

Philippine GHG Inventory and Reporting Protocol: Manual for Business

November 2017



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About the Cover

The cover shows an open book with an outline of buildings on the left side that reflects emissions from the private sector, and an outline of renewable energy projects on the right side that shows how GHG accounting can help support the country's agenda for low-carbon and climate-resilient development.

Foreword

The landmark signing of the Paris climate accord in December 2015 by 195 countries, including the Philippines marks a global commitment to lower global warming to below 2 degrees Celsius above pre-Industrial levels and to pursue efforts to limit the increase to 1.5 degrees Celsius to avoid climate-induced disasters.

After the Philippine government signed the instrumentation for the accession to the Paris accord in February 2017, the Climate Change Commission (CCC) is now pursuing mechanisms to achieve its Intended Nationally Determined Contributions (INDCs), now called Nationally Determined Contributions (NDCs) to limit emissions from greenhouse gases (GHGs) through accounting and monitoring of reported emissions.

The Philippine GHG Inventory and Reporting Protocol Manual for Business will provide guidelines to companies and enterprises on GHG accounting and reporting at the organizational level.

This guide ensures GHG accounts of reporting companies are comparable and the double counting of emissions avoided at the reporting platform level. It also ensures GHG accounts are compatible with international standards and reporting program.

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Acronyms

CDP	Carbon Disclosure Project
CEMS	Continuous Emissions Monitoring System
CFCs	Chlorofluorocarbons
CFO	Chief Financial Officer
CH4	Methane
CO2	Carbon Dioxide
CSO	Civil Society Organization
FMCG	Fast-Moving Consumer Goods
GHG	Greenhouse Gas
GJ	Gigajoules measure
GLA	Gross Leasable Area
GSA	General Services Administration
GWP	Global Warming Potential
HFCs	Hydrofluorocarbons
INDC	Intended Nationally Determined Contribution
IMP	Inventory Management Plan
IPCC	Inter-governmental Panel on Climate Change
IPPU	Industrial Processes and Product Use
ISO	International Organization for Standardization
KPIs	Key Performance Indicators
kWh	kilowatt-hours
LECB	Low Emission Capacity Building (LECB) Programme
LPG	Liquefied Petroleum Gas
MAGRAMA	Spanish Ministry of Agriculture, Food and Environment
MtCO2e	Million Tonnes of CO2 equivalents
N2O	Nitrous Oxide
NDC	Nationally Determined Contributions
NF3	Nitrogen Trifluoride
NGO	Non-governmental Organizations
NICCDIES	National Integrated Climate Change Database and Information Exchange System
NOx	Nitric Oxide
PAS	Publicly Available Specification
PFCs	Perfluorocarbon
PhP	Philippine Peso
QES	Qualifying Explanatory Statements
REC	Renewable Energy Credit
SEC	Securities and Exchange Commission
SF6	Sulphur Hexafluoride
SME	Small and Medium Enterprise
T&D	Transmission and Distribution
UNDP	United Nations Development Programme
UNFCCC	United Nations Framework Convention on Climate change
WBCSD	World Business Council for Sustainable Development
WRI	World Resources Institute

I. The GHG Inventory Protocol

Climate change is one of the biggest challenges of our time, especially for developing nations with limited capacity to address its multiple implications on a country's economic development.

The Philippines is among the ten most vulnerable countries to the impacts of climate change, according to the United Nations Office for Disaster Risk Reduction (UNISDR). Located in one of the world's most typhoon-prone areas, the Philippines is visited by 20 typhoons annually and Filipinos have developed a familiarity to weathering heavy rains and floods during the rainy season.

Historical data from the country's state-run weather bureau, the Philippine Atmospheric, Geophysical and Astronomical Services Administration have showed that strong typhoons that used to happen once every century or every 50 years have been occurring more often. In November 2013, super typhoon Yolanda (international name: Haiyan) has caused thousands of death, severe infrastructure damage and displaced families in multiple regions, setting back economic development in the provinces along its path. Even in Mindanao, provinces previously spared from regular typhoon visits, have been experiencing damage from typhoons in recent years.

This has made the Philippines a strong voice in international climate negotiations, showing the consequences of inaction in reducing carbon emissions worldwide.

In March 2017, the Philippines signed the Paris Climate Agreement. It is a landmark agreement signed by 195 nations during the 21st Conference of Parties (COP 21) in December 2015 with the aim to "holding the increase of global temperature to "well below 2 degrees C above pre-industrial levels... and to pursue efforts to limit the temperature increase to 1.5 degrees C above pre-industrial levels, recognizing that this would significantly reduce the risks and impacts of climate change." This warming limit is key to prevent the irreversible damages caused by climate change.

The Philippines submitted its Intended Nationally Determined Contributions (INDCs) outlining its target to cut emissions by 70 percent by 2030. The INDCs, now called Nationally Determined Contributions (NDCs) spells out the country's strategy for adaptation and mitigation by pursuing low-carbon development and cutting emissions in energy, transport, forestry, agriculture, industry and waste sectors.

Key to achieving this goal is limiting the emission of carbon dioxide and the six greenhouse gases (GHG), which are released by burning fossil fuels and these gases trap heat in the Earth's atmosphere.

The Philippine Climate Change Commission (CCC) highlights the important role of the private sector as partners in achieving the country's goal to cut carbon emissions through a transparent GHG inventory and reporting mechanism.

This manual aims to help companies measure GHG emissions to identify major sources of emission across the supply chain and manage them in order to ensure business continuity, lower future business risks related to climate change and make informed decisions when it comes to business investments. The Philippine Climate Change Commission has also developed a Recognition Program to businesses that report their GHG emissions for transparency, environmental commitment, and leadership in climate action.

The Philippine GHG Inventory and Reporting Protocol for Business will provide guidelines to companies and enterprises on GHG accounting and reporting at the organizational level.

To prevent the double counting of emissions and compliance with international standards, this reporting protocol harmonizes the best features of available standards worldwide. Chief among these, the GHG Protocol: Corporate Accounting and Reporting Standards offers the most comprehensive guidance on which other standards such as ISO 14064 and Climate Leaders GHG Inventory protocol by the US-EPA are based upon.

Unless otherwise cited, guidance provided here are sourced or adapted from the *GHG Protocol: Corporate Accounting and Reporting Standards*.

The GHG Protocol Framework

The Greenhouse Gas Protocol Framework (**Figure 1**) provides for specification on the six (6) major steps in the GHG Accounting and Reporting Process, beginning with a) setting your entity's boundary to b) identifying emissions sources within the boundary, d) to calculating emissions, e) setting targets, f) reporting your emissions data and the verification process.

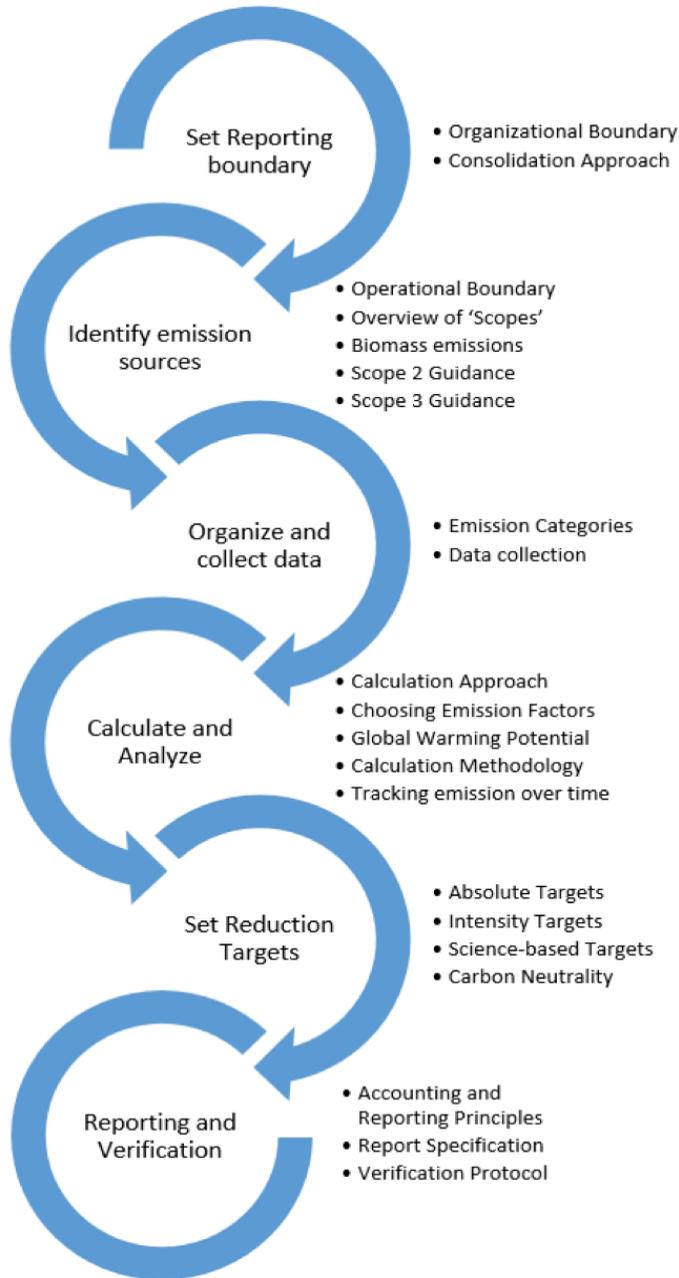


Figure 1. GHG Protocol Framework. Source: GHG Protocol Corporate Standard (WBCSD, WRI, 2004).

A business case for GHG inventory

Reporting of annual GHG inventory enables companies to access to national recognition programs, mentorship, workshops, tools and benchmark data by showing leadership in climate action.

LOCAL ACTION, GLOBAL IMPACT

In 2015, 195 countries signed the Paris Agreement to lower global emissions well below 2 degrees Celsius above pre-industrial levels. As one of the signatories, the Philippines signified its commitment in the form of the Nationally Determined Contribution (NDC) to lower emissions by a 70 percent* in 2030, with adaptation as a priority strategy.



In the Philippines, over half (54%) of GHG emissions comes from the energy sector, followed by the agriculture (33%), industrial processes (8%), waste (7%), and land-use change and forestry (-1%) sectors, according to the World Resources Institute Climate Analysis Indicators Tool (WRI CAIT 2.0, 2016).



In line with the Philippine GHG reporting program, an account of absolute GHG emissions commenced in FY 2010 from January to December. Annually thereafter, each company **must report** the inventory of the preceding fiscal year by January. The deadline is: January 30th.

* This is conditional on the basis of financial aids and technology transfer mechanisms received by the country.

HOW TO CLASSIFY EMISSIONS FROM SOURCES

The *Philippine GHG and Reporting Protocol for Business* enjoins the private sector to do their share of cutting the country's emissions.

A company's GHG emissions may come from direct sources (those owned or controlled by a business or Scope 1 emissions) and/or indirect sources (those owned or controlled by another company or Scopes 2 or 3 emissions). See **Figure 2**.

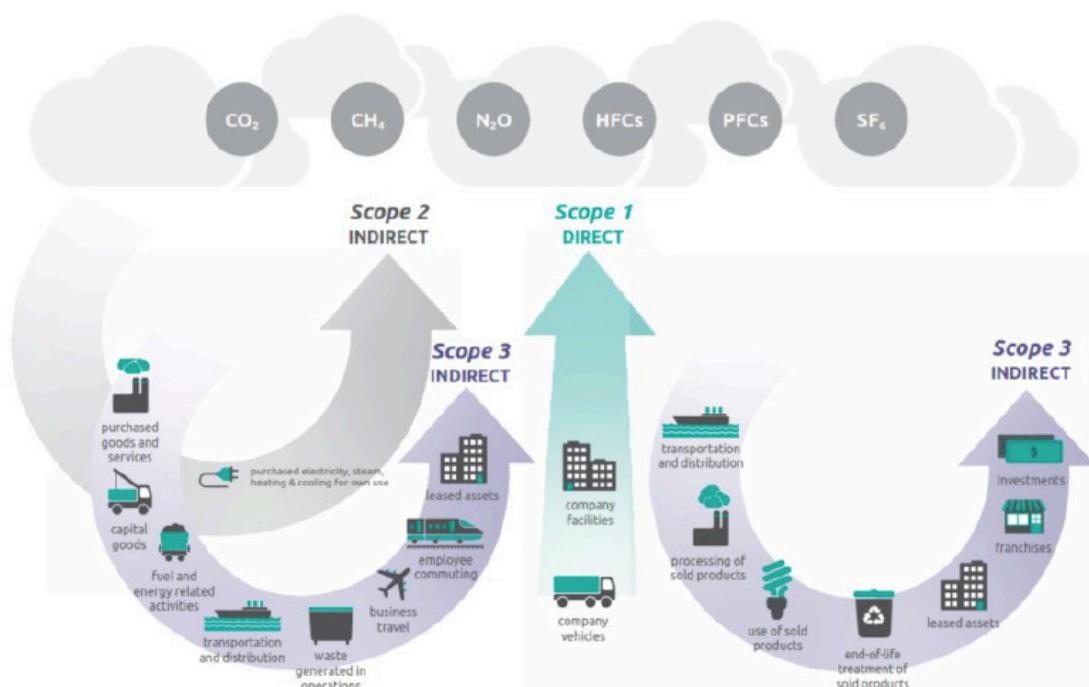


Figure 2. GHG Emissions, Scope 1, 2, and 3 Across the Value chain.

Source: WRI/WBCSD Corporate Value Chain (Scope 3) Accounting and Reporting Standard.

HOW TO PREPARE AN EMISSION REPORT

Here's a checklist of what your GHG inventory report should have:

- * Organizational Profile
- * Emissions presented in Scope 1, 2 and 3
- * Emissions according to 6 Kyoto Gases plus NF3
- * Key assumptions used
- * Emission factors used
- * Reduction from initiatives implemented

A sample template on GHG Reporting for businesses is available on the *Philippine GHG Inventory and Reporting Protocol - Manual for Business (Section IV. GHG Inventory Management Plan (IMP), pages 56-72)*.



How to prepare for reporting your emissions

Ideally, a business has a dedicated person who will be responsible for collecting the GHG report and ensures that data reported complies with the Philippine GHG Inventory and Reporting Protocol for Business.

Use these steps from the GHG Protocol Framework to plan your GHG inventory:

STEP 1

Set your 'reporting boundary'

Businesses that own 100 percent of its assets, reporting is straightforward and will include all emissions from the operations. Organizations with more complex value chain network such as joint-ventures, partnerships or franchises and those when a company is part-owner of an entity of the business, it is crucial to determine the legal entities and operations covered by the GHG inventory and reporting to prevent inconsistency and double counting of emissions. To determine how to approach this step, refer to the *Philippine GHG Inventory and Reporting Protocol for Business* (pages 5-8).

STEP 2

Identify emission sources

Define your business' operational boundary, which is basically business activities with GHG emissions that may include electricity or gas use, waste disposal and recycling, business travel, owned or controlled vehicles, and staff commuting.

Emission Type	Scope	Definition	Examples
Direct Emissions	Scope 1	Emissions from operations that are owned or controlled by the reporting company	Emissions from combustions in owned or controlled boilers, furnaces, vehicles, etc., emissions from chemical production in owned or controlled process equipment
	Scope 2	Emissions from the generation of purchase or order acquired electricity, steam, heating or cooling consumed by the reporting company	Use of purchased electricity, heating or cooling
Indirect Emissions	Scope 3	All indirect emissions (not included in Scope 2) that occur in the value chain of the reporting company, including both upstream and downstream emissions	Production of purchased products, transportation of purchased or use of sold products

Figure 3. Summary of GHG emission scopes.

A company's GHG emissions can have direct sources (those owned or controlled by a business) and/or indirect sources (those owned or controlled by another company). To promote transparency and prevent double counting, emissions are classified under three "scopes" under the GHG inventory protocol:

Scope 1: Direct GHG emissions

Scope 2: Electricity Indirect GHG emissions

Scope 3: Other indirect GHG emissions

1. Collect data from business activities which release GHG emissions

To identify emission sources, companies can use different approaches depending on the nature of the business:

- **Value chain** – From each process, GHG emission sources can be identified, usually from fuels or energy used in the supply chain, in the company operations and the distribution networks.
- **Process flow control chart, energy and materials balance charts** – for manufacturing companies, referring to these charts can help you identify specific sources of emissions.
- **Factory Floor Plan review and walk-throughs** – this method can also be used to get teams involved with the production process, especially corporate staff who are not directly involved in the factory operations.

2. Classify your emission sources under the GHG Scopes 1, 2 or 3.

After identifying emission sources, classify them according to scope 1, 2 and 3.

For more details on classifying emissions, please refer to *Philippine GHG Inventory and Reporting Protocol for Business (pages 8-17)*.

STEP 3

Organize and collect data

After identifying activities with GHG emissions, identify where you can get the information and record them in a spreadsheet or table. Data collected from different departments should follow a common reporting format for entering data.

To identify the sources of emission for common business activities that release GHGs, refer to the guide on **Table 1**:

Table 1. Common activity data sources for key emissions-releasing activities.
Source: (DEFRA, 2009)

Emission releasing activity	Sources of information
Electricity use	Total kilowatt hours (kWh) used from electricity bills
Natural gas use	Total kilowatt hours (kWh) used from electricity bills
Water supply	Total water supplied in cubic meters (m3) from water bill
Fuel used in company owned vehicles	Liters of fuel purchased from invoices and receipts (more accurate); or vehicle mileage from vehicle logbooks or odometers (less accurate)
Employee passenger travel	Receipts for details of travel, and use distance calculation websites to obtain flight, rail and road distances
Waste disposal and recycling	Tonnes of waste-treated by waste type (e.g. paper, glass, waste to landfill) from waste collection provider

If reporting for the first time, make sure to choose a 12-month period to collect the data. You can use your electricity bills, gas bills, and receipts from fuel purchase or vehicle mileage as sources of information.

STEP 4

Calculate and analyze emissions

There are several ways to compute your carbon emissions (**Figure 4**). It is important to know your emission from stationary sources and be familiar with the standard for emission factor and global warming potential (GWP) of each GHG emission from your operations.

To calculate your emission, use this two-part formula:

a) Activity data x emission factor = **tons of emissions**

b) tons of emissions x global warming potential (GWP) = **CO2 of emissions**

To convert liters of petrol to carbon emission, multiply the unit by emission factor.

200 liters of petrol x (emission factor e.g. 2.331) = 4.66.2 kg CO2 emission

IMPORTANT: All energy consumed must be converted in common units of kg carbon dioxide equivalent using GHG conversion factor.



Figure 4. Sample computation of emission from your operations (employee passenger travel).
Source: UK Greenhouse Gas (GHG) Regulation A Guide for Businesses.

To arrive at this number, follow these steps:

1. Calculate emissions from stationary sources using direct measurement and analysis of fuel input.

a. Direct measurement of CO₂ emissions is performed through the use of a Continuous Emissions Monitoring System (CEMS), the ongoing measurement of pollutants emitted into the atmosphere in exhaust gases from combustion or industrial processes.

b. Analysis of fuel input is a mass balance approach where carbon content and carbon oxidation factors are applied to fuel input to determine emissions.

A GHG emission factor helps convert the energy used by a business such as kilowatts of electricity for offices and liters for business travel into Philippine standard for measuring carbon emissions. Using the right GHG emission factors is critical in generating high-quality GHG reports.

The Department of Energy (DOE) generates the emission factors specific to fuels sold in the Philippines. DOE regularly updates the emission factors per grid or per Distribution Utility. This will be made available in the Philippine GHG reporting platform.

NOTE: Without the Philippine Emission Factors, reporters may use the IPCC Emission Default Factor Database:

<http://www.ghgprotocol.org/Third-Party-Databases/IPCC-Emissions-Factor-Database>.

Global warming potential (GWP) is a measure of how much a greenhouse gas contributes to global warming relative to CO₂. The GHG Protocol GWP database is available online: <http://www.ghgprotocol.org/files/ghgp/tools/Global-Warming-Potential-Values.pdf>.

Calculation tools

GHG protocol provides Excel-based tools which companies can use to calculate stationary, mobile, Scope 2 and HFC use. Sector specific tools are also available for Aluminum, Iron and Steel, Cement, Pulp and Paper, among others. Download the tools from <http://www.ghgprotocol.org>. A Philippine-specific tool is also available at the Philippine GHG reporting program website.

2. Track emission over time

Monitoring emissions over time can help a company identify emission reduction targets. Choose a base year and then draw up a base year emissions recalculation policy.

A company may align this with the accounting or calendar period as advised by the Climate Change Commission. Be sure to also check the deadline for submission of the GHG inventory reports.

IMPORTANT: Each COMPANY must report the inventory of the preceding fiscal year by January.

STEP 5

Set reduction targets

A GHG target will help raise internal awareness and effectively manage business risks associated with climate change and ensure the issue is on the business agenda. Having good practices can also position the company as an innovation leader. The *GHG Protocol Corporate Accounting and Reporting standards* provides for 10 practical steps that can help companies set a GHG target.

There are two broad types of GHG targets: absolute and intensity-based.

Ultimately, the goal is to achieve carbon neutrality wherein an organization has contributed no net greenhouse gas emissions to the atmosphere and thus, its impact on climate change is zero.

The Philippines adopts specifications provided by **PAS 2060:2014** on demonstration of carbon neutrality, which has four stages: a) Measurement; b) Reduction; c) Offsetting; and d) Documentation and Verification.

STEP 6

Reporting and verification

The GHG inventory report should provide a clear overview of a company's emissions data. GHG Reporting should be guided by the following principles:

Relevance: the report is useful to guide for decision making on cutting emissions

Completeness: the report includes all relevant emission sources related to the company's operations, with exclusions documented and justified in the report

Consistency: the report follows the methodologies, standards and formats set by the Philippine GHG protocol so reporters and the authorities can make valid comparisons over time

Transparency: the report discloses all processes to provide a clear understanding of the issues in the context of the reporting company and a meaningful assessment of performance

Accuracy: the report is precise and provides correct data

Verification is an objective assessment of the accuracy and completeness of reported GHG information and the conformity of this information to pre-established GHG accounting and reporting principles. Before commissioning an independent verification, a company should clearly define its goals and decide whether they are best met by an external verification.

II. GHG Inventory Roadmap for Business

By tracking and calculating GHG emissions, companies can help minimize their environmental impact and save costs.

In the Philippines, the GHG inventory and reporting officer can take the responsibility of compiling the company's GHG emissions to comply with reporting regulations.

This part uses a four-step framework (**Figure 5**) to give businesses a practical approach to developing an entity-level GHG inventory and management system.

1. Define the business case
2. Build capacity
3. Develop inventory
4. Take strategic action

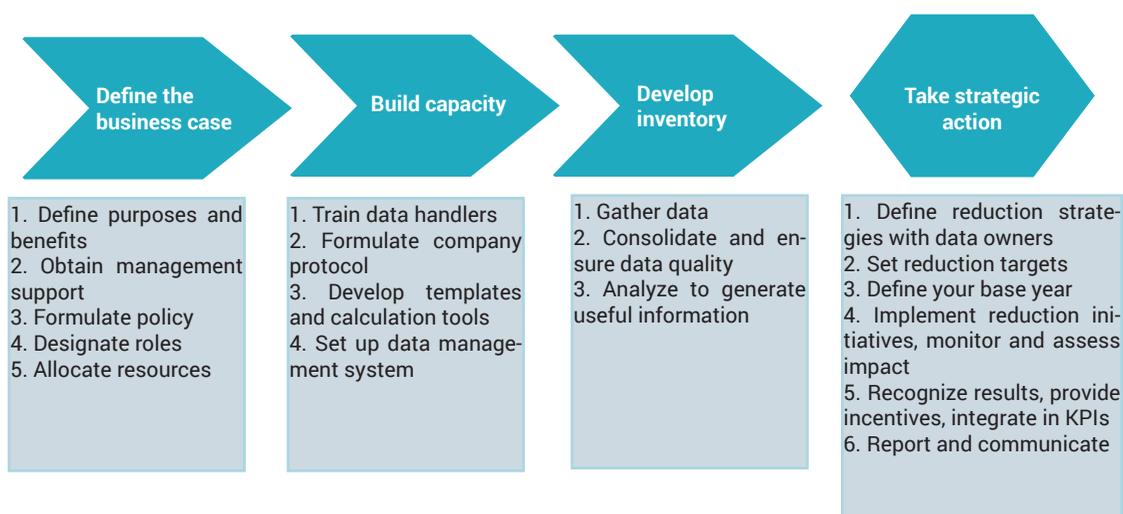


Figure 5. GHG Inventory Roadmap framework.

ROADMAP FRAMEWORK: Steps on how to report emissions

1. DEFINE THE BUSINESS CASE

Define the purpose and value of the GHG Inventory and Reporting Protocol to the organization by taking the following steps:

A. Identify and rank the benefits of a GHG inventory to your business.

Use **Table 2** to determine how and why a GHG inventory will benefit your business. For each item, mark a Yes or No on **Column A** and rank the top three items on **Column B**.

Table 2. Defining the business case for GHG inventory protocols.

Value of GHG Inventory to the Business	A. Yes or No?	B. Rank Top 3
Relevance Does our company own assets or operations within its control or influence that potentially contribute to GHG emissions?		
Efficiency improvement potential Can our company leverage on the GHG emissions data to significantly reduce operating cost and increase efficiency?		
Innovation driver Will GHG information drive innovation in our operations and in our delivery of products and services?		
Potential to create solutions Is our company in the position to provide solutions to reduce emissions within the sector where it belongs or even in other sectors as a result of its initiatives?		
Regulatory requirement Are there existing and upcoming regulations that will impact our business based on our GHG emissions?		
Market requirement Do we have markets that require GHG inventory from its suppliers?		
Company brand Is managing your climate impacts an important aspect of our reputation management?		

If the team answers YES to more than three questions, there is a strong case for the business to develop a GHG inventory protocol. Next, the company must rank the top three value propositions that benefit the business most.

The Carbon Disclosure Project (CDP) provides for useful case studies of companies who have realized benefits from developing their own GHG inventory and management program (CDP, 2015)¹.

¹ Source: <https://www.cdp.net/CDPResults/CDP-global-climate-change-report-2015.pdf>

B. Obtain management support.

Make a business case to gain the top management's buy-in for a GHG inventory by listing its benefits to the company, describing who needs to be involved and citing how the company can derive business insights from the data collected.

C. Formulate a policy or mandate.

Translate the approval of the management into a company directive or official mandate to create a team to handle the GHG inventory and reporting. Install mechanisms for accountability and incentives for GHG emission reductions met.

D. Designate roles.

Making climate mitigation a part of your business requires having a dedicated unit responsible for the company's GHG inventory and reporting.

It is best practice to get them to align the GHG data reporting requirements into already existing reporting systems in each department. A coordinating office must be designated to take charge of consolidation. A designated team can be created and assigned roles (**Figure 6**) based on the organizational structure to help consolidate an integrated GHG reporting strategy at an entity level (**Figure 7**, see page 17).

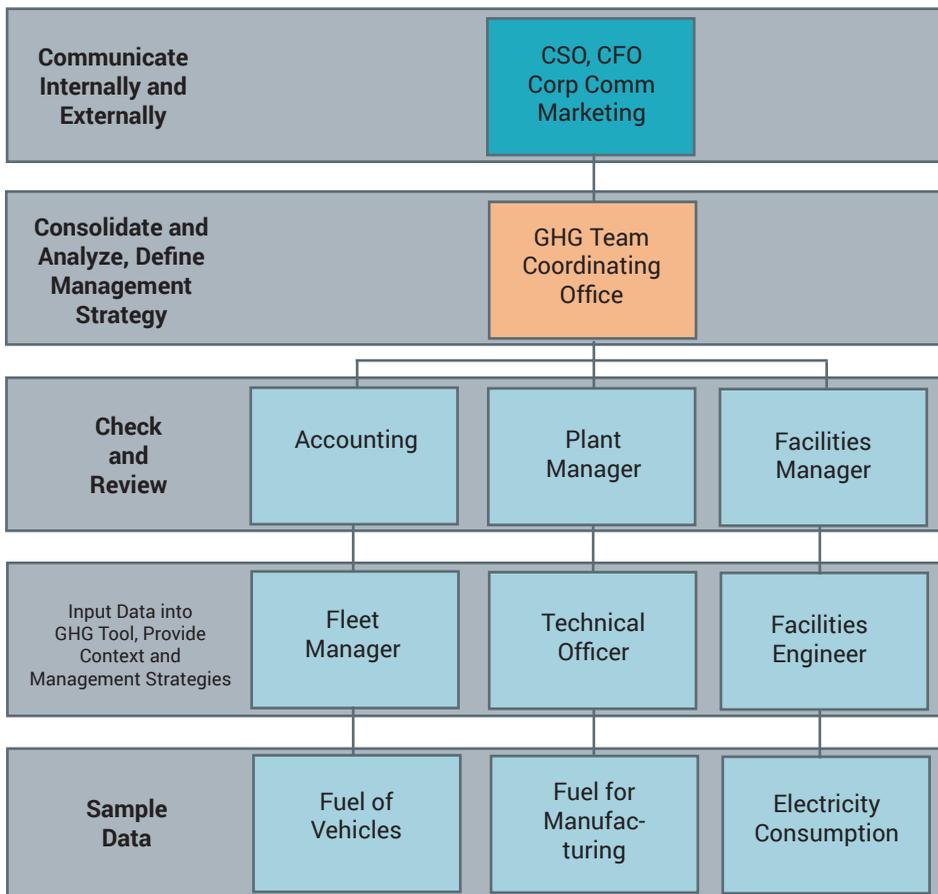


Figure 6. Sample GHG team and roles.

E. Allocate resources

Resources must be made available, in a form of time, expertise, and logistical costs (meetings, site visits, trainings). For most, engaging external experts at the start works best to reduce mistakes, speed up the process and train the company's designated team.

2. BUILD CAPACITY

A. Train data handlers

It is crucial to provide clarity on the specific data needed for the GHG Inventory Report. If the company has templates, train the data handlers on its use.

B. Formulate company protocol

The protocol must contain data architecture or which data will be collected, from which source, at which facility and how they will be consolidated at the entity-level. It needs to be continually improved, based on learning in each year the company develops a GHG report.

C. Develop templates and calculation tools

There are existing publicly available tools. The most widely used tools are those developed by the WRI and the WBCSD. These are available at the GHG Protocol website (<http://www.ghgprotocol.org>).

It is recommended that companies develop their own templates and calculation tools, customized according to the facilities, assets, and operations of the company. These tools can take advantage of using available local emission factors.

D. Set-up a Data Management System

For companies with large operations in many geographies, it is important to develop a good data management system that contains key functions that allows for: (1) logging or auto-logging of raw data; (2) remote users to analyze data in multiple ways; (3) generation of summaries and reports; and (4) verification, traceability, and accountability by data handlers.

3. DEVELOP A GHG INVENTORY

A. Gather data

Here are three tips to make data collection effective and efficient:

1. Build a data architecture.

Develop a company template for collecting emissions data at different levels of the company's operation and make sure it follows the Philippine GHG Reporting platform requirements for each specific type of data disaggregation to ensure compliance.

For example, define what type of data consolidation will be useful for corporate level, for facility level, for line level (for manufacturing) or equipment level. Define clearly the level of disaggregation in each level. For example, for mobile emissions at the facility level, the data can be disaggregated based on fuel consumption per vehicle, or by vehicle type (i.e. delivery truck, company shuttle, or employee vehicles). See **Figure 7** below:

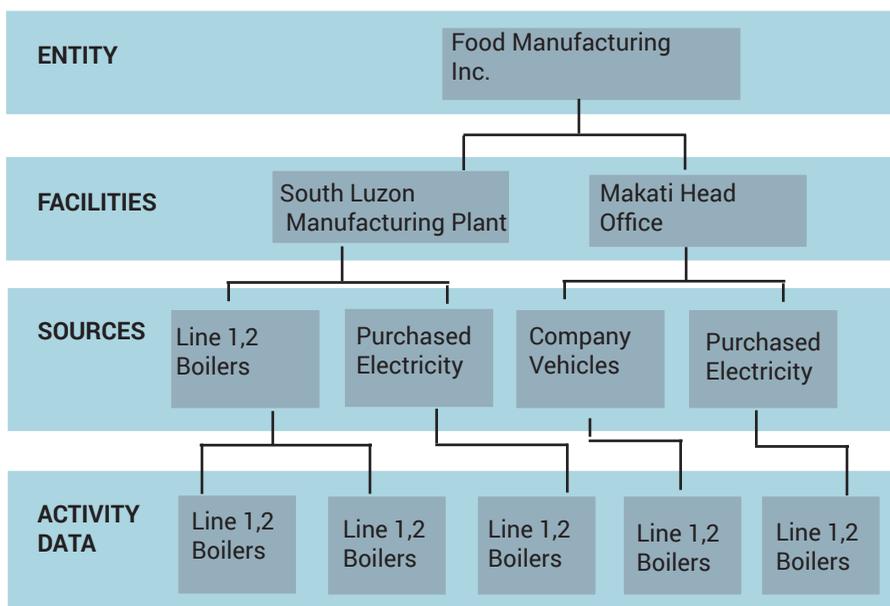


Figure 7. Sample Data architecture.

2. Create a timeline for the data collection.

Inform team of the internal company submission deadlines to meet submission date set under the Philippine GHG Inventory and Reporting Protocol.

B. Consolidate and ensure data quality

Collect activity data and GHG information, as well as operations data such as levels of production (for manufacturing), or number of employees (for service sector), revenue per output, number of production lines, square meter of office space, number of clients serviced, among others. This information is useful to explain the increase or decrease in emissions.

The coordinating office may consolidate the entries from the different facilities or emission sources using pre-programmed tools. Apply random tests and statistical analysis to verify the accuracy of data submitted.

C. Analyze to generate useful information

Use the consolidated data to draw insights for reducing carbon emissions and making better investments. For example, showing efficiency performance across vehicles by presenting data on emissions across vehicle type, or model. This can lead to strategic action such as re-fleeting of older vehicles or developing a vehicles deployment system that considers fuel efficiency and emissions.

4. TAKE STRATEGIC ACTION

The goal is not only to reduce the emissions and impact to climate change, but to align this to existing continual improvement efforts of the company. This will ensure GHG inventory becomes an integral part of company's management strategy.

Here are tips to determine your reduction targets:

A. Establish an emissions reduction target.

One way is to define an absolute target such as a 20 percent reduction by 2020 from 2015 emission levels. Another is determining an intensity target, designed to reduce GHG emissions relative to the scale of business activity, indicated by a business metric such as production levels, client served, or revenue. This is normally expressed in a ratio or emission per unit million revenue, or per unit thousand products sold.

B. Define your base year.

The base year is your reference against which the company can track its performance over time. Choose a normal year as base year, wherein no divestment or acquisition happened that could significantly affect your GHG emissions level. Refer to GHG protocol guidelines on guidance in setting a base year.

C. Implement reduction initiatives and assess impact

Highlight financial impact realized from the initiative to encourage more support from management and from those who play active roles. Periodically re-assess the strategy to optimize results.

D. Recognize results, provide incentives, Integrate in KPIs

Celebrate small successes and reward teams or employees who deliver the best results. Ensure the results are integrated in existing employee evaluation systems and are counted as part of an employee's Key Performance Indicators (KPIs).

E. Report & Communicate

Using the GHG protocol guidelines, Develop a GHG report for internal and external purposes. Include the following in the report:

- Organizational Profile
- Emissions presented in Scope 1, 2 and 3
- Emissions according to 6 Kyoto Gases plus NF3
- Key assumptions used
- Emission factors used
- Reduction from initiatives implemented

III. Reporting to the Philippine GHG Reporting Program

This section outlines the Entity-Level GHG Reporting Program, including the features and reporting requirements for companies reporting their GHG inventories.

A. Reporting Platform Architecture

The Philippine reporting platform architecture requires the input of a company's verifiable emissions data, which are then processed to generate reports. This section provides a step-by-step process following the design of the reporting platform.

Access and registration

1. Sign up via the GHG Reporting Program website using a company-designated email address. A company can have a user or set of users who can access its official account. The website address can be found online from the Greenhouse Gas Protocol global website (<http://www.ghgprotocol.org/philippines-ghg-program>).

The following information are required upon sign-up.

Company Profile

- 1) Company user name (user defined)
- 2) Company-designated email address
- 3) Name of Company (As registered at the Securities and Exchange Commission)
- 4) Head Office Address (user defined)
- 5) Company Phone Number / Trunk line (user defined)
- 6) Type of Business: Cement Manufacturing, Fast-Moving Goods and Services (FMCG), Banking, Retail, Real Estate, etc. (to be provided in pull-down menu)
- 7) Brief Description of company: (user defined, maximum of 500 characters)
- 8) Top Products / Brands: (Top 5 max)
- 9) Designated Users Name and Designation (user defined)

The profile information will be logged only once, during sign-up but may be updated periodically, as needed.

2. After submitting a complete registration application, a verification email will be sent with a link to activate the account. Click the link to verify the account.

3. After account verification, an email will be sent to your account containing links to the emissions data input module. Emissions data are submitted annually, through this module. Data logged must be disaggregated in at least four levels – Entity, Facility, Sources, and Activity Data Levels (see **Figure 7**: Sample Data architecture).

At the 'Activity Data' level, the emissions must be disaggregated according to gases and according to four types as specified in the GHG protocol (Stationary, Mobile, Fugitive, and Process Emissions), as shown in **Table 3** and **Table 4**:

Table 3. Activity Data Inputs for Energy-Related Emissions.

Activity Data		Emission Factors	Emission in Tonnes (t)						
Fuels Used	Quantity		CO ₂	CH ₄	N ₂ O	HFCs	PFCs	SF ₆	NF ₃
Stationary									
e.g. Coal									
Bunker Fuel									
Mobile									
Gasoline									
Diesel									
Total (t of gas)									
Total (t CO ₂ e)									

Table 4. Activity Data Inputs for Process and Product Use Emissions and Waste.

Activity Data for Industry Process Emissions and Product Use		Emission Factor	Emission in Tonnes (t)						
Process/Product	Quantity (t)		CO ₂	CH ₄	N ₂ O	HFCs	PFCs	SF ₆	NF ₃
Process									
e.g. Clinker Production									
Steel Production									
Product Use or Fugitive Emissions									
e.g. Refrigerants									
Waste									
Total (t of gas)									
Total (t CO₂ e)									

At the activity 'sources' level, data must be classified according to scope 1, 2, and 3 and organized according to the IPCC sectoral categories as illustrated in the **Table 5**:

Table 5. Sample data sheet showing data disaggregated according to scopes and according to IPCC sectoral categories.

Emission Category	Scope 1 (Mt CO₂e)	Scope 2 (Mt CO₂e)	Scope 2 (Mt CO₂e)
Direct Emissions			
Energy			
a. Manufacturing Industry and Construction - Fuel Combustion in Clinker and Cement Production	4,500,000		
b. Transport - Fuel combustion from quarry operation	15,000		
c. Transport - Transport of Raw Materials	18,000		
Industry Process and Product Use (IPPU)			
d. Mineral Industry - Process emissions from clinker production	3,500,000		
Waste			
e. Waste Water Treatment	200		
f. Solid Waste Disposal			
AFOLU			
g. Land - Quarry Rehabilitation into Forest land	-5,000		
h. Land - Conversion of Grassland into open quarry	3,000		
Indirect Emissions			
Purchased Electricity Consumption		1,500,000	
Transport - Distributor's Transport of Products			9,500
TOTAL GHG EMISSIONS	8,036,200	1,500,000	9,500
TOTAL OFFSETS	5,000		

B. Verification

GHG data submitted by companies will not be included in the GHG Benchmarking program until verified by a third-party, and approved by the platform administrator.

However, companies that choose not to have their reports verified may still be able to use the platform. This allows them to generate reports, with an option to publish their report under “non-verified reports” category that is accessible on the website.

The steps to the verification process are as follows:

1. **Selection of a verification body.** The reporting company can select from a list of accredited verification bodies (verifiers) to check compliance on GHG inventory (ISO 14064).
2. **Setting the scope of verification.** The agreed upon scope of verification should match the scope of reporting, the boundary, and facilities specified in the reporting boundary. The reporting company can set the level of assurance (limited or reasonable).
3. **Conduct of verification.** The verification body will develop a methodology based on the level of assurance, particularly on sampling methods, number of site visits and materiality thresholds.
4. **Verification report and corrective action.** The verifier submits a report to the reporting company to crosscheck the data and correct any errors. The reporting company then makes the changes in the reporting platform.
5. **Final Report and Verification statement.** Upon review of final report, the verifier submits a verification statement through the reporting platform.
6. **Approval of GHG account for publication in platform.** The platform administrator reviews the completeness of the report and the verification statement issued by the verifier. Once the requirements are met, the company's GHG report is approved for publication under the verified list.

Companies may also opt to submit previously verified corporate GHG reporting program provided that it is verified by a credible third-party in accordance to international assurance standards. The administrator will publish them under the “verified reports list” upon submission of proper documentation.

IV. Benefits of GHG Reporting

In 2014, Executive Order 174 was issued, which established the Philippine Greenhouse Gas Inventory Management and Reporting System as a means to help the country transition to low-carbon path to sustainable and resilient development.

The private sector can help in the fight against climate change, especially in terms of cutting emissions as a means of reducing risks associated with severe weather events that may disrupt critical business operations. The country's Nationally Determined Contribution (NDC) highlights the Philippines goal to cut emissions by 70 percent between 2015 and 2030 and this require cooperation of the private sector, especially industries identified with high carbon emissions such as:

Here's a list of tangible benefits for companies submitting their GHG Inventory for reporting.

1. Streamline green investments, which can translate to cost savings

A company can gain an overview of its greenhouse gas emissions across its business operations and identify ways on how to reduce their environmental impact. For example, a company may identify ways to save costs for its car fleet based on eco-friendly and fuel-efficient vehicle models.

2. Access to calculation and visualization tools

Reporting companies can use the platform's calculation tools to generate its own GHG inventory. It can choose to make the entire report accessible only to the report administrator for consolidation of sectoral emissions data and benchmarking. Reporters can also use visualization tools to help them make their GHG data more accessible to their internal or external audience.

3. Access to benchmarks

Benchmark data will also be accessible only to reporting companies that have submitted their GHG inventory to third-party validation. These can be very useful for decision making of companies towards enhancing their competitiveness and reducing risks of being an early adopter of a certain technology or practice. With benchmark information they can define their leadership strategy and positioning in the bell curve.

4. Brand Value: Leadership in Climate Action

The GHG reporting program will publish feature articles to recognize reporters for their transparency, environmental commitment, and leadership in climate action. Mitigation actions of companies will also be recognized, upon approval of reporting company.

5. Marketing

Product level data that can be generated using the platform and may also be used to position your product as a low-carbon option in the market. With benchmark information at hand, best performing companies can position their brands as the low-carbon option available in the market. The reporting program can provide a seal to validate the company's claim.

6. Mentoring and Sharing of Best Practices

The reporting program secretariat will also organize periodic mentoring sessions to enable advance reporters to help first-time reporters in their reporting process. These workshops will also foster sharing of best practices among reporters to improve overall reporting quality.



“The climate challenge is daunting and time is of the essence in climate action. It is everybody’s business to reduce risk and enhance resilience.”

*- Secretary Emmanuel M. De Guzman
Climate Change Commission*

V. Appendix

The GHG Inventory Management Plan is a template crafted for Philippine-based companies to use as basis for developing their own GHG Inventory and Management Plan. It contains a sample implementation plan guided by the GHG Roadmap for Business.

A copy of the template is found in the main source document for this manual, the Philippine GHG Inventory and Reporting Protocol for Business (pages 56 to 72).

The template is adapted from the Inventory IMP template developed by the United States Small Business Administration. The source US document is available online: <https://www.sba.gov/sites/default/files/Greenhouse%20Gas%20Inventory%20Management%20Plan.pdf>

This section includes useful tables for identifying and classifying specific sources of emissions such as fuel combustion (Scope 1), electricity consumption (Scope 2), Agriculture-, Forestry-, Other Land Use-related emissions, including emissions associated with wastes must be included by reporting entities. Specific industry sectors must report on their emissions relevant to their respective processes and product use.

Table 6. Major GHG emission sources in mineral industry.
 Source: 2006 IPCC Guidelines for National Greenhouse Gas Inventories.

Industry	Major GHG Sources
Cement	Calcination (CO ₂)
	Raw Materials and Product Transport (CO ₂ , CH ₄ , N ₂ O)
Glass	Raw Materials (limestone, dolomite, soda ash) Melting (CO ₂)
Lime Production	Calcination (CaCO ₃ → CaO + CO ₂)
Carbonates use - Ceramics	Calcination of raw materials - clay, shale, lime, dolomite, witherite (CO ₂)
	Use of limestone as flux
Soda Ash use	Use in flue gas desulphurization, pulp and paper, soaps, consumer goods (CO ₂)
Non-metallurgical magnesia production	MgCO ₃ → MgO + CO ₂

Table 7. Major GHG emission sources in metal industry.
Source: 2006 IPCC Guidelines for National Greenhouse Gas Inventories..

Industry	Major GHG Sources
Iron and Steel	
Metallurgical coke production - carbonization of coal	Combustion of Blast furnace gas and coke oven gas (CH ₄ , CO ₂)
Sinter Production	Sintering Process - Oxidation of coke breeze and other inputs (CO ₂) Off gas from sintering process (CH ₄)
	Fuel Use (CO ₂ , CH ₄ , N ₂ O)
Pellet production	Fuel Use (CO ₂ , CH ₄ , N ₂ O)
Iron-making from ore with use of coke	Use of Carbon (i.e. metallurgical grade coke) as reducing agent to convert iron oxide into iron (CO ₂ , CH ₄)
Other Metal Industries	
Steel Production	Primary Steel Production - Exothermic reaction of high purity oxygen and carbon in molten iron in basic oxygen furnace (BOFs) to reduce carbon content to less than 1%
	Secondary Steel Production - production from scrap using electric arc furnace (AEF) that use carbon electrodes to impart electrical energy. CO ₂ is emitted from consumption of carbon electrodes
Ferroalloy	Metallurgical reduction process - emissions originating from reducing agents and electrodes: C (electrodes) + O ₂ (metal oxides) --> CO. 2CO + O ₂ --> 2CO ₂ through energy production or flaring)
	Calcination of carbonate fluxes (CO ₂)
Aluminum Production	Carbon Anodes consumption in conversion of Aluminum Oxide to Aluminum Metal $2 Al_2O_3 + 3 C \rightarrow 4 Al + 3 CO_2$
	Perfluorocarbons (PFCs) - CF ₄ and C ₂ F ₆ during anode effects
Magnesium	Primary Magnesium Production - electrolysis or thermal reduction - calcination of carbonate-based raw materials (dolomite, magnesite) - CO ₂
	Gases use for protection system of molten magnesium (SF ₆ , HFC's)
Lead Production	Sintering/smelting & Direct smelting - reduction of lead oxide (CO ₂)

Table 8. Major GHG emission sources in chemical industry.
Source: 2006 IPCC Guidelines for National Greenhouse Gas Inventories..

Industry	Major GHG Sources
Ammonia Production	Primary steam reforming: $\text{CO (from CH}_4\text{) + H}_2\text{O} \rightarrow \text{CO}_2 + \text{H}_2$
	Secondary reformer process gas shift conversion: $\text{CO + H}_2\text{O} \rightarrow \text{CO}_2 + \text{H}_2$ - regeneration of CO_2 scrubbing solution
Nitric Acid Production	High temperature catalytic oxidation of ammonia (NH_3) produce N_2O as by-product
Adipic Acid	Nitric Acid Oxidation Stage Produces N_2O as by-product
Carbide production	Silicon Carbide: Silica (SiO_2) + Petroleum coke \rightarrow Silicon Carbide + CO_2 . Presence of H- containing volatile compound petroleum coke produces CH_4
	Calcium Carbide: Limestone + Petroleum coke \rightarrow Calcium Carbide + CO_2
Titanium Dioxide Production	Titanium Slag Production in electric furnaces (CO_2)
	Synthetic rutile production (CO_2)
	Rutile TiO_2 production via chloride route (CO_2)
Soda Ash Production (Na_2CO_3)	Sodium sesquicarbonate (trona) \rightarrow Soda Ash + H_2O + CO_2
Petrochemicals & Black Carbon Production	Production of methanol, ethylene, and propylene, ethylene dichloride, ethylene oxide, and acrylonitrile (CO_2)
Flourochemical Production	HFC - 23 from HCFC-22 Production
	Emissions from production of fluorinated compounds (SF_6 , CF_4 , etc.)

Table 9. Major process and product use GHG emission sources in electronic industry.
Source: 2006 IPCC Guidelines for National Greenhouse Gas Inventories.

Industry	Major GHG Sources
Use of fluorinated compounds (FCs) Semiconductor Thin-film-transistor flat panel display Photovoltaic (PV) manufacturing	Use of Sulfur hexafluoride (SF_6), Nitrogen trifluoride (NF_3), CF_4 , etc. for (1) plasma etching intricate patterns of silicon-containing materials and (2) cleaning of chemical vapor deposition in reactor chambers walls where silicon has deposited

Table 10. Major product use- related GHG emission sources.
Source: 2006 IPCC Guidelines for National Greenhouse Gas Inventories..

Industry	Major GHG Sources
Non-energy products from fuels and solvents	
Lubricants use	Lubricants oxidized during use (e.g. lubricants that slips into the combustion chamber of engines)
Paraffin waxes use	Candles, corrugated boxes, paper coating, board sizing, adhesives (CO2)
Bitumen/asphalt	NMVOCs, CO --> CO2
Solvents	NMVOCs, CO --> CO2
HFCs and PFCs as substitute ODS	
Refrigeration and Air-conditioning	Leaks from mobile and stationary refrigeration systems (HFC-23, 32, 125, etc.)
Fire suppression and explosion protection	HFCs, PFCs
Aerosols (propellants and solvents)	HFCs, PFCs
Solvent cleaning	HFCs, PFCs
Foam blowing	HFCs, PFCs
Other Product Manufacture and Use	
Electrical Equipment	SF6 used in electrical insulation and current interruption in equipment used in T & D of Electricity, emission across life cycle from manufacture to disposal
SF6 and PFCs of other product use	
N2O from product uses	SF6 used in airborne radar system for military
	PFCs used as heat transfer fluids in high-powered electronic applications
	SF6 used in soundproof windows
	PFC in cosmetics and medical applications
Other Industries	
Pulp and paper industry	Process emissions in paper pulping (CO2)
Food and Beverage	Use of CO2 for Carbonated drinks

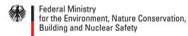
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