IFVI
INTERNATIONAL FOUNDATION FOR VALUING IMPACTS

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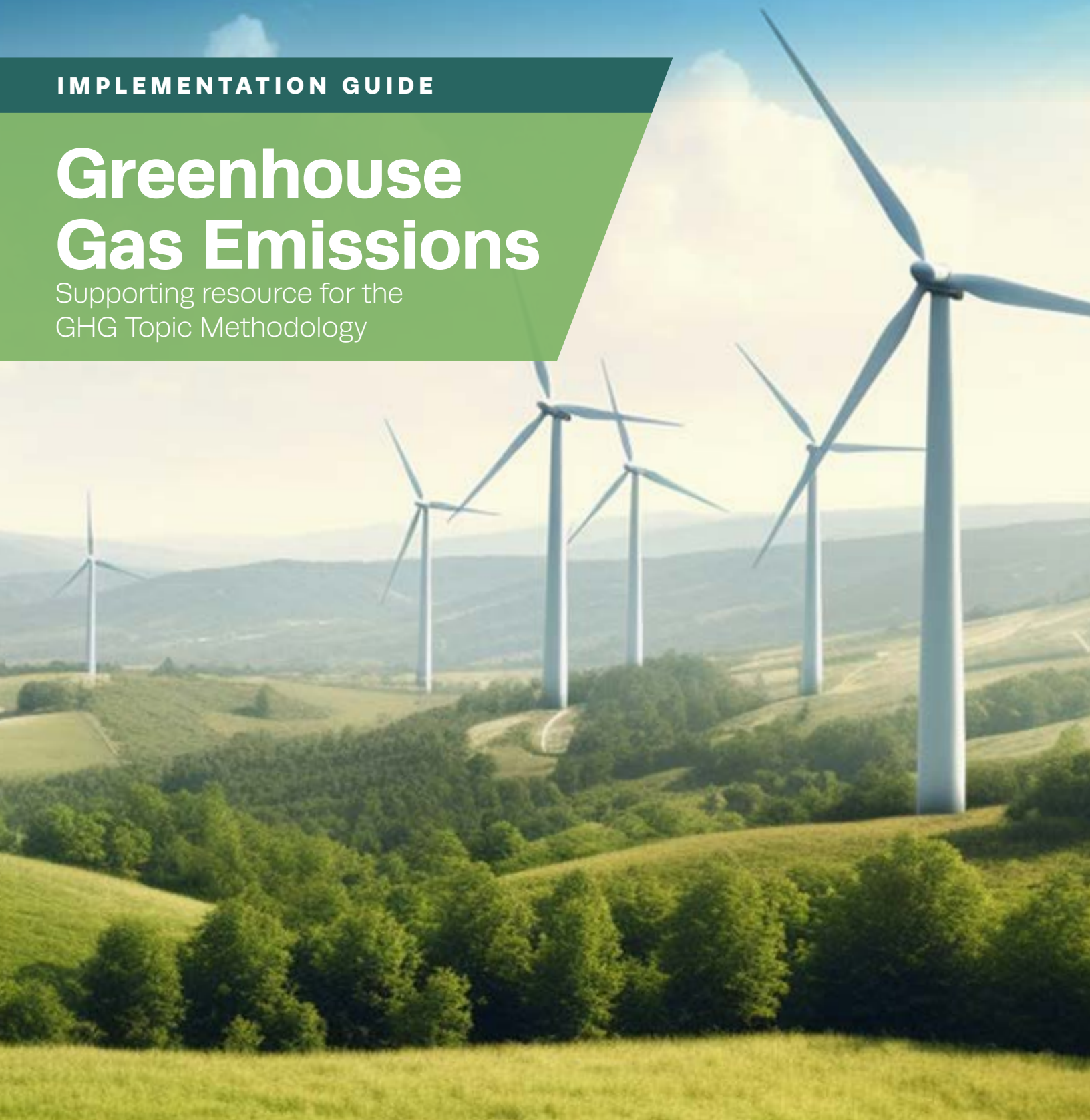
IMPLEMENTATION GUIDE

Greenhouse Gas Emissions

Supporting resource for the GHG Topic Methodology



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Acronyms & abbreviations

AUM	Assets under management
CDP	Carbon Disclosure Project
CH_4	Methane
CO_2	Carbon dioxide
CO_2e	Carbon dioxide equivalent
GHG	Greenhouse gases
EEIO	Environmentally-extended input output
ESRS	European Sustainability Reporting Standards
GRI	Global Reporting Initiative
GWP	Global warming potential
HCFs	Hydrofluorocarbons
IAM	Integrated assessment model
IFRS	International Financial Reporting Standards
IFVI	International Foundation for Valuing Impacts
IPCC	Intergovernmental Panel on Climate Change
LCA	Life-cycle assessment
MD&A	Management Discussion and Analysis
N_2O	Nitrous oxide
NF_3	Nitrogen trifluoride
PFCs	Perfluorinated compounds
R&D	Research and development
SCC	Social cost of carbon
SF_6	Sulfur hexafluoride
UNFCCC	United Nations Framework Convention on Climate Change
VBA	Value Balancing Alliance
VTPC	Valuation Technical and Practitioner Committee

01

Introduction

Impact accounting is "a system for measuring and valuing the impacts of corporate entities and generating impact information to inform decisions related to an entity's effects on sustainability."[1] Impact accounting translates corporate and investor environmental and social performance into a language that companies, investors, and governments rely on and prioritize – currency.

Social and environmental *impacts* translated into monetary terms makes information about impact accessible, actionable, and comparable. Once expressed in currency, impact can be measured and managed using the same existing infrastructure for financial management. This way, impact can be readily incorporated into decision-making in real time, mitigating negative risk and optimizing positive outcomes.

The International Foundation for Valuing Impacts (IFVI) and the Value Balancing Alliance (VBA) are developing a globally applicable methodology for impact accounting as a public good that details the framework for calculating impact in monetary terms. The methodology is developed according to a formal due process and overseen by the independent Valuation Technical and Practitioner Committee (VTPC).

Why use this guide?

As a complementary document to the *Greenhouse Gas Emissions Topic Methodology (GHG Topic Methodology)*, developed by the partnership between IFVI and VBA, this guide is intended for those seeking to measure and value the impact of an organization's GHG emissions in monetary terms.

While this guide primarily focuses on companies and investors as primary users and preparers of impact accounting, this resource can also be leveraged by a wide range of *stakeholders* that either influence or are impacted by a company's actions directly or indirectly, including auditors, customers (especially business-to-business or B2B), regulators, service providers, suppliers, academia, advocacy groups, industry associations, other affected stakeholders, and people as stewards of nature.

This guide outlines how you can convert *Scope 1, 2, and 3 GHG emissions* data into impact expressed in monetary terms and helps answer the following questions:

- What data is required to calculate GHG impact information in monetary terms? (page 12)
- What options are available to collect GHG primary data? (page 12)
- What methods are available to estimate GHG data when there are gaps in primary data? (page 13)
- What resources are available to estimate GHG data using secondary data? (page 16)
- How do you convert various GHG emissions into metrics tons of carbon dioxide equivalent (CO_2e)? (page 17)
- How do you value GHG impact in monetary terms using the *GHG Topic Methodology*? (page 19)
- How can companies (page 24) and investors (page 28) use GHG impact information once it is calculated in monetary terms?

In addition to the guidance provided on the questions above, select sections also include reflection questions to help you take the appropriate next steps in GHG impact accounting.

[1] Terms that are italicized are featured in the Glossary of this guide. See definition of impact accounting in the Glossary from The International Foundation for Valuing Impacts, & The Value Balancing Alliance. (2024). *General Methodology 1: Conceptual Framework for Impact Accounting.*

Why use GHG impact information?

Producing *impact information* is the objective of the broader system of impact accounting. By representing impact in monetary terms, impact information informs decision-making related to an organization's effects on specific sustainability topics.

GHG impact information comprises GHG emissions data that is converted into monetary terms, representing the actual impact of those emissions on society. That conversion process is often referred to as valuing GHG impact in monetary terms. The specific value used to convert GHG emissions data into GHG impact information is known as a *social cost of carbon (SCC)*. Many companies already use an internal carbon price, which can be based on a SCC. For example, the Carbon Disclosure Project (CDP) questionnaire, which has been used by over 21,000 companies, features the SCC as an optional response in their questionnaire.[2]

Why is GHG impact information more useful than GHG emissions data alone? As organizations strive to set and meet climate goals, they need to evaluate their progress in a way that aligns with financial decision-making. Monetizing GHG emissions allows business leaders to intuitively compare and prioritize environmental impacts alongside financial performance, offering a clearer understanding of the true societal cost of emissions beyond metric tons of CO_2e. This approach also enables better integration of environmental considerations into a company's business strategy.

Simply analyzing metric tons of CO_2e cannot convey the same level of topic insights, especially when it is compared alongside other environmental or social topics, and therefore does not allow for a more holistic understanding of the overall impact of a company.

Furthermore, using a standardized SCC of $236 for every metric ton of CO_2e — as proposed by the *GHG Topic Methodology*[3] — compared to some other price determined by the company, increases comparability, removes the burden of calculating a company's own SCC value, and improves credibility by leveraging the best available science and an independent due process for a company's carbon pricing strategy.

Reflection questions:

- How would your company benefit from converting its GHG emissions data into GHG impact information?
- What is your company's current extent of measurement of GHG emissions data?

[2] Under section C11.3 of the CDP questionnaire, the CDP asks companies to report their internal price on carbon, which includes the option to report an internal SCC.

[3] The *GHG Topic Methodology* proposes a SCC of $236 for 2023 GHG emissions data. See the *GHG Topic Methodology* for values beyond 2023.

02

Measuring data and filling gaps

Concerned about collecting additional sustainability data? No need. The data you need to produce GHG impact information is the same underlying data required to report GHG emissions data.

While data collection and reporting on GHG emissions is already common, especially by larger companies, this frequently remains a challenge for many small and medium-sized businesses that may lack the resources or capacity to do so effectively, especially for Scope 3 data. Moreover, large companies often struggle with data gaps as they look further down their *value chains.*

There are several approaches to both directly measure emissions or estimate them when direct data is not available. To start, consider the following basic steps for data collection and estimation:

Steps to measuring GHG emissions data and filling data gaps

Aligning with reporting requirements

1. Review your existing data aligned with reporting requirements and GHG Protocol resources.

Collecting primary data

2. Determine what components of GHG emissions are possible to measure directly.

Estimating data to fill gaps

3. Determine most appropriate estimation approaches to address data gaps.
4. Measure and estimate Scope 1, 2, and 3 emissions and distinguish between Scope 3 *upstream (cradle-to-gate)* and *downstream (gate-to-gate)* activities.
5. Record data estimation approaches and rationale for reporting results.

Converting data into one metric

6. Convert GHG emissions into metric tons of CO_2e via *global warming potential (GWP).*

Aligning with reporting requirements

The *GHG Topic Methodology* corresponds with GHG reporting standards to reduce the burden on those calculating and preparing GHG impact information. Requiring metric tons of CO_2e is aligned with existing data requirements from the following standard setters:

Metric	ESRS E1: Climate change	IFRS S2: Climate related disclosures	GRI 305: Emissions 2016
Scope 1 Emissions	Fully aligned E1-6 Paragraph 41(a)	Fully aligned Climate-related metrics paragraph 29(a)(i)(1)	Fully aligned Disclosure 305-1
Scope 2 Emissions	Fully aligned E1-6 Paragraph 41(b)	Fully aligned Climate-related metrics paragraph 29(a)(i)(2)	Fully aligned Disclosure 305-2
Scope 3 Emissions	Fully aligned E1-6 Paragraph 41(c)	Fully aligned Climate-related metrics paragraph 29(a)(i)(3)	Fully aligned Disclosure 305-3

Table 1. Alignment with reporting standards[4]

Before starting to collect primary and secondary data from scratch, make sure to check existing data collection practices that your company is aligned with.

Collecting primary data

Before any calculations, you should collect as much primary data available across Scope 1, 2, and 3 value chain operations for carbon dioxide (CO_2), methane (CH_4), hydrofluorocarbons (HCFs), nitrogen trifluoride (NF_3), nitrous oxide (N_2O), perfluorinated compounds (PFCs), and sulfur hexafluoride (SF_6). As outlined in "Converting data into one metric" in Section 2, the data collected across these different GHG emissions will then be converted into metrics tons of CO_2e using each GHG's global warming potential (GWP).

Here are a few ways to start collecting GHG emissions data:

Scope 1	Scope 2	Scope 3
Need: Understand the type and level of GHG emissions within own operations across *stationary combustion*, *mobile combustion, process emissions*, and *fugitive emissions*.	**Need:** Reflect the level of generation of purchased or acquired electricity, steam, heating, or cooling consumed by the reporting company. Need: Coordinate with suppliers to collect any primary Scope 3 data available.	**Need:** Coordinate with suppliers to collect any primary Scope 3 data available.
Primary data: Fuel receipts, leaking of refrigerants, employee records, fleet management software, purchase records, centralized billing systems, etc.	**Primary data:** Total consumption in megawatt hour (MWh) or kilowatt hour (kWh) units from utility bills, energy meters, etc., and then multiply by location-based or market-based emission factors.	**Primary data:** Invoices and bills of sale. Collect through surveys, materiality assessments, or other measurement approaches. However, it is expected that Scope 3 data will also need to be estimated.

Table 2. GHG emissions primary data collection methods by scope category

[4] Table and content are originally outlined in the *GHG Topic Methodology*. Categories of alignment include (1) fully aligned: data from reporting can be used as is for preparation of impact accounts; (2) expands upon: data from reporting conceptually aligns with the impact accounting methodology, but additional detail, context, or presentation is necessary for an accurate accounting of impact; or (3) independent: Data needed for the preparation of impact accounts are not covered by the reporting standards and would require separate data collection and analysis.

The *GHG Topic Methodology* asks to distinguish Scope 3 upstream and downstream emissions data to promote deeper reporting transparency and provide greater insights. This is aligned with the GHG Protocol that prescribes which business activities are defined as Scope 3 upstream and downstream activities.[5] For more guidance on how to collect primary data, refer to the GHG Protocol standards and guidance on Scope 1, 2, and 3 emissions, and "GHG Protocol and additional data management resources" in Section 2.

Estimating data to fill gaps

Primary data availability gaps are inevitable. This is especially challenging for Scope 3 emissions which require you to collect indirect emissions data on upstream activities from your suppliers and downstream activities from your customers.

When primary data is not available, it is possible to estimate emissions based on secondary data using various estimation techniques. For general guidance on addressing data gaps and the need to estimate, you can refer to *General Methodology 2: Impact Measurement and Valuation Techniques*. Specifically, for GHG emissions, you can also take one or both of the following approaches to address data gaps with secondary data:

1. **Leverage GHG Protocol guidance to independently estimate data:** Data can be estimated using ratios, industry-level data sets, economic modeling, etc. The GHG Protocol outlines which estimation methods are best for specific Scope 1, 2, and 3 categories (see resources listed in "GHG Protocol and additional data management resources" in Section 2) with many examples of different applications depending on company size, capacity, and data availability.
2. **Hire a third-party consultant or inventory firm:** There are many consultancies and firms that specialize in GHG inventory data estimation. Many companies leverage external expertise to ensure reporting is compliant with current regulations, and that they are efficiently collecting information.

The following examples outline how companies and investors can use different estimation methods to fill data gaps. Keep in mind that using different estimation techniques across upstream and downstream activities can lead to inconsistent estimates. Therefore, it is recommended to use the same estimation technique for both upstream and downstream activities; however, hybrid approaches can be used if appropriate.

[5] For the complete categorization of Scope 1, 2, and 3 activities, see page 6 of Barrow, M. et al. (2013). *Greenhouse Gas Protocol Technical Guidance for Calculating Scope 3 Emissions (version 1.0).*

Company example: Environmentally-extended input output (EEIO) models (spend based method)

Clothes R Us, a multinational apparel producer, needs to estimate GHG emissions in its upstream supply chain activities. The company decides to use EEIO modelling – a type of *integrated assessment model* – leveraging the EXIOBASE 3 database to cover its entire upstream value chain and hires a consultant to support in the modelling process.[6]

EEIO models utilize input-output tables that capture all inputs and economic activities required for a producing a specific good and service – such as textiles – broken down by sector and country. The model then estimates approximate environmental impact, measured in metric tons of CO_2e. In this case, the EEIO model estimates about 426.7 metric tons of CO_2e are emitted for every 1 million euro spent on textiles sourced from a producer in Spain.[7]

As a result, Clothes R Us can estimate how many metric tons of CO_2e are emitted in its upstream supply chain operations based on its spending on textiles from that Spanish producer. EEIO models enable the assessment of the GHG emissions across all tiers of the supply chain, providing a comprehensive view of the total upstream GHG emissions related to the production of textiles.

Company example: Life-cycle assessment (LCA) data (average data or hybrid methods)

A multinational food and beverage company, Big Snacks, needs to measure its Scope 3 emissions throughout its value chain. Given its wide range of products and extensive value chains, the company needs estimation techniques that can leverage industry-level data and extrapolate data to apply to other activities within the value chain. Additionally, the company's products are linked to various agricultural supply chains in emerging markets, where traceability of goods and services purchased by its suppliers is limited. Big Snacks could leverage its existing LCA studies to assess the environmental impacts of a large share of its products.

For example, it might find that the production of salted pistachios emits about 1.55 kilograms of CO_2e per kilogram of pistachios.[8] By multiplying this figure by the total amount of pistachios purchased, the company can estimate its Scope 3 upstream GHG emissions due to its pistachios sold. To cover additional products in its portfolio, it will apply the same approach based on LCAs for its most relevant products, and EEIO modelling to estimate the remaining Scope 3 upstream GHG emissions.

[6] The EXIOBASE 3 database is free, detailed multi-regional environmentally extended supply-use table (MR-SUT) and input-output table (MR-IOT). It was developed by a consortium of several research institutes in projects financed by the European research framework programs. For more information, see K. Stadler et al. (2018). *EXIOBASE 3: Developing a Time Series of Detailed Environmentally Extended Multi-Regional Input-Output Tables.*

[7] Typically, EEIO modelling is done directly with EEIO tables and the spend data of companies, not with emission factors applied for each sector as described here for illustrative purposes. For this example's emission factor source, see Climatiq. (2019). *Emission Factor: Textiles.*

[8] For this example's source, see Sustainability Impact Metrics. (2024). *Scope 3 Idemat Dataset.*

Investor example: Proxy data collection methods

Power Tomorrow Ventures is an energy sector investment firm with over $10 billion assets under management (AUM) across three funds.

Currently, most of the portfolio companies only have data for 85% of their operations due to sparse or inconsistent data collection on some facilities and field equipment. To fill those data gaps, Power Tomorrow could leverage proxy data collection methods following these steps:

- Grouping the data with similar characteristics from all portfolio companies, such as facility or equipment type, location, or activity.
- Calculating an intensity ratio appropriate to the specific industry. For example, an oil & gas company might divide its measured emissions by its measured production in million barrels per day (mbbl/day) for oil for each facility. The denominator could be total revenue, total cost, total spend, number of employees, etc. The denominator may be industry specific.
- Applying the intensity ratio to estimate the missing data in other facilities, equipment, locations, activities, etc. For example, an offshore facility from Company Y leverages third party experts to calculate an emissions intensity of 100 kilograms (kg) of CO_2e per barrel of oil produced. Since Company Z lacks robust tracking systems and maintenance records for all equipment before the acquisition, it could use Company Y's intensity ratio to estimate its emissions.
- Portfolio companies missing Scope 3 data could also do simple random sampling, systematic sampling, or stratified sampling to extrapolate data from a representative sample of activities.

Recording estimated data and improving estimated data ratio over time

Once all data is estimated, you should document limitations, selected estimation methods and secondary data sources, and assumptions applied. Recording the ratio of reported to estimated data across each emissions-generating activity can help you understand data management improvements year-over-year.

While the *GHG Topic Methodology* is ideally applied along the entire value chain with a large share of primary data, it is better to start somewhere. If taking a comprehensive approach to data collection and estimation is not feasible, start with areas that are most material and feasible while aiming to improve measurements over time.

GHG Protocol and additional data management resources

The GHG Protocol offers the following resources to address data collection and management:

- **GHG Protocol Calculation Tools:** Enable companies and cities to develop comprehensive and reliable inventories of their GHG emissions, and track progress toward their climate goals.
- **GHG Protocol Corporate Value Chain Accounting Reporting Standard (Scope 3 Standard):** Allows companies to assess their entire value chain emissions impact and identify where to focus reduction activities.
- **GHG Protocol Corporate Value Chain (Scope 3) Standard Online Course:** Teaches business professionals how to account for emissions throughout their value chain online.
- **GHG Protocol Life Cycle Databases:** List of available third-party databases to assist users in collecting data for product life cycle and corporate value chain (Scope 3) GHG inventories.
- **GHG Protocol Scope 3 Technical Guidance:** Serves as a companion to the Scope 3 Standard to offer companies practical guidance on calculating their Scope 3 emissions. Provides methods for calculating GHG emissions for each of the 15 Scope 3 categories, data sources, and worked examples.

In addition to the GHG Protocol, there may be other types of resources that can aid GHG emissions data collection and estimation. For example, there are free carbon calculators that help companies aggregate GHG emissions, which could be helpful for potentially resource-constrained organizations. There are also many software providers that specialize in carbon accounting, which can help alleviate the initial burden of collecting and estimating GHG emissions data for companies.

Broader resources exist such as environmental sustainability-focused consulting firms, and government environmental protection and mitigation resources. Consider your specific goals as a company for using impact accounting and your operating context to identify and prioritize potential resources that may be available to you.

Converting data into one metric

Once all emissions are collected and estimated, you need to convert your GHG emissions for each gas into metric tons of CO_2e to ensure they are aligned with standard setters' requirements. Conversion is likely only necessary for primary data as secondary data estimations usually already produce GHG emissions data in metric tons of CO_2e.

Data needs: GHG emissions for CO_2, CH_4, HCFs, NF_3, N_2O, PFCs, SF_6, and other gases.

Calculation: Total GHG emissions per gas multiplied by the latest corresponding 100-year Global Warming Potential (GWP) value (see page 1831 of the Working Group III contribution to the Sixth Assessment Report (AR6) of the Intergovernmental Panel on Climate Change (IPCC)). See Table 3 to reference 100-year GWP values of common GHGs:

GHG type	GWP-100 value
Carbon dioxide (CO_2)	1
Methane (CH_4) fossil	29.8
Methane (CH_4) non-fossil	27
Hydrofluorocarbons (HCFs)	Multiple values
Nitrogen trifluoride (NF_3)	17,423
Nitrous oxide (N_2O)	273
Perfluorinated compounds (PFCs)	5,301
Sulfur hexafluoride (SF_6)	25,184

Table 3. GHGs and respective GWP-100 values as of April 2022[9]

Company example: Big Snacks

The company needs to convert total Scope 1 methane fossil emissions and total Scope 1 methane non-fossil emissions into metric tons of CO_2e The GWP value of fossil methane fuel over 100 years is 29.8 times more potent than CO_2. The GWP value of non-fossil methane fuel over 100 years is 27 more times potent than CO_2. Big Snacks calculates the following:

Total metric tons of methane fossil fuel release * GWP of 29.8 = Total metric tons of CO_2e

Total metric tons of methane non-fossil fuel release * GWP of 27 = Total metric tons of CO_2e

Big Snacks records its total metric tons of CO_2e for total Scope 1 methane emissions. If the company had other GHG emissions, it would follow the same process for those, calculating Scope 1, Scope 2, and Scope 3 upstream and downstream GHG emissions into CO_2e.

[9] See page 1831 of Al Khourdajie et al. (2022). Annex II: Definitions, Units and Conventions in *IPCC Climate Change 2022: Mitigation of Climate Change. Contribution of Working Group III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change*. According to the IPCC, the Synthesis Report of the Seventh Assessment Report will be released by late 2029.

Investor example: Super Mega Ventures[10]

The firm requires each of its portfolio companies to collect and estimate their N_2O data in 2023 and then convert to CO_2e. Since the GWP value of N_2O over 100 years is approximately 273 times more potent than CO_2, portfolio companies calculate the following[11]:

Portfolio company total metric tons of N_2O * GWP of 273 = Portfolio company metric tons of CO_2e

Each portfolio company sends their converted Scope 1 N_2O emissions in metrics tons of CO_2e to Super Mega Ventures. Aligning with the GHG Protocol, Super Mega Ventures requires portfolio companies to record Scope 1 N_2O emissions and repeat the conversion process for each Scope category and GHG. Super Mega Ventures then categorizes GHG emissions in CO_2e across Scope 1, 2, and 3 upstream and downstream across its portfolio companies.

Reflection questions:

- Which GHG emissions data has your company already collected and what Scope 1, 2, and 3 data is missing?
- Which missing GHG emission data could most feasibly be directly collected, and which data likely requires estimation?
- What resources do you currently have available for collecting and estimating GHG data? What additional resources do you still need? Are those resources available internally or do you need external support?

[10] For this exercise, we will cover the calculation for Super Mega Venture's calculation for only one of its portfolio companies. It is assumed that Super Mega Venture's would repeat this exercise for as many portfolio companies it oversees.

[11] See N_2O GWP value in United States Environmental Protection Agency. n.d. *Understanding Global Warming Potentials.*

03

Valuing impact in monetary terms

Now that you have your GHG emissions data converted to metric tons of CO_2e, you are ready to convert that data into GHG impact information. This process is referred to as valuing impact in monetary terms. This section outlines how to convert GHG emissions data measured in metric tons of CO_2e into GHG impact information expressed in monetary terms.

Steps to calculate impact accounts
1. Calculate Scope 1, 2, and 3 upstream and downstream GHG emissions impact
2. Calculate total GHG emissions impact

Step 1: Calculate Scope 1, 2, and 3 GHG emissions impact

To start, calculate the monetary value of Scope 1, 2, and 3 upstream and downstream GHG emissions impact by following the guidance below.

Data needs: Total Scope 1, 2, and 3 GHG emissions for all gases converted to CO_2e, with Scope 3 emissions distinguished between upstream emissions and downstream emissions.

Calculation: Multiply total Scope 1, 2, and 3 emissions by the *GHG Topic Methodology* SCC of the respective year (for 2023: $236 per metric ton of CO_2e).

Scope 1 emissions (metric tons of CO_2e) * $236 = Scope 1 GHG impact

Scope 2 emissions (metric tons of CO_2e) * $236 = Scope 2 GHG impact

Scope 3 upstream emissions (metric tons of CO_2e) * $236 = Scope 3 GHG upstream impact

Scope 3 downstream emissions (metric tons of CO_2e) * $236 = Scope 3 GHG downstream impact

Step 2: Calculate total GHG emissions impact

Once GHG emissions impact is calculated across all scopes, you may want to aggregate into total GHG emissions impact for specific use cases of impact information or to communicate the impact with your stakeholders. For most use cases, and to ensure wide scale comparability, it is beneficial to demonstrate total GHG emissions impact as a value. In some other cases, a total value might not be as decision-useful or additional.

If you decide to calculate total GHG emissions impact, always present that total value, GHG emissions impact per scope category, and the assumptions and variations in data collection and estimation that may vary between scopes together.

Data needs: Total impact of GHG emissions in monetary terms for Scope 1, 2, and 3 upstream and downstream.

Calculation: Add total GHG emissions impact per scope category together.

Total GHG emissions impact = Scope 1 impact + Scope 2 impact + Scope 3 upstream impact + Scope 3 downstream impact

Data collection and estimation will vary based on your organization. The following examples illustrate how an organization's GHG emissions would be organized and then converted into total GHG emissions impact in monetary terms per scope category using the *GHG Topic Methodology* SCC.

Company example: Big Snacks

Step 1: Calculate Scope 1, 2, and 3 GHG emissions impact

The company multiplies its GHG emissions data per scope category and multiplies each scope category by the *GHG Topic Methodology* SCC to calculate GHG emissions impact.

Scope category	Data needs: Total emissions (metric tons of CO_2e)	Calculation: Multiply by SCC in 2023 (USD)	GHG emissions impact (USD)
Scope 1	147,000	* $236	= -$34,692,000
Scope 2	61,000	* $236	= -$14,396,000
Scope 3 upstream	5,026,180	* $236	= -$1,186,178,480
Scope 3 downstream	320,820	* $236	= -$75,713,520

Table 4. Big Snacks Scope 1, 2, and 3 GHG emissions impact calculation

Step 2: Calculate total GHG emissions impact

The company aggregates its total GHG emissions impact by adding each scope total together.

GHG emissions impact (USD)	Scope category
-$34,692,000 +	Scope 1
-$14,396,000 +	Scope 2
-$1,186,178,480 +	Scope 3 upstream
-$75,713,520	Scope 3 downstream
-$1,310,980,000	Total GHG impact

Table 5. Big Snacks' total GHG emissions impact calculation

Big Snacks' total GHG emissions impact is approximately -$1.311 billion.

Investor example: Super Mega Ventures

Step 1: Calculate Scope 1, 2, and 3 GHG emissions impact

The firm multiplies Portfolio Company A's GHG emissions data per scope category and multiplies each scope category by the *GHG Topic Methodology* SCC to calculate GHG emissions impact.

Scope category	Data needs: Total emissions (metric tons of CO_2e)	Calculation: Multiply by SCC in 2023 (USD)	GHG emissions impact (USD)
Scope 1	15,000.00	* $236	= –$3,540,000
Scope 2	36,000	* $236	= –$8,496,000
Scope 3 upstream	51,000	* $236	= –$12,036,000
Scope 3 downstream	12,750	* $236	=–$3,009,000

Table 6. Super Mega Ventures Scope 1, 2, and 3 GHG emissions impact calculation

Step 2: Calculate total GHG emissions impact

Scope category	GHG emissions impact (USD)
–$3,540,000 +	Scope 1
–$8,496,000	Scope 2
–$12,036,000 +	Scope 3 upstream
–$3,009,000	Scope 3 downstream
–$27,081,000	Total GHG impact

Table 7. Super Mega Ventures' total GHG emissions impact calculation

The firm aggregates Portfolio Company A's total GHG emissions impact by adding each scope total together.

In this example, Super Mega Ventures owns 100% of Portfolio Company A.[12] Therefore, Super Mega Ventures' Portfolio Company A's total GHG emissions impact is approximately –$27.081 million.

Reflection questions:

- Which scope emissions of your company do you expect to have the greatest impact? Once you have calculated your emissions, what do the results show?
- How would your performance compare to peers, or to your performance in past years?
- If your GHG impact information were to be compared or incorporated into your financial performance (for example, through a carbon tax in the magnitude of the SCC), how would this change the profitability of your business?

[12] For simplicity of this example, Super Mega Ventures owns 100% of Portfolio Company A. An investment firm should calculate GHG emissions impact based on the percentage of ownership over its respective portfolio company.

04

Using impact information

Now that you have calculated your GHG impact information, how can you make the most use of it? Simply knowing the monetary impact of an organization for reporting is helpful, but the real value of impact accounting is to enable improved decision-making, as a company or an investor.

In general, impact accounting helps to contextualize different metrics into the same unit: monetary values. Therefore, GHG impact information is most powerful if it is used alongside impact information of other topics, such as water consumption, occupational health and safety (OHS), or waste to capture a complete picture of an organization's impacts and to understand tradeoffs in decision-making. Impact expressed in monetary terms helps to quantify the magnitude of those societal and environmental impacts in comparison to each other and together. GHG impact information can help guide both companies' and investors' decision-making.

Company use cases

Business operations and decision-making

There are many ways for companies to leverage GHG impact information to monitor or change internal business operations. The table below outlines the type of decisions that GHG impact information can generally inform, specific to the business operation:

Business operation	Decision options with GHG impact information
Capital budgeting and investment	■ Integrate the monetary values of GHG impacts into capital budgeting to assess the net present value of financial returns alongside the social costs of GHG emissions. ■ Draw on GHG impact information to guide prioritization of capital expenditures to mitigate negative impacts.
Corporate management (acquisitions, mergers, or joint ventures)	■ Assess GHG emissions impacts of acquisition or merger partners to identify companies with the lowest footprint per currency unit of enterprise value. ■ Build pro-forma analyses (i.e. calculate hypothetical financial scenarios using projections or presumptions) to assess the combined GHG impacts of two companies after a transaction.
Corporate strategy	■ Inform medium to long-term strategic planning with projections of GHG impacts to understand how different choices create opportunities or risks over time. ■ Compare the social costs of GHG impacts to the costs to restructure and reduce GHG emissions. ■ Inform materiality assessments to help determine priority impact areas for corporate strategy.
Distribution, procurement, and supply chain	■ Use monetized Scope 3 emissions to identify high risk areas for achieving net zero emissions. ■ Use monetized GHG emissions of vendors to identify high emitting suppliers and engage with them in e.g., due diligence processes. ■ Use monetized GHG emissions of purchased goods and services to determine internal compensation prices to finance carbon transition projects.
Risk management	■ Quantify in monetary terms high-risk areas, such as specific countries and/or business units, in an entity's operations or supply chain that are connected to GHG emissions.
Inform materiality assessment	■ Inform and complement materiality assessments in compliance with sustainability regulations like the Corporate Sustainability Reporting Directive (CSRD).
Product portfolio design and research & development (R&D)	■ Compare the social costs of GHG emission across design and product development choices. ■ Assess trade-offs between the financial costs of design, manufacturing, and distribution choices with the social costs of GHG emissions in various scenarios.

Table 8. Relevant business decisions leveraging GHG impact information

Company example: Big Snacks

After calculating its total GHG impact of approximately –$1.311 billion, Big Snacks' sustainability team needs to set priorities to reduce emissions, effectively monitor their climate commitment of net zero emissions by 2040, and present its plan to the board of directors. The sustainability team has a few different options:

1. **Start with scope:** Focus on Scope 3 upstream operations, especially on emissions from fertilizer production due to conventional farming, waste generation, and transportation and distribution.
2. **Zoom in at the country level:** After disaggregating GHG impact per country, it concludes most of emissions are from suppliers in Vietnam. It investigates which specific business operations within the value chain in Vietnam might contribute to higher GHG emissions.
3. **Zoom in at the facility level:** Request data disaggregated by highest emitting facilities either within their own operations or indirect facilities within Scope 3 emissions. Determine highest emitting facilities in Vietnam and assess farming techniques, machinery efficiency, fuel alternatives, product emissions, etc.
4. **Zoom in at the supplier level:** Compare GHG impact across specific suppliers and modify procurement requirements to encourage applications from lower emitting suppliers. Survey current suppliers to understand what the training gap for current suppliers is to reduce their emissions.

When communicating the GHG emissions to the board of directors, the sustainability team provides GHG impact information in monetary terms alongside CO_2e information. This helps the board contextualize the information and demonstrate the relevant impact on society. GHG impact information also increases the transparency of the investment costs that the business faces, and the societal costs that are reduced due to

Company case study: Impact accounting in business travel[13]

To incentivize low-carbon employee travel, one VBA member company leverages an internal carbon price for employee business flights. For each flight purchased, a fixed carbon price is paid to the organizational cost center, which is invested in vetted carbon offset projects. As a result, alternative transportation to flights is incentivized, especially for short-distance travel.

The SCC serves as a basis to determine this internal carbon price and to adjust it over time. Similar to the SCC, the internal carbon price per flight increases over time and can be adjusted once the SCC is updated due to more recent research available. The exact internal carbon costs are subject to the company's discretion. The example below assumes a price of $100 per flight.

An employee has two options for traveling from Berlin to Frankfurt: by train or by plane. The train costs $170, while taking the plane costs $200. However, due to internal company policy, an additional internal carbon cost of $100 would be required if the plane is taken, resulting in a total cost of $300. This makes it less likely for the cost center to opt for the plane as a mode of transportation and therefore reduces emissions for company travel in the long term.

[13]This is a real-world example of impact accounting provided by a VBA member company that has been anonymized.

Company case study: Impact accounting in R&D[14]

Another VBA member company leverages impact accounting to increase transparency of GHG emissions impacts on society when initiating R&D projects.

By including GHG impact information in regular financial reports, the company raises the awareness on societal cost and incentivizes decision-making associated with reduced GHG emissions.

To do this, the company completes the following steps when setting up a new R&D project:

1. **Estimate the associated GHG emissions:** To quantify the associated GHG emissions with an R&D project, Scope 1 emissions are estimated based on allocation keys for the respective internal activities. In addition, the company covers the upstream impacts by using EEIO factors.
2. **Calculate the monetary value of GHG impacts on society:** Multiply estimated GHG emissions in metric tons of CO_2e by the SCC estimate.

When a new R&D project is launched, the company assesses GHG emissions data and GHG impact information to understand total societal impact. The company can also perform scenario analysis to investigate how to reduce GHG emissions. By showing the GHG emissions impact in monetary terms, the company's decision makers can more easily understand the societal costs and more readily compare it to the financial costs associated with the R&D project.

In addition to evaluating single R&D projects, multiple R&D projects can be considered and analyzed together. In doing so, GHG emission intensities, and their associated societal impact in monetary terms can be compared. This increased transparency can help controllers act more consciously, and foster GHG emissions-sensitive decision-making.

Contextualizing company GHG emissions monetary impact through metrics

As mentioned above, companies can present their GHG impacts using metrics, such as ratios or intensities, that help contextualize the degree of their impact to investors, employees, and other stakeholders. The tables below indicate metrics examples for companies, including portfolio companies of investment firms, that leverage GHG impact information expressed in monetary terms. The following ratios are examples of metrics that may help to understand the degree of a company's impact in new and insightful ways.

[14] This is a real-world example of impact accounting provided by a VBA member company that has been anonymized.

GHG emissions monetary impact examples	
Revenue metrics	
Metric:	GHG impact intensity
Calculation:	= total GHG impact / total revenue
Use case:	May be more intuitive than carbon intensity and calculates social cost per dollar of revenue
Business unit metrics	
Metric:	GHG business unit impact intensity
Calculation:	= total GHG impact in respective business unit / total revenue in respective business unit
Use case:	Compare company's GHG emissions social cost across specific business units
Regional metrics	
Metric:	GHG regional impact intensity
Calculation:	= total GHG impact in a region / regional revenue
Use case:	Compare company's GHG emissions social cost across geographic regions
Unit production metrics	
Metric:	GHG unit production impact intensity
Calculation:	= total GHG impact / total unit production for a specific product line
Use case:	Contextualize GHG emissions social cost of the specific product produced in monetary terms

Table 9. Company metrics examples to contextualize GHG monetary impact

Company example: Big Snacks

In their presentation to the board of directors, Big Snacks' sustainability team demonstrates the nuance of the company's GHG emissions impact by sharing its GHG business unit impact intensity, GHG regional impact intensity, and GHG unit production impact intensity. This allows the board to understand which business units, regions, and products are associated with a higher societal cost and can understand their emissions challenges at a deeper level.

Using GHG impact information for disclosure

In addition to internal decision-making, GHG impact information may also be valuable for reporting purposes. For example, GHG impact information can supplement existing reporting requirements to more strongly contextualize and convey areas for improvement and progress towards GHG emissions commitments. Reporting also enables a wider audience, including investors, to effectively leverage the benefits of impact information (see "Investor use cases" in Section 4). How impact information can be reported in an efficient way will be explored in our future work under the general methodology workstream.[15]

[15] As uptake of impact accounting increases, more examples using GHG impact information for disclosure are expected to emerge. IFVI and VBA continue researching potential frameworks and guidance for integration of impact information into existing reporting requirements.

Whether you are a company or investor, you may consider the following if you decide to integrate GHG impact information into your reporting:

- Provide qualitative notes in addition to the numeric values to aid reader understanding[16]
- Include assumptions and limitations to the information shared as clearly as possible
- Look forward and include future targets for improved total GHG impact and specific metrics

Investor use cases

Portfolio management and decision-making

Based on the impact information provided by their portfolio companies, or calculated independently based on publicly available emissions data, investors themselves can leverage GHG impact information for decision-making related to monitoring portfolio companies or reassessing their portfolios.

Portfolio comparability	Portfolio construction
■ **Compare:** Cross-examine which funds, portfolio companies, or scenarios demonstrate better GHG emissions impact performance compared to a relevant benchmark alternative. ■ **Assess:** Identify which funds or portfolio companies are heightening your risk or outperforming.	■ **Buy or invest:** Increase investment in or buy a new company that would decrease the overall emissions or average emissions of a fund. ■ **Engage:** Prioritize which underperforming companies to support and plan emissions reduction strategy. ■ **Reconstruct**: Create a new fund and raise money for a more climate aware strategy. ■ **Exit:** If high-emitting company cannot meet requirements after attempts to address emissions, divest from high-emitting company if it poses a risk to performance and/or reputation.

Table 10. Investor decisions leveraging GHG impact information

[16] The Capitals Coalition Value Commission is developing the Governance for Valuation, which will include provisional guidance on these types of qualitative notes. The initial draft of the Governance for Valuation is scheduled to open for public consultation and piloting with select stakeholders from October to December 2024, with the aim to launch the final version in Q1 2025.

Investor example: Super Mega Ventures

The firm needs to assess the GHG impact of its Real Estate Fund A. After collecting GHG emissions data and calculating the GHG impact of its portfolio companies, it concludes Company C has the highest emitting GHG emissions in the portfolio.

Portfolio company	Scope 1 GHG impact	Scope 2 GHG impact	Scope 3 GHG upstream impact	Scope 3 GHG downstream impact
Company A	–$991,200	–$274,780	–$120,860	–$109,000
Company B	–$3,780	–$79,060	–$212,200	–$134,000
Company C	–$56,640	–$1,771,888	–$8,540,000	–$8,341,650

Table 11. Super Mega Ventures' Real Estate Fund A GHG emissions impact in monetary terms

Super Mega Ventures has a few different options to take action:

1. **Understand the problem:** Require follow up discussions with Company C to understand why emissions are so high, starting with Scope 3 as its highest emitting category.
2. **Make a portfolio decision:** Establish new requirements for Company C to follow to improve its emissions, like interviewing its vendors and facilities to address emitting factors.
3. **Divest or reconstruct:** If Company C cannot meet these requirements, Super Mega Ventures might divest or add another portfolio company that could improve the total portfolio impact, while working with Company C to improve its tactics.

Contextualizing investor GHG emissions monetary impact through metrics

Aligned with and building off the metrics shared for companies above, investors can contextualize GHG impact information. The following ratios are examples of metrics that may help to understand the degree of an investment portfolio's impact in new and insightful ways.

GHG monetary impact examples	
Total investment metrics	
Metric:	GHG investment impact intensity
Calculation:	= total GHG impact / total investment in a company
Use case:	May be more intuitive than CO_2e footprint and helps to contextualize the social cost per dollar of investment
Total AUM metrics	
Metric:	GHG AUM impact intensity
Calculation:	= total GHG impact / total AUM (across all portfolios or for a single portfolio)
Use case:	Determine total social cost of assets and compare across different investments portfolios

Table 12. Investor metrics examples to contextualize GHG monetary impact

Investor example: Super Mega Ventures

The firm needs to understand just how severe Company C's GHG impact is compared to its other two portfolio companies within its real estate portfolio. This can be done by using different GHG impact intensity ratios. Super Mega Ventures could compare the portfolio companies using a total GHG investment impact intensity; or if it wanted a more granular view, it could compare the portfolio companies using a GHG regional impact intensity.

Investor case study: Impact accounting in real portfolio reporting

Want to see how real investors are sharing GHG impact information and impact accounting results more broadly? Check out Summa Equity's 2023 portfolio report for more information (starting on page 56).

Reflection questions:

- What do you want to use your impact information for? What specific metrics would best help your company or organization track GHG emissions reduction and priorities?
- What stakeholders would benefit from having insight into your organization's GHG impact information? What level of information would be most beneficial for these stakeholders?
- Based on your current level of reporting, what reporting documents do you envision embedding GHG impact information into? What could that look like five years from now?

05

Looking ahead

Impact accounting is designed to provide a rigorous assessment of impact, and to be comparable across sustainability topics. GHG impact accounting is a great place to start, but you should also consider applying other available impact accounting methodologies to increase the comprehensiveness of impacts included, increase your positive impacts and decrease your negative impacts, and ensure that decision-making is based on a complete, holistic understanding of an organization's impacts.

Interested in exploring impact accounting with a group of like-minded companies? The VBA is an alliance of multinational companies committed to measuring and valuing impact in monetary terms. Its 25+ members test impact accounting methodologies developed together with IFVI to ensure feasibility, robustness, and relevance. If your company is interested in digging deeper into impact accounting, reach out to VBA today and stay on top of VBA resources:

- Publications: Includes impact accounting case studies, pilot studies with member companies, and methodologies co-developed with IFVI.
- Membership: Insights on membership benefits and anecdotes from practitioners.
- Follow us on LinkedIn: More insights into the ongoing work at the VBA including industry-specific solutions for impact accounting, financial market applications, or more details on the interconnection between sustainability reporting and impact accounting.
- Join us on YouTube: Subscribe to explore insights from industry leaders, dive into our expert-led webinars, and discover how we're scaling our work with impact accounting methodologies to measure and value the sustainability performance of businesses in a reliable and feasible way.

About the VBA: The VBA is an alliance of multinational companies coming together with a common goal: to create a way of measuring and comparing the value of contributions made by businesses to society, the economy, and the environment – a metric not previously reflected in a company's balance sheet. The Alliance translates environmental and social impacts into comparable financial data. Our members test the methodology to ensure feasibility, robustness, and relevance.

Stay in touch: IFVI continues to develop impact accounting methodologies in collaboration with the VBA. To stay up to date on our work, follow updates shared on our website below and LinkedIn.

- Research: Follow our latest impact accounting methodologies developed in partnership with the VBA, including those currently open for public comment, and our provisional work plan for upcoming methodologies.
- Market Development: Includes guidance materials and tools for implementation of impact accounting. This page will be updated as new resources are developed.
- Follow us on LinkedIn: Regular updates about our work including methodologies open for public comment, meeting minutes from our technical committee, public webinars, and other resources.
- Join us on YouTube: Subscribe to explore insights from industry leaders, dive into our expert-led webinars, and discover how we're scaling our work with impact accounting methodologies to measure and value the sustainability performance of businesses in a reliable and feasible way.

About IFVI: The International Foundation for Valuing Impacts (IFVI) is an independent nonprofit bridging the gap between financial accounting and impact measurement. IFVI works to create a just and sustainable economic system built on the full contribution of business to people and the planet. IFVI's mission is to build and scale the practice of impact accounting to promote decision-making based on risk, return, and impact. Founded in 2022, IFVI grew out of the Impact-Weighted Accounts Project at Harvard Business School.

Implementation Guides are designed to increase usability and practical application of our impact accounting methodologies. We welcome readers to direct any suggestions for future guides to the IFVI team's email: marketdev@ifvi.org

06

Appendix A: Glossary

Term	Definition	Source[17]
Carbon dioxide equivalent (CO_2e)	A metric used to compare the emissions of the different greenhouse gases based upon their global warming potential (GWP). Global warming potentials are used to convert greenhouse gases to carbon dioxide equivalents.	United Nations Framework Convention on Climate Change (UNFCCC)
Downstream processes (gate-to-grave)	Covers activities linked to the purchase, use, re-use, recovery, recycling, and final disposal of the business' products and services.	Natural Capital Protocol
Fugitive emissions	Emissions that are not physically controlled but result from the intentional or unintentional releases of GHGs. They commonly arise from the production, processing transmission storage and use of fuels and other chemicals, often through joints, seals, packing, gaskets, etc.	GHG Protocol
Global warming potential (GWP)	The index used to translate the level of emissions of various gases into a common measure in order to compare the relative radiative forcing of different gases without directly calculating the changes in atmospheric concentrations. GWPs are calculated as the ratio of the radiative forcing that would result from the emissions of one kilogram of a greenhouse gas to that from the emission of one kilogram of carbon dioxide over a period of time (usually 100 years).	UNFCCC
Greenhouse gas (GHG)	Any gas that absorbs infrared radiation in the atmosphere. Greenhouse gases include, but are not limited to, carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), sulfur hexafluoride (SF_6), and nitrogen trifluoride (NF_3).	UNFCCC
Impact	A change in one or more dimensions of people's well-being directly or through a change in the condition of the natural environment.	N/A (General Methodology 1, GM1)
Impact accounting	The system for measuring and valuing the impacts of corporate entities and generating impact information to inform decisions related to sustainability performance.	N/A (GM1)
Impact accounts	A set of accounts that contain the material positive and negative impacts of an entity valued in monetary terms.	N/A (GM1)

[17] Some definitions are adapted from the original source.

Term	Definition	Source
Impact information	Impact information is derived from impact accounts and informs decision-making related to an entity's effects on sustainability. Impact information includes, but is not limited to, impacts that have been classified and aggregated for the purpose of presentation, supplemental notes that describe the assumptions, data, or methods used to measure and value impacts, and qualitative commentary that contextualizes impacts.	N/A (GM1)
Integrated assessment models (IAMs)	Computational models of global climate change that include representation of the global economy and greenhouse gas emissions, the response of the climate system to human intervention, and impacts of climate change on the human system.	The National Academies of Science, Engineering, and Medicine
Mobile combustion	Burning of fuels by transportation devices such as cars, trucks, trains, airplanes, ships, etc.	GHG Protocol
Process emissions	Emissions generated from manufacturing processes, such as CO_2 that arise from the breakdown of calcium carbonate ($CaCO_3$) during cement manufacture.	GHG Protocol
Scope 1 emissions	Emissions from operations that are owned or controlled by the reporting company.	GHG Protocol
Scope 2 emissions	Emissions from the generation of purchased or acquired electricity, steam, heating, or cooling consumed by the reporting company.	GHG Protocol
Scope 3 emissions	All indirect emissions (not included in scope 2) that occur in the value chain of the reporting company, including both upstream and downstream emissions.	GHG Protocol
Social cost of carbon (SCC)	The net present value of aggregate climate damages from one more metric ton of carbon in the form of carbon dioxide (CO_2), conditional on a global emissions trajectory over time.	IPCC
Stakeholders	Stakeholders are defined as those who can affect or be affected by the entity.	European Sustainability Reporting Standards (GM1)
Stationary combustion	Burning of fuels to generate electricity, steam, heat, or power in stationary equipment such as boilers, furnaces, etc.	GHG Protocol
Upstream processes (cradle-to-gate)	Covers the activities of suppliers, including purchased energy.	Natural Capital Protocol
Value chain	The value chain of an entity is the full range of activities and business relationships related to the entity's business model(s) and the external environment in which it operates. A value chain encompasses the activities and business relationships the entity uses and relies on to create its products or services from conception to delivery, consumption, and end-of-life.	European Sustainability Reporting Standards

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