



Why Measure GHG Emissions & How to Get Started

Speakers



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About Pinion



Workshop Overview

Goals and Outcomes



Discuss the current GHG regulatory landscape as well as **voluntary reporting requests** impacting the industry.



Gain a tangible understanding of the steps necessary to quantify scope 1 and 2 GHG emissions.



Review best practices for ongoing reporting and management of your GHG inventory.



Learn about resources available to assist in GHG accounting.



Engage with other industry members to share knowledge, challenges, and advice related to scope 1 and 2 GHG accounting.

Agenda

Topic	Presenter(s)	Duration
Introduction to GHGs	Dylan Johnston	10 minutes
Evolving Regulatory Disclosures and the Voluntary Reporting Landscape	Lisa Becker	45 minutes
Meat Institute Poll: Member Sustainability Reporting	Kristi Block (<i>The Meat Institute</i>)	15 minutes
15-Minute Break		
How to Measure Scope 1 and 2 GHG Emissions for Meat Packer/Processors	Dylan Johnston	25 minutes
Live Workshop: GHG Inventory Development	ALL	30 minutes
GHG Inventories – Reporting and Ongoing Management	Dylan Johnston	10 minutes
Resources for Scope 1 and 2 GHG Inventories	Dylan Johnston & Kristi Block	10 minutes

Kickoff Questions

Who in the room:

- Has **completed** a scope 1 and 2 inventory?
- Is **developing** a scope 1 and 2 inventory?
- Is **considering** developing a scope 1 and 2 inventory?

What are the **main GHG-related challenges** your organization is facing (technical, cultural, financial, regulatory, etc.)?

- What **roadblocks** have you encountered when developing your GHG inventory?

What would make this workshop valuable to you and your organization (obtaining technical guidance, sharing experiences/challenges, identifying GHG sources, etc.)?

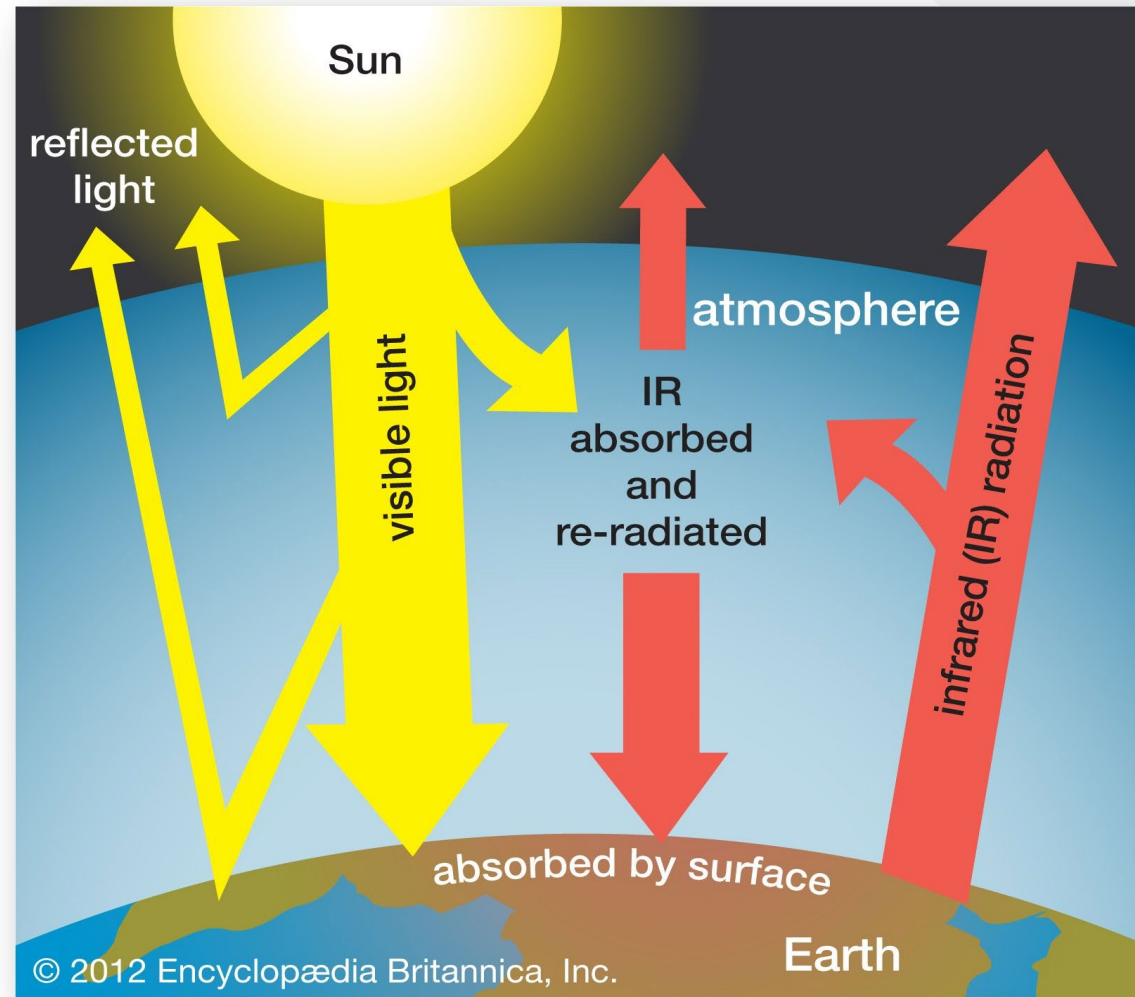
Greenhouse Gases 101

What Causes the Greenhouse Effect?

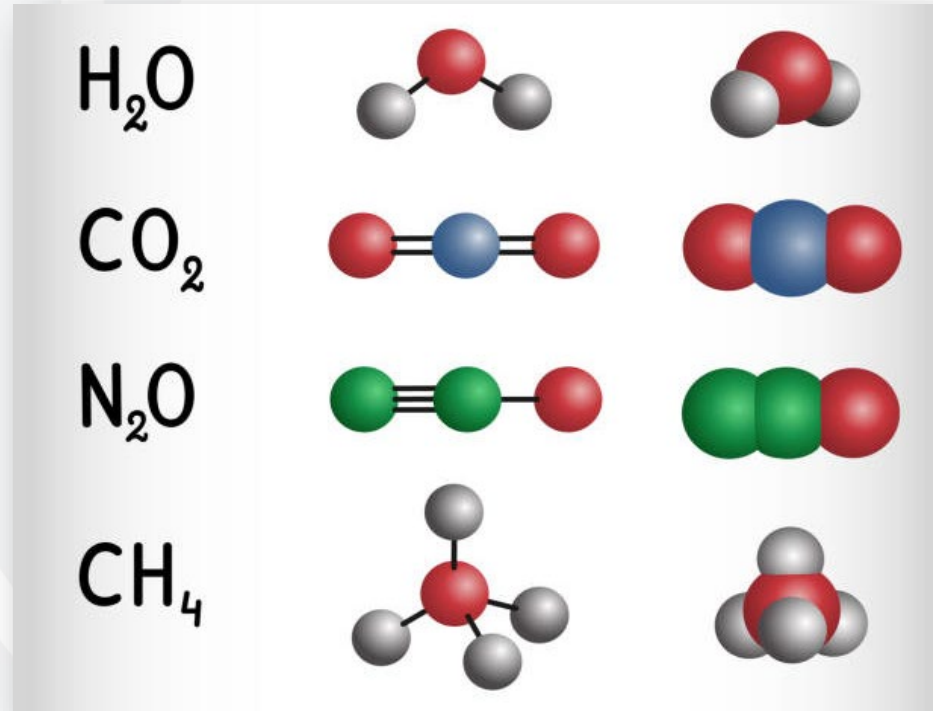
Sunlight passes through the atmosphere and is absorbed by the Earth.

The Earth reradiates infrared radiation; it is then absorbed by the atmosphere.

This is known as the greenhouse effect.



What are GHGs?

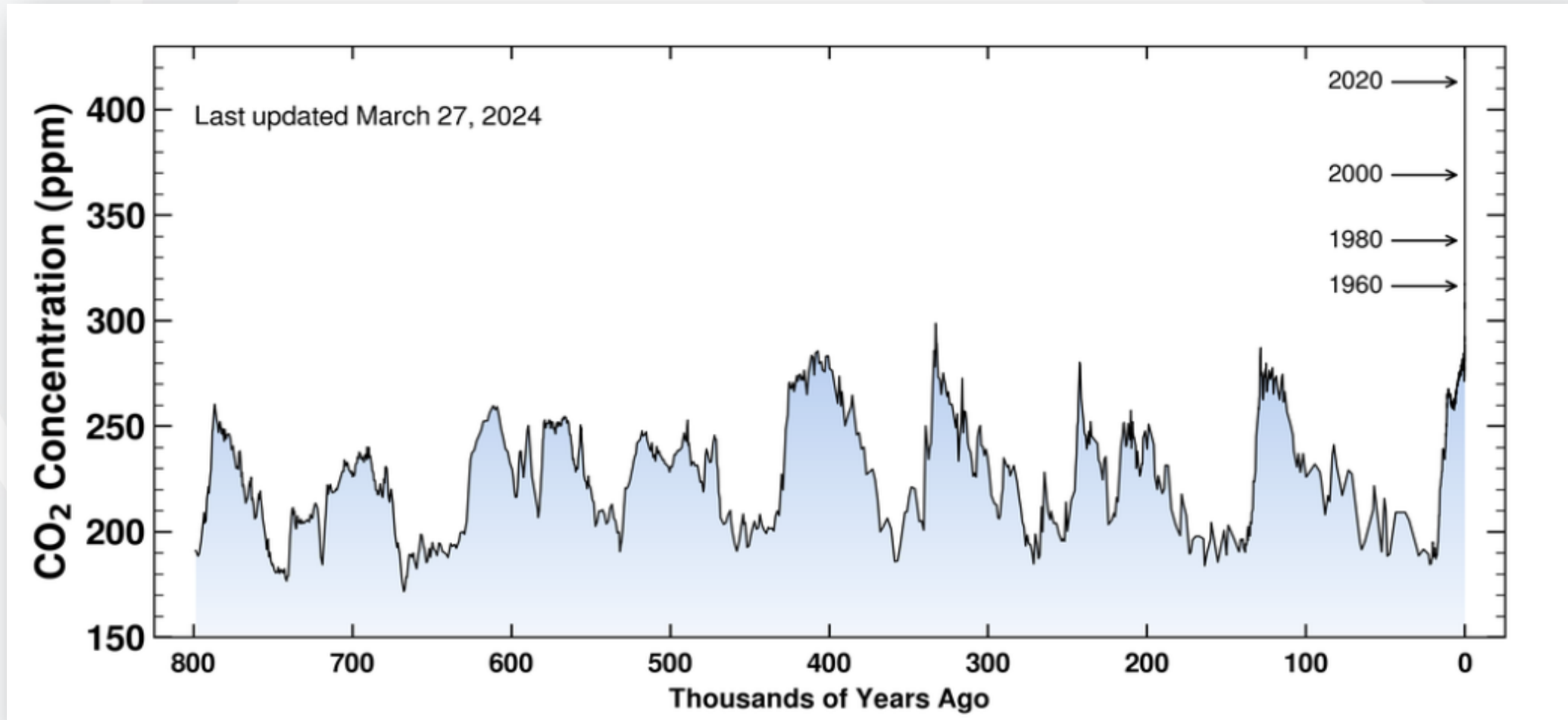


The **structure and time in the atmosphere** of the gases in the atmosphere **determine their warming potential.**

The gases vibrate after absorbing the infrared radiation, causing the atmosphere to warm.

This process is essential to keeping the Earth temperate.

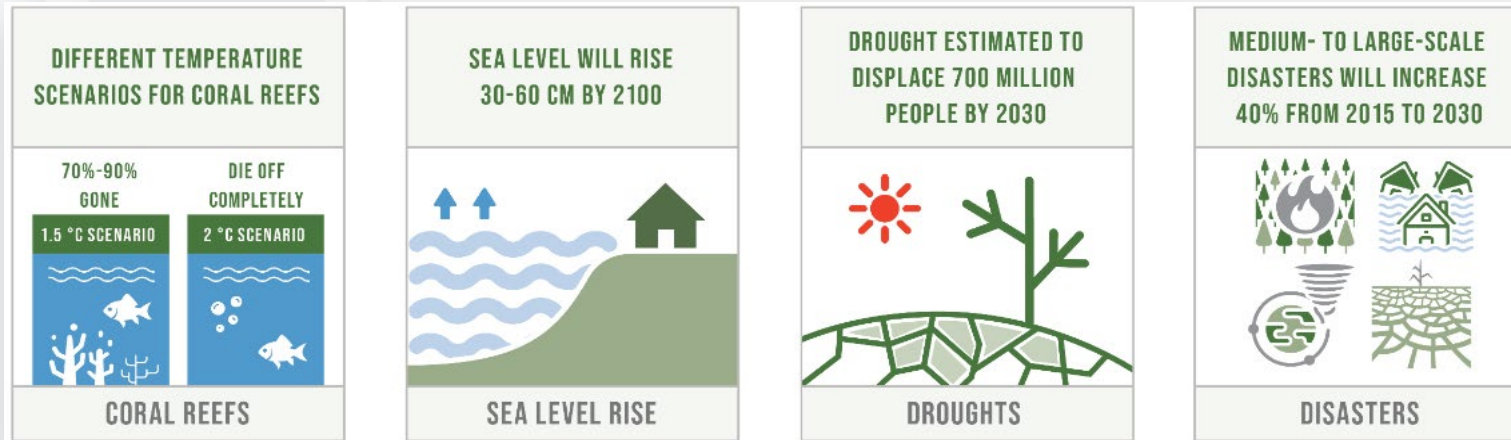
The Keeling Curve



Keeling Curve UC San Diego

Effects of a Warming Climate

Increases in GHGs from fossils fuels has caused significant warming, **currently 1.07°C**.

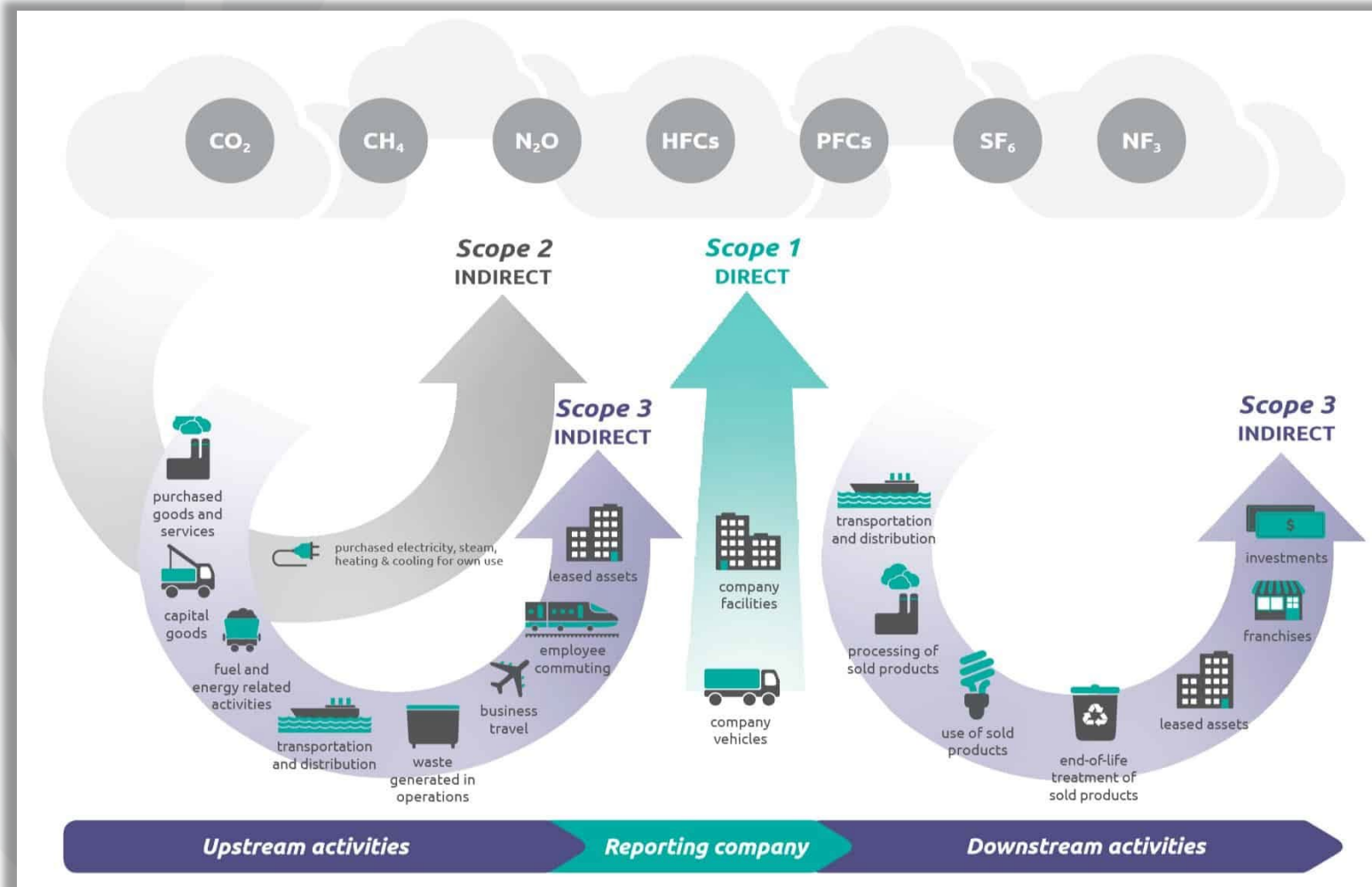


WORLD RESOURCES INSTITUTE

HALF A DEGREE OF WARMING MAKES A BIG DIFFERENCE:
EXPLAINING IPCC'S 1.5°C SPECIAL REPORT

	1.5°C	2°C	2°C IMPACTS
EXTREME HEAT Global population exposed to severe heat at least once every five years	14%	37%	2.6X WORSE
SPECIES LOSS: VERTEBRATES Vertebrates that lose at least half of their range	4%	8%	2X WORSE
SPECIES LOSS: PLANTS Plants that lose at least half of their range	8%	16%	2X WORSE
SPECIES LOSS: INSECTS Insects that lose at least half of their range	6%	18%	3X WORSE

Scope 1, 2, and 3 Emissions Sources



Source: GHG Protocol

Meat Processor Perspective

Scope 1 Emissions: Direct Usage

- Stationary combustion.
- Mobile combustion — Transportation fuels (owned or operated transport).
- Fugitive emissions.

Scope 2 Emissions: Indirect Usage

- Purchased electricity, heat, steam, or cooling.

Scope 3 Emissions: Supply Chain

- 15 upstream and downstream categories.
- Includes purchased goods and services from farm level.

An aerial photograph of a rural landscape. The foreground is dominated by vibrant green fields, some of which are divided by stone walls. A small cluster of buildings, possibly a farm or a small village, is visible in the lower right. In the middle ground, a dense town or city stretches across the horizon. The background shows rolling hills and a hazy sky, suggesting a vast, open landscape.

The Current GHG Reporting Landscape

The Current GHG Reporting Landscape



Evolving Voluntary Disclosure and Sustainability Reporting Landscape

Increasing data requests to:

- Determine contribution towards targets
- Monitor supply chain impacts
- Develop product-level claims



Evolving Policy and Regulatory Landscape

Increasing sustainability disclosures to:

- Increase transparency
- Reduce risk
- Enable comparability

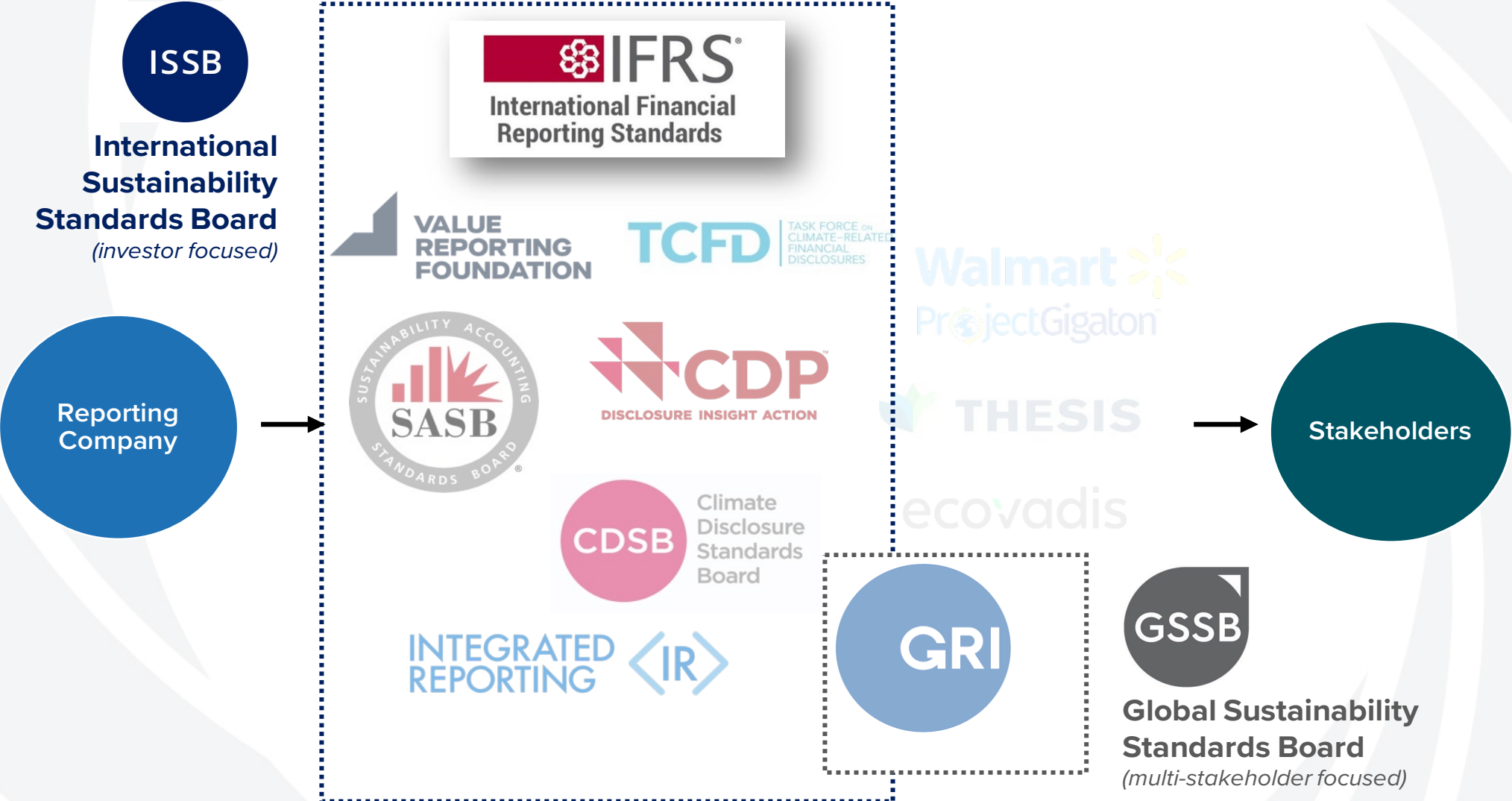
Voluntary and regulatory disclosures are two different mechanisms to achieve similar outcomes.

Past Voluntary GHG Reporting Frameworks

GHG data requested through a variety of different frameworks



Converged GHG Reporting Frameworks



An aerial photograph of a rural landscape. The foreground is dominated by vibrant green fields, some of which are divided by stone walls. A winding river or stream flows through the middle ground. In the background, a dense town or village is visible, followed by rolling hills and a hazy horizon under a clear sky.

Evolving Policy and Regulatory Landscape

Climate-Related Regulations



Securities and Exchange Commission (SEC) Climate-Related Disclosure Rules

- Final rules adopted March 6, 2024

California

Climate Accountability Package (SB 253 and SB 261)

- Bills signed into law on October 7, 2023
- California Air Resources Board (“CARB”) to develop and adopt regulations to implement the legislation by January 1, 2025

European Commission

European Sustainability Reporting Standards (ESRS)

- CSRD went into force on January 5, 2023
- First set of ESRS adopted on July 31, 2023

International Sustainability Standards Board (ISSB)

IFRS S1 and S2

- Issued June 26, 2023
- Jurisdictional authorities can require companies to provide disclosures under these standards

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Climate-Related Regulatory Disclosures (1 of 4)

Standard or Regulation	SEC Climate-Related Disclosure Rules	CA Climate Accountability Package (SB 253 and SB 261)	European Sustainability Reporting Standards (ESRS)	IFRS S1 and S2
Regulator or Standard Setter	Securities and Exchange Committee (SEC)	California <ul style="list-style-type: none"> Climate Corporate Data Accountability Act (CCDAA) Climate-related Financial Risk Act (CRFRA) 	European Commission <ul style="list-style-type: none"> Corporate Sustainability Reporting Directive (CSRD) 	Adopting jurisdictions
Standard Developer	SEC	California Air Resources Board (CARB)	EFRAG (formerly European Financial Reporting Advisory Group)	International Sustainability Standards Board (ISSB)
Applicability <i>Who is this applicable to?</i>	Domestic (US) registrants and foreign private issuers: <ul style="list-style-type: none"> Large accelerated filers Accelerated filers (excluding SRCs and EGCs) SRCs, EGCs, and non-accelerated filers 	SB 253: US businesses with total annual revenues over \$1B USD that do business in California. SB 261: US businesses with total annual revenues over \$500M USD that do business in California. Includes public and private companies.	Companies listed on EU-regulated markets “Large” unlisted companies or groups in the EU. Non-EU companies with net turnover >€150 million in EU in each of the last 2 years with EU subsidiary or branch – report at group level of non-EU company	TBD Supporting regulators and standard setters include: <ul style="list-style-type: none"> Canada, Mexico, ASEAN, Australia, Brazil, Brunei, Costa Rica, the EU, Germany, Ghana, Hong Kong, Japan, Kenya, Malaysia, Mauritius, Myanmar, Nigeria, the Philippines, Singapore, Sri Lanka, Turkey, the UK, Uruguay and Vietnam

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Climate-Related Regulatory Disclosures (2 of 4)

Standard or Regulation	SEC Climate-Related Disclosure Rules	CA Climate Accountability Package (SB 253 and SB 261)	European Sustainability Reporting Standards (ESRS)	IFRS S1 and S2
Required Disclosures <i>What needs to be reported?</i>	Scope 1 and 2 emissions Climate-related risks <ul style="list-style-type: none"> Material impacts Management’s role and BoD’s oversight Processes for identifying, assessing, and managing Climate-related targets/goals 	SB 253: Scope 1, 2, and 3 emissions SB 261: Climate-related financial risk report, including the risk and measures adopted to reduce and adapt to climate-related financial risk	Scope 1, 2, and 3 emissions Climate-related risks All material sustainability focus areas (based on 12 standards), including climate-related disclosures Materiality assessment	Scope 1, 2, and 3 emissions Climate-related risks All sustainability focus areas , including climate-related disclosures
Interoperability <i>How do the standards and regs align with others?</i>	GHG Inventory Methodology and Calculations: Aligned with the GHG Protocol standards and guidance			
	Some alignment and divergence from IFRS S2 <ul style="list-style-type: none"> No scope 3 reporting 	GHG Inventory Reporting: Aligned with IFRS S2		
	Climate-Related Risk Reporting: Aligned with the Task Force on Climate-Related Financial Disclosures (TCFD) framework			

Climate-Related Regulatory Disclosures (3 of 4)

Standard or Regulation	SEC Climate-Related Disclosure Rules	CA Climate Accountability Package (SB 253 and SB 261)	European Sustainability Reporting Standards (ESRS)	IFRS S1 and S2
Effective Date <i>When does this go into effect?</i>	<p>Disclosures other than GHG emissions:</p> <ul style="list-style-type: none"> • Starting in 2026, report for FYB 2025 for large accelerated filers • Starting in 2027, report for FYB 2026 for accelerated filers • Starting in 2028, report for FYB 2027 for SRCs, EGCs, and non-accelerated filers <p>Scope 1 and 2:</p> <ul style="list-style-type: none"> • Starting in 2027, report for FYB 2026 for large accelerated filers • Starting in 2029, report for FYB 2028 for accelerated filers • N/A: SRCs, EGCs, and non-accelerated filers 	<p>SB 253:</p> <ul style="list-style-type: none"> • Starting in 2026 and annually thereafter, report scope 1 and 2 emissions for prior FY • Starting in 2027 and annually thereafter, report scope 3 emissions for prior FY <p>SB 261:</p> <ul style="list-style-type: none"> • On or before 1/1/2026 and biannually thereafter, provide climate-related financial risk report on company website 	<p>Starting in 2025, report for financial year 2024 for large listed and large companies</p> <p>Starting in 2026, report for financial year 2025 for other large companies</p> <p>Starting in 2027, report for financial year 2026 for SMEs</p>	<p>International: Available for reporting periods beginning on or after 1/1/24 (reporting to begin in 2025)</p> <p>Canada - CSSB: <i>CSDS 1 and CSDS 2 (S1 and S2 aligned)</i></p> <ul style="list-style-type: none"> • Proposed and accepting public comment through 6/10/24 • Effective on or after 1/1/2025 for voluntary reporting <p>Canada - CSA: <i>NI 51-107 Disclosure of Climate-related Matters</i></p> <ul style="list-style-type: none"> • In Revision • To consider CSSB standards <p>Mexico: Declaration of Support at COP28 from Consejo Mexicano de Normas de Información Financiera y de Sostenibilidad (CINIF)</p>

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Climate-Related Regulatory Disclosures (4 of 4)

Standard or Regulation	SEC Climate-Related Disclosure Rules	CA Climate Accountability Package (SB 253 and SB 261)	European Sustainability Reporting Standards (ESRS)	IFRS S1 and S2
Assurance <i>What level of assurance is required?</i>	<p>Scope 1 and 2 limited assurance:</p> <ul style="list-style-type: none"> FYB 2029 for large accelerated filers FYB 2031 for accelerated filers <p>Scope 1 and 2 reasonable assurance:</p> <ul style="list-style-type: none"> FYB 2033 for large accelerated filers 	<p>SB 253:</p> <ul style="list-style-type: none"> Scope 1 and 2 emissions - limited assurance beginning in 2026, reasonable assurance beginning in 2030 Scope 3 assurance TBD by state board in 2026 (may require limited assurance in 2030) <p>SB 261:</p> <ul style="list-style-type: none"> None 	<p>Assurance of materiality assessment</p> <p>Limited assurance for initial reporting period</p> <p>Reasonable assurance within 2 subsequent years of initial reporting period</p>	<p>International: Assurance requirements left to individual jurisdictions.</p> <p>Canada: TBD, would be determined by the CSA</p>

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Timelines – CA Climate Regulations

Proposed Planning
 SB 253
 SB 261

Develop GHG reporting strategy

Data Collection

FYE2025: Tracking of scope 1 and 2 emissions data (annual)

FYE2026: Tracking of scope 3 emissions data (annual)



Reporting Requirements

On or before 1/1/26: Provide climate-related financial risk report (biannual)

After 1/1/26: Report first year of scope 1 and 2 emissions data (annual)

After 1/1/27: Report first year of scope 3 emissions data (annual)

Assurance Requirements

Beginning in 2026: Limited assurance on scope 1 and 2 emissions

2026: Scope 3 assurance TBD by state board

Beginning in 2030: Reasonable assurance on scope 1 and 2 emissions

Beginning in 2030: Limited assurance on scope 3 (TBD)

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What to Watch

Regulations

- “Doing business in California”
- ISSB adoption by countries, especially across North America
- Legal challenges (SEC and CA)

Guidance

- Changing GHG Protocol guidance for GHG inventories



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Evolving Voluntary Disclosure and Sustainability Reporting Landscape

Voluntary Reporting Stakeholders



Investors



Customers



Industries



Executives and Directors



Investors



Investors are asking for GHG data to enable increased transparency and comparability.

Why are investors wanting GHG data?

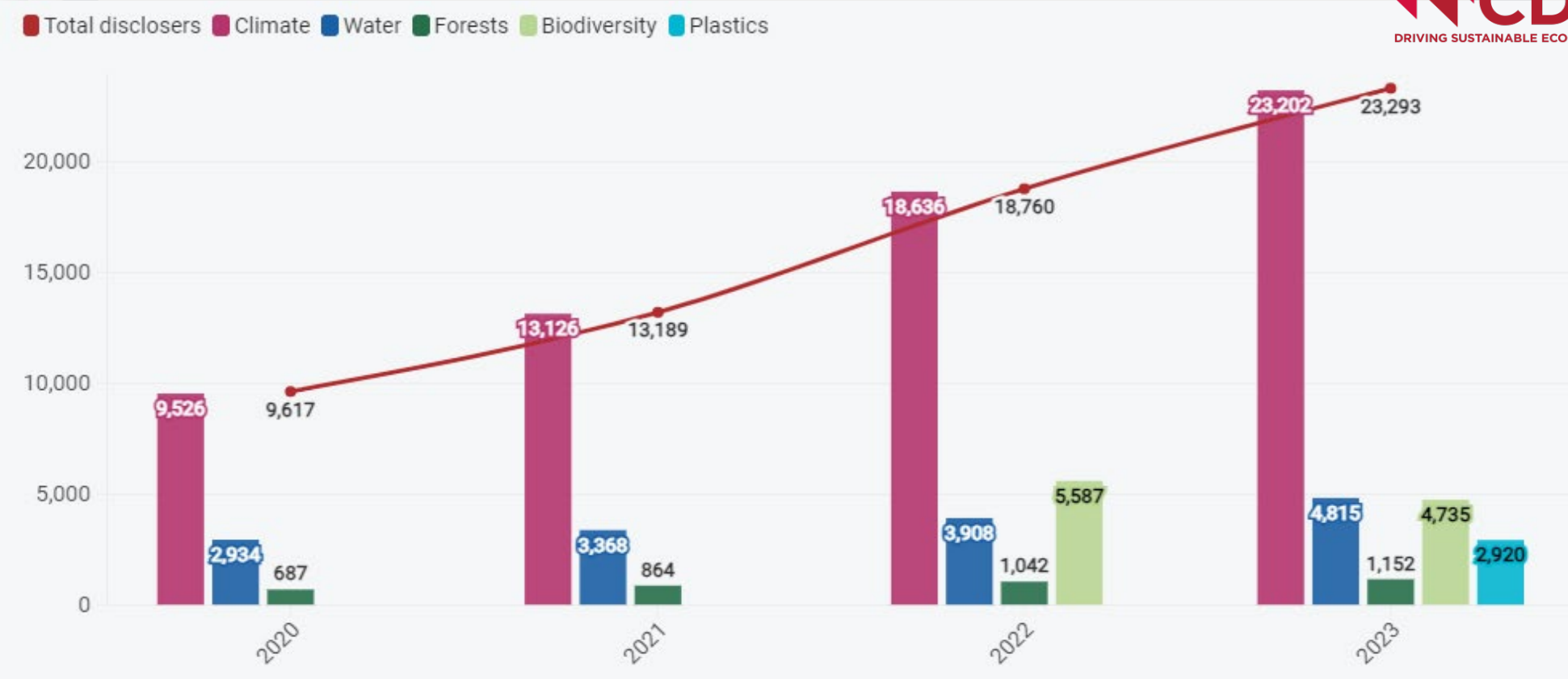
- Investors, without regulatory disclosure requirements, still want a more complete picture of their investment portfolios.
- Voluntary GHG disclosures provide investors with additional information to understand and mitigate risk.
- Investor demand for disclosures from public companies also exists for private companies.



Customers



Customers are requesting GHG data to demonstrate progress towards targets, to enable product-level claims, to understand supply chain impacts, and provide regulatory disclosures.



Source: CDP



The Meat and Animal Protein Industries



Industries are requesting GHG data to tell members' collective story and to drive continuous improvement across the sector.

Protein PACT For the People, Animals & Climate of Tomorrow

U.S. beef has reduced its environmental “hoofprint” by more than 16% since 1977¹, and the U.S. Roundtable for Sustainable Beef has developed a framework to do even more.

More and more U.S. pig farms use renewable energy – even capturing methane from manure to power their farms. Some are already carbon neutral or negative, and the National Pork Board is working with farmers to aim even higher.

Sustainable animal feed production makes significant contributions to sustainable animal agriculture - U.S. soybean and corn farmers are building on their sustainability achievements by committing to further reduce erosion and greenhouse gas emissions, among other goals.

U.S. Meat Sector Releases First-Ever Data Report on Environment, Other Key Indicators

01 November, 2022

FOR IMMEDIATE RELEASE: November 1, 2022

CONTACT: Sarah Little (443) 440-0029

WASHINGTON, DC – A major **new report** released in advance of the United Nations Climate Summit next week in Sharm el Sheikh, Egypt, reveals that about 81% of facilities reporting data are covered by Meat Institute members' commitments to reduce greenhouse gas (GHG) emissions.

Landmark tool supports meat sector greenhouse gas reduction targets

19 September, 2023



Global Compact
Network USA

The Meat and Animal Protein Industries



Industries are requesting GHG data to tell members' collective story and to drive continuous improvement across the sector.

From Farm to Market: Fueling Demand with Sustainable Pork



The latest Pork Cares Farm Impact Report snapshot shares on-farm sustainability measurements from 2022 farm data.

April 1, 2024 By Jamie Burr 6 min. read

STRATEGIC PLAN
2023-2025

U.S. ROUNDTABLE FOR SUSTAINABLE BEEF

ABOUT US

Mission
Advance, support and communicate continuous improvement of sustainability across the U.S. beef value chain.

Vision
The U.S. beef value chain is the trusted global leader in environmentally sound, socially responsible and economically viable beef.

CORE STRATEGIES*

- Measure and Report Progress Toward Goals and Targets
- Drive Adoption of Sustainability Practices
- Identify, Facilitate and Support Sustainability Research Priorities
- Ensure Organizational Success

www.USRSB.org

*Unless otherwise stated, objectives for each core strategy are intended to be accomplished by 2025.

GHG Neutrality

The dairy community strives to significantly reduce emissions industry-wide and sequester carbon by scaling climate-smart technologies and agricultural practices.

U.S. dairy is working collectively to achieve GHG neutrality at the farm, field and processor level by balancing GHG emissions with reductions and removals, as defined by the Intergovernmental Panel on Climate Change (IPCC).³⁰ Because there is no one-size-fits-all solution, partnerships, collaborations, committees, forums and industry-wide events encourage the sharing of ideas and information across sectors. In this way, the U.S. dairy industry is addressing climate change by bringing actionable measures to farms, processors, consumer packaged goods companies, retailers and consumers.

Executives and Boards



Executives and boards are tracking and using GHG data internally to inform decision making and to turn risks into opportunities.

“Our facility and fleet energy use are key sources of scope 1 and 2 emissions.”

Opportunities:

- Drive **cost savings** from increased energy efficiency and renewable energy use.
- Leverage **funding programs** for capital costs.

“Our lenders are looking to reduce climate risk in their loan portfolios.”

Opportunity:

- Obtain **lower-cost loans for equipment or infrastructure** that make your businesses more resilient to climate impacts.

“Our insurance providers are investing in climate-smart practices and infrastructure.”

Opportunity:

- Obtain **premium discounts** for practices that bolster resilience.

“Global markets and jurisdictions are beginning to require GHG data and disclosures.”

Opportunities:

- **Develop a GHG strategy** for upcoming regulations to meet upcoming reporting requirements.
- **Reach new markets** by using GHG data to make product-level claims or develop innovative new products.

“More customers are asking for our GHG data.”

Opportunity:

- **Strengthen relationships** with key customers by providing data to meet their GHG targets and open the door to conversations about GHGs across your shared value chain.

How to Prepare for GHG Reporting



Determine GHG reporting requirements

- Which climate-related regulations apply to your company?
- Which stakeholders (customers, investors, etc.) are requesting GHG data?



Develop a GHG strategy or roadmap

- Who will lead this effort? Who needs to be involved?
- What data does your company need to report?
- Where are disclosures and data reported?
- When does the information need to be provided?



Anticipate long-term needs and holistic planning

- For GHG inventory development, how can you develop documentation to be “audit-ready”?
- For climate-related risk assessment, how can you leverage existing, broader strategic planning for business risks and opportunities?

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An aerial photograph of a rural landscape. The foreground is dominated by vibrant green fields, some of which are divided by stone walls. A winding river or stream flows through the middle ground. In the background, a dense town or village is visible, with numerous buildings and houses. The sky is a deep, clear blue, and the overall scene is bathed in bright, natural light.

The Meat Institute: Industry Poll

2025 Environment Education & Resource Needs



15-Minute Break



How to Measure Your Scope 1 and 2 Emissions

GHG Protocol

Scope of This Workshop

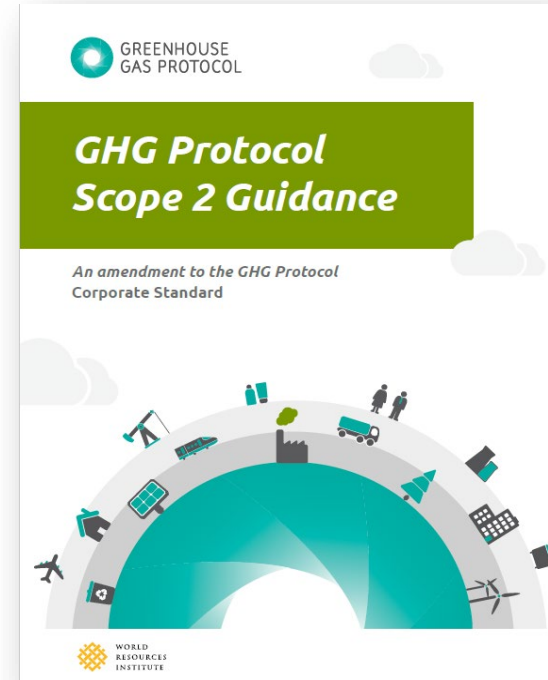
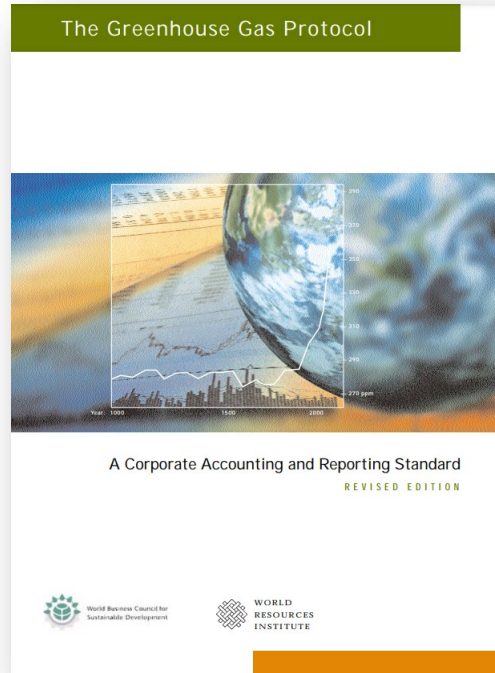
We will focus on processor-level **scope 1 and 2 inventories only.**

For vertically integrated operations, we will focus on **processor-level emissions** and not cover the identification of on-farm GHG sources and sinks from the GHG Protocol Land Sector and Removals Guidance draft.



Accounting for Emissions - GHG Protocol

The **GHG Protocol** is the leading global guidance for greenhouse gas accounting and reporting.



GHG Protocol Principles

Relevance

Inventory **appropriately reflects the GHG emissions** of the company and meets decision-making needs.

Completeness

Report on all GHG emissions from sources, sinks, and activities; disclose and justify any specific exclusions.

Consistency

Use **consistent methodologies** to allow for performance tracking of GHG emissions over time; **document any changes** to the data, inventory boundary, and methods.

Transparency

Disclose any relevant assumptions and make appropriate **references** to the accounting and calculation methodologies and data sources.

Accuracy

Quantification of GHG emissions **neither over nor under actual emissions** and reduce uncertainties as far as practical.

Permanence

Monitor the continued storage of reported removals, account for reversals, and report emissions.

Comparability

Apply common methodologies, data sources, assumptions, and reporting formats so **GHG inventories from multiple companies can be compared**.

GHG Protocol Updates

GHG Protocol Feedback

- From November 2022 to March 2023 the **public provided feedback on the Corporate Standard, Scope 2 Guidance, Scope 3 Standard**, and supporting documents.
- The goal of the feedback is to **inform updates** to the standards.
- The updated drafts are scheduled to be **released in 2024** and **finalized in 2025**.

Corporate Standard Survey

- Most survey respondents were satisfied with the document and suggested only minor updates.

Scope 2 Survey

- Survey responses were generally mixed.
- Some wanted to maintain the dual reporting requirements, others wanted a single requirement.
- Some wanted more granularity in reporting requirements to reflect hourly changes in grid energy mixes.

Source: GHG Protocol

Scope 1 and 2 GHG Inventory

How to Measure Your GHG Inventory

1. Determine consolidation approach

2. Choose a base year

3. Draw inventory boundary

4. Identify GHG sources and sinks

5. Collect data

6. Quantify emissions

How to Measure – Determine Consolidation Approach

1. Determine consolidation approach

The GHG Protocol provides three consolidation approaches to select from when determining how to draw your GHG inventory boundary:

Operational Control

- Boundary drawn based on activities directly operated by the company.
- Operational control is often selected as the consolidation approach for most manufacturing companies (including meat processors).

Financial Control

- Boundary drawn according to what gets consolidated into its financial reporting (financial statements).
- Often used by the investment industry.

Equity Share

- Accounting for emissions based on share of equity in a company.
- Less commonly used.

How to Measure – Choose a Base Year

2. Choose a base year

- A base year allows for consistent tracking over time.
- Should have forward looking ambition for target setting.
- Companies should set single base year for all scopes.
- Often the most recent year with available data.

Base Year Recalculation:

- GHG Protocol requires a base year recalculation policy.
- Recalculation is required if significant changes to company structure or inventory methodology occur.

Source: GHG Protocol

How to Measure – Draw Inventory Boundary

3. Draw inventory boundary

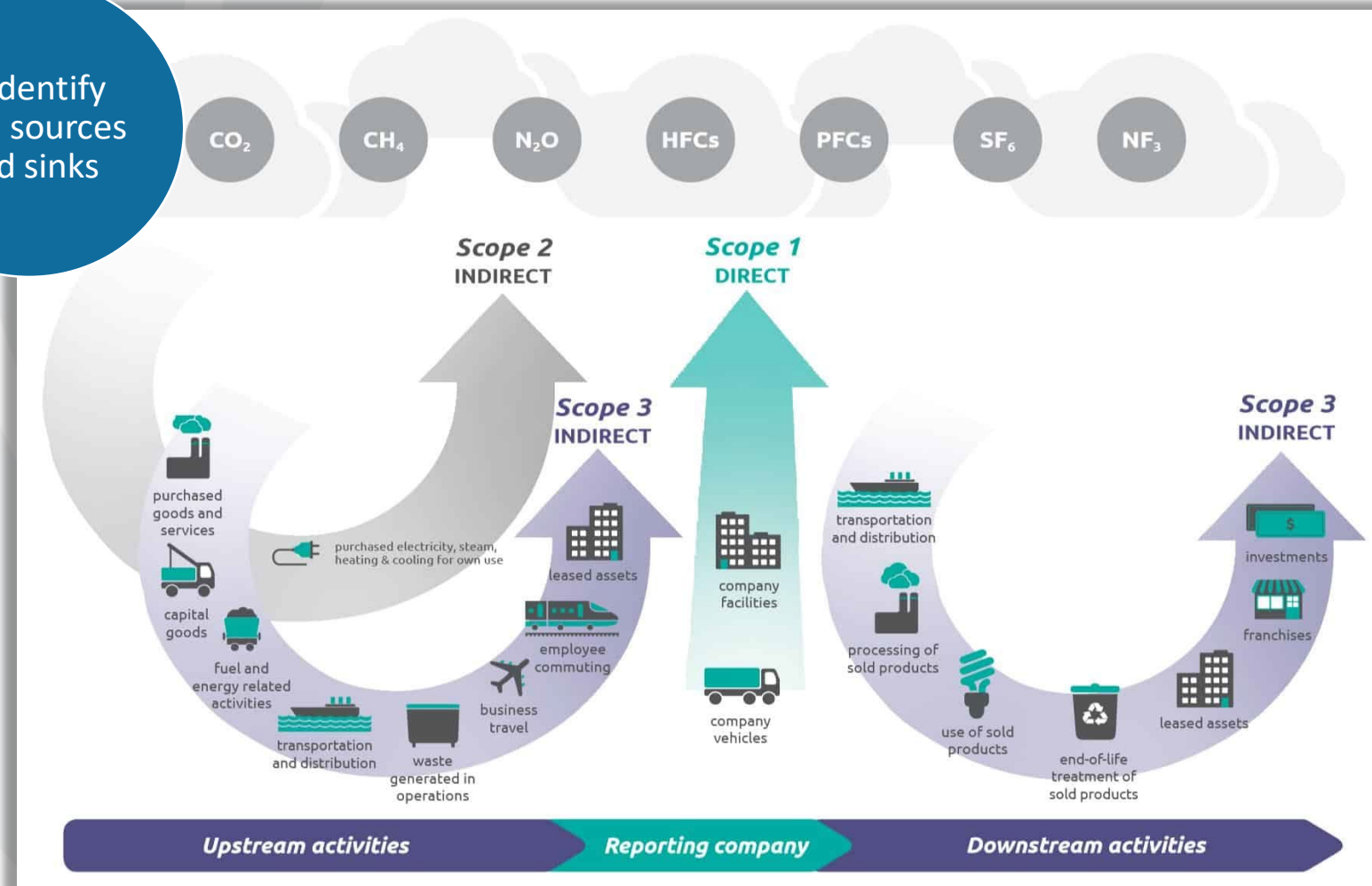
- Determine which operations and activities are included within your boundary.
 - This depends on the consolidation approach you choose.
- Draw boundaries around scope 1 and 2 based on your selected consolidation approach.

“Operational Control” Example:

- Company fleet – [scope 1](#)
- Leased trucks – employee drivers – [scope 1](#)
- Wastewater processed on site– [scope 1](#)

How to Measure – Identify GHG Sources and Sinks

4. Identify GHG sources and sinks



Source: GHG Protocol

Meat Processor Perspective

Scope 1 Emissions: Direct Usage

- Stationary combustion.
- Mobile combustion — Transportation fuels (owned or operated transport).
- Fugitive emissions.

Scope 2 Emissions: Indirect Usage

- Purchased electricity, heat, steam, or cooling.

Scope 3 Emissions: Supply Chain

- 15 upstream and downstream categories.
- Includes purchased goods and services from farm level.

How to Measure – Collect Data

5. Collect data

Corporate GHG Inventory

Financial/Purchase Activity Data

- Fuel use.
- Electricity use (scope 2).
- Refrigerant gases.

Operational Activity Data

- Wastewater treated on site.

Product-Level Carbon Footprint

Allocate

- For facilities producing multiple products.
- Allocate a portion of process emissions to products (as applicable) based on mass, energy, or economic value.

How to Measure – Quantifying Emissions

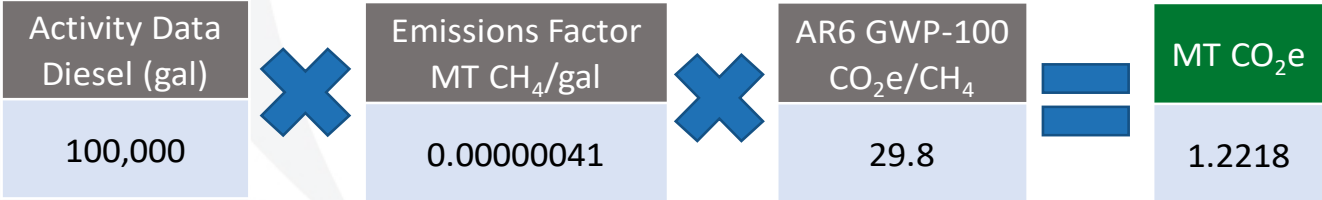
6. Quantify emissions

Apply Emissions Factors

- Emissions factors can be applied to activity data – fuel use, electricity purchased, etc.
- Key sources of emissions factors:
 - EPA Emissions Factor Hub – Emissions factors by fuel, waste, electricity region (eGRID), etc.
 - IPCC

Apply GWPs

- Determine which IPCC Assessment Report (AR) to use for your 100-year global warming potentials (GWPs):
 - Typically, most recent (AR6).
 - Can use the version approved for national inventories (AR4).
- Apply the same GWP consistently across your inventory.
- More recent ARs will follow the most recent science.



GHG	AR4 GWP-100	AR6 GWP-100
CO ₂	1	1
Bio CH ₄	25	27.9
Fossil CH ₄	25	29.8
N ₂ O	298	273

An aerial photograph showing a vast landscape. In the foreground, there are rolling green hills and fields, some with small clusters of buildings. In the middle ground, a large, densely populated city or town is visible, stretching across a valley. The background shows more distant hills and a clear blue sky with some light clouds. The overall scene is bright and clear.

Scope 1 and 2 Sources

Scope 1 Sources – Stationary Combustion

Stationary combustion:

- Combustion of fuels in fixed equipment or machinery.

Where are they?

- All facilities operated by the reporting company.

Includes:

- Boilers, furnaces, burners, turbines, heaters, incinerators, engines, flares, etc.
- CH₄ and N₂O emissions from biofuels.

Excludes:

- Vehicle fuel combustion.
- CO₂ emissions from biofuels.

Where does the activity data live?

- Purchase records.

Emissions factor resource



Activity data

- Fuel type
- Quantity of fuel used (gal, MMBTU, MCF, liter, etc.)

Source: GHG Protocol

Scope 1 Sources – Mobile Combustion

Mobile combustion:

- Combustion of fuels in transportation and vehicles.

Where are they?

- Company owned or leased vehicles operated by company employees.

Includes:

- Automobiles, trucks, forklifts, tractors, buses, trains, airplanes, boats, ships, barges, etc.
- CH₄ and N₂O emissions from biofuels.

Excludes:

- Stationary combustion.
- CO₂ emissions from biofuels.

Where does the activity data live?

- Purchase records.

Emissions factor resource



Activity data

- Fuel type
- Quantity of fuel used (gal, MMBTU, MCF, liter, etc.)
- Vehicle type
- Vehicle year
- Distance traveled (for on road vehicle only)

Source: GHG Protocol

Scope 1 Sources – Process Emissions

Process emissions:

- Emissions from physical or chemical processes.

Where are they?

- Owned and operated factories.

Includes:

- Calcination step in cement manufacturing, catalytic cracking in petrochemical processing, PFC emissions from aluminum smelting, etc.

Excludes:

- Combustion from processing.

Where does the activity data live?

- Production records.

Emissions factor resource



Activity data

- Production data
- Clinker content of cement
- Raw material content of the clinker

Source: GHG Protocol

Scope 1 Sources – Fugitive Emissions

Fugitive emissions:

- Intentional and unintentional releases of GHGs.

Where are they?

- Owned and operated wastewater treatment.
- Refrigerant gases.

Includes:

- Leaks from joints, seals, gaskets.
- Emissions from wastewater treatment, pits, cooling towers, gas processing facilities, etc.

Excludes:

- Process emissions, combustion emissions.

Where does the activity data live?

- Purchase records (refrigerant gases).
- Operation and/or wastewater data.

Emissions factor resources



Wastewater activity data

- Wastewater discharged
- Treatment type
- Chemical oxygen demand or biologic oxygen demand
- Mass of sludge removed

Refrigerant activity data

- Refrigerant gas type
- Mass of refrigerant gas purchased/replaced

Source: GHG Protocol

Scope 2 Sources – Purchased Electricity

Indirect emissions:

- Upstream emissions from purchased electricity, heat, steam, and cooling.

Where are they?

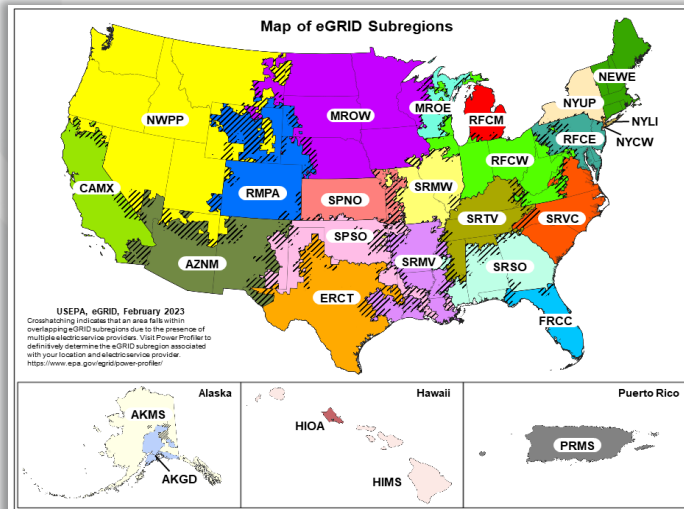
- Company-operated facilities.

Excludes:

- Emissions from on-site generated electricity, heat, steam, cooling.

Where does the activity data live?

- Purchase records.



Emissions factor resources



Location-based activity data

- kWh of electricity purchased
- Location of electricity generator

Market-based activity data

- Renewable Energy Credits (RECs)
- Guarantees of Origin (GOs)
- Power Purchase Agreements (PPAs)
- kWh of electricity purchased
- Supplier-specific emissions factor
- Residual Mix – Green-e Emission Factors

Source: GHG Protocol

Inventory Development Workshop

Considerations for the Inventory Development Worksheet

If you chose operational control as your consolidation approach, **are all GHG sources operated by your company?**

Is the **base year you chose representative** of your company's year-to-year emissions (did it include any supply chain disruptions or unusual challenges)?

Have you received any **requests for your scope 1 and 2 data** from your customers that may require allocation?

Partial/Complete Scope 1 & 2 Inventory Questions

Which sources of emissions did you find tricky to identify in your initial inventory?

How have you been able to increase data accuracy over time in your inventory? For example, by using more granular calculation methods, better emissions factors, and/or more primary data?

What key knowledge have you learned throughout your GHG inventory development and management process? What did you wish you knew sooner?

Who have you found to be helpful partners in managing your GHG emissions? Why?

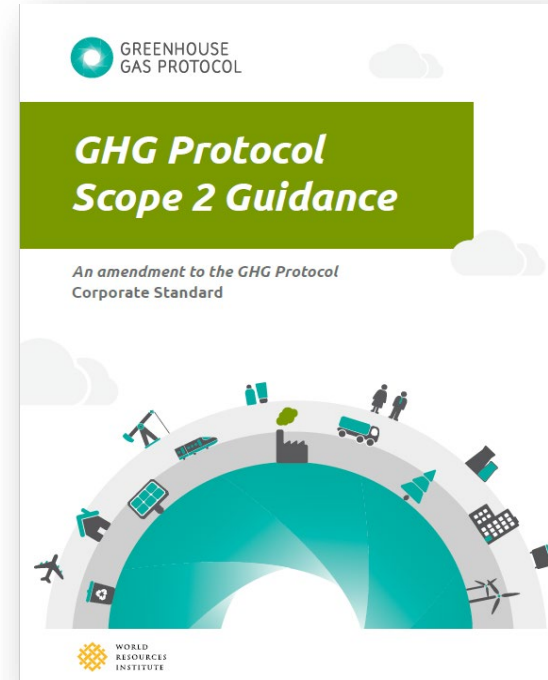
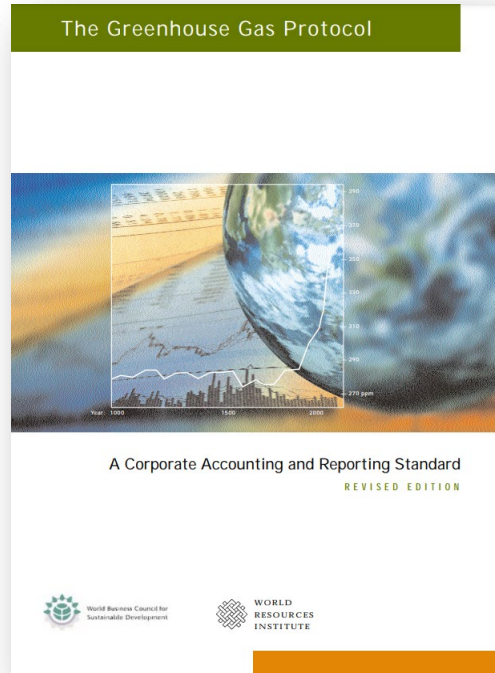
Where have you used your scope 1 and 2 data (reporting, satisfying customer requests, CSR, etc.)?

How have you used your scope 1 and 2 data to inform reduction planning?

How to Manage and Report Scope 1 and 2 Emissions

Reporting for Emissions - GHG Protocol

The **GHG Protocol** is the leading global guidance for greenhouse gas accounting and reporting.

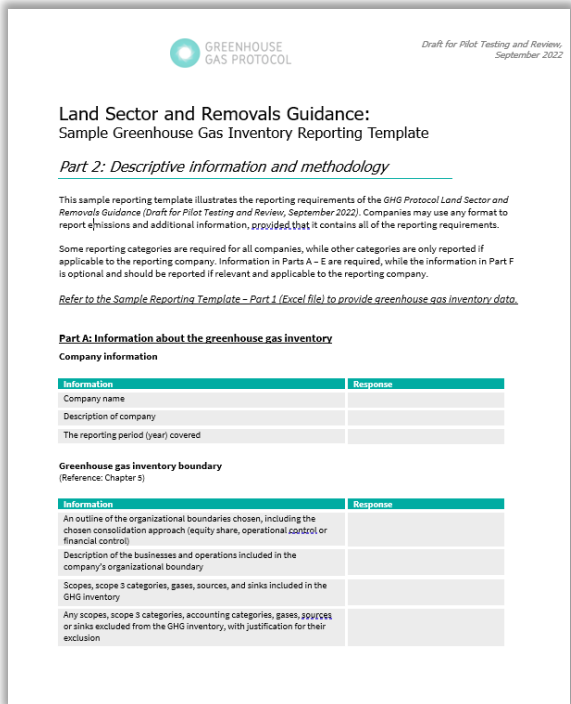


How to Report Scope 1 and 2 Emissions

GHG Protocol Requirements

- Description of the **organizational boundary**.
- **Base year and reporting year**.
- Total **GHG emissions**.
- Emissions data for CO₂, CH₄, N₂O, HFCs, PFCs, SF₆, NF₃, **separately reported in CO₂e** (scope 1).
- **Context for any significant emissions changes** that would trigger a base year recalculation.
- CO₂ emissions from **biofuel** combustion reported **outside of the scopes**.
- **Methodologies** used to calculate emissions.
- Any **exclusions** with justification of omission.

	Removals		Emissions						
	Gross emissions and removals		Land emissions (net)		Net emissions of biogenic or TCDR CO ₂ stored in product* or geologic carbon pools				
	Land tracking	Reversals	Emissions (non-land)	Land use change emissions	Land management net CO ₂ emissions	Land management non-CO ₂ emissions	Net CO ₂ emissions from geologic storage	Net LULU emissions from biogenic product storage	Net LULU emissions from TCDR-based product storage
Scope 1: Direct emissions from owned/controlled operations								NA	NA
Scope 2: Indirect emissions from the use of purchased or acquired electricity, steam, heating, and cooling					NA			NA	NA
Scope 3: Indirect emissions in the value chain – Upstream								NA	NA
Category 1: Purchased goods and services								NA	NA
Category 2: Capital goods								NA	NA
Category 3: Fuel- and energy-related activities (not included in scope 1 or scope 2)								NA	NA
Category 4: Upstream transportation and distribution								NA	NA
Category 5: Waste generated in operations					NA			NA	NA
Category 6: Business travel								NA	NA
Category 7: Employee commuting								NA	NA
Category 8: Upstream leased assets								NA	NA
Other								NA	NA
Scope 3: Indirect emissions in the value chain – Downstream								NA	NA
Category 9: Downstream transportation and distribution								NA	NA
Category 10: Processing of sold products					NA			NA	NA
Category 11: Use of sold products								NA	NA
Category 12: End-of-life treatment of sold products					NA			NA	NA
Category 13: Downstream leased assets								NA	NA
Category 14: Franchises								NA	NA
Category 15: Investments								NA	NA
Other								NA	NA



How to Manage a GHG Inventory – DMP

A data management plan (DMP) is tool to **document the high-level GHG Protocol reporting requirements and procedures** used to measure emissions and ensures accurate data year to year.

GHG Protocol DMP resources:

- Scope 3 Appendix C
- Land Sector and Removals Guidance: Sample Greenhouse Gas Inventory reporting Template

Appendix C. Data Management Plan

Table [C.1] Data management plan checklist

Component	Information	Rationale
Responsibilities	Name and contact details of persons responsible for: <ul style="list-style-type: none">• Management of GHG inventory• Data collection for each process• Internal audit procedures• External audit procedures	<ul style="list-style-type: none">• This ensures institutional knowledge is maintained and allows relevant person(s) to be identified for:<ul style="list-style-type: none">• Confirming and checking information during any internal or external audit procedures• Producing consistent future GHG inventories
Boundary and inventory description	<ul style="list-style-type: none">• Description of the boundary decision based on the <i>GHG Protocol Corporate Standard</i>• Description of what scope 3 categories and activities are included in the inventory• Description of what categories are excluded and why (as the company may begin including these, as data becomes available, for example)	<ul style="list-style-type: none">• To provide internal auditors, assurance providers, and those doing future GHG inventories sufficient information on the activities and categories included in the corporate inventory.
Data summary	<ul style="list-style-type: none">• Data collection procedures, including data sources for each process• Quality of data collected for each process and if and how a data quality assessment was undertaken• Gap analysis identifying where better quality data is preferable and plan for how to improve that data• Information on how data assumptions were determined, including use profiles of sold products, product lifetimes, waste treatment profiles, and other relevant assumptions	<ul style="list-style-type: none">• Records all data sources and allows others to locate data sources (for audit and updates to inventory). Also provides information on which suppliers have been approached for data.• Enables data quality to be tracked over time and improved• Identifies where data sources should be improved over time, including those suppliers who were asked to provide data and those that were not• Allows internal auditors, assurance providers, and those doing future inventories sufficient information on how assumptions were determined, and identifies how this information may be improved

Source: GHG Protocol

How to Manage a GHG Inventory – Data Quality



Start with the data you have.

- Use existing fuel and energy data, and measure emissions in alignment with GHG Protocol calculation methods.



Improve data quality and granularity over time.

- Downstream companies are seeking more information on the products they purchase.
- It will become vital to break out emissions by location and product.



Update emissions factors.

- The EPA updates the Emissions Factor Hub every year.
- Work with electricity suppliers to obtain primary emissions factors for market-based scope 2 calculations.



Disclose any assumptions.

How to Manage a GHG Inventory – Base Year Recalculation

The **GHG Protocol requires** reporting companies to develop a **base year recalculation policy**.

The policy goes into effect when a “**significant threshold**” is met that would compromise the consistency and relevance of the reported emissions.

The GHG Protocol does not make a recommendation on what constitutes “significant” but provides a 10% example used by the California Climate Action Registry.

- **SBTi requires a 5% threshold.**

What triggers a base year recalculation?

- ✓ **Structural changes** to the reporting company (mergers, acquisitions, divestments).
- ✓ Changes in **calculation methodology**, or improvements in the accuracy of emission factors or activity data.
- ✓ Discovery of significant **errors**.



How to Manage a GHG Inventory – Data Management

Data management systems are tools to **store, collect, and analyze large amounts of data** across an organization and its supply chain.

The purpose of a data management system is to **reduce the manual effort** needed to manage sustainability data.

Effective data management systems **automate data collection** from a company's existing information and can digitize utility bills and purchase records.



How to Manage a GHG Inventory – Data Management

Leading Sustainability Software Vendors – North America

<p>Technology Giants</p>	<p>Environmental, Health & Safety (EHS) Leaders</p>	<p>Enterprise Risk Management (ERM) and Governance, Risk management & Compliance (GRC) Leaders</p>	<p>Specialized ESG Data Management & Reporting Software Players</p>	<p>Mid-market Software Vendors</p>
<p>Industrials & Utility Leaders</p>				<p>SMB Software Vendors</p>
<p>Information Services & Accounting Leaders</p>				

SOURCE: THIBAUT BOIRON (2023)

GHG Inventory Management – Best Practices

- ✓ Build your GHG accounting and reporting **team**.
- ✓ Take stock of **available data** for emissions reporting.
- ✓ Determine which **platform or software** you will use to measure and track year-over-year emissions.
- ✓ Develop your **data management plan**.
- ✓ Quantify your **inventory**.
- ✓ Draft your GHG inventory **report**.

Closing

Key Takeaways

Measuring and reducing GHG emissions can help companies **reduce risk and increase resiliency** by pursuing new opportunities from changing climatic and regulatory environments.

There are many reasons why companies develop a scope 1 and 2 inventory (regulatory requirement, customer reporting, operational insights, etc.). **Tailor and “right size” your GHG strategy** based on your company’s internal and external needs.

Guidance and resources are available from the GHG Protocol and the Meat Institute, among others, to support you with measuring and reporting scope 1 and 2 emissions.

GHG Resources for the Meat Industry

- GHG Calculations Resources for Meat Processors (Pinion)
- [Greenhouse gas emissions surveys in the meat sector – A detailed case study](#) (Meat Institute)
- Supplier LOCT

Greenhouse gas emissions surveys in the meat sector - A detailed case study

- Executive summary
- Introduction, motivation, and purpose
- How to navigate this document
- Determining organizational and operational boundaries
- Scope 1: Direct emissions
- Scope 2: Indirect emissions
- Scope 3 Screening
- Scope 3: Value chain emissions
- Next Steps in Setting Science Based Targets

Organization	Resource	Notes	Scope 1	Scope 2	Scope 3.1 Purchased Goods and Services	Scope 3.2 Capital Goods	Scope 3.3 Fuel- and Energy-Related Activities	Scope 3.4 Upstream Trans and Dist.
Greenhouse Gas Protocol	Corporate Standard	Definitive guide to conducting a GHG inventory.	x	x	x	x	x	x
Greenhouse Gas Protocol	Scope 2 Guidance	Supplementary guidance for completing scope 2 calculations.		x				
Greenhouse Gas Protocol	Scope 3 Standard	Definitive guide to conducting a scope 3 GHG inventory.			x	x	x	x
Greenhouse Gas Protocol	Scope 3 Calculation Guidance	Supplementary calculations guidance for completing scope 3 inventory.			x	x	x	x
Greenhouse Gas Protocol	Land Sector and Removals Guidance (draft) - Part 1 and 2	Draft guidance for developing a GHG inventory for land-based emissions/removals. Final guidance expected at the end of 2024. (Scroll down to bottom left of webpage)			x			
Greenhouse Gas Protocol	List of Land Sector Calculation Resources	Excel spreadsheet that outlines resources for land sector and removal calculations. (Scroll down to bottom left of webpage)			x			
Greenhouse Gas Protocol	Calculation Tools	List of all tools developed by GHG Protocol to assist in calculating GHG emissions.	x	x	x	x	x	x
Greenhouse Gas Protocol	Life Cycle Databases	A list of third-party life cycle assessment databases containing emissions factors. Often require a user fee.			x			
Greenhouse Gas Protocol	Online Training	Online education for the GHG Protocol standards.	x	x	x	x	x	x
Green-e	Green-e	Provides residual mix data by eGRID region for market-based scope 2 calculations.		x				
EPA	Scope 3 Inventory Guidance	Webpage with US-specific guidance for scope 3 calculations.	x	x	x	x	x	x
EPA	Emissions Factor Hub	Excel spreadsheet with US-specific emissions factors for various sources.	x	x				x

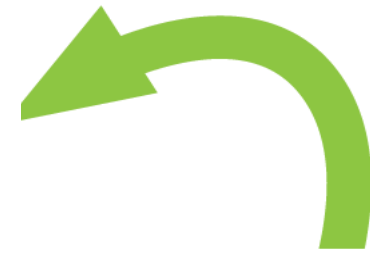
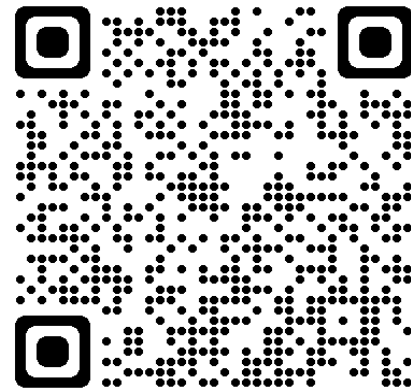


**SUPPLIER LEADERSHIP
ON CLIMATE TRANSITION**

The Meat Institute Updates

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