Better Plants
U.S. DEPARTMENT OF ENERGY

Scope 3 Emission Considerations

Virtual INPLT Training

Session 6

Tuesday – March 25, 2025

10:00 am – 12:30 pm EDT

U.S. DEPARTMENT OF ENERGY

Waste Virtual INPLT Agenda

- **Week 1 (February 18th) – Introduction: Waste Diversion and Reduction 101**
- **Week 2 (February 25th) – How to Effectively Track and Measure Your Waste**
- **Week 3 (March 4th) – Source Reduction and Waste Minimization Techniques**
- **Week 4 (March 11th) – Finding Outlets for Hard to Manage Waste Streams**
- **Week 5 (March 18th) – Construction Waste Management and Green Building Certifications**
- **Week 6 (March 25th) – Scope 3 Emission Considerations**
- **Week 7 (April 1st) – Implementation of a Waste Diversion Program – Developing a Roadmap to Zero Waste**
- **Week 8 (April 8th) – Conclusions, Summaries, and Wrap up Presentations**

Plan of Action

Today, we will:

- Review the previous training
- Discuss the homework
- Lecture on today's topic, "Scope 3 Emissions Considerations"
- Conduct a Q&A session
- Test your knowledge with a Kahoot! quiz

Takeaways

Today, you will learn:

- What are greenhouse gas emissions and their environmental impacts
- How to integrate sustainable considerations into sourcing and procurement
- What calculation methodologies exist for Scope 3 emissions
- An overview of greenhouse gas reporting frameworks and standards

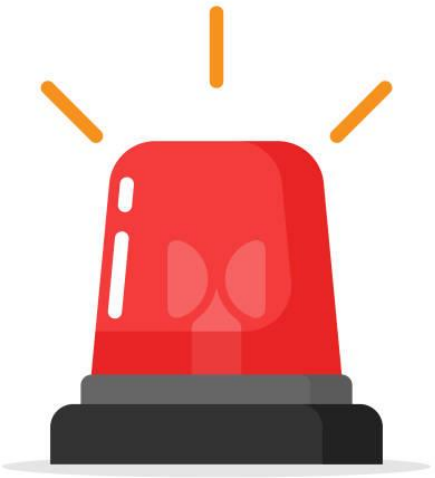
Presenters from Sustainable Solutions Corporation

Lora Urbaniak, LEED Green Associate
Operations Manager
Sustainable Solutions Corporation

Nick Mummau, LEED Green Associate
Senior Project Manager
Sustainable Solutions Corporation

Session 8 Participation

- We are looking for participants to present during week 8!
  - Hearing from participants provides a lot of value, as other attendees can see specific details related to real situations that may provide insights on how they can approach waste minimization and diversion
- Interested people will be provided with a base template to follow, giving guidance on what to discuss
  - Development of a few slides (10-15 minutes of content)
  - Slides will be provided to Nick so that he can combine them all into one presentation
- Session 8 will **not be publicly available** on the ORNL Better Plants website



Quick Review

Remembering Session 5

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Session 5 Review: Of the construction and demolition waste generated in the U.S., what percentage of the waste is from demolition?

Please respond to the Zoom poll

Answer: 90%

Review: Construction Waste Management and Green Building Certifications

In the last session you learned to:

- Plan for construction and demolition (C&D) waste
- Develop a C&D waste management plan
- Understand the relationship between C&D waste management and green building standards as part of a company's carbon reduction goals
- Meet green building standard requirements for waste management

Homework Discussion

Homework Takeaways

Overview

- Input waste data into the EPA's WARM tool and review the results. Write which wastes contribute the most to the emissions totals and describe if any influence from waste streams were surprising.

Takeaways

- Surprise by the negative values in the results
  - Some uncertainty in how to interpret results depending on person's role. Some responders do not normally deal with emissions-related data or sustainability reporting
- In some cases, waste streams that seemed most prevalent in the dumpster were not as impactful to overall emissions, however, in some the two aligned

Today's Topic:

Scope 3 Emissions Considerations

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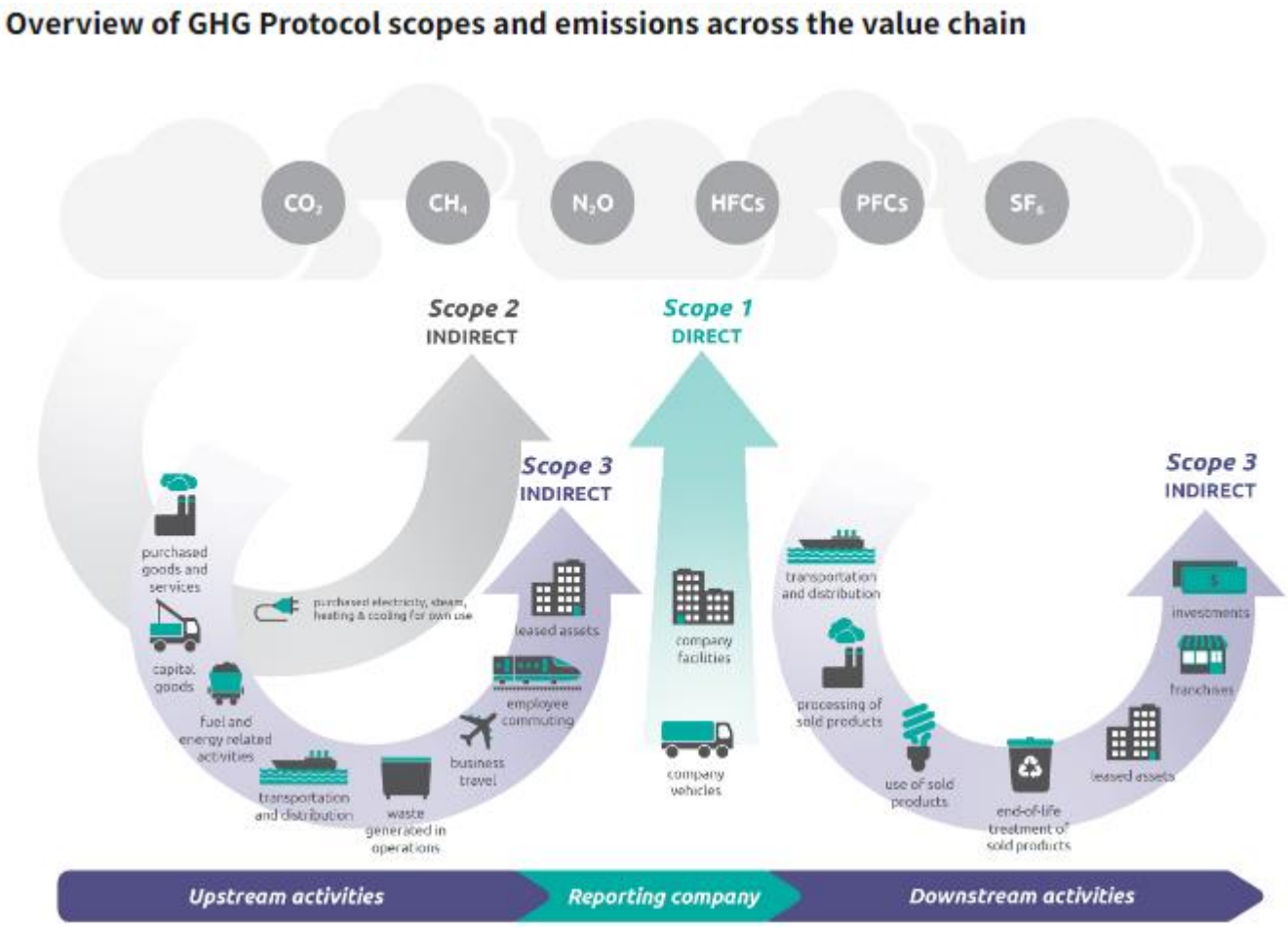
Measuring Global Warming Impacts

- A major focus for environmental stewardship programs is reducing greenhouse gas emissions
- Greenhouse gas emissions have an associated Global Warming Potential (GWP)
- Key terms to understand include:
  - Embodied carbon and operational carbon
  - Scope 1, Scope 2, and Scope 3 emissions
  - Carbon neutral and net zero

Scope Emissions



GHG Protocol

OWNED DIRECT EMISSIONS

Scope 1: GHG emissions from sources owned and controlled by the company

OWNED INDIRECT EMISSIONS

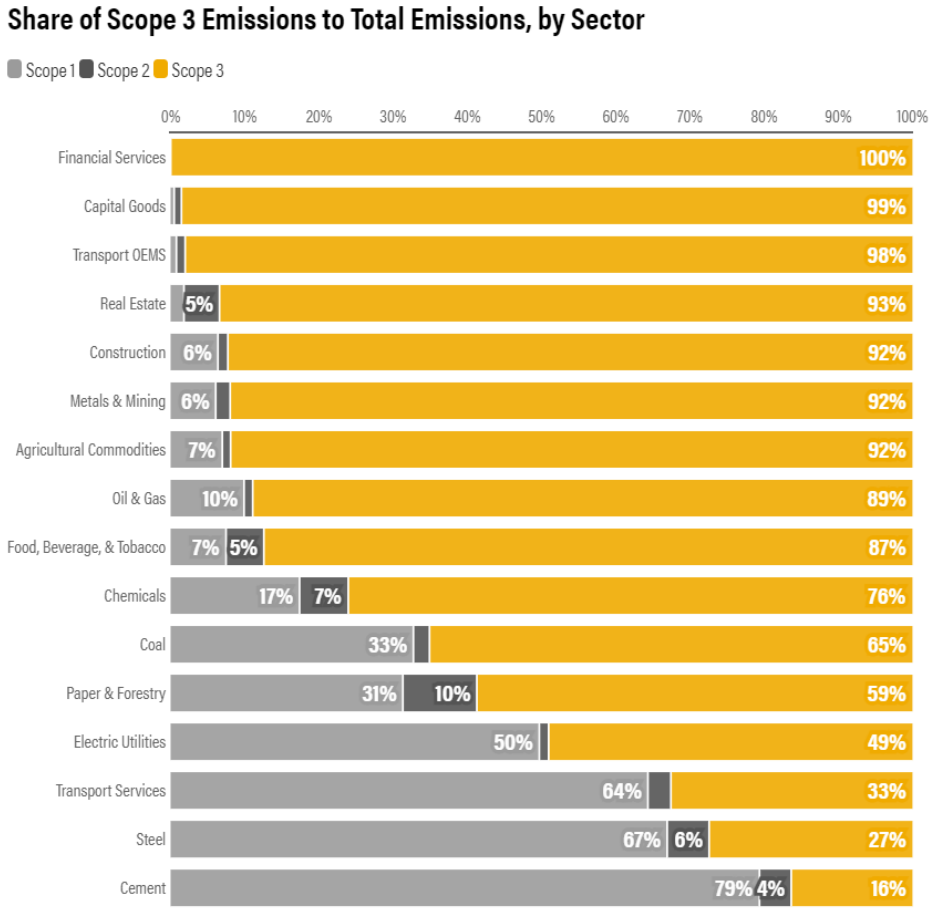
Scope 2: GHG emissions from utilities purchased by the company (electricity, steam, heat, etc.)

UNOWNED INDIRECT EMISSIONS

Scope 3: All other GHG emissions that are linked to the company but do not fall into the other categories; they can occur upstream and downstream

Scope 3 Emissions by Sector

How large are Scope 3 emissions?



Source: Data is from CDP. Research and analysis of the data was conducted by Concordia University.

WORLD RESOURCES INSTITUTE

[World Research Institute Scope 3 Disclosure Trends]

Scope 3 Emission Categories

Upstream or downstream	Scope 3 category
Upstream scope 3 emissions	1. Purchased goods and services 2. Capital goods 3. Fuel- and energy-related activities (not included in scope 1 or scope 2) 4. Upstream transportation and distribution 5. Waste generated in operations 6. Business travel 7. Employee commuting 8. Upstream leased assets
Downstream scope 3 emissions	9. Downstream transportation and distribution 10. Processing of sold products 11. Use of sold products 12. End-of-life treatment of sold products 13. Downstream leased assets 14. Franchises 15. Investments

The impact of each category will vary by company and industry

Within GHG considerations for Scope 3, there is an increasing focus on methane emissions resulting from waste end-of-life scenarios

GHG Protocol Scope 3 Guidance

Scope 3 Emissions Reduction Example

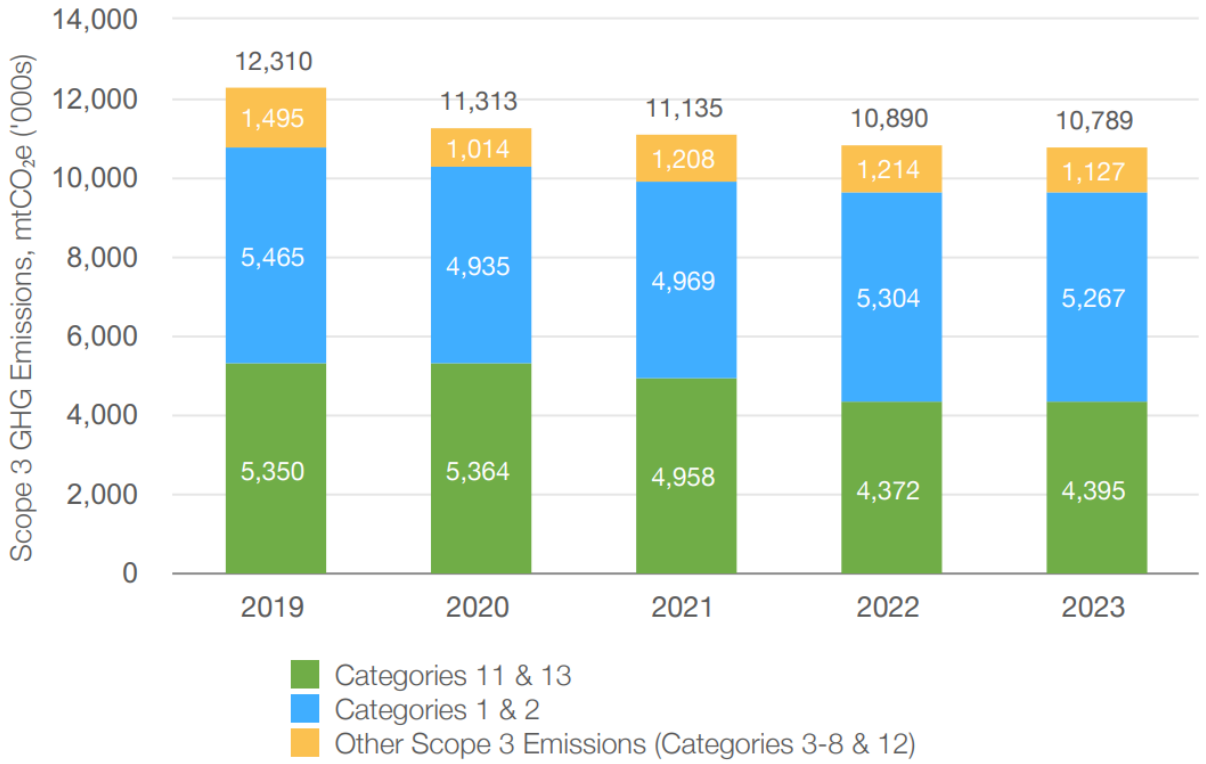
- Bristol-Myers Squibb utilized Principals of Green Chemistry to improve their sustainability efforts
- Focused on making significant reductions in the volume of their product packaging
  - Led to an approximate 40% reduction in transportation GHG emissions
  - Led to just under $1 million in annual savings for shipping costs per year

Bristol-Myers Squibb

Better Buildings Case Study: Bristol-Myers Squibb

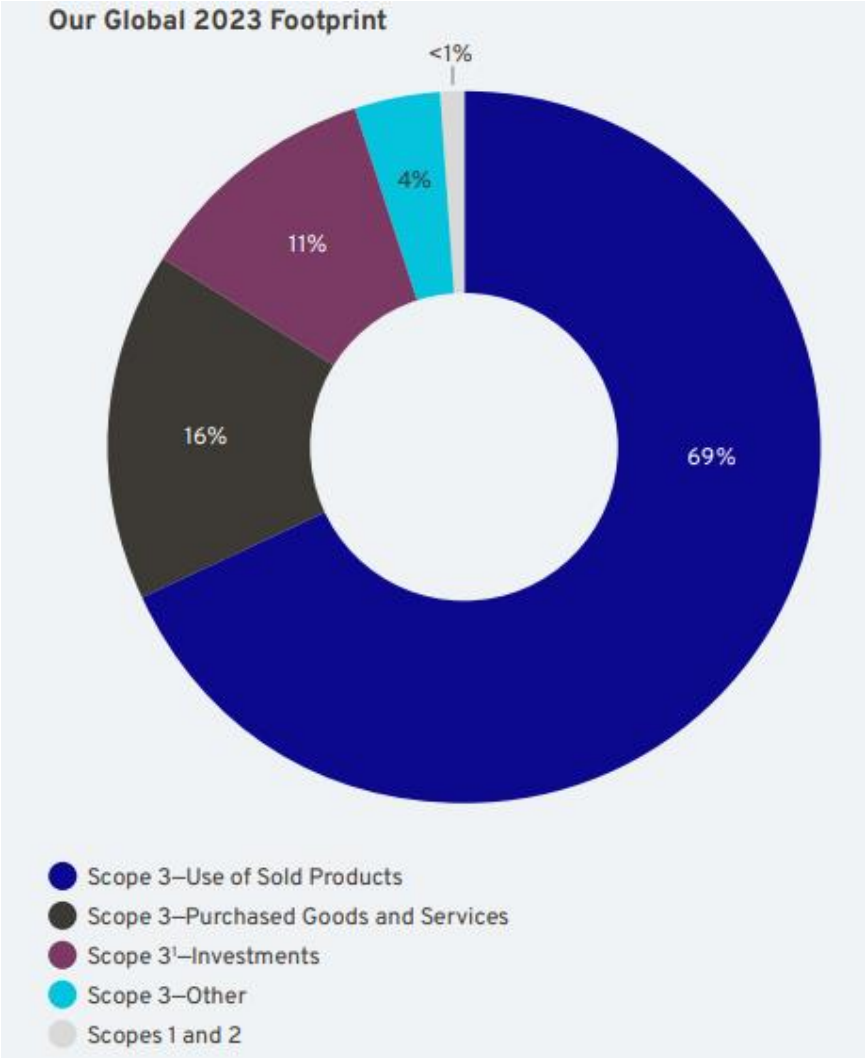
Comcast Scope 3 Emissions Example

- Comcast's largest contributors to Scope 3 emissions are:
  - Purchased Goods and Services and Capital Goods along with Processing and Use of Sold Products



Comcast Scope 3 Emissions Breakdown

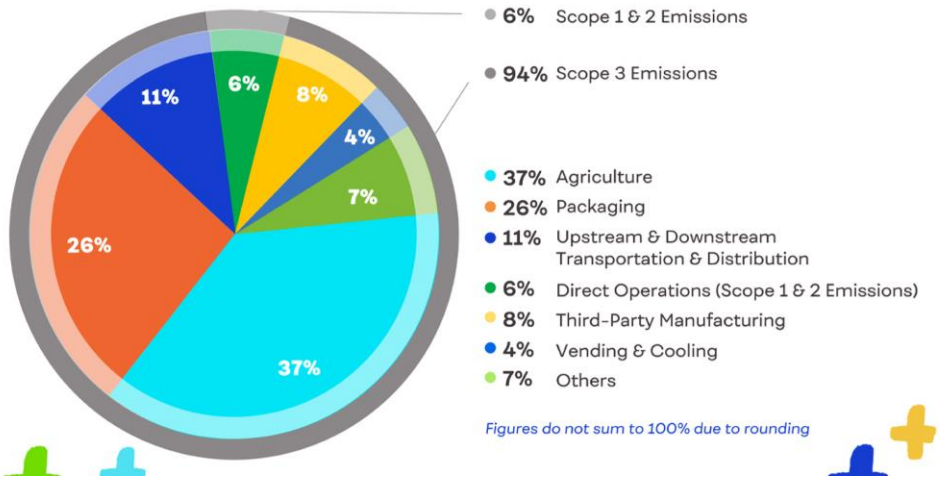
General Motors Scope 3 Emissions Example



GM 2023 Sustainability Report

Pepsi Scope 3 Emissions Example

Our 2023 Emissions Footprint



Emissions Progress

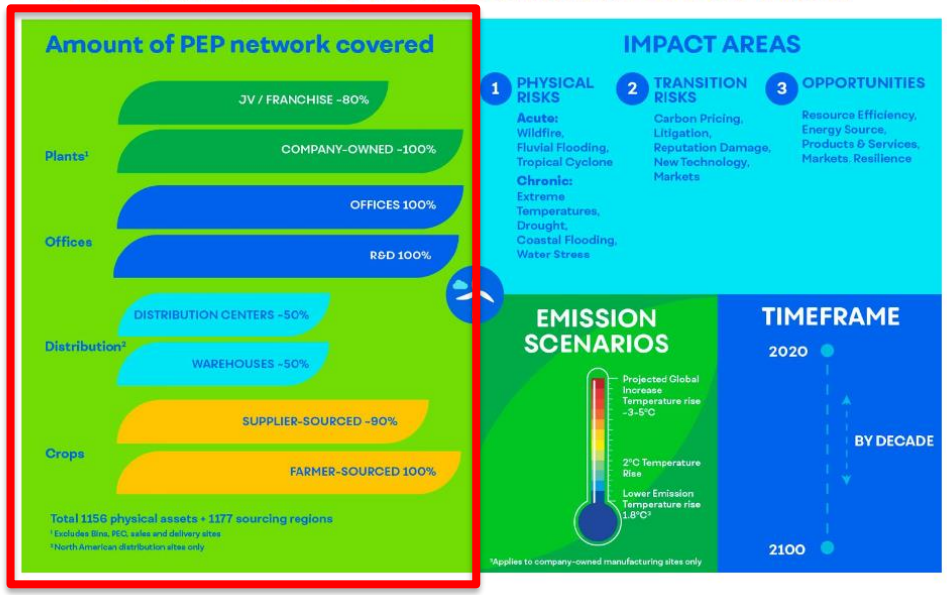
	2023		2022		2021[1]		2015[2] (Baseline year)	
	%[3]	Absolute (million metric tons)	%	Absolute (million metric tons)	%	Absolute (million metric tons)	%	Absolute (million metric tons)
Scope 1	6%	3.4	6%	3.5	6%	3.4	6%	3.6
Scope 2	<1%	0.3	1%	0.8	1%	0.7	3%	2
Scope 3[4]	94%	54[5]	93%	57	93%	56	91%	55
Total[4]		58		61		60		60

[1] In 2023, we recalculated the 2021 reported results to reflect the divestiture of Tropicana
[2] In 2023 we further remeasured the 2015 baseline to reflect the divestiture of Tropicana, enhancements in our calculation methodology and the inclusion of additional data
[3] Figures do not sum to 100% due to rounding
[4] Where actual data was not available, estimated data was used
[5] In 2023 we continued to enhance our calculation methodology and reflected the inclusion of additional data

[Pepsi Climate Change]

Pepsi discloses how much of coverage they have in emissions reporting

Climate Risk Assessment Overview



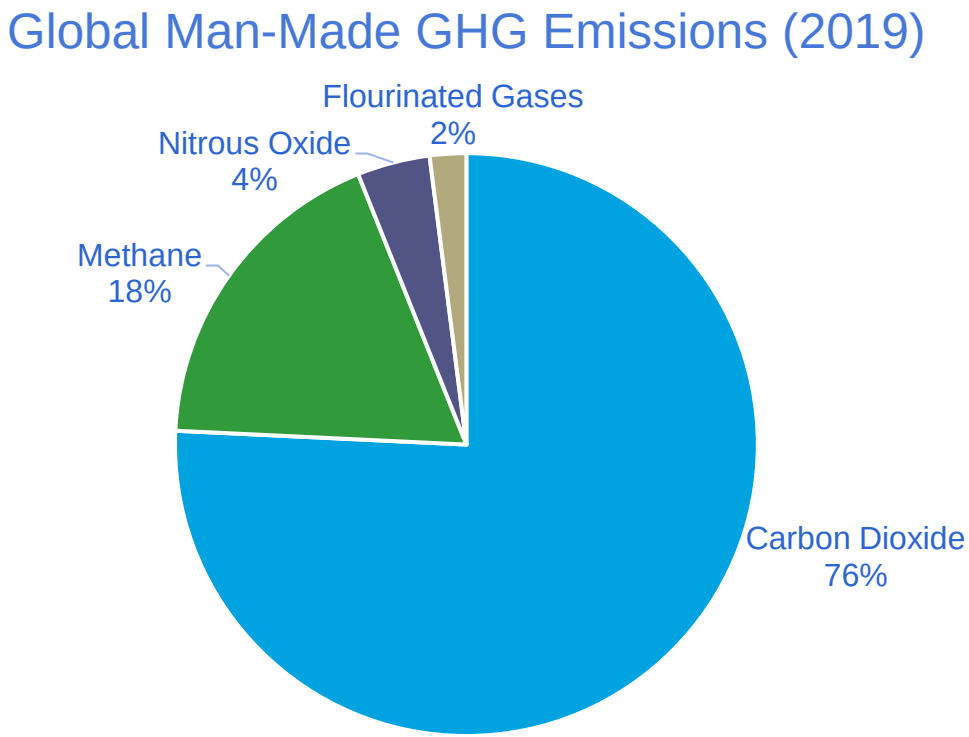
Poll: How much more potent is methane than carbon dioxide at trapping heat in the atmosphere?

Please respond to the Zoom poll

Answer: 28 times more potent

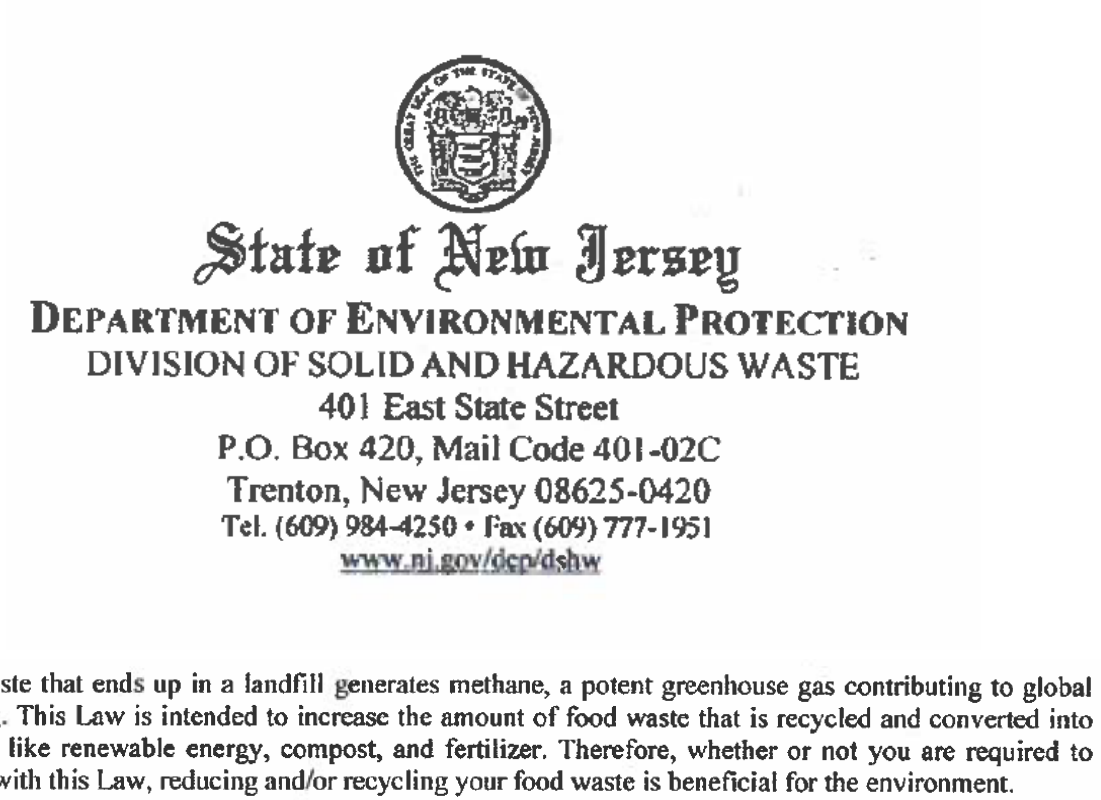
The Facts About Methane

- Methane represents a large portion of global GHG emissions
- Methane is **28 times more potent** than carbon dioxide at trapping heat in the atmosphere



EPA Source

State Legislation – New Jersey



State of New Jersey
DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF SOLID AND HAZARDOUS WASTE
401 East State Street
P.O. Box 420, Mail Code 401-02C
Trenton, New Jersey 08625-0420
Tel. (609) 984-4250 • Fax (609) 777-1951
www.nj.gov/dep/dshw

Food waste that ends up in a landfill generates methane, a potent greenhouse gas contributing to global warming. This Law is intended to increase the amount of food waste that is recycled and converted into products like renewable energy, compost, and fertilizer. Therefore, whether or not you are required to comply with this Law, reducing and/or recycling your food waste is beneficial for the environment.

- An Act focused on reducing methane emissions related to food waste
  - Requires qualifying establishments to separate and divert their food waste
- A state goal of reducing food waste by 50% by 2030 from 2017 food waste emissions levels
- Plans to optimize energy recovery in wastewater treatment

Additional State Organics Recycling Laws

Organizations in New York generating more than one ton of food scraps a week must separate excess edible food for donation and send food scraps to recycling

SECTION 27-2201

Definitions

Environmental Conservation (ENV) CHAPTER 43-B, ARTICLE 27, TITLE 22

https://www.nysenate.gov/legislation/laws/ENV/27-2201

In Connecticut, organizations generating more than one-half ton a week must send food scraps to recycling

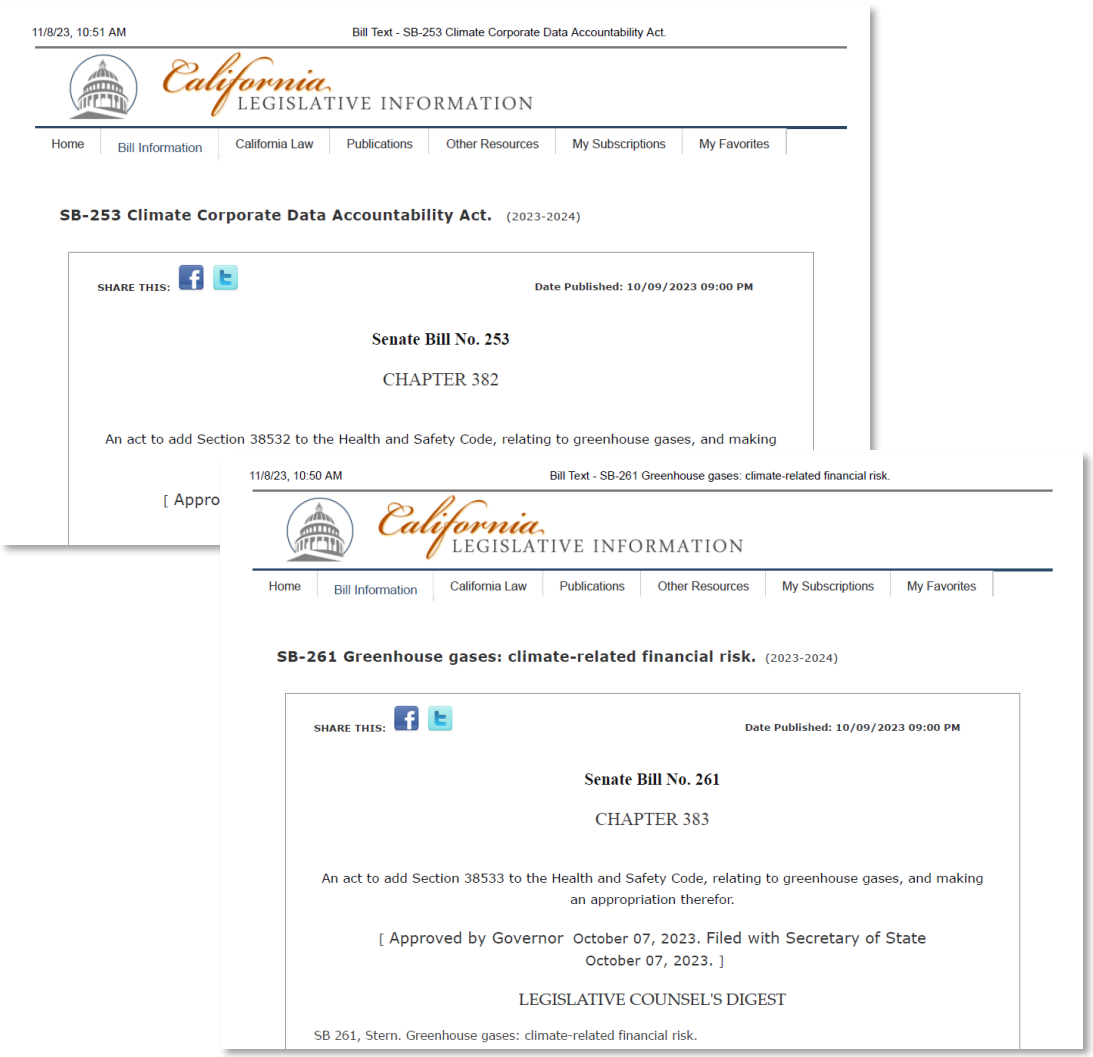
https://portal.ct.gov/DEEP/Waste-Management-and-Disposal/Organics-Recycling/Commercial-Organics-Recycling-Law

Shifts in Federal Administration

Initial actions under the current administration have shifted the federal landscape of waste regulation

- Executive Order: Catalyzing Clean Energy Industries and Jobs Through Federal Sustainability was revoked January 20th and included requirements for agencies to:
  - Minimize waste and promote a transition to a circular economy
  - Implement sustainable acquisition and procurement policies
- The Bipartisan Infrastructure Law included funding to increase recycling infrastructure for state and local governments
  - In November of 2023, EPA awarded 25 grants totaling $72.9 million to advance reuse, recycling, composting, and anaerobic digestion
  - In 2024, EPA announced $117 million in funding under this program
- The Inflation Reduction Act
  - Applicable to petroleum and natural gas production, transport, and storage
  - Fees will be applied to companies that report over 25,000 metric tonnes of CO_2e per year that are exceeding acceptable thresholds for methane emissions

California SB 253 and SB 261



- Under California Senate Bill 253, companies doing business in California will be required to disclose Scope 1, Scope 2, and Scope 3 emissions
- California Senate Bill 261 requires companies to prepare and publicly share a report summarizing publicly available climate-related financial risk reports
- The California state assembly estimated that both bills would impact roughly 7,000 companies

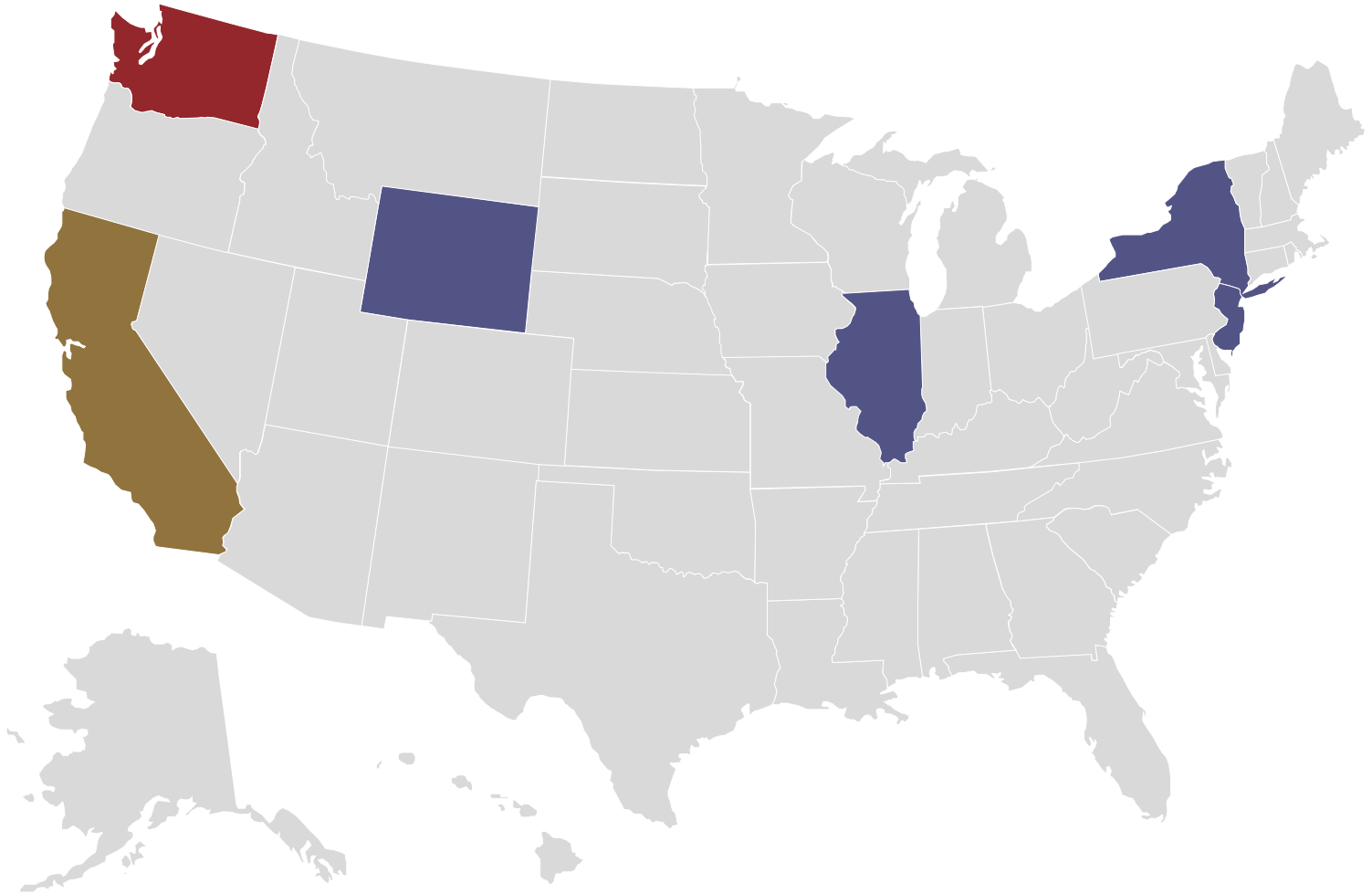
Climate Corporate Data Accountability

- The following states have introduced a bill related to corporate climate data disclosure

Passed

Introduced 2025

Introduced in previous legislative session but did not pass; may reintroduce in 2025



Regulatory Drivers – Starting in Europe

Regulations	Region	Reporting requirements	Applicable to:
CSRD Corporate Sustainability Reporting Directive	EU	• Covers broadly sustainability • Double materiality – financial and world impacts, assumes climate is material • Resource use and Circular Economy specific section; Scope 1, 2, 3 • Third-party limited assurance	• Large EU companies and foreign companies doing business in EU • FYB 2025; reporting 2026 • Phase in periods; 8300 initially, 50-60K companies worldwide when fully implemented
CS3D Corporate Sustainability Due Diligence Directive	EU	• Beyond reporting - Adopt transition plan aligned with Paris agreement; net-zero by 2050 • Interim targets every 5-years • Civil liability	• Narrower than CS3D. • Start with EU companies >5000 employees, EUR 1,500m worldwide phase into Non-EU companies with EUR > 450m in EU over 5-years • First wave comes into Scope in 3-years

Environmental, Social, and Governance (ESG) Reporting Frameworks

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Transparency

- There is increasing pressure and expectation for companies to disclose sustainability-related information
- Various platforms and frameworks exist to assist companies in disclosing correct and relevant information

Demonstrating Environmental Leadership

Investors Step Up Pressure On Companies That Don't Disclose Environmental Risks

"Climate change, deforestation and water security have become material issues to many industries. Investors require more comprehensive information and scientific analysis to address risks and opportunities derived from these issues," said Sophia Cheng, chief investment officer at Cathay Financial Holdings.

Forbes Article Link

- Investors of publicly traded companies are putting more emphasis on sustainability initiatives
- Customers want to see environmental stewardship

Transparency

FORBES > SMALL BUSINESS

Green Business Is Good Business: Why Transparency Is Key For Corporate Sustainability

Gary Steele Forbes Councils Member
Forbes Business Council COUNCIL POST | Membership (Fee-Based)

Research by Sprout Social found that 86% of Americans viewed transparency in business as "more important than ever before." Similarly, 86% of respondents said, even after a bad experience, if a business has a good history of transparency, they would be more likely to give it a second chance. On top of that, 89% said they think a business would regain their trust if it's been completely transparent about a mistake.

In an international study conducted by Unilever, they discovered that one-third of consumers are buying from brands that are seen as sustainable.

A recent survey discovered that 81% of global respondents felt organizations should be working to improve the environment, a sentiment shared across generational lines. The trend has been called the pursuit of

At the same time, we distance ourselves from viewing transparency as a corporate concept and see it for what it is — a real human quality. It's been found that 94% of consumers are more likely to be loyal to a brand that's completely transparent. Transparency also builds trust, trust that is foundational to your relationships with your employees and customers.

Forbes Article Link

STATEMENTS

STATEMENT: Climate Mayors to Uphold Paris Agreement Commitment and Accelerate U.S. Subnational Climate Ambition and Global Economic Competitiveness

Washington, D.C. (January 20, 2025) – Today, President Donald Trump announced his intention to withdraw the U.S. from the Paris Agreement and the U.N. Framework Convention on Climate Change. Under the Paris Agreement, countries have committed to reducing greenhouse gas emissions to limit global warming to well below two degrees Celsius in order to prevent severe climate impacts.

In response, Climate Mayors Chair and Phoenix Mayor Kate Gallego issued the following statement:

"Regardless of the federal government's actions, Climate Mayors are not backing down on our commitment to the Paris Agreement. The cost of inaction is simply too high. As we have recently seen from the devastating wildfires in Los Angeles, extreme summer temperatures in Phoenix, and hard-hitting hurricanes in North Carolina and Florida, the effects of our changing climate are at our doorstep. Now, more than ever, we must accelerate our work to protect our communities, lower energy bills, create good-paying local jobs, and maintain our nation's economic competitiveness by modernizing our infrastructure and investing in emerging markets.

Climate Mayors

Nov. 12, 2024, 5:30 AM EST

States Embrace Climate Leadership as Trump Heads to White House

Drew Hutchinson
Reporter

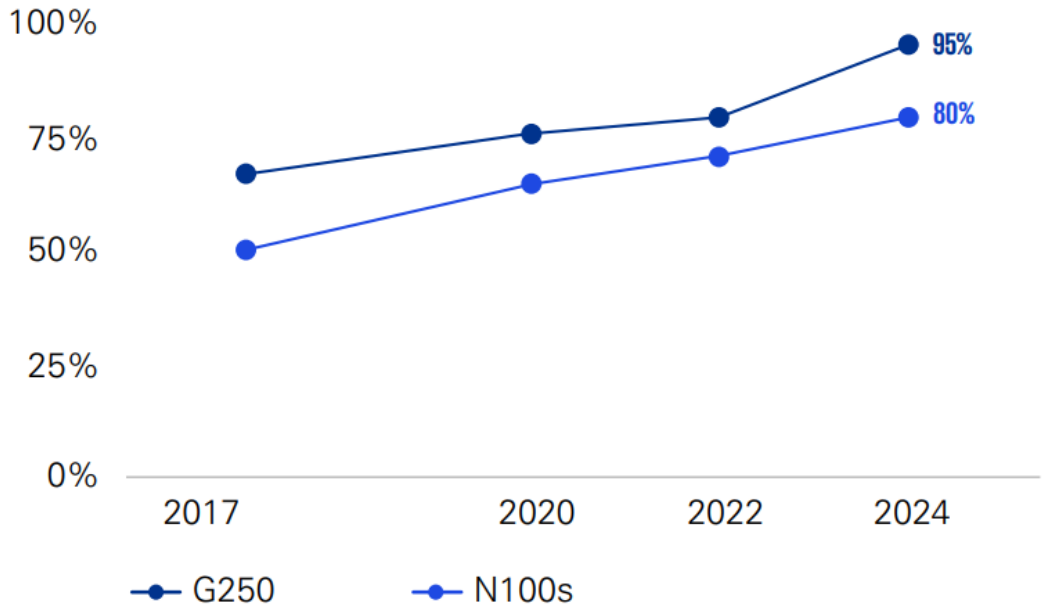
Bloomberg Law

More than half of individual investors say they plan to increase their allocations to sustainable investments in the next year, while more than 70% believe strong ESG practices can lead to higher returns.

Morgan Stanley

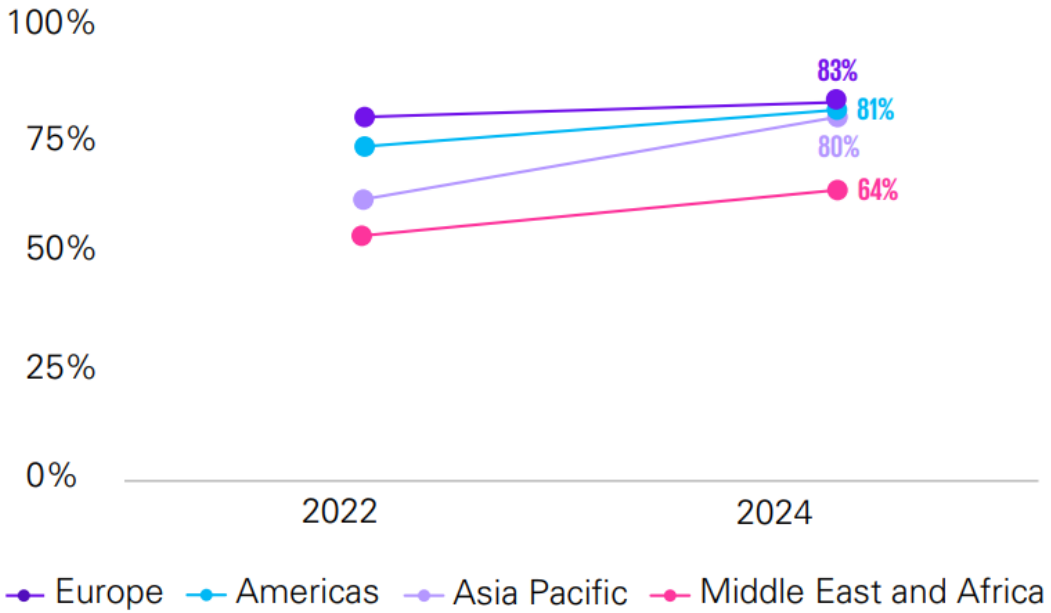
Sustainability Reporting

Companies with carbon reduction targets in G250 and N100s (2017–2024)



Base: 4,581 N100 companies that report on sustainability or ESG matters

Companies with carbon reduction targets by region (2022–2024)



Base: 4,581 N100 companies that report on sustainability or ESG matters

KPMG

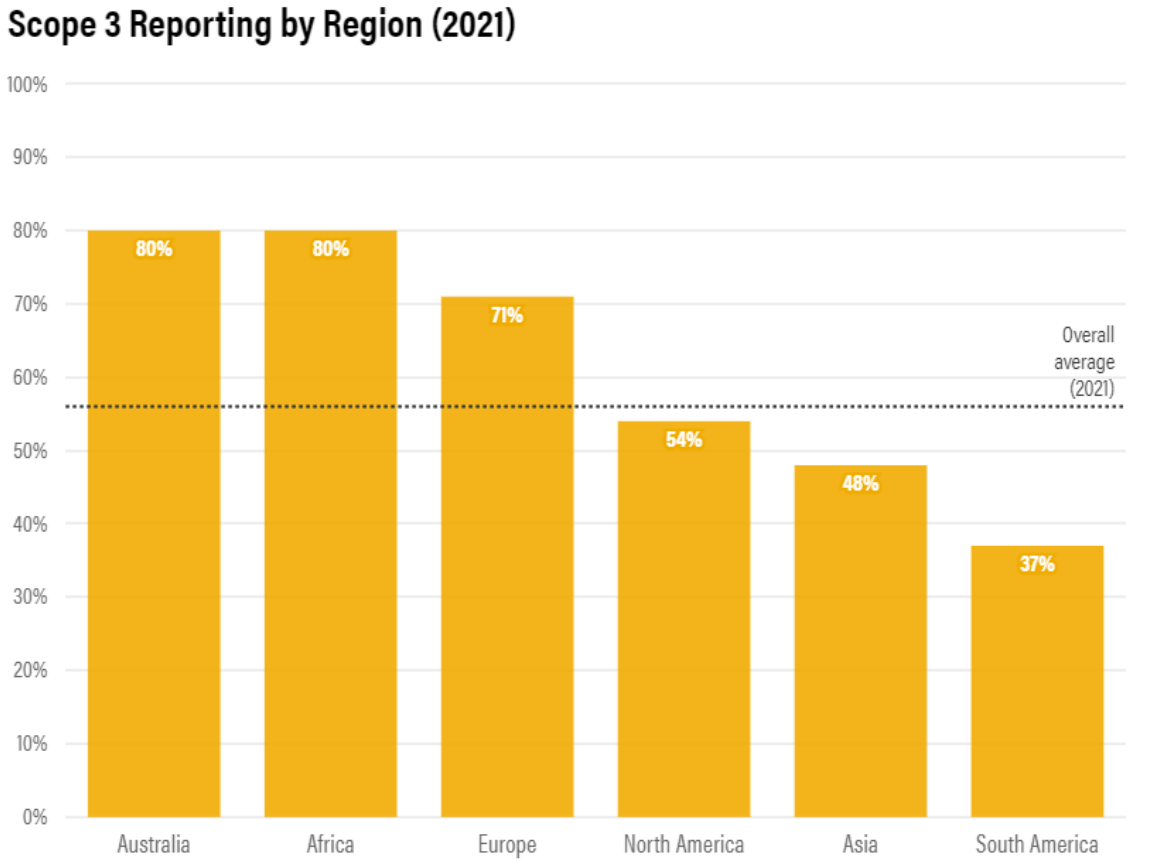
Sustainability Reporting

Key findings

	World's largest 250 companies	All 5,800 companies in the research
Report on sustainability	96%	79%
Publish a carbon target	95%	80%
Have a sustainability leader	56%	46%
Consider sustainability in leadership pay	41%	30%

KPMG

Status of Disclosure



Source: Data is from CDP. Research and analysis of the data was conducted by Concordia University.

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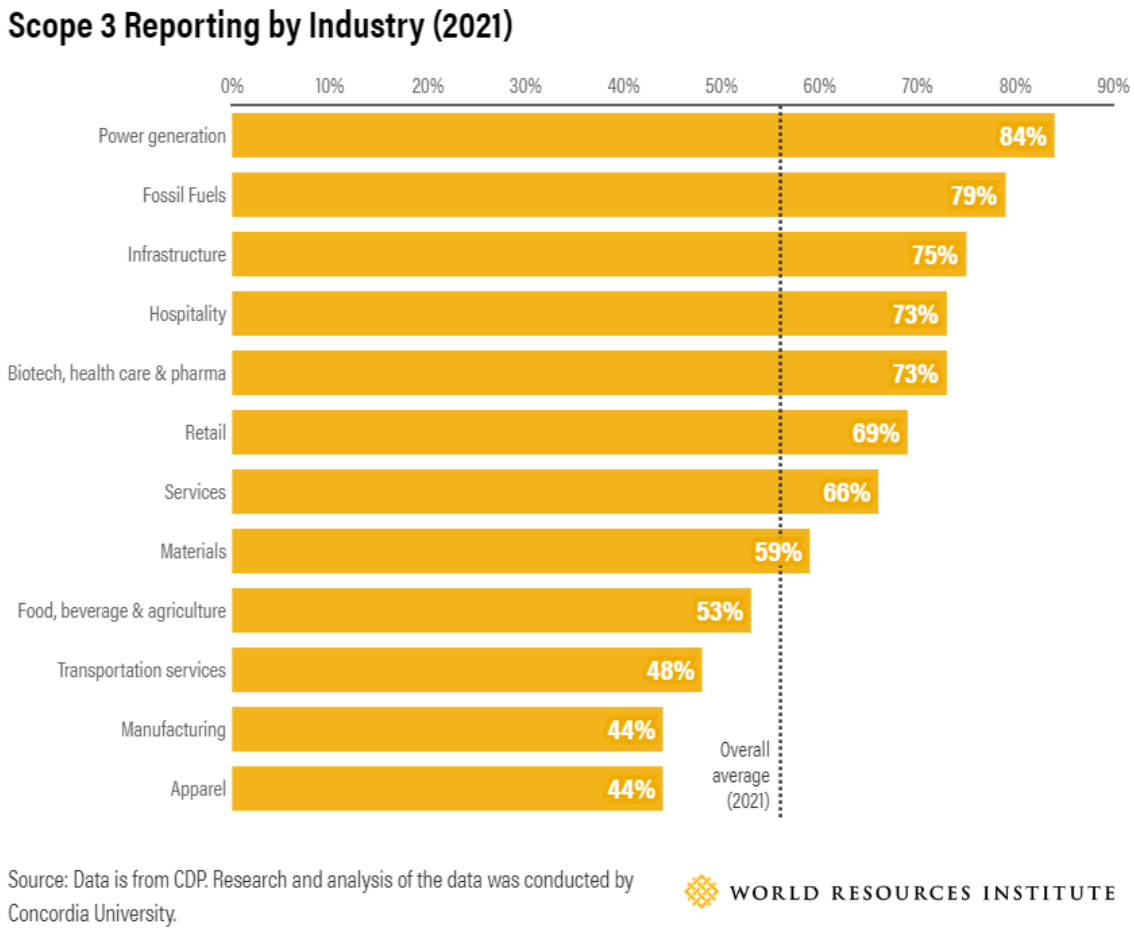
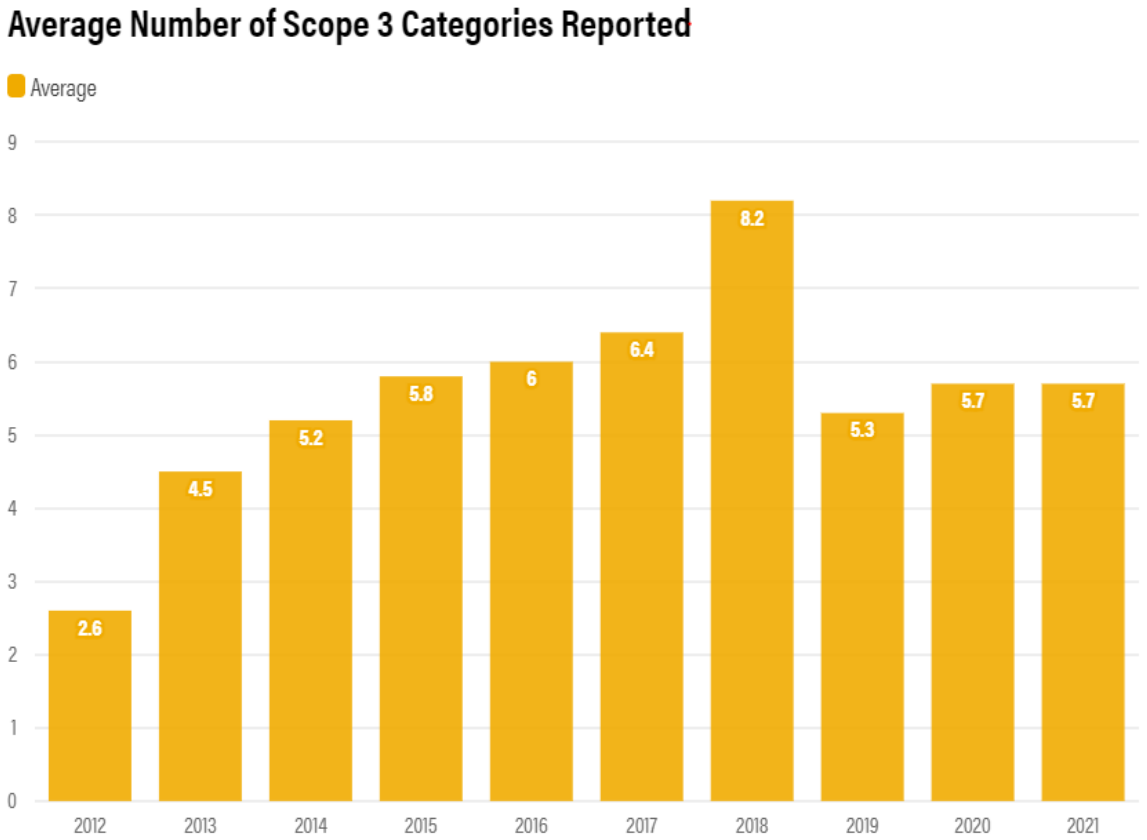
[World Research Institute Scope 3 Disclosure Trends]

Status of Disclosure



[World Research Institute Scope 3 Disclosure Trends]

Disclosure of Scope 3 Categories



Source: Data is from CDP. Research and analysis of the data was conducted by Concordia University.

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[World Research Institute Scope 3 Disclosure Trends]

Question: Are there any external reporting standards related to waste or emissions that your company reports to? If so, what are they?

Please type your answer in the chat

Global Reporting Index - GRI

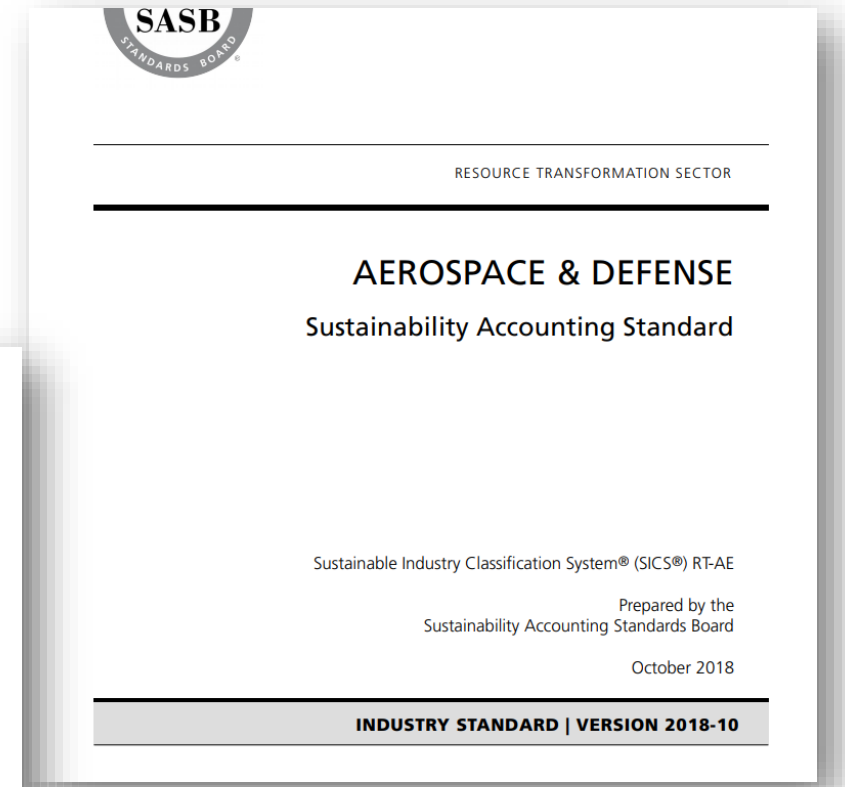
Reporting structure for disclosing impacts of company activities

- Have guidance for various topics including waste and emissions
  - High-level instructions on what to report

Sustainability Accounting Standards Board

Reporting structure for disclosing impacts of company activities

- Calls for the disclosure of metrics specific to an industry that drive Scope 3 emissions
  - Intent is to help investors identify the companies positioned to adapt and manage Scope 3 emissions



SASB

RESOURCE TRANSFORMATION SECTOR

AEROSPACE & DEFENSE

Sustainability Accounting Standard

Sustainable Industry Classification System® (SICS®) RT-AE

Prepared by the
Sustainability Accounting Standards Board

October 2018

INDUSTRY STANDARD | VERSION 2018-10

SASB

SASB Implementation Supplement: Greenhouse Gas Emissions and SASB Standards

SEPTEMBER 2020

- **This supplement provides an overview of SASB's approach to greenhouse gas emissions and related topics in the SASB Standards.**
- **Reporting entities that wish to disclose Scope 1, 2, or 3 emissions, regardless of their industry, are not precluded from doing so when using SASB Standards. Disclosure of this information may be made alongside relevant SASB disclosures. This is consistent with the guidance provided in the "Use of the Standards" section of SASB Standards, available for download here.**

Contents

Introduction

SASB aims to facilitate more effective communication between companies and investors on the environmental, social, and governance (ESG) topics most relevant to long-term enterprise value creation. SASB's industry-specific disclosure standards are fundamental to achieving that goal. SASB Standards identify the subset of ESG issues reasonably likely to materially impact the financial performance of the typical company in an industry. The Standards are developed using a transparent due process that is evidence-based and market-informed.

This document provides a practical overview of how risks and opportunities related to greenhouse gas (GHG) emissions (Scope 1, Scope 2, and Scope 3) are captured in SASB Standards, including summarizing which industry standards include topics related to Scope 1, 2, and/or 3 GHG emissions. The Methodology and Background section of this document provides an explanation of SASB's standard-setting process and presents the rationale for the treatment of GHG emissions in the Standards.

Regardless of the specific disclosures recommended by SASB Standards, SASB recognizes that certain regulatory jurisdictions require disclosure of Scope 1, 2, and 3 GHG emissions across all industries. **Use of SASB Standards does not preclude disclosure of Scope 1, 2, and 3 GHG emissions by a company in any industry, either to meet regulatory requirements or to prepare disclosures in accordance with a framework such as the Task Force on Climate-related Financial Disclosures (TCFD) recommendations. (See below.)**

CDP

- Manages the global disclosure system for investors, companies, cities, states, and regions to manage their environmental impacts
- Benefits of disclosing data to investors or customers through CDP:
  - Provides a framework
  - Satisfies the demands of customers, investors, and stakeholders for transparency and accountability
  - Minimizes the disclosing burden on companies (aligns with other reporting standards)
- Over 24,836 companies, worth over half of the global market capitalization, disclosed data through CDP in 2024

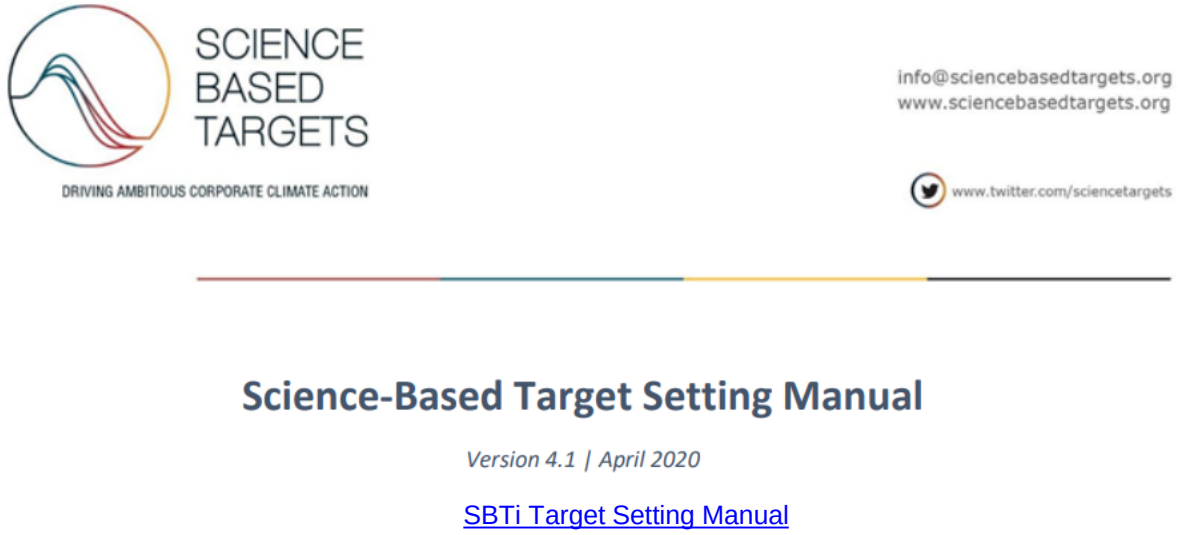
CDP Data

CDP

- General emissions guidance provided
  - What to report and methodology
  - Ask for changes in company and reporting boundary year to year
- For Scope 3, options are provided per category for:
  - Evaluation status
    - Relevance, calculated or not, evaluated or not
    - Methodology
    - Explanations of responses
  - Guidance and examples provided
- References Greenhouse Gas Protocol throughout

Science Based Target Initiative

- The Science Based Target initiative (SBTi) drives ambitious climate action in the private sector by enabling companies to set science-based emissions reduction targets



SBTi Target Setting Manual

SBTi

Science Based Target Initiative

- Target setting manual provides guidance on:
  - How to calculate Scope 3 emissions
    - Conduct and inventory
    - Determine boundary
      - Should include at least two thirds of relevant Scope 3 emissions
      - Purchased Goods and Services along with Use of Sold Products are specifically called out as the majority contributor to Scope 3 emissions across sectors
  - How to set targets
    - Can set category specific targets or an overall target covering relevant categories
    - Targets can be absolute, emissions intensity, or supplier engagement
      - Supplier engagement relates to getting suppliers to adopt targets

SBTi Scope 3 Management

Why Science Based Targets?

Increase Innovation

- SBTs inform business strategy in a way that catalyzes the development of new technologies, products, and operational practices

Strengthen Investor Confidence

- SBTs bolster credibility and reputation among stakeholders, including investors, customers, employees, and policy makers

Boost Competitive Advantage

- 55% of companies with a SBT say they have gained competitive advantage from their targets

Mitigate Risks

- Companies that have proactively assessed carbon risks and understand mitigation opportunities can be better prepared for future regulations

Scope 3 Emissions Calculation Methods

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Poll: Does your company currently track Scope 3 emissions?

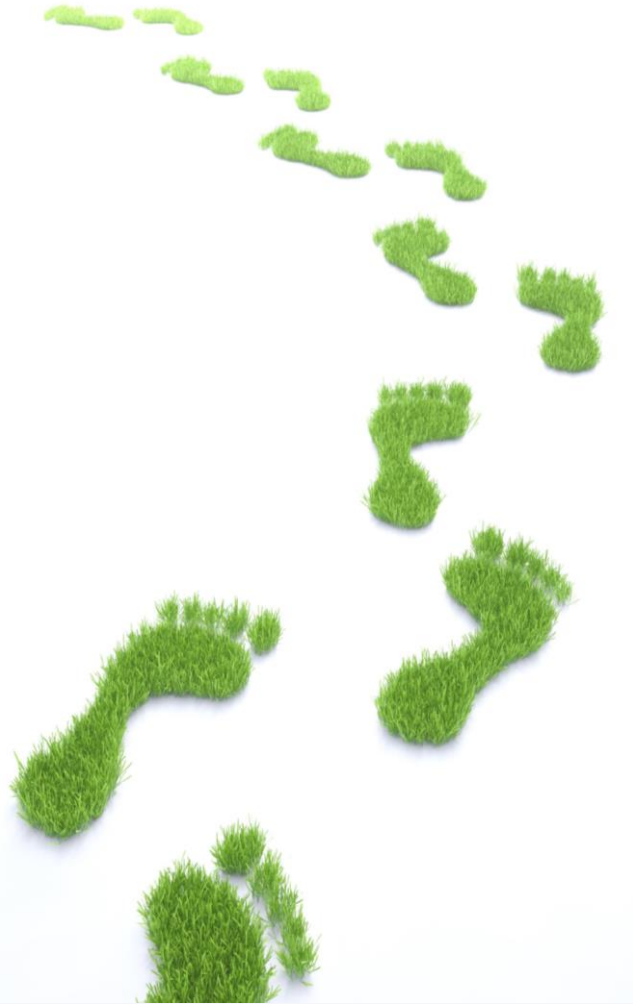
Please respond to the Zoom poll

Developing a Baseline

What is a baseline and why is it important?

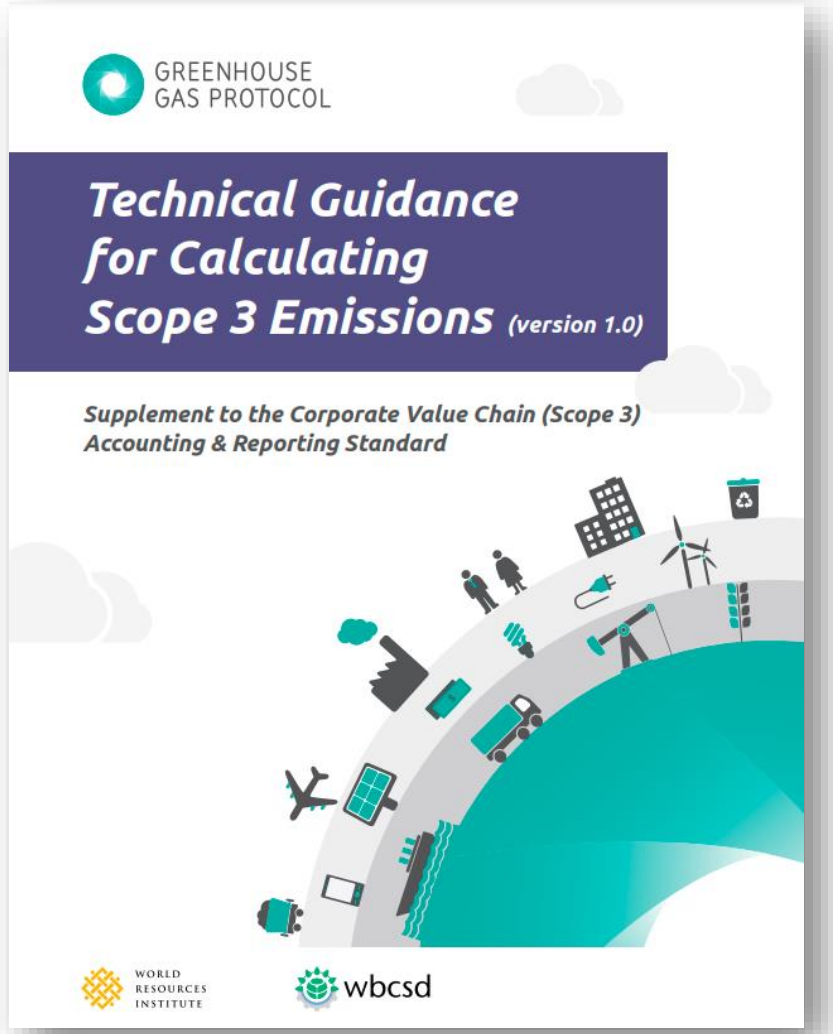
- Provides a starting point to reference, allowing the ability to monitor progress over time
- Enables establishment of realistic targets and goals
- Better understand performance and costs
- Develop material flow and spend analysis

You can't manage what you don't measure



How to Calculate Scope 3 Emissions

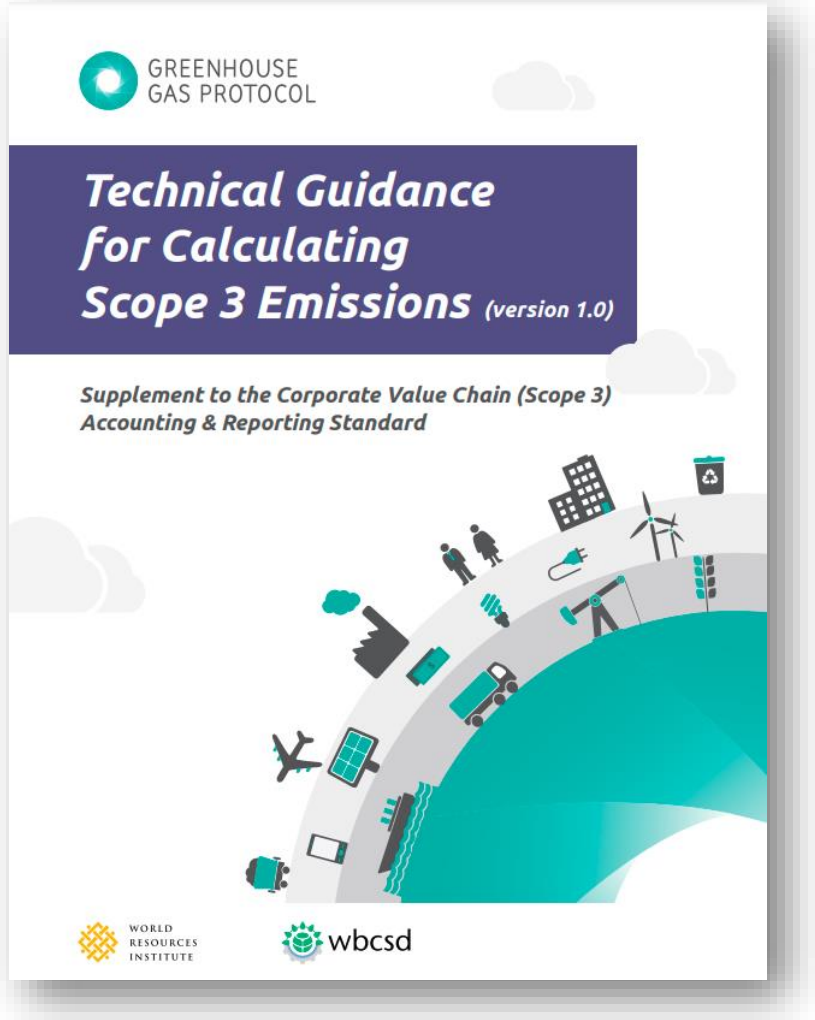
- Follow established guidelines for calculating Scope 3 emissions
  - What data is needed, how to use the data, what the thresholds are, where assumptions can be made
- A significant amount of data will be required
  - Coordination with procurement or finance is likely needed for some categories
  - Focus on hotspots once data is obtained



Greenhouse Gas Protocol

- The Greenhouse Gas Protocol (GHG Protocol) is a multi-stakeholder partnership of businesses, non-governmental organizations (NGOs), governments, and others
- Developed by the World Resources Institute and the World Business Council for Sustainable Development
- GHG Protocol provides internationally accepted greenhouse gas accounting and reporting standards and tools
  - Standards for Scope 1, 2, and 3 emissions
  - Supporting guidelines for calculating various Scope 3 categories
  - Specific guidance for some sectors

GHG Protocol Scope 3 Guidance

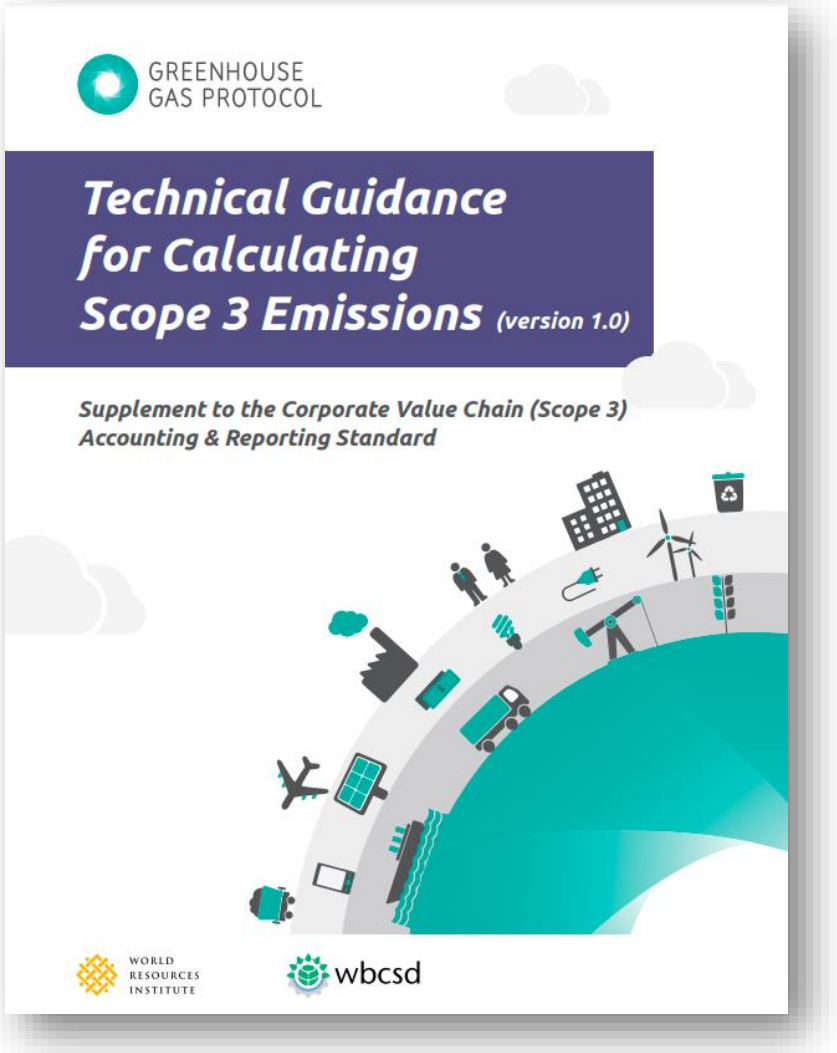


GHG Protocol – Scope 3 Calculations

- Calculation methods:
  - Companies should use exact data where feasible
    - Average data methods are acceptable in situations where data is unavailable, or data source is not reliable
      - Sometimes supplier data, for example, can be inaccurate or unreliable
  - If data of sufficient quality are not available, companies can use consistent estimates ("proxy data") to fill in gaps and disclose to ensure transparency
  - Over time, companies should seek to replace lower quality data with higher quality data
- Boundaries and thresholds:
  - Acceptable boundaries vary by category
  - If a category is anticipated to be a significant contributor, it should be included
- GHG Protocol states that **calculated emissions should not be much higher or much lower than actual emissions**, to the best of ones' ability

GHG Protocol – Scope 3 Calculations

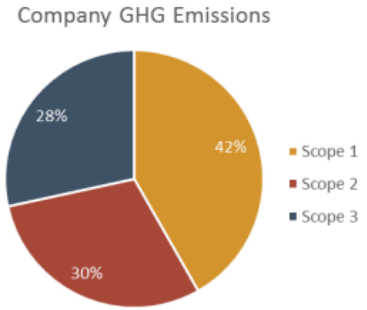
- How do we start?
  - Review Scope 3 categories and establish categories to prioritize based on:
    - Available data
    - Company activity
    - Stakeholder interests
  - Obtain data in-house and use that data to calculate emissions
  - Identify hotspot and key impact categories based on results
- How can we be certain our calculations are correct?
  - Establish internal data verification and calculation quality checks
  - Utilize external parties to provide assurances



SBTi Example Case Study

- A chemical and gas company started with a screening of its value chain
- They investigated which Scope 3 categories contributed the most and which were not applicable at all
- This screening and analysis allowed them to focus reduction efforts on more specific items

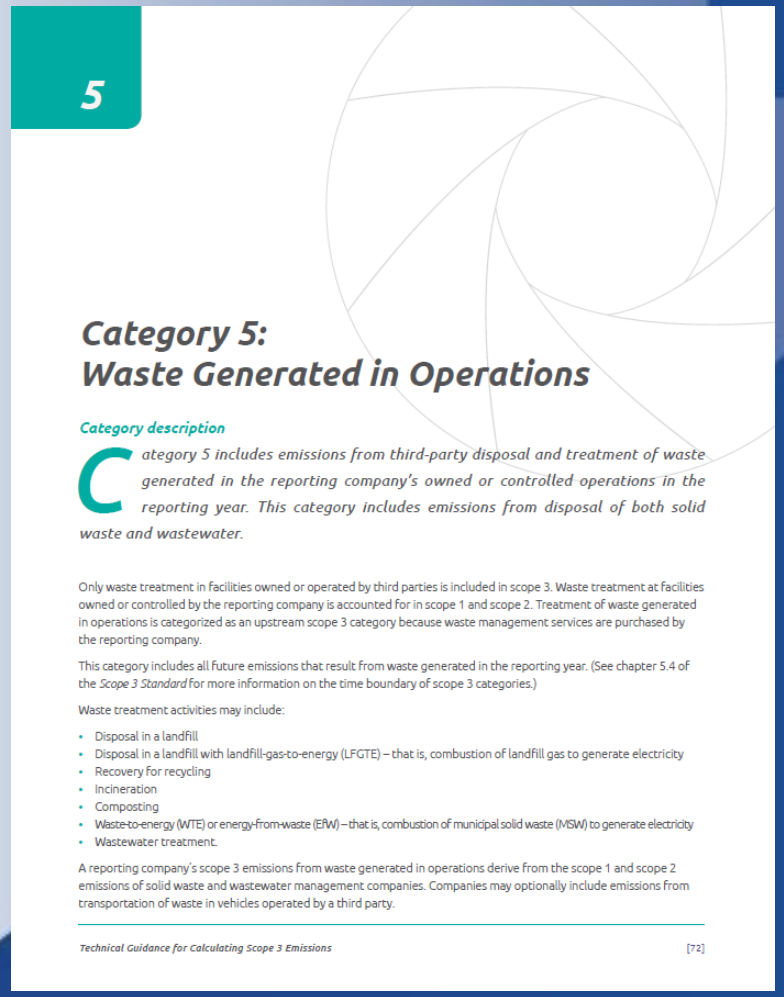
Box 6-2: Determining Relevant Scope 3 Categories



An international industrial chemical and gas company conducted a screening inventory of its full value chain and determined that scope 3 emissions contributed almost 50% of its total footprint. Recognizing that scope 3 was a significant contributor to overall emissions, the company then investigated which of the 15 scope 3 categories contributed most to scope 3 emissions. Three categories were not applicable for the company and were not included in the inventory (categories 10, 13, and 14). Conducting the inventory for the remaining categories led the company to focus its target setting activities on the three categories that accounted for the majority of emissions: upstream fuel and energy, use of sold products, and investments.

Category	Scope 3 Emissions (mmt CO2e)	% of Scope 3 Emissions
1. Purchased goods and services	773,731	8%
2. Capital goods	35,054	>1%
3. Fuel- and energy-related activities (upstream)	5,152,751	51%
4. Upstream transportation and distribution	125,000	1%
5. Waste generated in operations	10,667	>>1%
6. Business travel	41,526	>1%
7. Employee commuting	39,742	>1%
8. Upstream leased assets	32,170	>1%
9. Downstream transportation and distribution	221,217	2%
11. Use of sold products	2,150,739	21%
12. End-of-life treatment of sold products	116,379	1%
15. Investments	1,347,360	13%

SBTi Industry Example



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Category 5: Waste Generated in Operations

Category description

Category 5 includes emissions from third-party disposal and treatment of waste generated in the reporting company's owned or controlled operations in the reporting year. This category includes emissions from disposal of both solid waste and wastewater.

Only waste treatment in facilities owned or operated by third parties is included in scope 3. Waste treatment at facilities owned or controlled by the reporting company is accounted for in scope 1 and scope 2. Treatment of waste generated in operations is categorized as an upstream scope 3 category because waste management services are purchased by the reporting company.

This category includes all future emissions that result from waste generated in the reporting year. (See chapter 5.4 of the *Scope 3 Standard* for more information on the time boundary of scope 3 categories.)

Waste treatment activities may include:

- Disposal in a landfill
- Disposal in a landfill with landfill-gas-to-energy (LFGTE) – that is, combustion of landfill gas to generate electricity
- Recovery for recycling
- Incineration
- Composting
- Waste-to-energy (WTE) or energy-from-waste (EfW) – that is, combustion of municipal solid waste (MSW) to generate electricity
- Wastewater treatment.

A reporting company's scope 3 emissions from waste generated in operations derive from the scope 1 and scope 2 emissions of solid waste and wastewater management companies. Companies may optionally include emissions from transportation of waste in vehicles operated by a third party.

Technical Guidance for Calculating Scope 3 Emissions [72]

Evaluating Waste

- Calculating emissions related to waste treatment

U.S. DEPARTMENT OF ENERGY

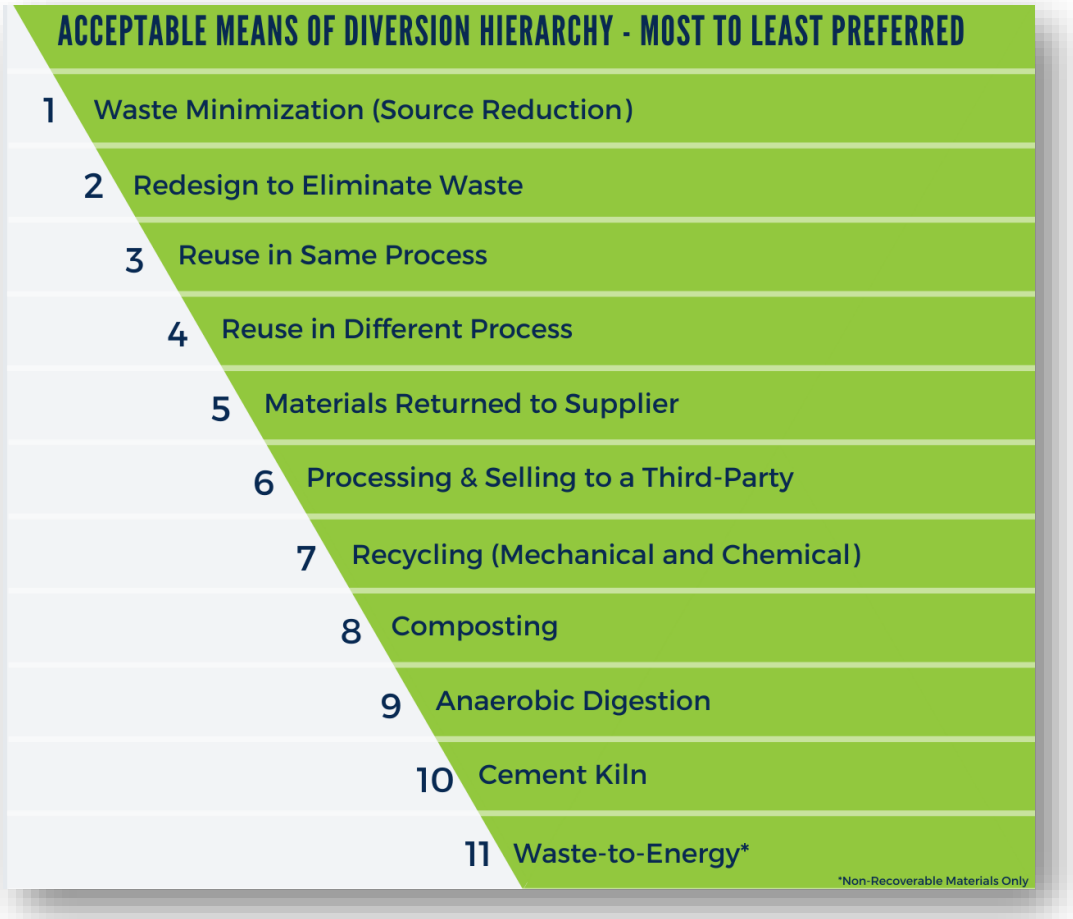
Review of GHG Protocol: Example

Poll: Is offsite waste treatment part of upstream or downstream Scope 3 impacts?

Please respond to the Zoom poll

Answer: Upstream

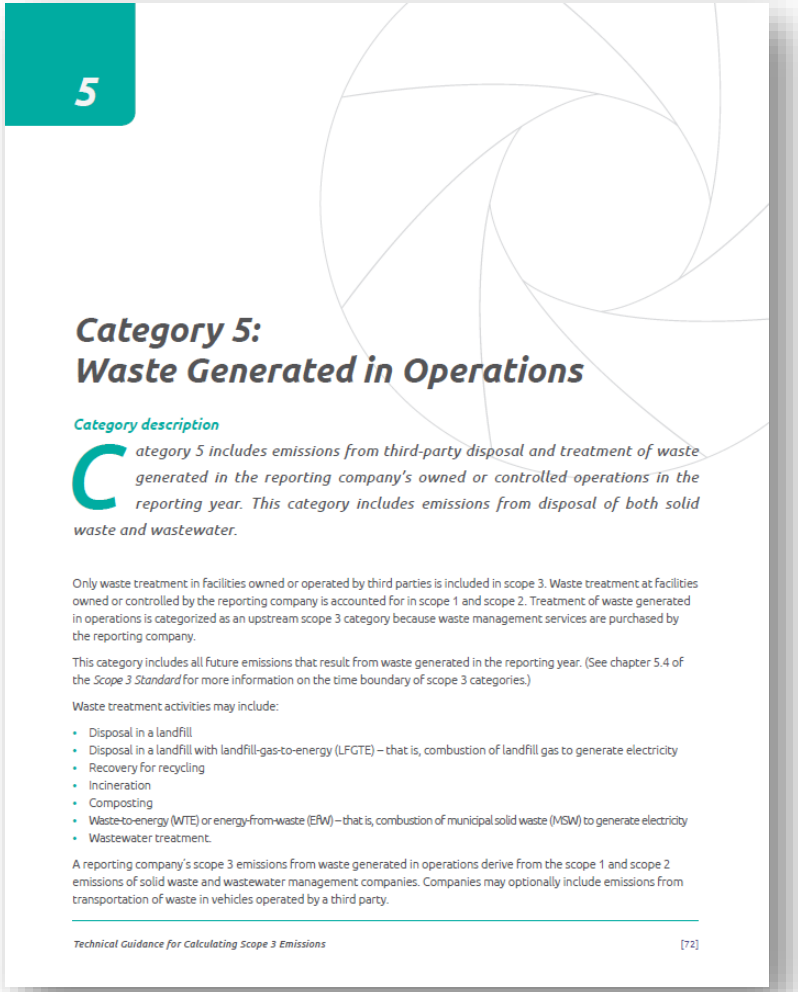
Waste Diversion Hierarchy



In general, strategies listed higher on the Waste Diversion Hierarchy result in less Scope 3 missions than those lower on the hierarchy

GHG Protocol – Waste Emission Calculation Guidance

- Three acceptable methods
  - Supplier-specific method
    - Collect Scope 1 and Scope 2 data directly from waste treatment company
  - Waste-type specific method
    - Use emissions factors for specific waste types and treatment methods
  - Average-data method
    - Estimate emissions based on total waste going to each disposal method and average emissions factors for each disposal method



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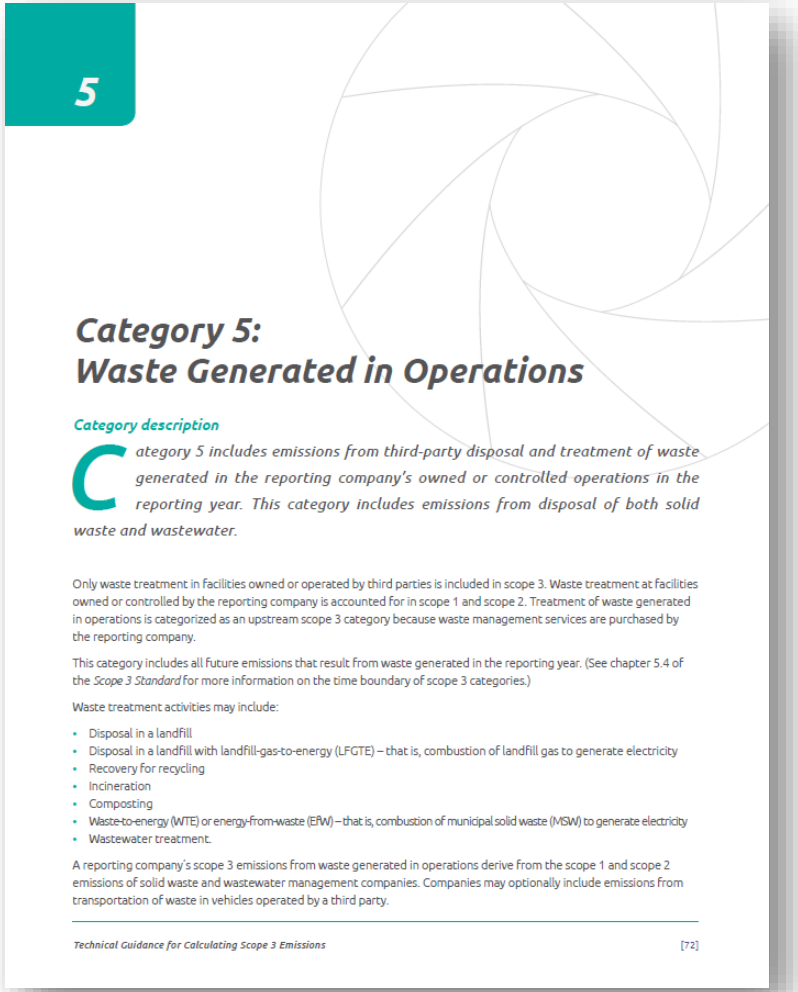
Technical Guidance for Calculating Scope 3 Emissions [72]

GHG Protocol – Waste Emission Calculation Guidance

- Where to obtain emissions factors for the waste-type or average-data method?
  - Lifecycle databases
  - Industry associations
  - National inventories
    - GHG protocol references the 2006 IPCC guidelines for national GHG inventories for waste
    - EPA WARM tool



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Technical Guidance for Calculating Scope 3 Emissions [72]

Calculating Emissions Related to Waste Treatment

- The EPA created the Waste Reduction Model (WARM) to provide high-level estimates of potential greenhouse gas emissions reductions, energy savings, and economic impacts from several dispositions for various waste streams
  - Source reduction
  - Landfilling
  - Recycling
  - Composting
  - Anaerobic digestion
  - Waste-to-energy

EPA WARM Tool - Example

- End-of-life scenarios for wastes influence an organization's Scope 3 emissions
- Determining these emissions is only feasible through:
  - Proper waste, segregation, and diversion
  - Organized data
  - Coordination with MMOs

Emissions Breakdown by End-of-Life Scenario (metric tonne CO_2eq)

Material	Weight (tons)	Landfill	Waste to Energy	Recycling	Compost
Mixed MSW	100	31	1	-	-
Mixed Recyclables	100	3.4	(43)	(285)	-
Cardboard	100	18	(49)	(314)	-
Paper	100	8	(49)	(355)	-
Mixed Plastic	100	2	126	(93)	-
Mixed Metals	100	2	(102)	(439)	-
Food	100	50	(13)	-	(12)

Question: What do you think negative values in waste emissions calculations represent?

Please type your response in the chat

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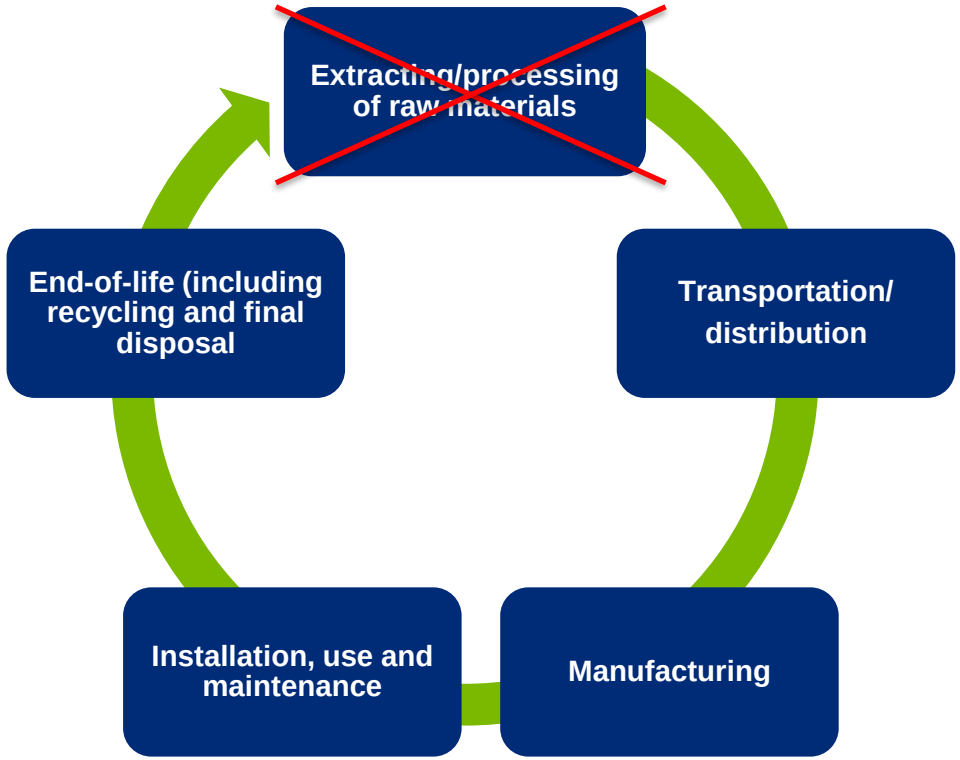
Food	100	50	(13)	-	(12)

Answer: Negatives represent offset raw materials

EPA WARM Tool

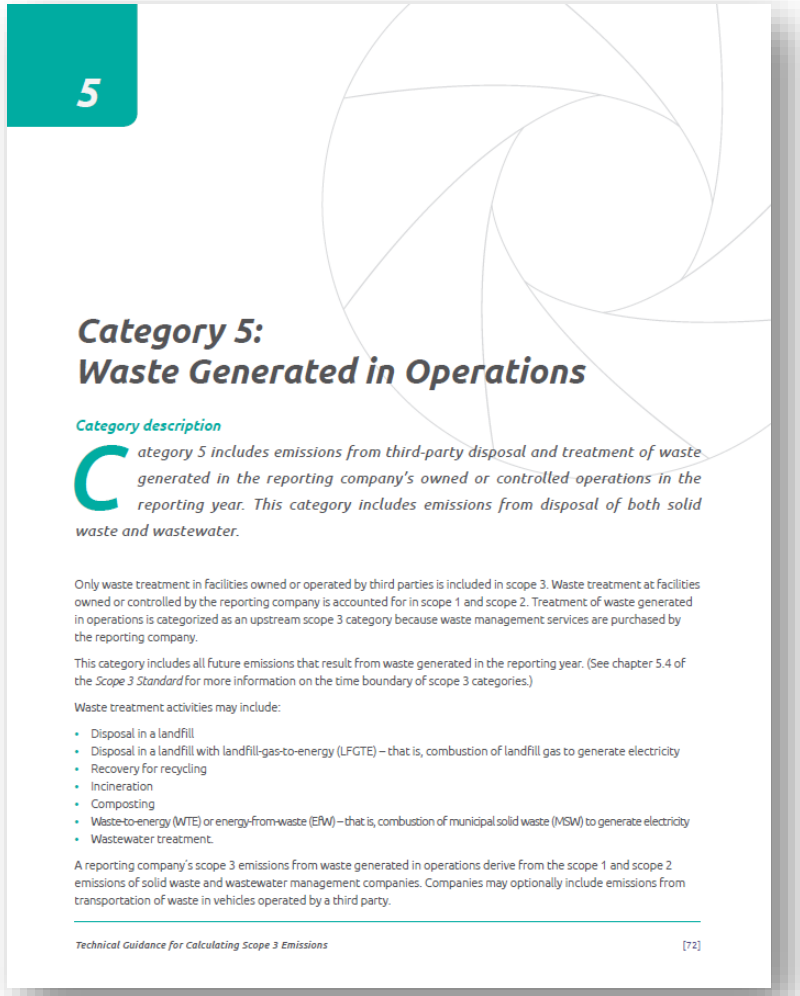
- Recall LCA thinking
  - When materials are sent to landfill their useful life ends
  - Diverting waste extends a material's lifespan, subsequently preventing or removing need for virgin raw materials
    - The EPA's WARM tool gives credit for these offset raw materials, creating "negative" emissions
  - Keeping materials in use reduces or eliminates the "extraction/processing of raw materials" bucket of LCA impacts



GHG Protocol – Waste Emission Calculation Guidance

GHG Protocol's explanation of recycling emissions:

- "The difference in emissions between extracting and processing virgin material versus preparing recycled material for reuse"
- "A reduction in emissions that would otherwise have occurred if the waste had been sent to landfill or other waste treatment method"



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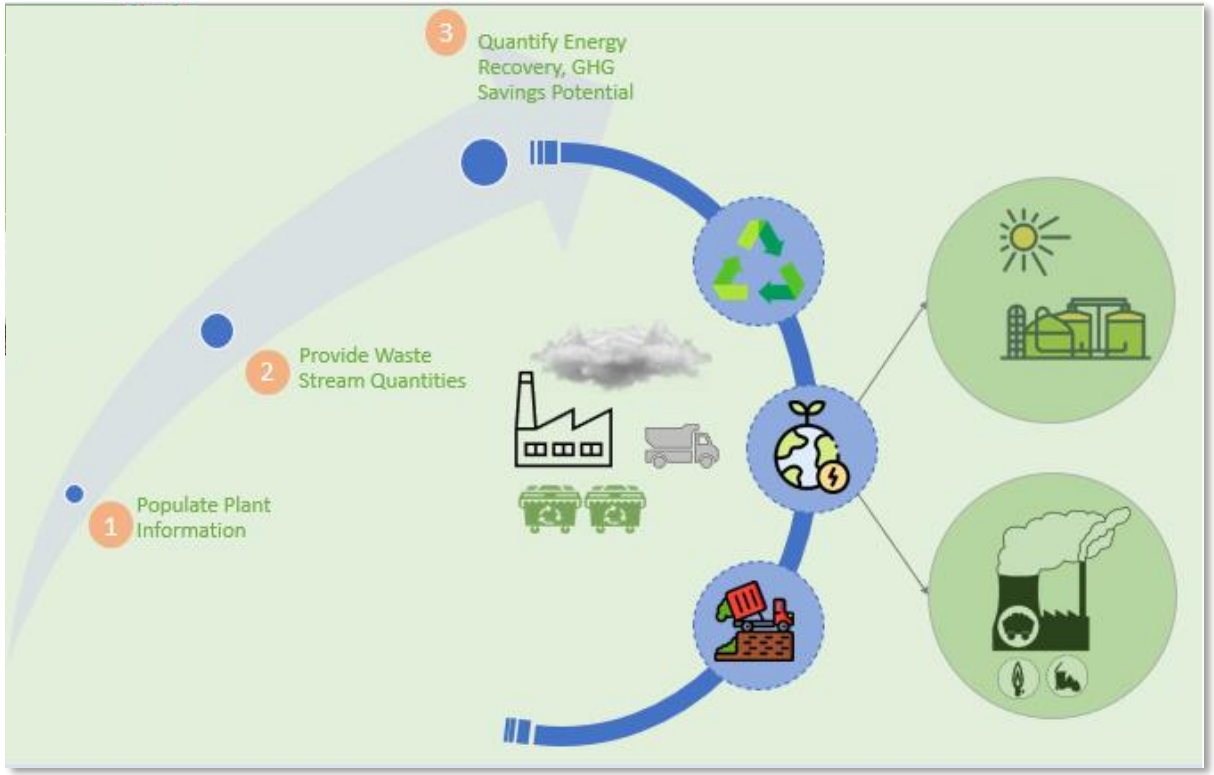
Technical Guidance for Calculating Scope 3 Emissions [72]

DOE Waste Stream Energy Content Calculator

- Is intended to quickly estimate the energy recovery potential of waste streams
- Considers two main pathways for energy recovery
  - Direct Combustion
  - Anaerobic Digestion
- Evaluates onsite GHG impact resulting from energy recovery
- Considers waste streams that are currently landfilled or composted



[Waste Stream Energy Content Calculator | Better Buildings Initiative]

DOE Waste Stream Energy Content Calculator

- For best results, enter all required data
  - Plant information, specifying industry type
  - Energy information, inputting annual energy usage, cost, and any offset energy
  - Waste information, describing waste generation and reduction activities
  - Enter energy recoverable waste stream data
    - Waste type
    - Outlet quantities
    - Waste management expenses
- Results include energy recovery, GHG recovery, and cost reduction potentials

Estimating Methane Emissions

5 WASTE

5.1 CH_4 EMISSIONS FROM SOLID WASTE DISPOSAL SITES

5.1.1 Methodological issues

Methane (CH_4) is emitted during the anaerobic decomposition of organic waste disposed of in solid waste disposal sites (SWDS). Organic waste decomposes at a diminishing rate and takes many years to decompose completely.

5.1.1.1 CHOICE OF METHOD

The *Revised 1996 IPCC Guidelines for National Gr*
methods to estimate CH_4 emissions from solid waste
Order Decay (FOD) method (Tier 2). The main diff
produces a time-dependent emission profile that bette
time, whereas the default method is based on the ass
waste is disposed of. The default method will give a re

The Intergovernmental Panel on Climate Change (IPCC) provides guidance to calculate methane emissions

- Methane (CH_4) is estimated to have a GWP of 27-30 over 100 years (Learn why EPA's U.S. Inventory of Greenhouse Gas Emissions and Sinks uses a different value.). CH_4 emitted today lasts about a decade on average, which is much less time than CO_2. But CH_4 also absorbs much more energy than CO_2. The net effect of the shorter lifetime and higher energy absorption is reflected in the GWP. The CH_4 GWP also accounts for some indirect effects, such as the fact that CH_4 is a precursor to ozone, and ozone is itself a GHG.

Sustainable Sourcing and Procurement

U.S. DEPARTMENT OF ENERGY

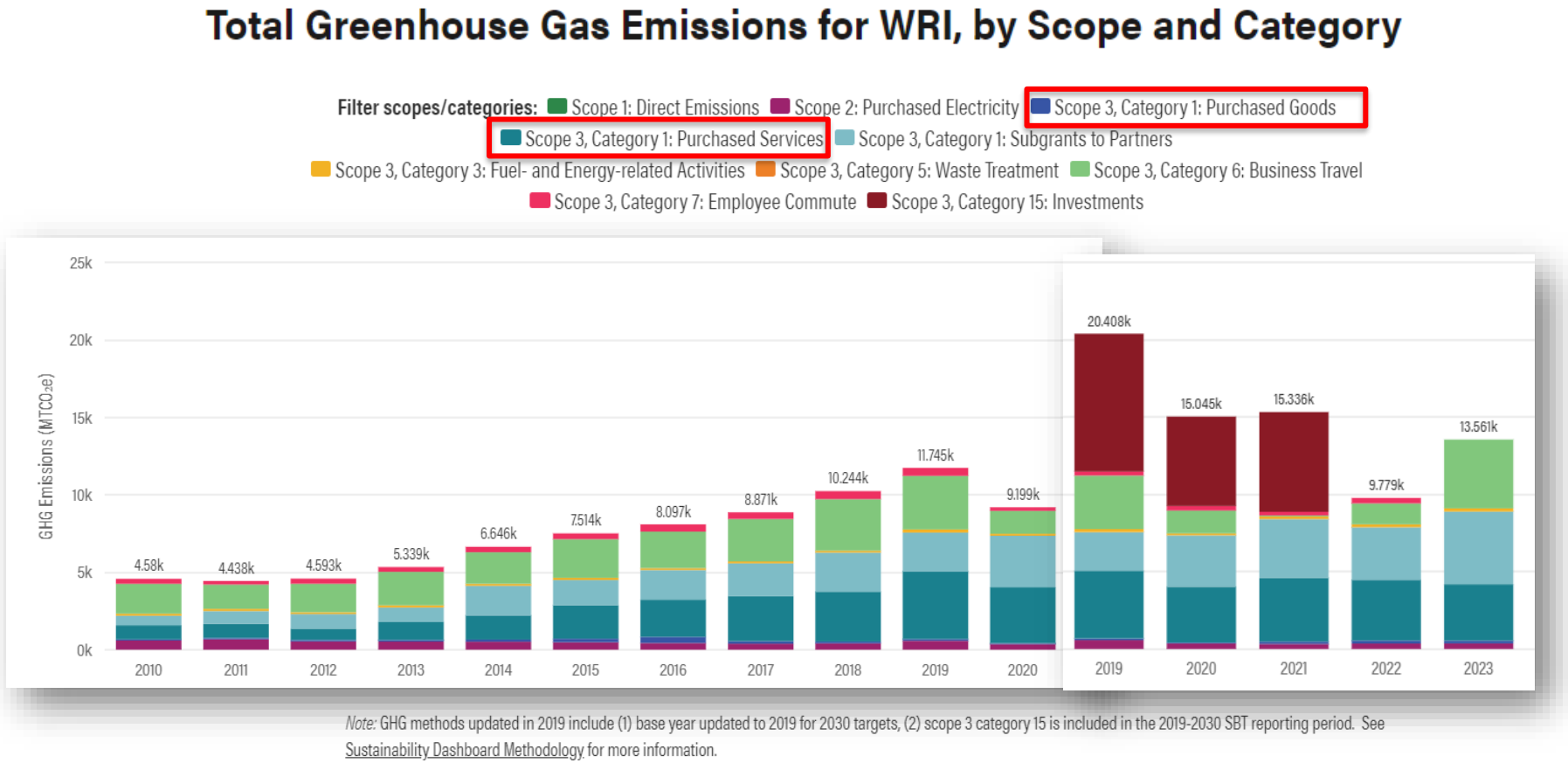
Procurement and Waste

Recall Session 2

- Review waste totals and compare to procurement purchasing and costs
  - Unused raw materials
  - Production scrap
  - Finished good waste
  - Company packaging
- Purchases which become waste influence Scope 3 in multiple categories
  - Category 1 – Purchased Goods
    - Highest impact from procurement
  - Category 4 – Upstream Transportation and Distribution
  - Category 5 – Waste Generated in Operations

Contributions to Scope 3 Emissions

- Purchased goods and services contribute significantly to total emissions

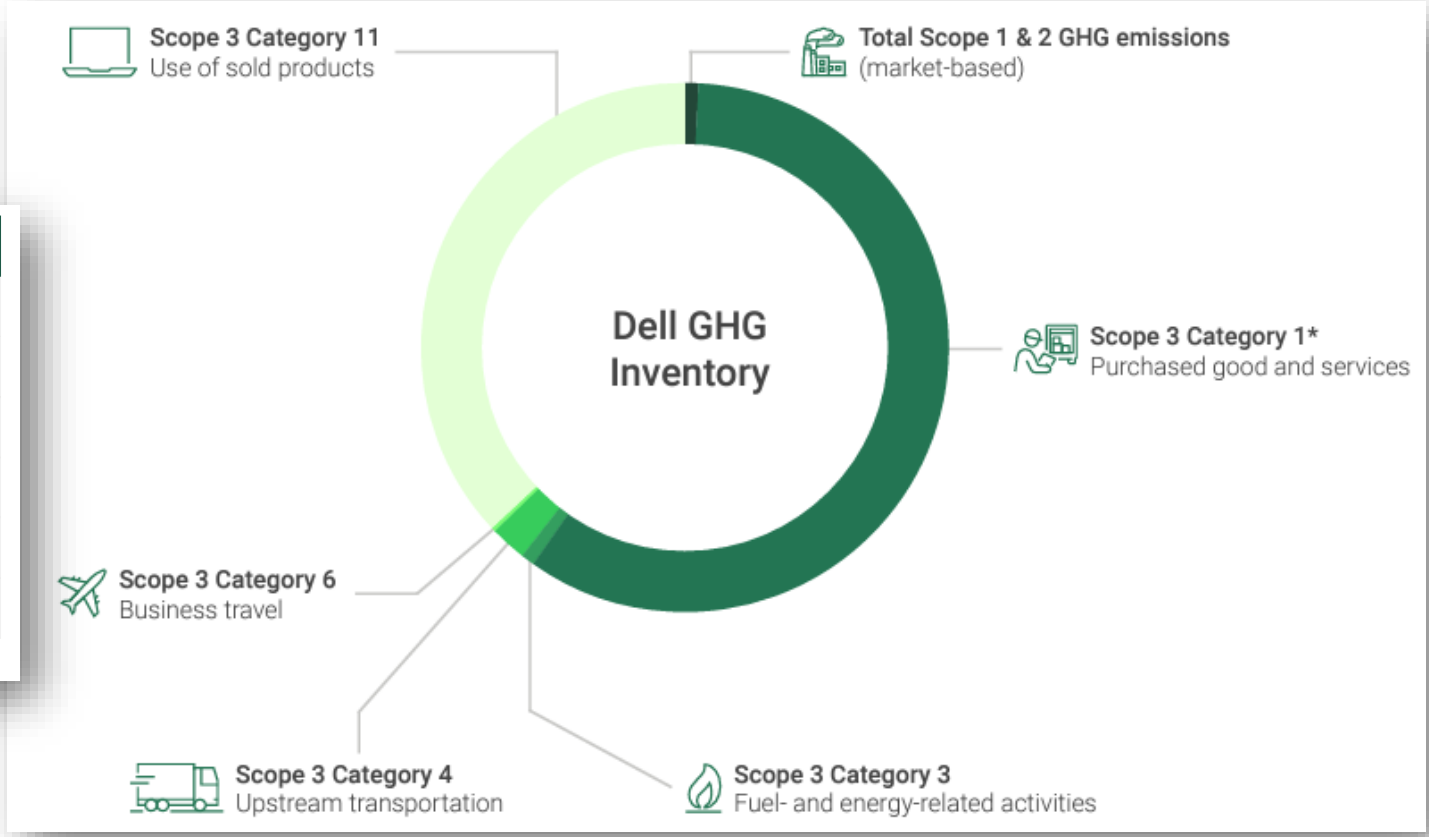


WRI Total Greenhouse Gas Emissions

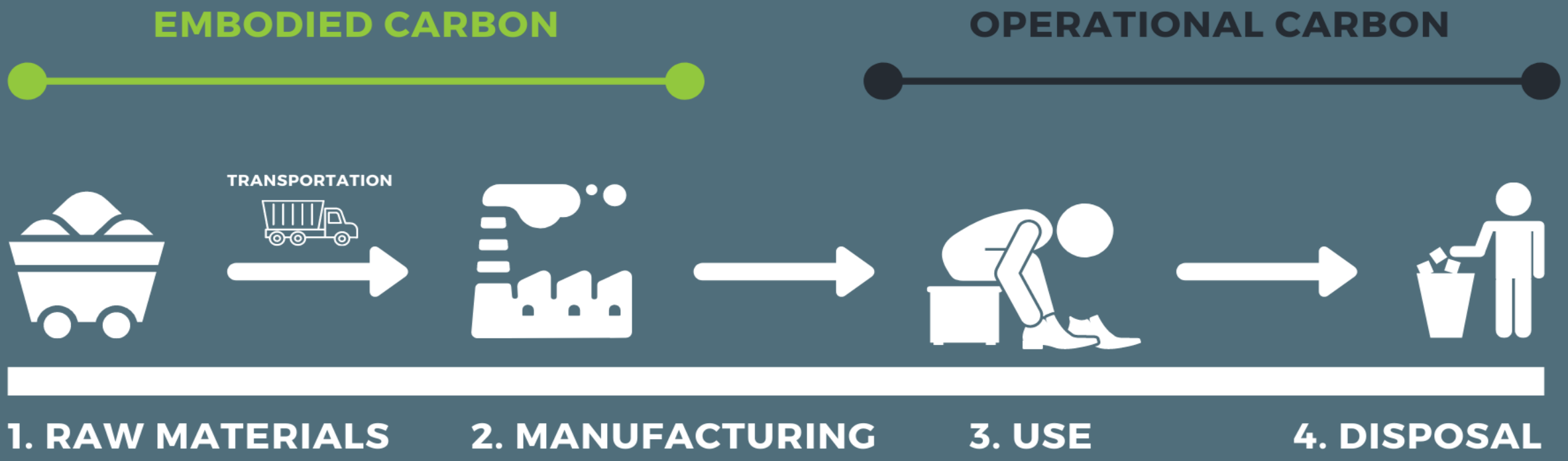
Contributions to Scope 3 Emissions

Greenhouse gas emissions scopes and categories	%
Total Scope 1 & 2 GHG emissions (market-based)	0.6%
Scope 3 Category 1 Purchased good and services*	59.0%
Scope 3 Category 3 Fuel- and energy-related activities	0.4%
Scope 3 Category 4 Upstream transportation	2.5%
Scope 3 Category 6 Business travel	0.3%
Scope 3 Category 11 Use of sold products	37.2%

*Our GHG Inventory includes FY23 Category 1 figures as explained in text



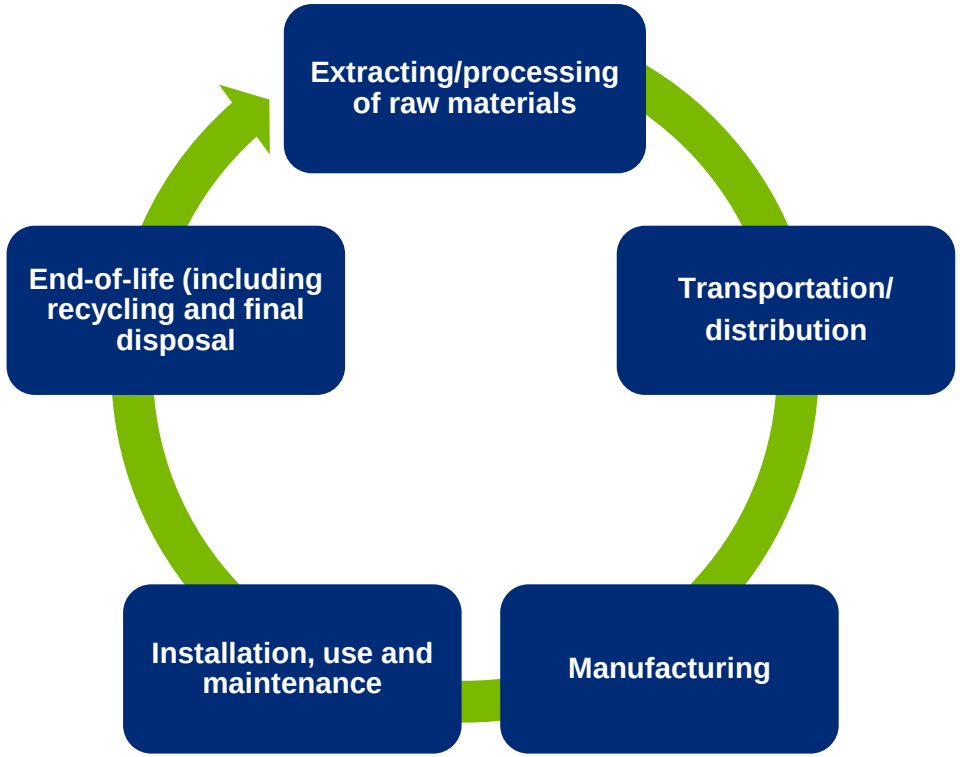
Embodied Carbon Life Cycle



Procurement and Life Cycle Assessment

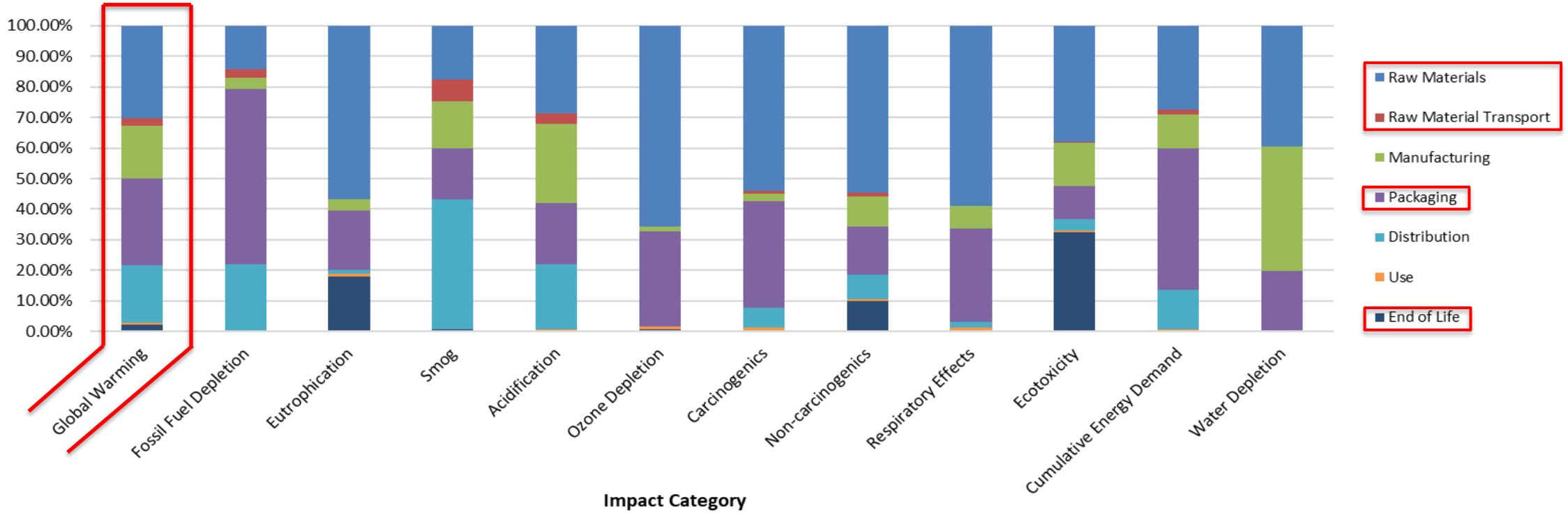
Recall life cycle thinking…

- Procurement has an impact on a product's life cycle
  - Where materials are extracted
  - How materials are manufactured
  - Where are materials shipped from
  - How often materials are shipped
  - How materials are transported
  - How materials are packaged



How Can LCAs Be Used in Procurement?

Seeing a product's impacts can assist with focusing procurement efforts and reduce embodied carbon in a product



Integrating Responsible Sourcing and Procurement

What is sustainable sourcing?

- The inclusion of social, ethical, and environmental factors into the process of selecting suppliers
- Procurement is not just related to products purchased, but includes services as well

Integrating Responsible Sourcing and Procurement

- Scope 3 emissions can represent over 90% of company emissions
  - The supply chain is a large portion of these emissions

GHG Protocol statistic

- However, sustainable procurement is not just emissions focused, it includes holistic **sustainability considerations like waste**

- **What constitutes sustainable procurement?**
  - The integration of specifications which protect the environment and society
  - Institutes sustainability principles throughout the life cycle of a product

What is Material to Your Company?

Questions to consider when evaluating the sustainability of your supply chain strategy:

- What is essential to your business strategy and long-term sustainability of your organization?
- What resources, suppliers, and services are you reliant on?
- What inputs are vital to your business?
- What is critical to your stakeholders?

Integrating Responsible Sourcing and Procurement

Where to begin?

- Estimate how much your company's supply chain contributes to the entire emissions profile and waste generation total
  - Use this information to identify hotspots or areas of focus
    - Specific resources, raw materials, suppliers, waste outlets, etc.
  - Create a list of suppliers or services who contribute to the focus area(s)

Integrating Responsible Sourcing and Procurement

What could sustainable sourcing include?

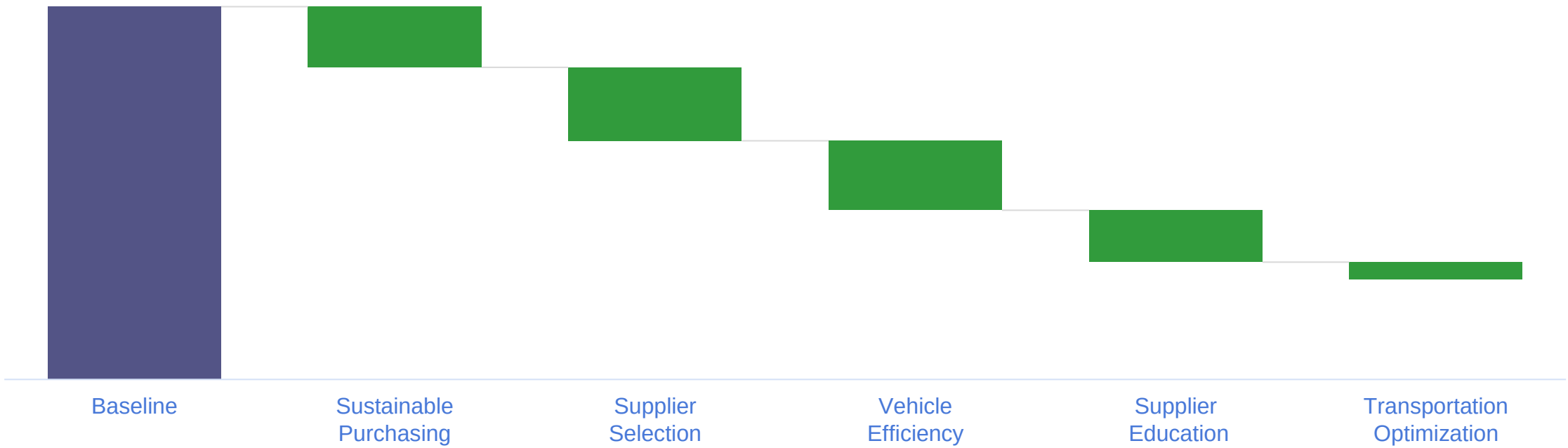
- Criteria within contractual agreements related to:
  - Data disclosure and information sharing
    - Include information requirements and frequency of reporting
  - Agreement to assist with sustainability initiatives
  - Sharing codes of conduct, ethics, or practices
    - Increasing number of companies have these available
  - Examples:
    - Leverage buying power to increase transparency and data sharing
    - Utilizing expertise to assist with internal initiatives
      - Example: requiring a material management organization (MMO) to assist with specific waste minimization and diversion efforts
    - Requiring building owners of leased assets to provide segregated dumpsters
    - Establishing criteria for takeback programs or develop packaging solutions to reduce waste

Reducing Impact Across Supply Chain

Dedicated initiatives related to Scope 3 emissions can be created so that emissions reductions occur over time – continuous improvement

- Specific actions within an overall strategy may provide reductions in another as well

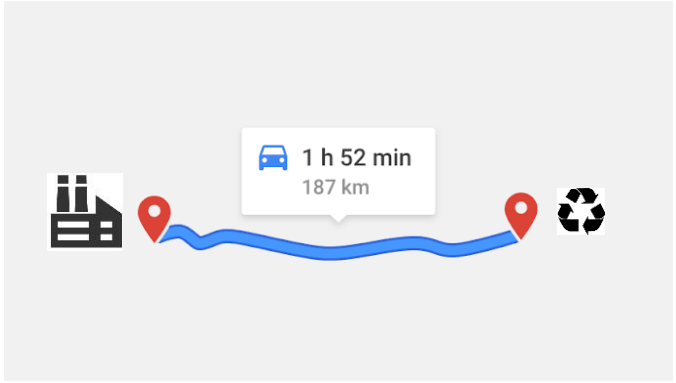
Example Strategies and Impact on Scope 3 Emissions



Integrating Responsible Sourcing and Procurement

What could sustainable sourcing include?

- Internal parameters for evaluating suppliers and services such as:
  - Prioritizing products which are made more sustainably
  - Requiring emissions data disclosure or similar
  - Prioritizing companies with third-party verification
  - Establishing sourcing distance requirements
    - Preferring regional options
  - Prioritizing sustainable material management options (waste outlets that will divert waste from landfill)
  - Requiring full trucks for shipping
  - Prioritizing companies with product stewardship, waste minimization, circularity, or other sustainability goals



Integrating Sustainable Procurement

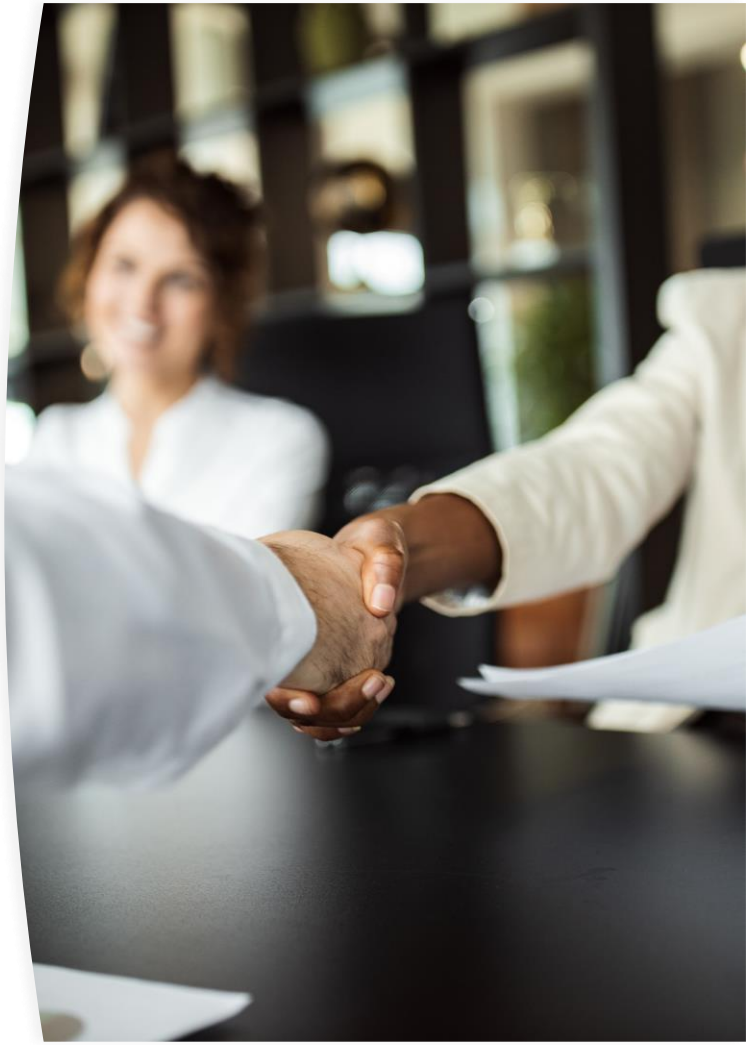
How does sustainable procurement help reduce supply chain impact?

- "You can't manage what you don't measure"
  - Forcing or encouraging suppliers to provide data may make them take a hard look at their own operations or risk being replaced by a company with lower impacts to your Scope 3 emissions and waste generation
- Sustainable purchasing
  - Prioritizing products that have lower embodied emissions
  - Working with companies actively trying to reduce their emissions
  - Selecting products with established circularity programs
- Innovative partnerships
  - Establishing programs to reuse materials, reduce packaging waste, or ship more efficiently

Strategies for Supplier Engagement

The Code of Conduct can be a tool to assist in achieving your sustainability goals

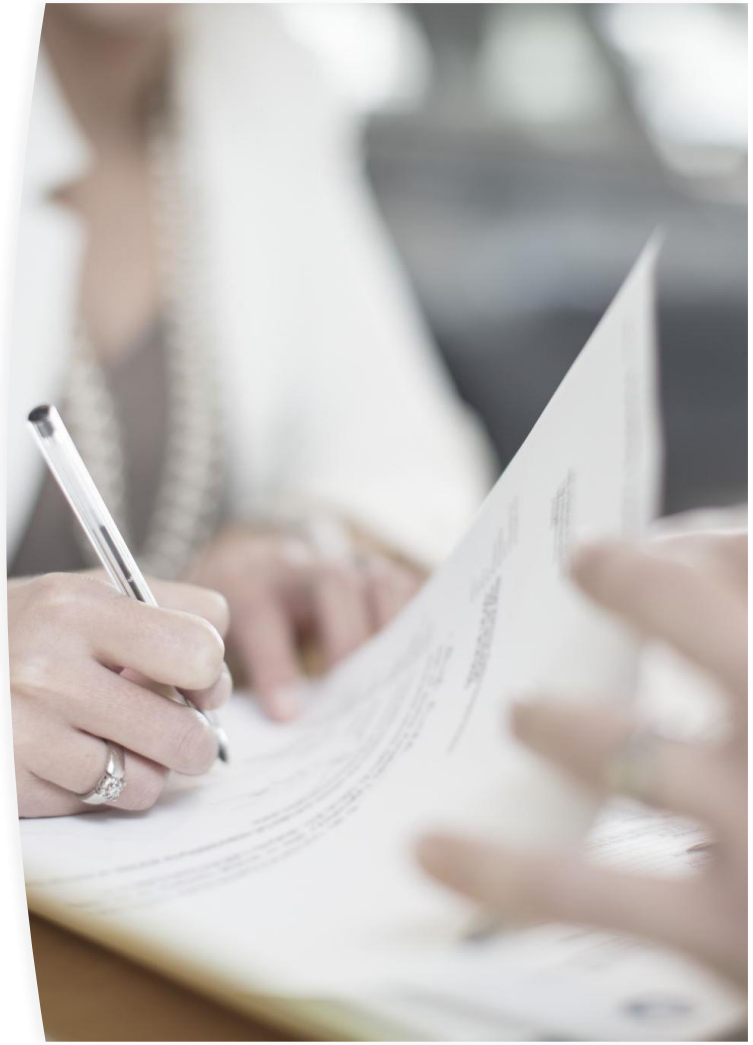
- Establish data reporting expectations
  - Suppliers must track, document, and publicly report Scope 1, 2, and 3 emissions
  - Suppliers must report an absolute corporate-wide GHG reduction goal
  - Suppliers must include the supply chain in the GHG reduction goal with a focus on significant Scope 3 categories
  - Suppliers will improve energy efficiency and reduce GHG emissions
- Help suppliers to understand your sustainability goals and targets
- Engage suppliers on their sustainability journeys
  - Leverage supplier sustainability commitments to confirm they are making plans to continually improve
  - Identify areas where you can partner



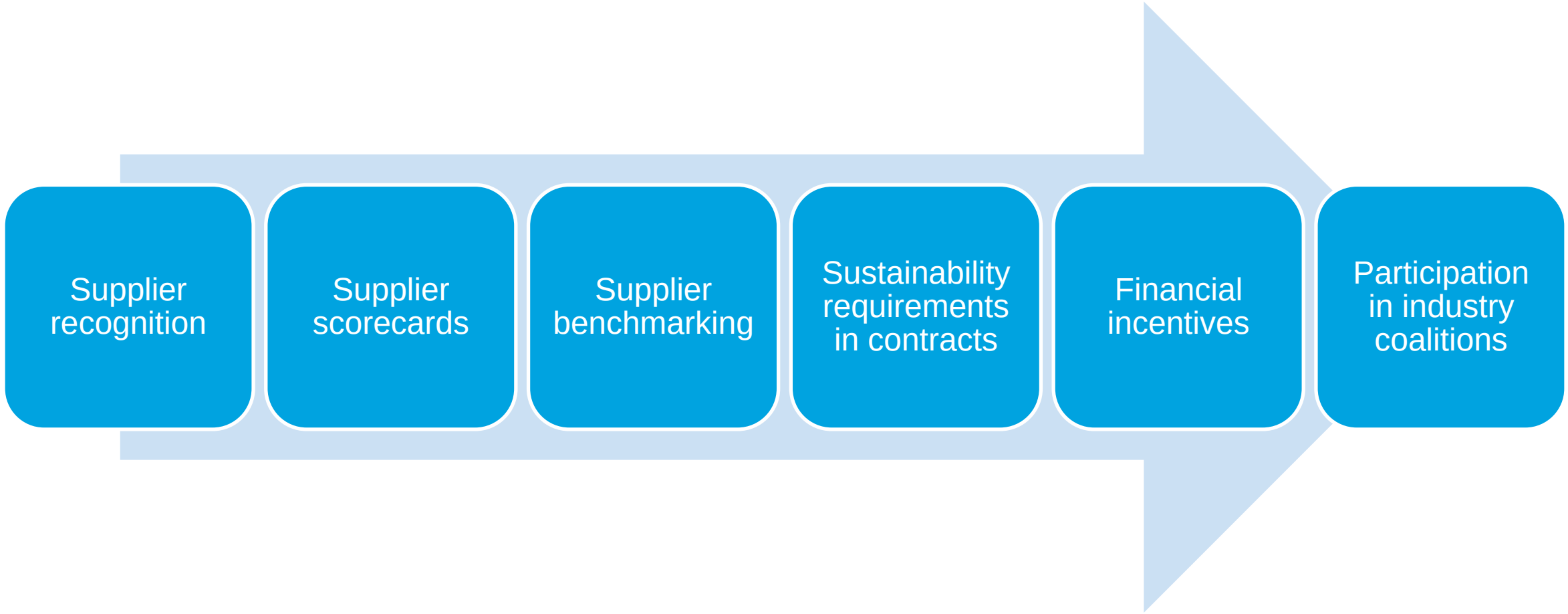
Strategies for Supplier Engagement

Integrate sustainability reporting requirements into your contracts

- Criteria that will assist your company in meeting their sustainability goals
- Requirements should be included in contract language and may include:
  - What data is needed and the frequency for reporting
  - Where and what form data is needed in
  - Level of verification on data provided
  - If utilizing any reporting platforms is required
  - What additional services or support is necessary



Strategies for Supplier Engagement



Question: Does the company you work for have procurement requirements related to sustainability? If so, what are they?

Please type your answers in the chat

Benefits of Responsible Sourcing and Procurement

- Assist with risk-management against:
  - Scarcity of supply
    - Lower impact products and companies who focus on sustainability will be in larger demand
  - Increased demand in emerging markets
    - Establish connections with sustainability focused companies
  - Stakeholder pressure to reduce emissions
    - Being proactive will mitigate pressure
  - Protection of brand reputation
    - Companies in supply chain who are not focused on ESG could represent larger risks
    - Stakeholders want to see transparency

Integrating Responsible Sourcing and Procurement

Ecovadis, a business sustainability rater, provides measurable benefits to sustainable procurement

15-30% brand value increase (equity)

90% have lower cost of capital

9-16% procurement cost reduction

Ecovadis

Integrating Responsible Sourcing and Procurement

What are the steps to integrate?

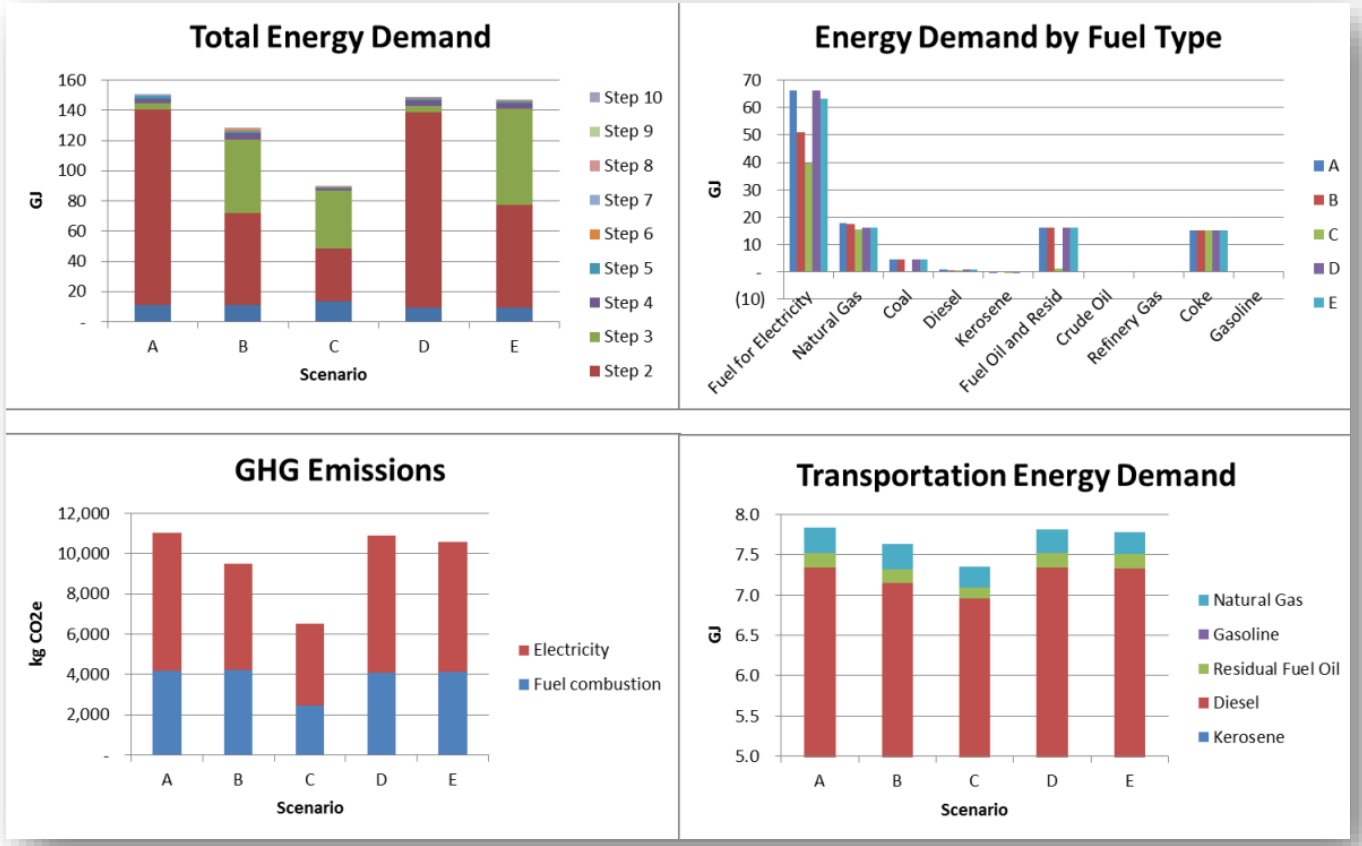
- Start with determining what sustainability criteria is most important (internally)
- Estimate how sustainable the site or company could be
  - Use data to understand baseline
  - Understand company goals
  - Establish a vision and assess its value
- Determine how your company will achieve internal goals
  - Establish core guidelines and initiatives
- Reach your goals
  - Revise policies and expectations as necessary
  - Reassess supply options

Integrating Responsible Sourcing and Procurement

- The Material Flow Through Industry (MFI) tool provides impacts of a materials in the supply chain
  - Request an account to utilize the tool
  - Has over 1,000 manufacturing recipes to analyze
- Process:
  - Select materials and processes that are used to create final product
  - Input energy sources
- Results:
  - Energy required, GHG emissions, fuel use in manufacturing and transportation

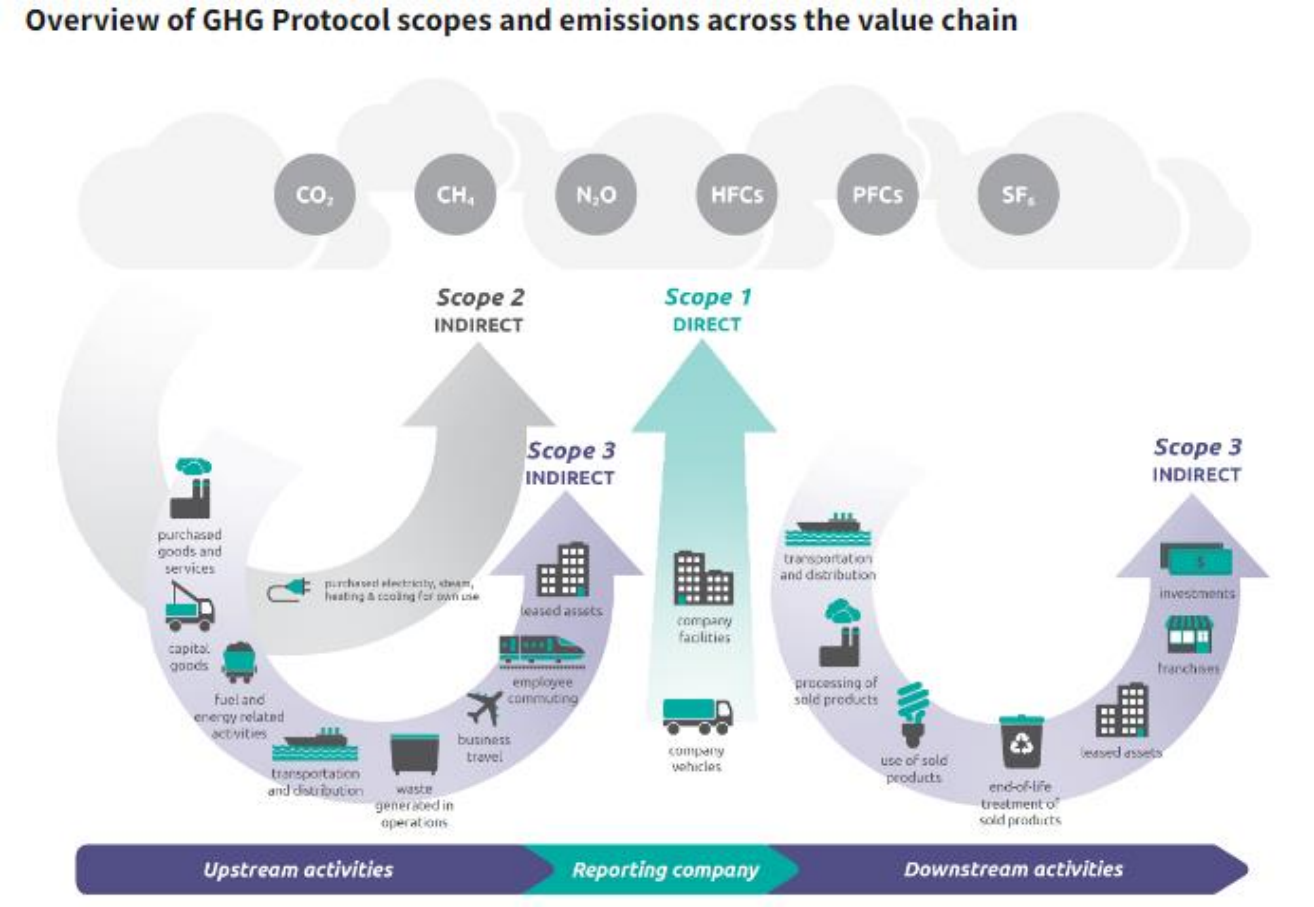
MFI Tool Example

- Analyzed five scenarios for 1,000 kg of aluminum smelt
  - **A** – Baseline (Modern Hall Heroult (MHH)); 0% SEP; national grid
  - **B** – HH Wetted Cathode (TRL – 7) Process; 0% SEP; national grid
  - **C** – Clay Carbochlorination (TRL – 6) Process; 0% SEP; national grid
  - **D** – MHH process; 100% SEP; national grid
  - **E** – MHH process; 100% SEP; 80% RE grid.



[NREL MFI Tool Example]

Closing Remarks



- Summary
  - What are emissions and their impacts
  - How to integrate sustainable sourcing and procurement
  - What calculation methodologies exist for Scope 3 emissions
  - What reporting frameworks exist for emissions
- Homework!
- Next training:
  - Implementing a zero waste to landfill program
  - April 1, 2025

Homework Overview

- Homework will:
  - Engage participants in the topics to be discussed in the following session
  - Serve as a guide for waste diversion and minimization
- If a homework is completed, please send to presenter, Nick, at nick@sustainablesolutionscorporation.com
  - Please use the subject “Better Plants Session # Homework: Complete – Company Name”
  - Participants will be asked to share their learnings and experiences in session 8, and if you would like to participate in this, please reach out to Nick

Homework Review

Assignment

1. Considering all waste generated, what is the current waste diversion rate of your site and/or company?
2. Certain hazardous waste may be excluded from diversion calculations when landfill or incineration is a regulatory requirement. With hazardous waste removed, how close is the site and/or company to being zero waste to landfill? Note that zero waste to landfill is typically awarded if a site and/or company achieves over a 98% diversion rate.
3. Through the exercises in the previous homework assignments, what waste streams did you identify as minimizable or divertible? Please note the estimated weight of each and specify the new end-of-life disposition (e.g., minimized, recycled, donated, etc.).
4. If the opportunities listed in Question 3 were implemented, how would the waste diversion rate change?
5. Based on the responses to Questions 3 and 4, if the site and/or company has not achieved zero waste to landfill, what are the necessary steps to move towards this goal?

Goal

- For a participant to establish a site and/or company's current progress in waste diversion.
- To have a participant begin to think about what it may take to increase waste diversion at their site and/or company.

Kahoot!

Q&A