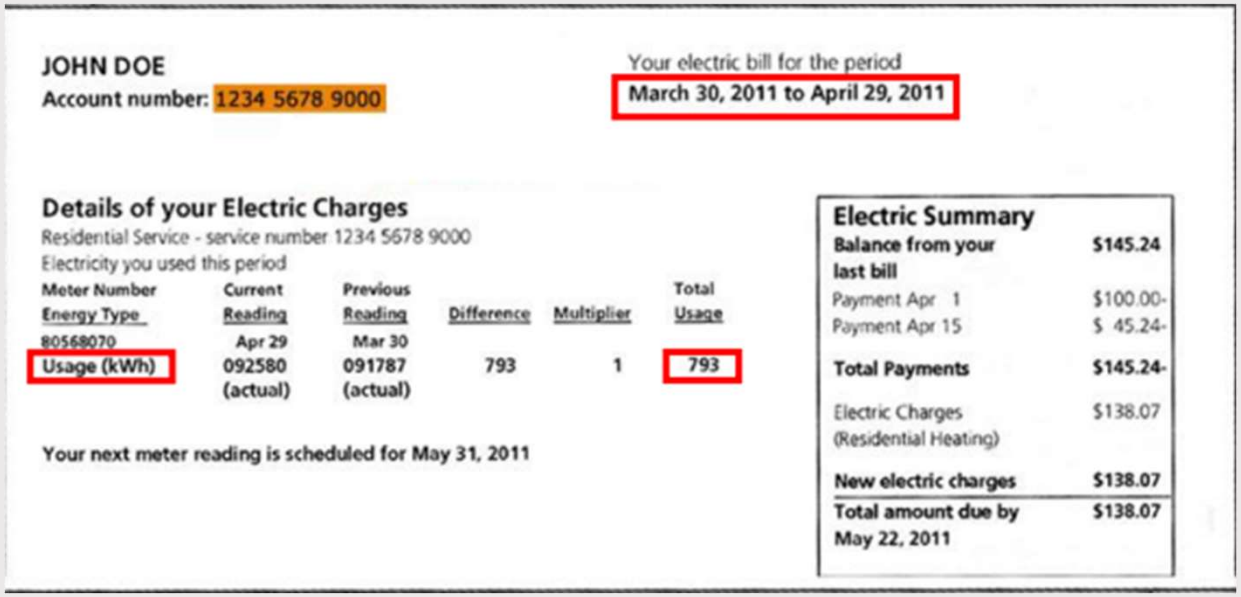
This hierarchy can be applied to other scope 1 and 2 emission sources besides natural gas and electricity

### When primary utility data is unavailable, there are three options:

1. **Property owner/manager (Proration)**: Collect building-wide data from your landlord and then prorate for your office, based on area.
2. **Organization-specific metrics**: You can create an internal energy intensity metric based on your other sites' data. This also includes gap-filling for a site if you are missing some months of the year.
3. **Industry Benchmarks**: There are publicly-available average intensities for energy consumption you can apply to your sites.

# Example Invoice – Will look different depending on Data Category

Here, we are looking at kWh for the period of March 30 - April 29. Where possible, this information should be aggregated into a spreadsheet by month, and ensure there are no monthly gaps



**JOHN DOE**
**Account number: 1234 5678 9000**

Your electric bill for the period
**March 30, 2011 to April 29, 2011**

**Details of your Electric Charges**
Residential Service - service number 1234 5678 9000
Electricity you used this period

| Meter Number / Energy Type | Current Reading | Previous Reading | Difference | Multiplier | Total Usage |
|---|---|---|---|---|---|
| 80568070 | Apr 29 | Mar 30 | | | |
| Usage (kWh) | 092580 (actual) | 091787 (actual) | 793 | 1 | 793 |

**Your next meter reading is scheduled for May 31, 2011**

**Electric Summary**

| | |
|---|---|
| **Balance from your last bill** | **$145.24** |
| Payment Apr 1 | $100.00- |
| Payment Apr 15 | $ 45.24- |
| **Total Payments** | **$145.24-** |
| Electric Charges (Residential Heating) | $138.07 |
| **New electric charges** | **$138.07** |
| **Total amount due by May 22, 2011** | **$138.07** |

# Things to Keep in Mind When Planning Your Data Collection Process

✓Data Collection Frequency: Aim to collect and review GHG data on a yearly basis to maintain consistency and align with CDP reporting cycles.

✓Prioritize High-Impact Sites: If full data coverage isn't feasible, focus on facilities or operations with the highest energy use or emissions to ensure the most meaningful impact on your GHG assessment.

✓Quality Assurance & Quality Control (QA/QC): Implement an internal validation process to catch errors early. When possible, pursue third-party verification to enhance credibility.

✓Document Assumptions and Methodologies: Keep a clear record of data sources, emission factors, and assumptions used. This supports transparency, enables reproducibility, and simplifies assurance reviews.

# Use Estimations/ Averages to Fill Data Gaps

**Guidance from GHG Protocol**: Emission estimates are acceptable if there is transparency regarding the estimation approach, and the data used for the analysis are adequate to support the objectives of the inventory. Be sure to record all estimates used in your IMP.

**Estimation methods:**

- **Property owner/manager (Proration)**: Multiply total building consumption by your share (%) of building's total area. This method still requires data collection form landlord.
- **Organization-specific metrics**: Use internal operational data (e.g., headcount, production output, or fleet mileage) to estimate energy or fuel use based on known historical patterns. For example, multiply historical energy use per employee by current headcount. This method requires access to internal metrics and past utility or fuel data.
- **Industry Benchmarks**: Apply average energy or emissions intensity values from your sector to your own operations when internal data isn't available. For example, you might multiply industry-average energy use per ft² by your facility's total square footage. This is a practical fallback when site-level data is missing.


**Additional Resources:**

- "How to collect and estimate activity data for your GHG inventory" **Article**

# Section 3: Incorporating Emission Factors & Calculations

# Emission Calculation Standard Formula

Sources of emissions factors can be found in the previous slides and in the Appendix.

**GHG Emissions in $CO_2e$** = **Activity Data** x **Emission Factor (EF)** x **Global Warming Potential (GWP)**

- By convention, express $CO_2e$ in metric tons
- Different GHGs cause different levels of warming
- $CO_2e$ standardizes the amount of warming relative to $CO_2$

Example data types:
- Fuel used/purchased
- Dollars spent
- Distance traveled
- Units sold
- kWh of electricity consumed/purchased

Emissions per relevant unit (i.e., per mile traveled, per dollar spent)
- Ex: 2 kg $CO_2e$/mile
- Ex: 4 g $CH_4$/kWh

- How much a gas warms the atmosphere relative to $CO_2$
- If EFs are already in $CO_2e$ per unit, GWP is not needed
- If the EF is not in $CO_2e$, GWP is needed
- See IPCC reports for GWP values

# Emissions Factors

Emissions factors provide a mechanism to estimate the number of emissions that result from a specific activity or process.

**Physical activity factors (Scope 1 & 2):** Most commonly is expressed as a quantity of $CO_2e$ emitted from a specific energy source (e.g. MT $CO_2e$ per mmBTU of natural gas) or quantity of $CO_2e$ emitted associate with purchasing electricity in a specific location (e.g. MT $CO_2e$ per MWh electricity in Vietnam)

**Environmentally-extended input output (EEIO – Scope 3):** EEIO models estimate energy use and/or GHG emissions resulting from the production and upstream supply chain activities of different sectors and products within an economy. They are derived by allocating national GHG emissions to groups of finished products based on economic flows between industry sectors and expressed as kg $CO_2e$/$ spend.

**Emissions Factor Sources:** Choosing a reliable source for emissions factors is critical to ensure calculation accuracy. Consider utilizing the sources below.

**Equation for calculating Scope 1&2 emissions**

$$\text{Metric Tons } CO_2 = \text{electricity use (MWh)} \times \text{emissions factor } \left(\frac{\text{metric tons CO2}}{\text{MWh}}\right)$$

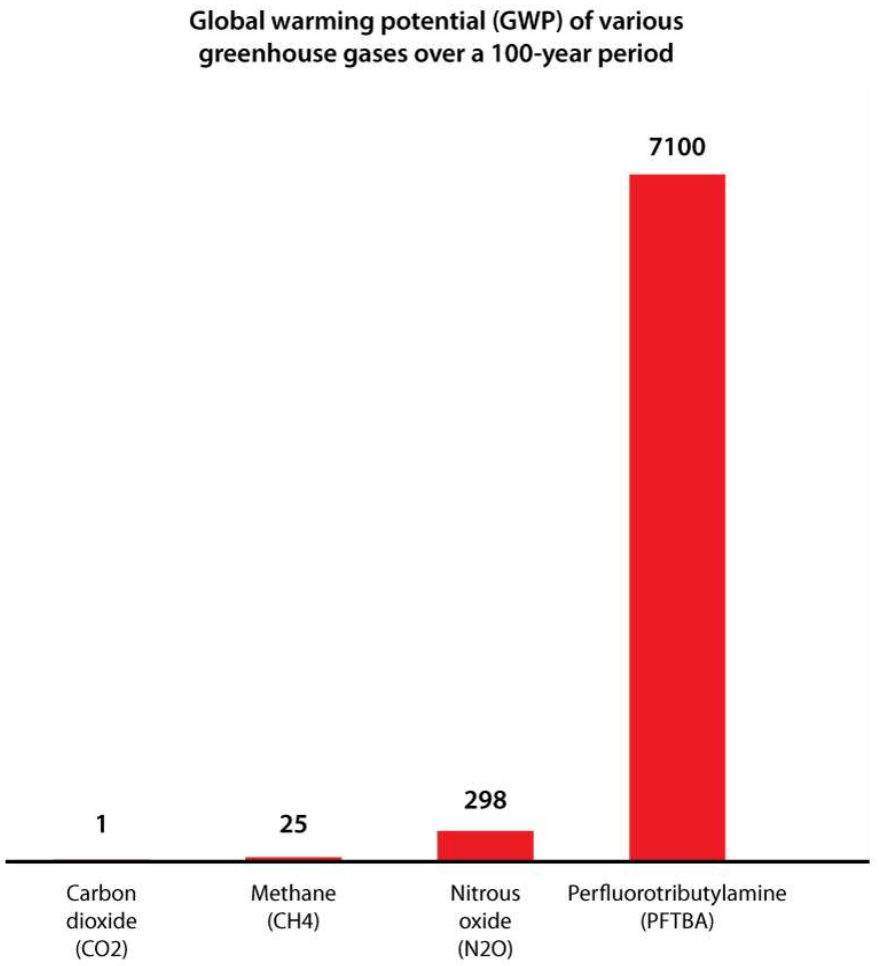
- Metric Tons $CO_2$: Total Scope 1&2 emissions
- electricity use (MWh): Derived from utility bills or estimated based on square footage
- emissions factor: Sourced from:
  - Government publications (US EPA eGRID and IEA Fuel and Country)
  - Licensed 3rd party databases (Ecoinvent)
  - Peer-reviewed studies for product-specific factors

United States EPA GHG Emissions Factors Hub  United Kingdom Department of Energy Emissions Factors

# Global Warming Potentials

- What is Global Warming Potential (GWP)?
  - GWP is a metric developed by the IPCC to compare how much heat a greenhouse gas traps in the atmosphere over a specific time period (typically 100 years), relative to $CO_2$.
  - By definition, $CO_2$ has a GWP of 1. Other gases, like $CH_4$ (methane) and $N_2O$ (nitrous oxide), have higher GWPs because they trap more heat per molecule.
- Why Normalize to $CO_2e$?
  - GHGs differ in potency — GWP allows us to convert all emissions into a common unit: carbon dioxide equivalent ($CO_2e$).
  - This makes it possible to add up total emissions across gases and compare sources consistently.

IPCC Global Warming Potential Values




By Wjfox2005 - Own work, CC BY-SA 3.0, https://commons.wikimedia.org/w/index.php?curid=32658369

# Global Warming Potentials

- Check Your Emission Factors:
  - Some sources (e.g., EPA eGRID, DEFRA) already provide data in $CO_2e$. Others require manual application of GWP values to gas-specific data (e.g., kg $CH_4$ or $N_2O$).
  - Misidentifying this can result in significant over- or underestimation.
- Which GWP Set?
  - GWP values are updated in IPCC's Assessment Reports (AR4, AR5, AR6) as science evolves.
  - Use a consistent GWP set across your inventory and clearly state which one you're using (e.g., AR5 for CDP reporting).

| Emission Factor Source | Includes $CO_2e$? | Notes |
|---|---|---|
| **EPA (U.S. eGRID)** | *Yes* | eGRID factors already in $CO_2e$; AP-42 typically reports by gas (e.g., $CH_4$) |
| **EPA Emissions Hub** | *Yes (most but not all factors)* | Includes $CO_2e$ using IPCC AR4 or AR5; always check documentation |
| **DEFRA (UK)** | *Yes* | Factors typically provided in $CO_2e$ using AR5 or specified GWP set |
| **GREET Model (Waste)** | *No* | Emission outputs by gas; requires manual $CO_2e$ conversion |

📌 *Always check the metadata or documentation to confirm whether GWPs have been applied — and if so, **which Assessment Report** they're based on (e.g., AR4, AR5, AR6).*

IPCC Global Warming Potential Values

## Scope 1: Stationary Combustion Calculation

Common stationary combustion sources and fuels in processing facilities

| Stationary Combustion Sources and Fuels | |
|---|---|
| Stationary Combustion Sources | Common Fuels Used |
| Boiler | Natural gas, Fuel oil, Propane, Diesel |
| Combustion Turbines | Fuel oil, Coal, Propane, Kerosene |
| Process Heaters | Natural gas, Propane |
| Incinerators | Natural gas, Propane |

| Scope 1 Emissions | = | Activity Data (Fuel) | x | Emission Factor (EF) (mT CO2e/unit) |
|---|---|---|---|---|

# Scope 1: Mobile Combustion Calculation

## Common mobile emission sources and fuels used in processing plants

| Mobile Emission Sources and Fuels | | |
|---|---|---|
| Common Mobile Combustion Sources | | Common Fuels Used |
| On-Road Vehicles | Company vehicles | Gasoline |
| | Combination trucks | Diesel fuel, gasoline, bio-diesel |
| Non-Road Vehicles (Mobile Machinery) | Forklifts and non-road equipment | Gasoline, diesel fuel, propane |
| | Construction equipment | Diesel fuel |

| Activity Data for Mobile Emission Calculations | |
|---|---|
| Type | Data Needed |
| Fuel Consumption | Number of gallons, barrels, cubic meters, etc. |
| Distance Traveled | Number of miles, kilometers |
| Vehicle Characteristics | Vehicle type and model year |
| Fuel Characteristics | Type of fuel and heating value |

Mobile Combustion =

Fuel or Distance Data x Emission Factor (EF)

Activity data that should be collected for each source of mobile combustion emissions

## Scope 2: Purchase Energy Calculation

How do I calculate scope 2 emissions?

**Scope 2 Emissions = Activity Data x Emission Factor (EF)**

**MWh** **Mt CO2e/MWh**

For every MWh…
Need an EF for each method

**MWh**

**Location-based**

**Market-based**

Scope 2 Guidance | GHG Protocol

# Location vs. Market-Based Emissions

## Location-Based Emissions

Uses a regional average grid mix to approximate GHG emissions from delivering energy.

**Why This Matters:** Gives a consistent baseline for comparing facilities but doesn't reward proactive clean energy purchasing.

This method does **not reflect your individual electricity procurement choices** — it reflects the general emissions intensity of the grid you're on.

**How Do Renewables Affect This?** Only **on-site renewable energy** (e.g., rooftop solar) can reduce location-based emissions because you're displacing grid electricity.

## Market-Based Emissions

**Definition:** Emissions calculated based on the specific contracts or certificates you hold with utility or others (e.g., RECs, Green Tariffs, PPAs, VPPAs).

**Key Point:** This method reflects your intentional purchasing decisions and allows you to claim emissions reductions for renewable energy.

**How Do Renewables Affect This?**

- RECs reduce market-based emissions when properly retired.
- Green Tariffs, PPAs, VPPAs all reduce emissions if they meet quality criteria (e.g., additionality, matching).
- On-site solar also reduces these.

*It is recommended to calculate both location and market-based emissions annually as you report to CDP.*

# Getting Started with Scope 3

**Scope 3 emissions vary significantly by company and value chain.**

**Not all 15 categories will be relevant, so companies typically begin with a Scope 3 screening to assess relevance using six objective criteria:**

1. **Size**
2. **Influence**
3. **Risk**
4. **Stakeholders**
5. **Outsourcing**
6. **Sector Guidance**

This screening helps identify which categories are **material** and should be prioritized in data collection and reporting.

**Additional Resources:**

- EPA Scope 3 Inventory Guidance

What are scope 3 emissions and how can you manage them? | Insights | 3Degrees


Often, scope 3 emissions can represent between **70-90%** of a company's total carbon footprint. Specifically, within categories **1, 2, or 4** (Purchased Goods and service, Capital Goods, and Upstream Transportation and Distribution).

- Many companies begin with a **spend-based analysis**, using $ spend × average emission factors (EEIO) to estimate emissions.
- This approach relies on **secondary data**, helpful for identifying high-emission "hotspots."
- Over time, companies aim to improve accuracy by collecting **primary data** (e.g., supplier-specific info, LCAs).
- **Scope 3 screening** helps prioritize the most **material** categories for deeper analysis and reporting.

# Section 4: Methodology Tracking and Data Quality

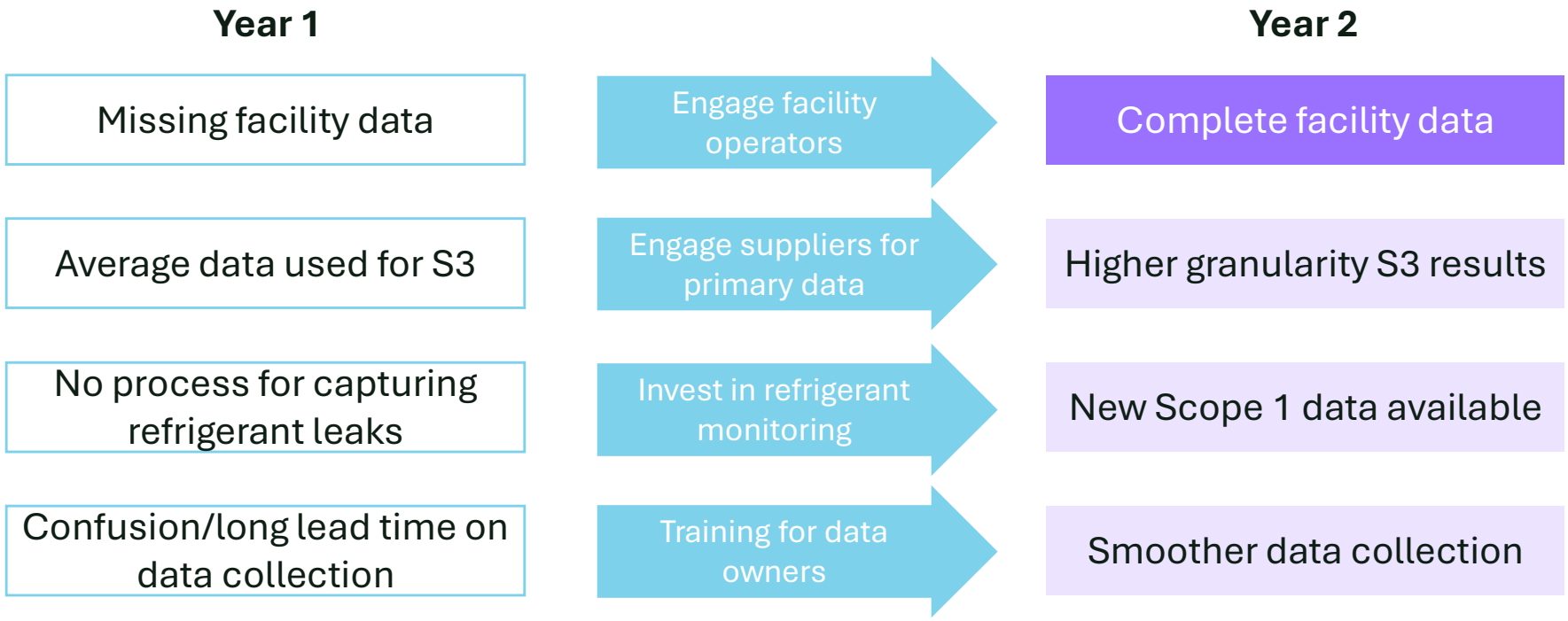
# Build an Inventory Management Plan

The person chosen to be the GHG inventory manager from your organization should follow these steps to initiate the appropriate data collection, collect that data effectively and identify gaps and assumptions that need to be made.

| | | |
|---|---|---|
| **Step 1** | **Solidify organizational data owners and data sources (Scope 1, 2, 3)** | Identify emissions sources within your operational control or in relevant Scope 3 categories, what data corresponds with those sources, and who is likely to own that data in your organization; checklist! |
| **Step 2** | **Perform initial engagement** | Send initial emails requesting data, or set up introductory calls with likely data owners to identify the correct point of contact, the data available, and collection timeline |
| **Step 3** | **Follow up, get involved** | Make sure to follow up with and support your data owners to deliver the data on the agreed timeline and build partnerships (as they will be important for future years!) |
| **Step 4** | **Identify and track gaps and assumptions** | Make note of any assumptions or data gaps you may encounter, and make appropriate estimates and replacements where necessary; these can be improved in future years |
| **Step 5** | **Populate data into tool/storage, record process** | Collect the data centrally, and begin populating tools/centralized data trackers to support calculation; consolidate notes on process, gaps, and data owners into an Inventory Management Plan |

# Opportunities for Program Improvement

Completing your first GHG Inventory will likely leave you with many caveats, notes, and disclaimers about your data and process. Between inventory seasons (typically in the second half of the year), it is important to identify the most important opportunities for improvement and address them to improve the inventory process in subsequent years.



# Section 5: Rolling Up Results

# Structuring Your GHG Inventory Summary for Reporting

Once your GHG inventory is complete, it's essential to organize and present your results in a transparent and standardized format — particularly when submitting data through CDP. A well-structured summary supports clarity, traceability, and alignment with KLA's data expectations.

## Key Dimensions to Include:

**By GHG Scope**
Report emissions for Scope 1, Scope 2 (both market-based and location-based), and each Scope 3. Clearly state the methodology used and distinguish between the different scopes and calculation types.

**By Emission Source**
Identify each source of emissions (e.g., combustion of natural gas, electricity consumption, diesel use).
Provide supporting data like fuel type, amount consumed, and units to ensure transparency and facilitate third-party verification.

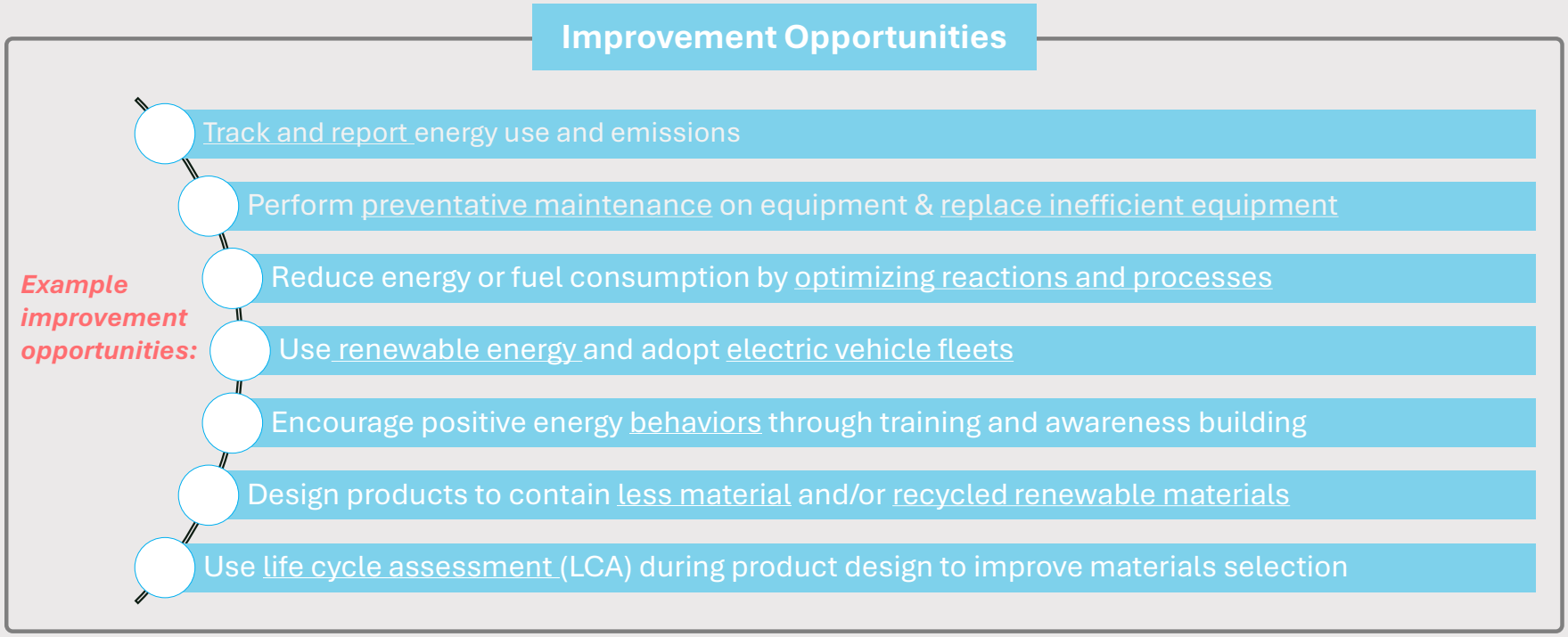
**By Geographic Location**
Present emissions data by operational site, regional cluster, or country. Geographic breakdowns can spotlight emissions hotspots and inform region-specific mitigation strategies.

**By Product or Service (where relevant)**
For organizations with diverse offerings, emissions should be apportioned using reasonable proxies such as production volumes, revenue, or other activity-based indicators.

**Include Energy Consumption**
Summarize energy use in megawatt-hours (MWh), disaggregated by energy type (e.g., electricity, steam) and energy source (e.g., grid, solar, diesel).
Flag renewable vs. non-renewable sources to meet CDP or client reporting requirements.

# Section 6: Emission Reduction Opportunities & Supporting Resources

# GHG Emissions Accounting & Reduction Opportunities



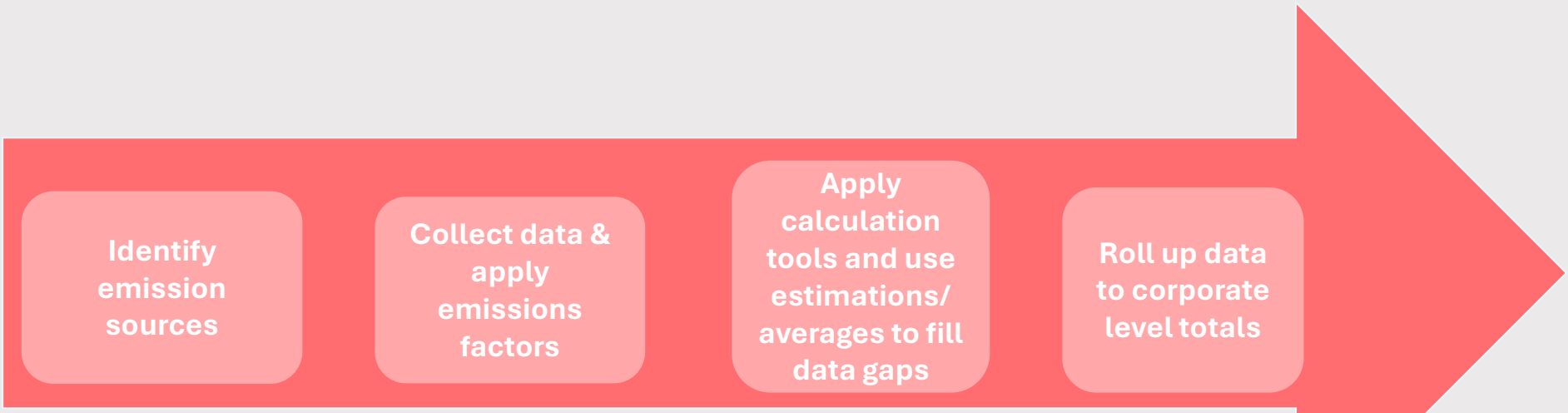

In the Appendix, there are detailed recommendations to review for scope 1, scope 2 and scope 3.

# GHG Resources: Use these tools to Build your Inventory

| Source | Resources | | | |
|---|---|---|---|---|
| GHG Protocol | Corporate Standard | Scope 1 Guidance | Scope 2 Guidance | Scope 3 Guidance |
| US EPA Climate Leadership Resources | Simplified GHG Emission Calculator | EPA Emissions Factors | EPA GHG Inventory Guidelines | |

# Section 6: Next Steps & QA

# Recap: Steps to Identify and Calculate GHG Emissions




Determine Scope 1, 2 & 3 emission sources based on activities in your owned operations versus in your value chain and develop an inventory management plan.

Use utility bills to collect Scope 1&2 emissions data and apply the formula using appropriate emissions factors.

If specific energy usage data is unavailable, use averages based on square footage to estimate your emissions.

Ensure totals are reflective of company-wide emissions.

# Key Next Steps for Suppliers

## Step 1: Track your emissions

Develop a greenhouse gas emissions (GHG) inventory of your annual emissions from across all your owned and operated facilities and fleet (representing scope 1 and 2).

**Note:**

- Tracking scope 3 value chain emissions is highly encouraged. Please start with scope 1 & 2 if building a GHG inventory is new to your organization.
- You will receive a copy of this training, along with the recording from Lilit.Hovhannisyan@kla.com.

## Step 2: Attend the science-based target training

Establish a baseline for your annual emissions and set a reduction target in line with science-based criteria from SBTi. It does not need to be verified by SBTi.

**Note:**

- Please join us on July 10, 2025, for an in-depth training. If you haven't received an invite, please e-mail Lilit.Hovhannisyan@kla.com.
- A recording will also be available after the session if you are unable to attend.

# Questions?

# 8: Appendix

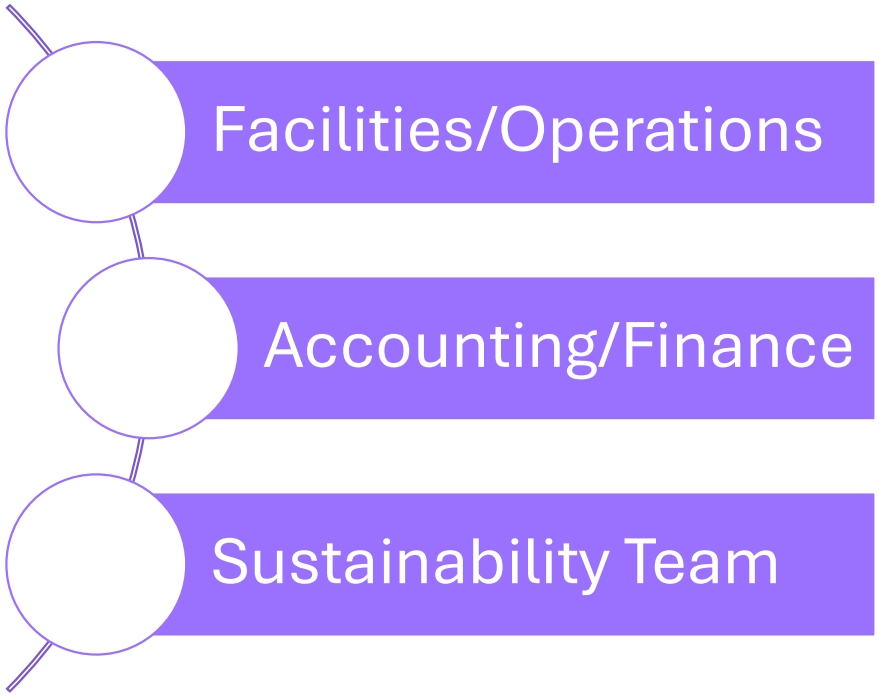
## Additional Resources

# Data Collection

## Identifying and Solidifying Data Owners

Once you know what your emissions sources are within your operational boundary/relevant scope 3 categories, it is time to find that data!

**Finding the right contact starts with a single email!**



# How to Ask for Data

**Summarize the ask**

- "Hi Bill, I'm wondering if your team has a record of our electricity usage for 2020 or electricity invoices from 2020? I'm looking for the total amount of electricity we used at each facility."

**Outline the reason for the ask**

- "We are being asked by our utility customers to provide our emissions for 2022, and our electricity use data will be used in the calculation."

**Identify a timeline for receiving data**

- "If this is something you already collect, are you able to send me the data by the end of this month?"

**Ask for support if they're not the right contact**

- "If your team doesn't collect this data, do you have a suggestion of who I may reach out to instead?"

**Be Patient!**

Identifying data owners and collecting data for GHG inventories could take months, depending on the data availability.

Getting started early is important.

# Data Collection

| Scope 1-2 Data Collection Checklist | | | | |
|---|---|---|---|---|
| **Type** | **Description** | **Examples** | **Data Required** | **Likely Data Owner** |
| **1- Stationary Emissions** | Direct emissions occurring onsite from fuel combustion (e.g., natural gas, propane, diesel, coal, biomass) in stationary equipment to produce electricity, heat, or steam. | • Boilers<br>• Furnaces<br>• Turbines<br>• Heaters<br>• Incinerators<br>• Engines<br>• Ovens/Kiln<br>• Generator | 1. Fuel type<br>2. Fuel usage<br>3. Fuel units (volume or weight) | Facilities/Operations leader, energy managers, or individual site managers |
| **1- Mobile Emissions** | Emissions from fuel combustion (e.g., diesel, biodiesel, gasoline, aviation gasoline, CNG) by vehicles owned or leased by your company | • Forklifts<br>• Cars/trucks/buses • Aircraft<br>• Ships and boats<br>• Trains | Two of the following:<br>1. Total fuel used by each vehicle<br>2. 2. Total distance traveled by each vehicle<br>3. 3. Fuel efficiency of each vehicle | Facilities/Operations leader, fleet managers, or individual site managers |
| **1- Fugitive Emissions** | Leaks in your company's refrigeration and air conditioning equipment through which refrigerant gas escapes. | • HVAC system<br>• Chillers<br>• Refrigerators | 1. Refrigerant type<br>2. Quantity of gas serviced<br>3. Quantity of gas recycled<br>4. Units for quantity serviced or recycled<br>*Quantity of leaked gas is assumed to equal amount of gas replaced by your maintenance company.* | Facilities/Operations leader, energy managers, or individual site managers |
| **2- Purchased Energy** | Indirect emissions from electricity, steam, and hot/chilled water purchased from your local utility (not combusted on-site). | • Purchased energy for all sites | 1. Energy source<br>2. Energy usage<br>3. Units (kWh for electricity) | Accounting/Finance leader, or individual site managers |

GHG Protocol

# Enter Collected Data into a Single File

Your calculation tool can act as a central file for inputting all collected data

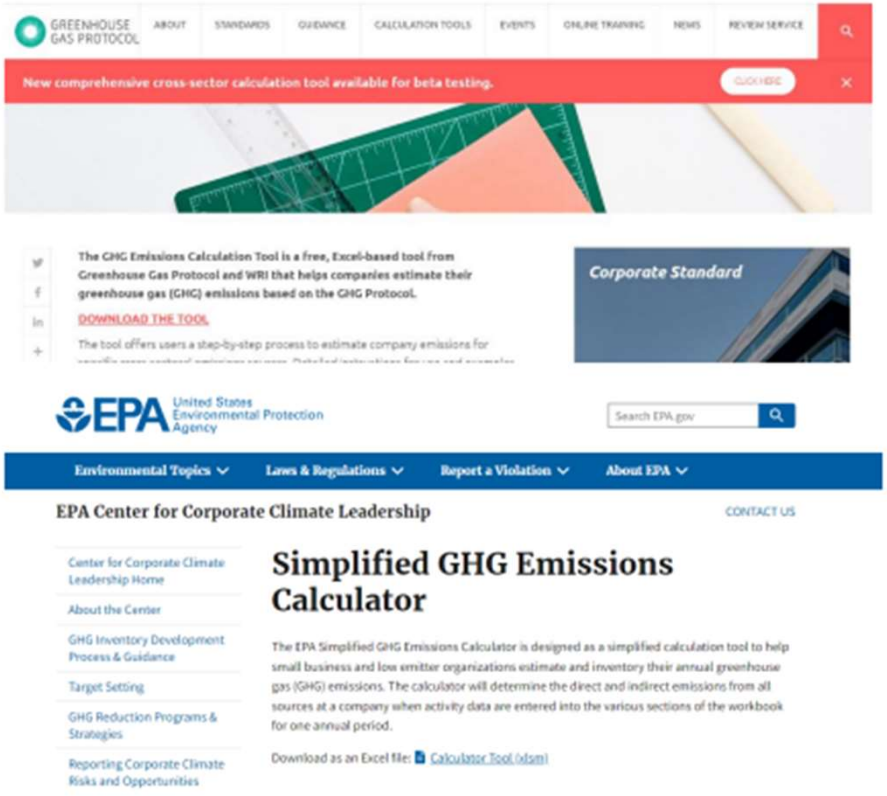
**Recommended tools:**

[GHG Protocol GHG Emissions Calculation Tool]

- The GHG Protocol recently paused access to their tool as they revise it, so stay tuned

[EPA GHG Calculator]

- The EPA Simplified GHG Calculator also provides a streamlined calculation process, with explanations and help tabs for every input



# Check Data for Consistency and Correctness

- Less necessary to check for correctness when data comes from monthly invoices
- If data is being collected in another method or format, do a high-level check of:
  - Consistency of numbers with similar sites (example: Site A and B are both located in Texas and have similar number of FTEs. If both sites serve the same business purpose and have similar building types, it may be unreasonable for Site A to have significantly higher purchased every usage)
  - Consistency of numbers month to month (example: a facilities manager sends a spreadsheet of information on Site A, located in Texas, and the electricity consumption is much higher in the winter compared to the summer. This may be an error, because we can assume air conditioning use in the summer would cause consumption to be higher.)
  - If number looks incorrect or inconsistent, don't throw it out right away. Ask the data provider to provide any context on why the numbers may be off.

GHG Protocol

# GHG Inventory Deep Dive

# Scope 3: What Makes a Scope 3 Category "Relevant"?

| Criteria | Description of Activities |
|---|---|
| **Size** | Contributes significantly to the company's total anticipated scope 3 emissions. |
| **Influence** | Potential emissions reductions that could be undertaken or influenced by the company. |
| **Risk** | Contributes to the company's risk exposure (e.g., climate change related risks such as financial, regulatory, supply chain, product and technology, compliance/litigation, and reputational risks). |
| **Stakeholders** | Deemed critical by key stakeholders (e.g., customers, suppliers, investors, or civil society). |
| **Outsourcing** | Outsourced activities previously performed in-house or activities outsourced by the reporting company that are typically performed in-house by other companies in the reporting company's sector. |
| **Sector Guidance** | Identified as significant by sector-specific guidance. |
| **High Costs or Revenue** | Areas that require a high level of spending or generate a high level of revenue (and are sometimes correlated with high GHG emissions). |
| **Other** | Meets any additional criteria developed by the company or industry sector. |

GHG Protocol

**There is no standardized threshold to determine relevance.**

Ex: a company with small business travel emissions may still consider the category relevant because of stakeholder pressure and the ability to influence emissions

**Prioritize data collection for most relevant categories**

Avoid chasing data for smaller, less relevant Scope 3 categories

# Record an Inventory Management Plan

## Inventory Management Plan (IMP):

Intended for internal and external stakeholders interested in learning more about the emissions sources included in the company's inventory and the details of the emissions calculations.

- Documentation of all information gathered during the inventory calculation process, including boundaries, raw data and sources, data owners (names and positions), emission factors and GWPs, calculation methodology, and assumptions
- Should be used to facilitate business decisions and ensure a consistent approach to inventory calculation every year

**Example Information in an IMP:**

| | |
|---|---|
| Boundaries | Data was collected for all sites in North America |
| Raw data and sources | Data source: 2020 fleet schedule site A |
| Data Owner | Fleet manager: Don Smith |
| Emissions Factors and GWPs | Used EFs and GWPs in GHG Protocol GHG Emissions Calculation Tool |
| Calculation Methodology | Used GHG Protocol GHG Emissions Calculation Tool |
| Assumptions | Assumed/averaged data for October and December to get an estimation for site A in November |

# Examples of Scope 1, 2 & 3 for Different Businesses

## Parent company with multiple subsidiaries

- **Scope 1:** Includes direct emissions from energy/fuel use in all owned/operated parts of the business, including subsidiary companies' direct emissions
- **Scope 2:** indirect emissions from purchasing electricity/steam/chilled water for all owned and operated facilities
- **Scope 3:** All indirect value chain emissions of the parent and subsidiary companies (e.g. manufacturing, distribution, product use)

## Own/operates and outsourced manufacturing

- **Scope 1:** Includes direct emissions from energy/fuel use in all owned/operated parts of the business, including all owned/operated manufacturing facilities
- **Scope 2:** indirect emissions from purchasing electricity/steam/chilled water for all owned and operated facilities
- **Scope 3:** All indirect value chain emissions, including from outsourced manufacturing and downstream emissions (e.g. third-party distribution to DCs)

## Vertically integrated manufacturer

- **Scope 1:** Includes direct emissions from energy/fuel use in owned/operated facilities and operations across production stages
- **Scope 2:** indirect emissions from purchasing electricity/steam/chilled water for all owned/operated facilities across all production stages
- **Scope 3:** All indirect value chain emissions, both upstream (e.g. material manufacturing if materials are being purchased from a supplier, and/or raw materials extraction) and downstream (e.g. third-party distribution to DCs)

**Note on leased facilities & fleet:** Emissions from leased facilities or fleet are typically counted in scope 1 and 2 if your company operates these assets; however, if you choose not to count them in scope 1, they must be counted in scope 3 (upstream or downstream leased assets) – just make sure not to double count leased asset emissions regardless of how you choose to account for them.

# GHG Inventory: Defining Your Goals

**Before getting started, define:**

1. Who is your intended audience? Other stakeholders who will be using this data?
2. What is your purpose for the inventory? (Interested in setting targets? Going carbon neutral?)

**<u>This will dictate:</u>**

1. Scope of assessment
2. Level of detail
3. Adherence to standards
4. Verification requirements
5. External support, software needs, etc.
6. Cost and level of effort

# Scope 1-Opportunities for Reductions

| Scope | Aspect | Potential Initiative |
|---|---|---|
| Scope 1 | Buildings | Efficiency measures for natural gas, diesel, and refrigerants |
| | Buildings | Transition from natural gas to electric (i.e., electrification of all gas-using equipment) |
| | Buildings | Phase out refrigerants or replace with low/no global warming potential refrigerants |
| | Mobile Combustion | Transition company fleet to electric |

**Efficient Equipment**
*Upgrade energy intense equipment and machinery to more efficient systems to reduce energy demand*

# Scope 2-Opportunities for Reductions

| Scope | Aspect | Potential Initiative |
|---|---|---|
| Scope 2 | Buildings | Phase out refrigerants or replace with low/no global warming potential refrigerants |
| | Buildings | Electricity efficiency measures for all owned sites and leased sites (LED and HVAC retrofits) |
| | Equipment | Purchase high efficiency equipment and maximize energy efficiency settings |
| | Buildings | Green Lease clauses that include 100% renewable energy requirement for multi-tenant office spaces |

| **Renewable Energy** |
|---|
| *Source renewable electricity from wind or solar power for factories, data centers, and offices* |

# Scope 3-Opportunities for Reductions

| Scope | Aspect | Potential Initiative |
|---|---|---|
| Scope 3 | PG&S | Lightweighting packaging, transitioning to alternative raw materials with lower carbon footprints, eliminating deforestation from supply chains |
| | PG&S | Engage vendors on emissions reductions and prioritize sustainable vendors and contracts |
| | Employee Commuting | EV adoption by employees, ride shares, transit passes, WFH programs |
| | Business Travel | Increase use of Sustainable Aviation Fuel (SAF), increase % of flights with<br>biofuels , reduce demand through policies and education |
| | Use of Sold Products | Energy Star, increased efficiency and addressing consumer behavior |

**Improve end-of-life**

*Reduce emissions from product end-of-life by implementing circular business models and recyclability*

# GHG Glossary

Base year: As greenhouse gas (GHG) accounting is an ongoing process, the first emissions inventory that is conducted is known as the base year. The base year is used as a point of reference to track changes in an inventory as well as progress toward reduction goals.

Baseline metrics: Basic or beginning measurements. Baseline metrics are valuable when setting management and/or reduction goals in order to have something to compare against when making improvements, diagnosing inefficiencies, or tracking progress.

$CO_2e$: Emissions of different greenhouse gases are often expressed in carbon dioxide ($CO_2$) equivalent ($CO_2e$) terms, which represents the amount of carbon dioxide that would have the same relative effect as the greenhouse gases actually emitted.

Direct energy: Direct energy is energy that is produced on-site by the consumption of fuel. Direct energy produces what are known as Scope 1 emissions in the World Reporting Institute's GHG Protocol.

Emissions: The exhaust gas(es) produced as the result of fuel combustion.

Energy efficiency projects: Capital investment in projects to achieve an overall reduction in energy consumption or a less energy intensive production process. Examples include low-hanging fruit such as behavioral changes or more intensive initiatives such as equipment retrofits.

Energy or GHG reduction emission targets: Goals set by an organization to reduce its energy consumption or greenhouse gas (GHG) emissions. This goal is typically set by measuring an organization's energy consumption and/or GHG emissions and establishing a start date (baseline), setting an appropriate and achievable target, and outlining a reduction plan that can be achieved by a specific date.

Environmental policies & reporting: Standards and protocols developed by various agencies to track and disclose environmental and social impacts. Environmental reporting and management standards help organizations identify how to reduce or mitigate their environmental impacts. Standards and protocols include ISO 14001, the Global Reporting Initiative, and the Carbon Disclosure Project.

# GHG Glossary

GHG Protocol: The GHG Protocol is the most widely used, internationally accepted tool for accounting for greenhouse gas emissions. It was developed by the World Resources Institute and the World Business Council for Sustainable Development. http://www.ghgprotocol.org/

Greenhouse gases (GHGs): GHGs are naturally occurring gases in the earth's atmosphere that absorb and re-emit radiation, trapping heat and making the planet warmer, known as the greenhouse effect. There are seven major GHGs: carbon dioxide ($CO_2$), methane ($CH_4$), nitrous oxide ($N_2O$), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), sulphur hexafluoride ($SF_6$), and the recently added and nitrogen trifluoride ($NF_3$). The consumption of fossil fuels is associated with an increase in the presence of these gases in the atmosphere and with climate change.

Indirect energy: Indirect energy is the energy obtained from purchased electricity, heat, or steam. This type of energy is obtained from a third-party, such as a utility provider. Indirect energy produces what are known as Scope 2 emissions under the GHG Protocol.

Onsite fuel combustion (direct): Any fuels combusted by a company-owned asset, such as natural gas used in a boiler or a back-up generator that runs on diesel fuel.

Operational boundary: Defined scope of both direct and indirect emissions within an organizational boundary. When defining operational boundaries, the entity must specify who/what is responsible for emissions, i.e. the entity itself or a 3rd party.

Organizational boundary: Those businesses and operations that make up an organization for the purpose of accounting for and reporting GHG emissions.

Purchased energy (indirect): Energy that is sourced by a third-party provider and purchased by the organization. For example, natural gas purchased from a utility or a governmental agency.

Purchased steam: Steam that is generated by a third-party provider and then purchased by the organization.

Renewable energy: Energy derived from naturally occurring, repeatable, and replenishing sources. Types of renewable energy include geothermal, solar, wind, ocean and other forms of hydropower, biomass, etc.

Science-based targets: Emissions reductions goals that are in line with what the latest climate science says is necessary to keep global temperature rise at safe levels.