Better Plants
U.S. DEPARTMENT OF ENERGY

Scope 3 Emission Considerations

Virtual INPLT Training

Session 6

Tuesday – May 30th, 2023

10:00 am – 12:30 pm EDT

U.S. DEPARTMENT OF ENERGY

DOE's Waste Reduction Network:

- Open to all existing Better Plants partners
- Goals are flexible
- Six goal options based on partner feedback
- Quarterly webinars
- Bi-monthly newsletter
- Access to new waste-related tools, trainings and programmatic elements

Waste Virtual INPLT Agenda

- **Week 1 (April 25th) – Introduction: Waste Diversion and Reduction 101**
- **Week 2 (May 2nd) – How to Effectively Track and Measure Your Waste**
- **Week 3 (May 9th) – Source Reduction and Waste Minimization Techniques**
- **Week 4 (May 16th) – Finding Outlets for Hard to Manage Waste Streams**
- **Week 5 (May 23rd) – Construction Waste Management and Green Building Certifications**
- **Week 6 (May 30th) – Scope 3 Emission Considerations**
- **Week 7 (June 6th) – Implementation of a Waste Diversion Program – Developing a Roadmap to Zero Waste**
- **Week 8 (June 13th) – 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

Tad Radzinski, PE, SEP, LEED AP, SFP
President
Sustainable Solutions Corporation

Nick Mummau, LEED Green Associate
Project Manager
Sustainable Solutions Corporation

Quick Review

Remembering Session 5

U.S. DEPARTMENT OF ENERGY

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 and SBT goals
- 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:

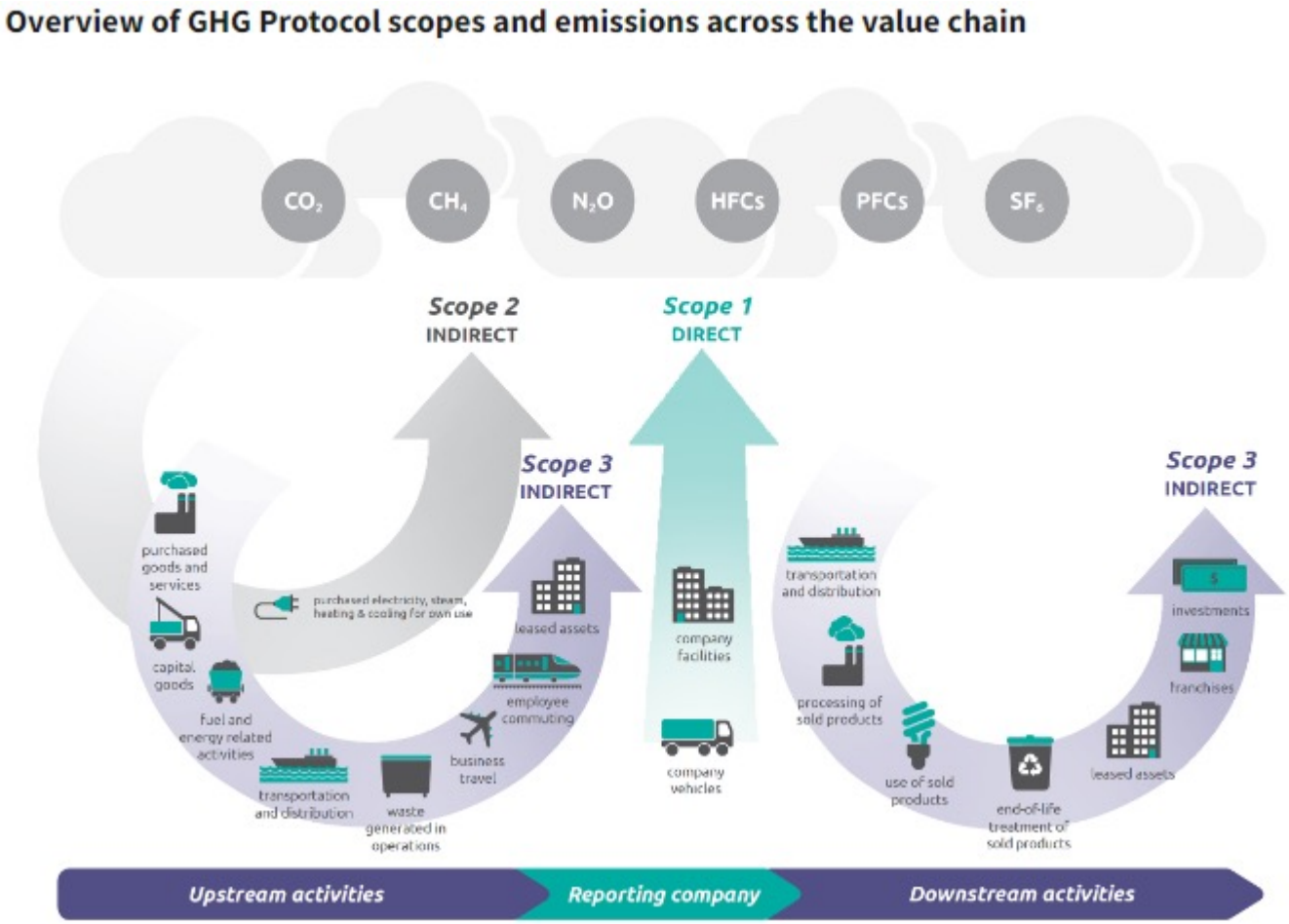
Scope 3 Emissions Considerations

U.S. DEPARTMENT OF ENERGY

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

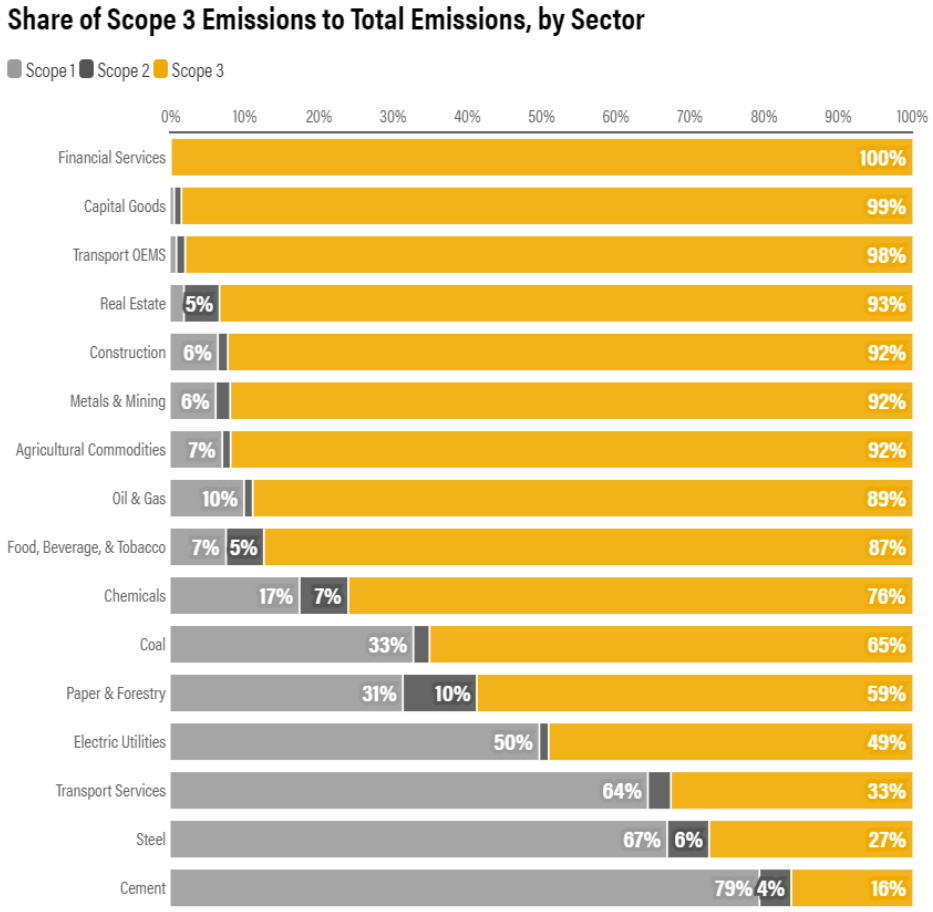
Scope 2: GHG emissions from utilities purchased by the company (electricity, steam, heat, etc.)

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 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

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

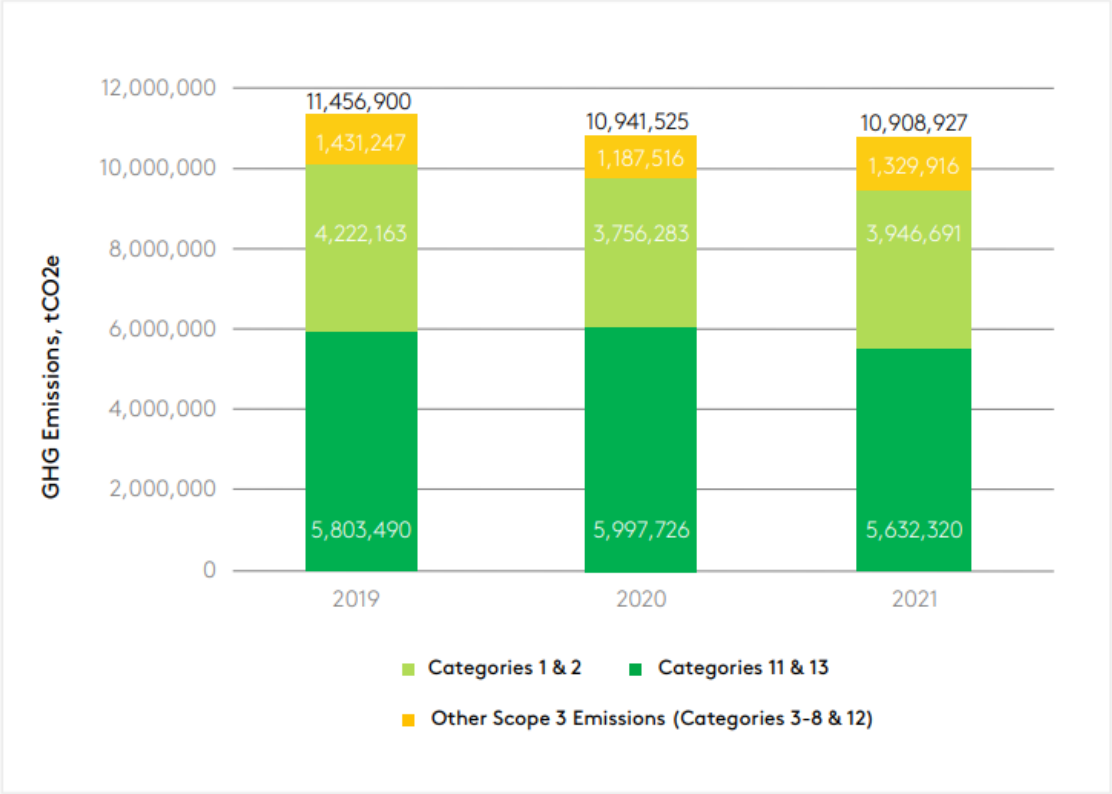
The impact of each category will vary by company and industry

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

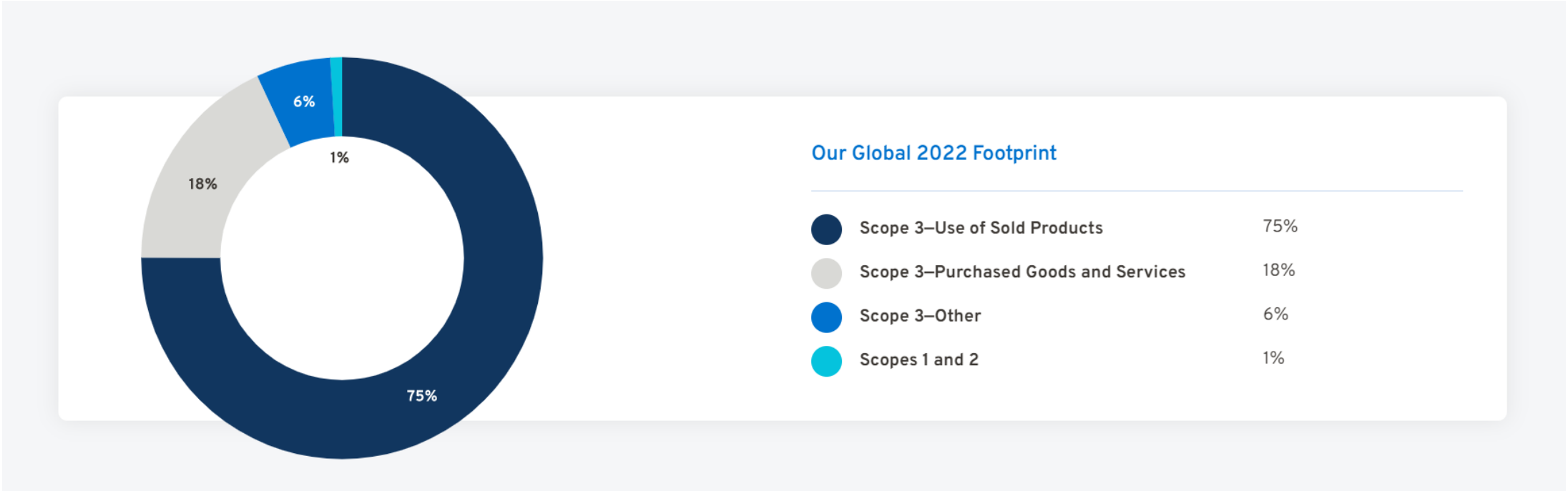
Comcast Scope 3 Emissions Example

- 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

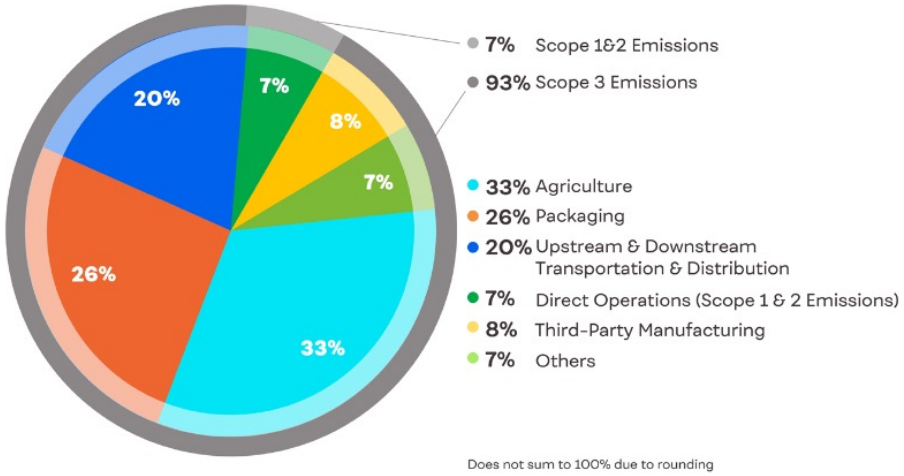
General Motors Scope 3 Emissions Example



GM Emission Reduction Plan

Pepsi Scope 3 Emissions Example

Our 2021 Emissions Footprint



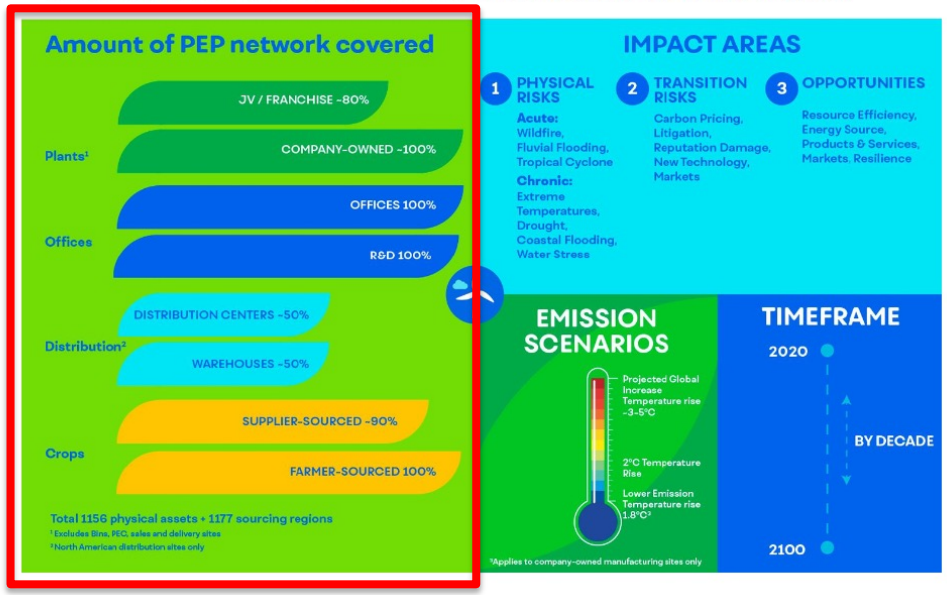
Our 2021 Emissions Progress

	2021		2020		2015 Baseline	
	%	Absolute (million metric tons)	%	Absolute (million metric tons)	%	Absolute (million metric tons)
Scope 1	6%	3.6	6%	3.6	6%	3.8
Scope 2	1%	0.7	1%	0.9	3%	2.0
Scope 3	93%	58	93%	56	91%	56
Total	100%	63	100%	61	100%	61

[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?

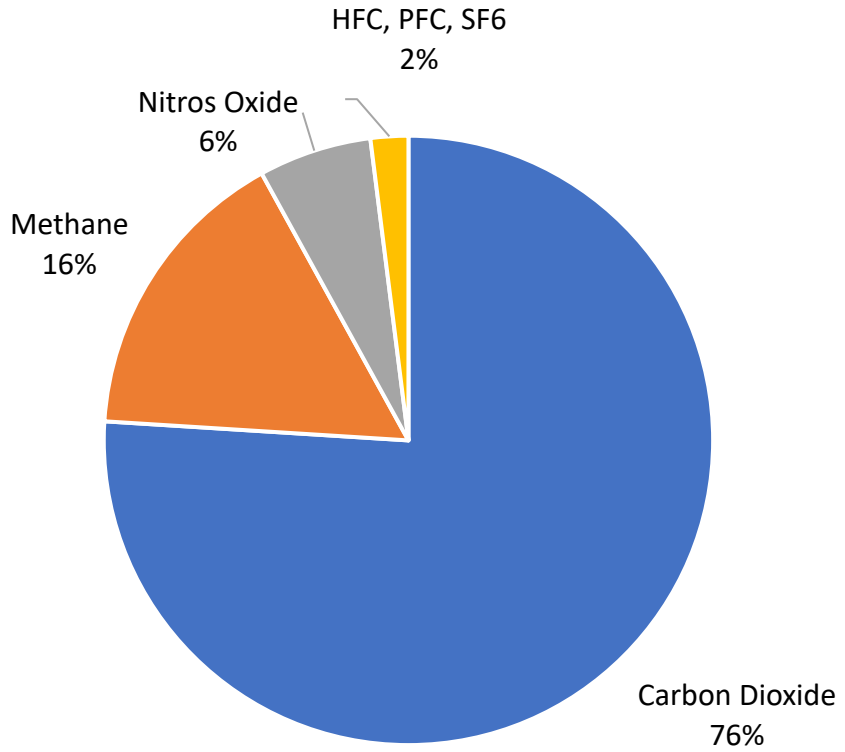
Please respond to the Zoom poll

Answer: 25 times more potent

The Facts About Methane

- Methane represents a large portion of global GHG emissions
- Methane is **25 times more potent** than carbon dioxide at trapping heat in the atmosphere

Global Manmade GHG Emissions by Gas, 2015



EPA Source

Plans to Reduce Methane Emissions

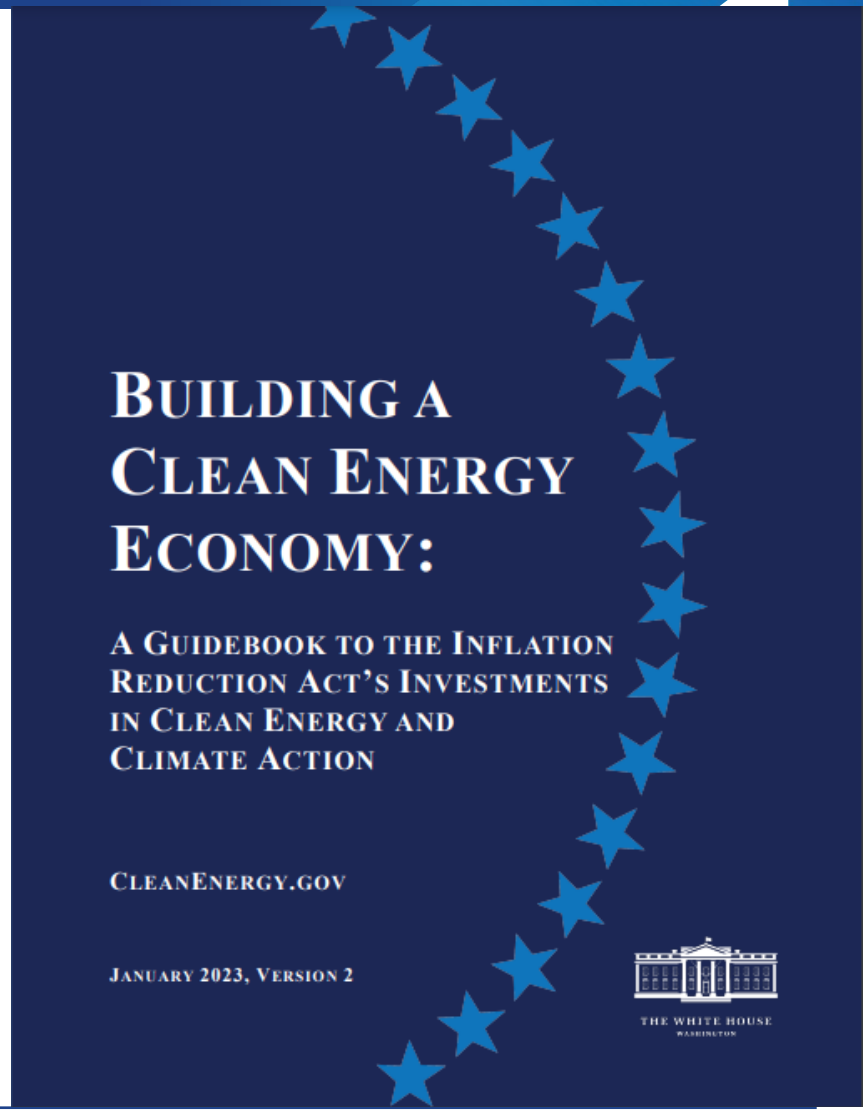
- **Inflation Reduction Act** IRA Guidebook
  - Wide-reaching plan to provide funding for climate action for various programs and assistance relating to clean energy development, clean buildings, clean manufacturing, and much more
- **Global Methane Pledge** Global Methane Pledge
  - 115 countries commit to reduce their methane emissions by 30% by 2030
- **Declaration of North America (DNA)** DNA
  - U.S., Canada, and Mexico vowed to reduce methane emissions from solid waste and wastewater by 15% by 2030 from 2020 levels

Plans to Reduce Methane Emissions

Inflation Reduction Act

- $1.55 billion in assistance for the EPA
  - Assistance to reduce methane and other GHG emissions from petroleum and natural gas systems
  - Waste emissions charge
    - Companies that report over 25,000 metric tonnes of CO_2eq per year that are exceeding acceptable thresholds for methane emissions are susceptible to this charge
      - $900 per metric tonne for emissions reported in 2024, which increases to $1,200 in 2025, and $1,500 in 2026 and on

EPA Source



IRA Guidebook

Plans to Reduce Methane Emissions

Notable highlights

- More than 50 countries have methane plans or plans to develop them
- Uniting importers and exporters to cut fossil energy methane
  - Joint declaration between US, European Union, Japan, Canada, Norway, Singapore, and UK
- Reducing food loss and waste
- Increasing measurement to create a waste sector methane benchmark
  - Will obtain data from over 10,000 landfill globally

Fact Sheet

Plans to Reduce Methane Emissions

JANUARY 10, 2023

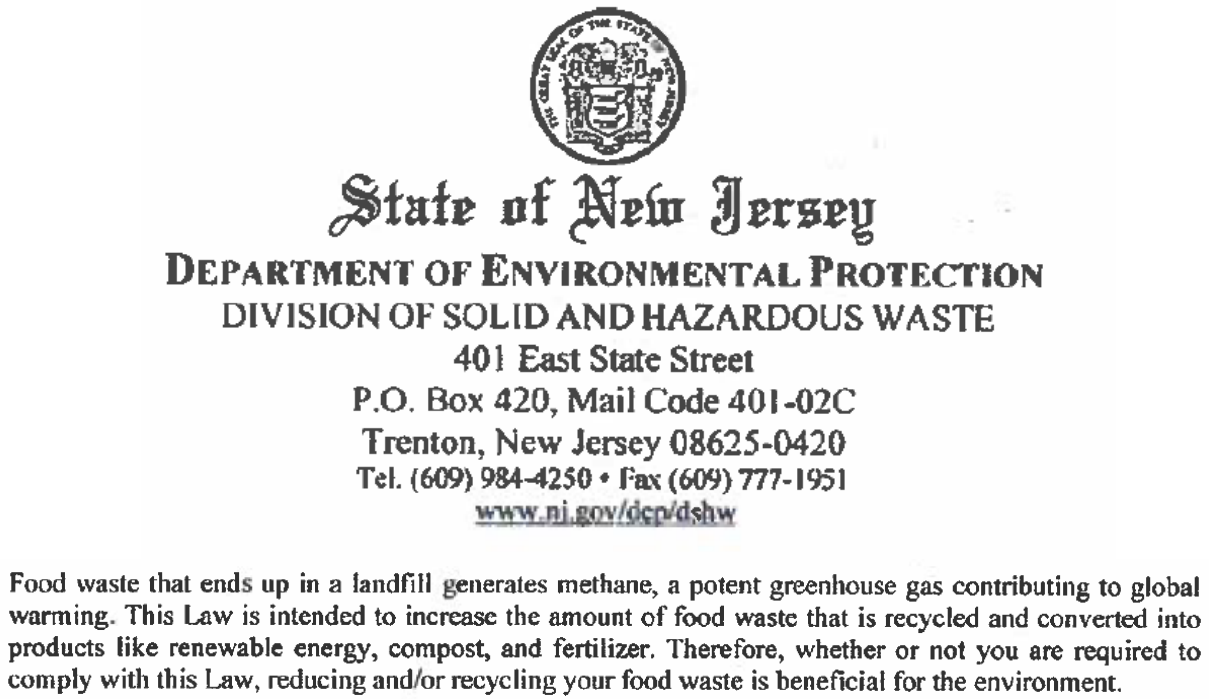
FACT SHEET: Key Deliverables for the 2023 North American Leaders' Summit

Declaration of North America

- Increase collaboration on waste and agriculture methane measurement and reduction
- Develop Food Loss and Waste Reduction Action Plan by 2025
  - Determine efforts to cut food loss and waste in half by 2030
- Expansion of critical minerals resource mapping
- Increase focus on semiconductor manufacturing
  - Institute a form to develop policies and invest in supply chains

DNA Deliverables

Plans to Reduce Methane Emissions



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

Environmental, Social, and Governance (ESG) Reporting Frameworks

U.S. DEPARTMENT OF ENERGY

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

Sustainability Reporting

Global sustainability reporting inches closer to 100 percent among the world's largest companies

Sustainability reporting has become standard practice for many companies, with steady growth over the past decade. Our survey shows that the N100 companies have continued to steadily increase their reporting rates with each global survey. Ten years ago, 64 percent of the N100 companies reported. In 2022, 79 percent of these companies report.

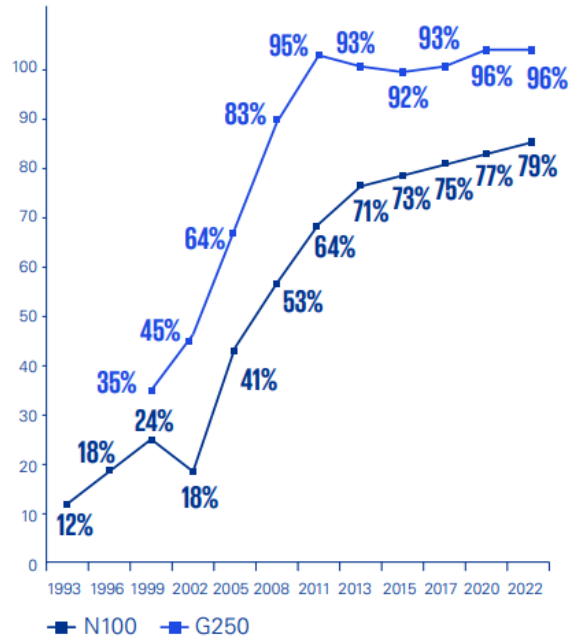
Today, nearly all G250 companies report on sustainability. In 2022, the rate of reporting among the G250 remains at 96 percent, the same as 2020.

The only companies in the G250 that do not report on sustainability are in China; however, this is expected to change in the coming years. Reporting regulations were introduced in China from mid-2022, stipulating that listed Chinese companies must now disclose environmental and social information. The expectation is that the companies that have recently entered the G250 will report within the next 2 years.

For more than a decade, 90 percent or more of the G250 have reported on sustainability. The number of companies reporting since 2011 has fluctuated between 93 percent and 96 percent mainly due to the composition of companies in the G250.

KPMG

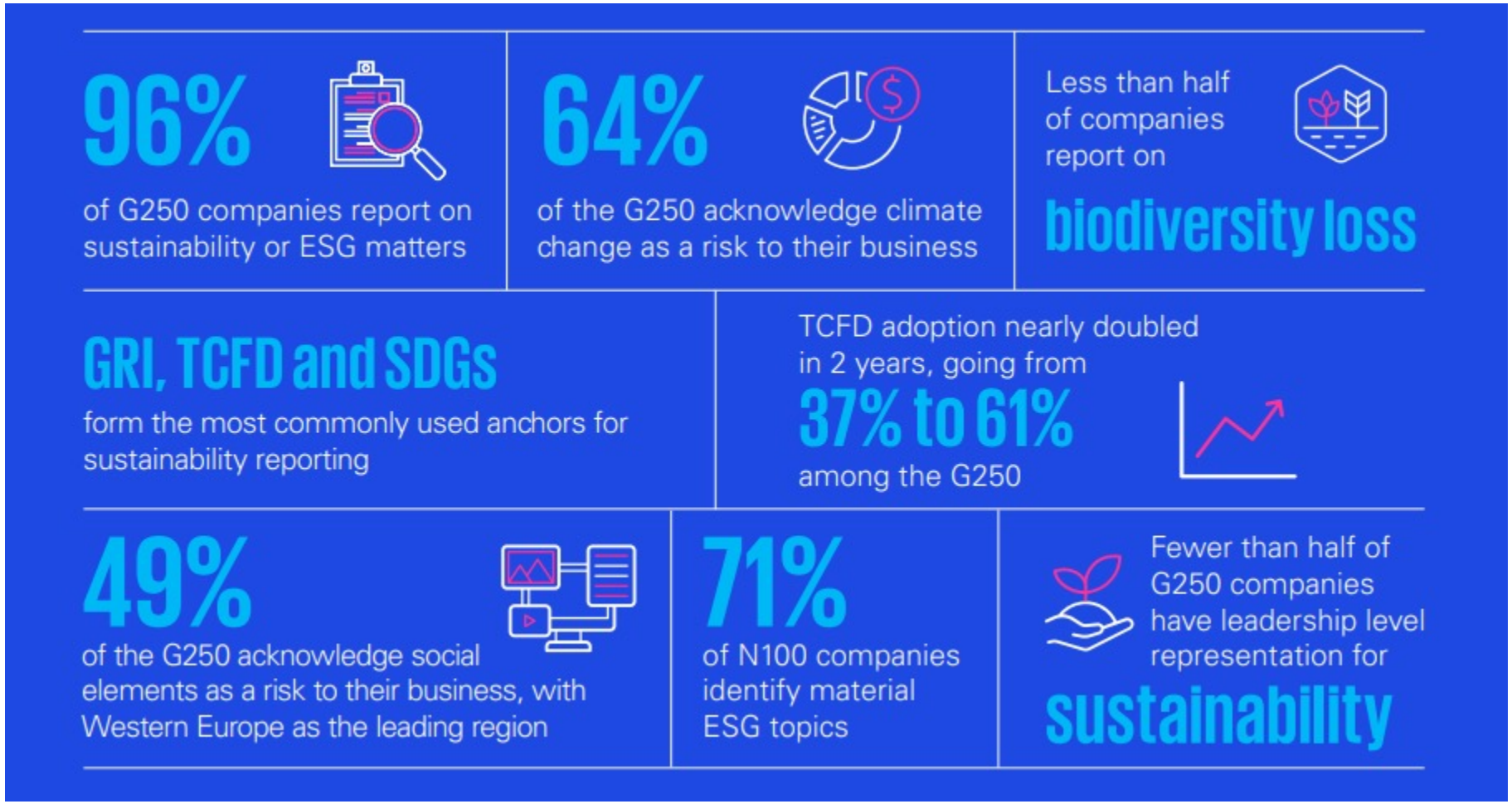
Figure 1: Global sustainability reporting rates (1993–2022)



Base: 5,800 N100 companies and 250 G250 companies

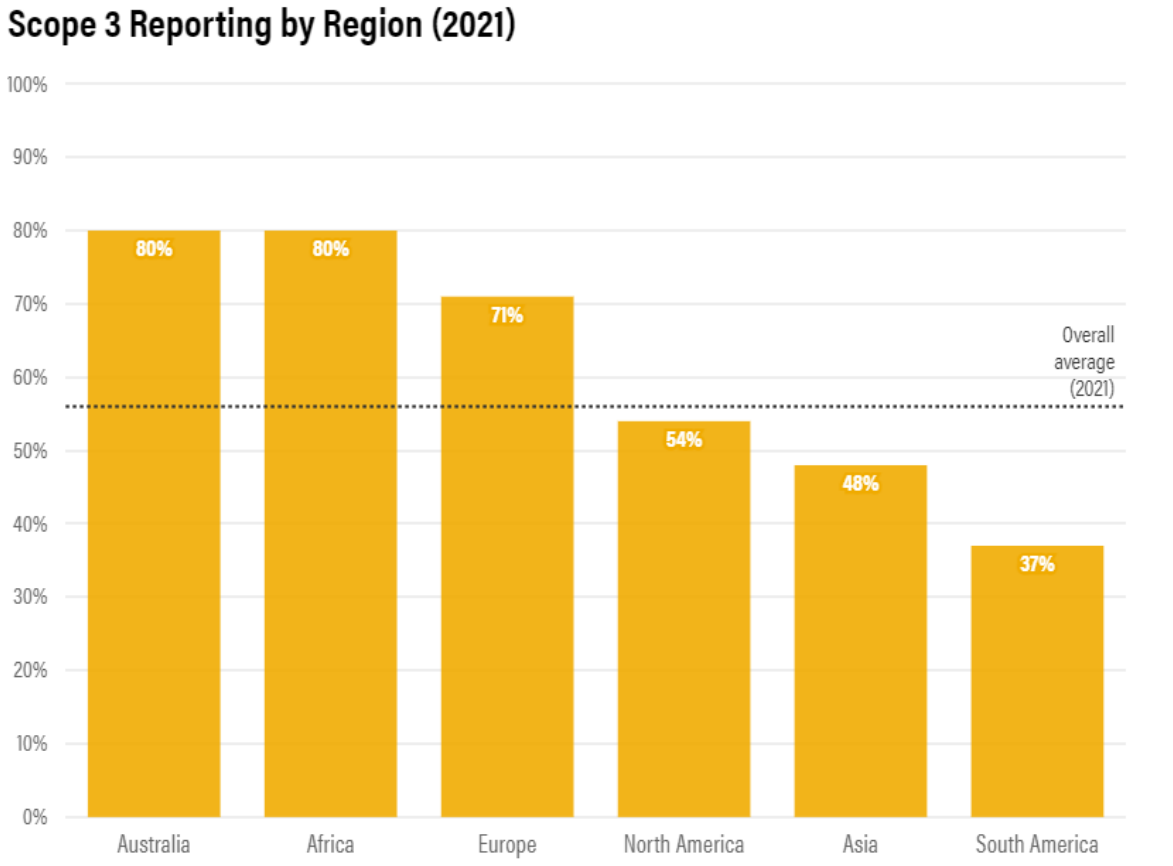
Source: KPMG Survey of Sustainability Reporting 2022, KPMG International, September 2022

Sustainability Reporting



KPMG

Status of Disclosure



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

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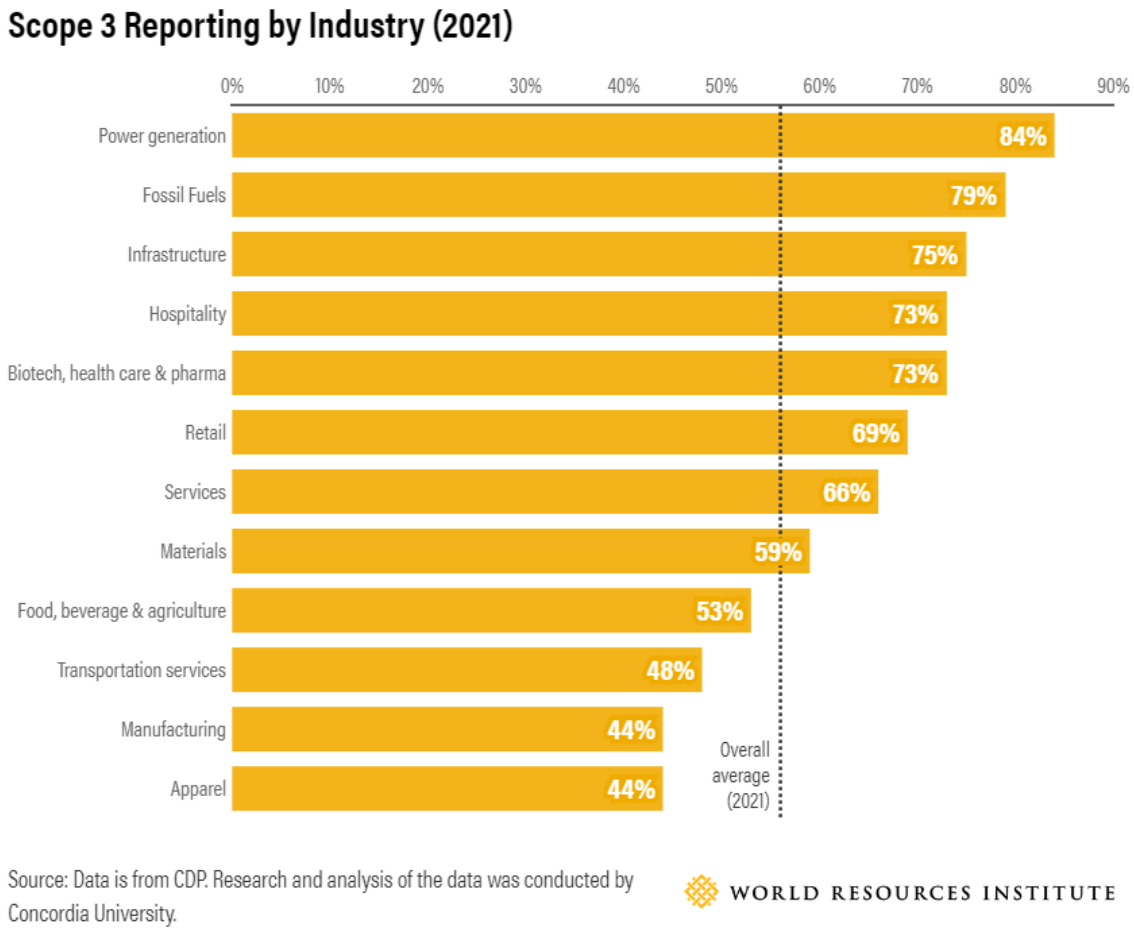
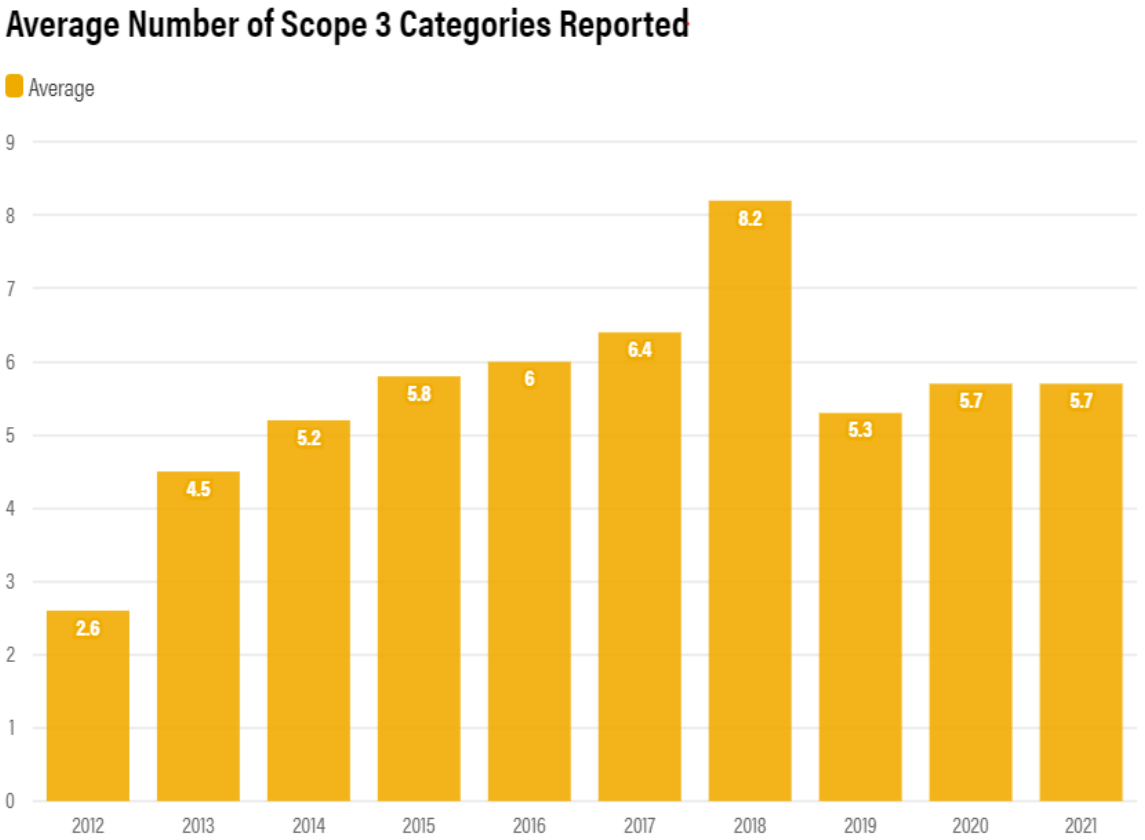
[World Research Institute Scope 3 Disclosure Trends]

Status of Disclosure



[World Research Institute Scope 3 Disclosure Trends]

Disclosure of Scope 3 Categories



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WORLD RESOURCES INSTITUTE

[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 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.**

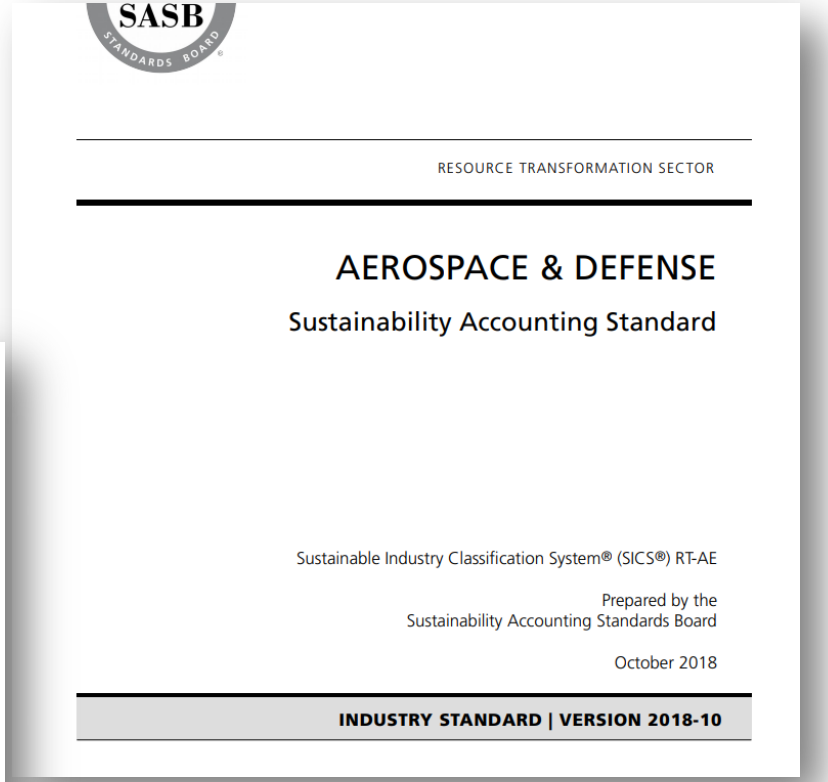
Contents

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.)**



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

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 18,700 companies, worth over half of the global market capitalization, disclosed data through CDP in 2022, an increase of 42% since 2021

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

Securities and Exchange Commission

SEC Proposes Rules to Enhance and Standardize Climate-Related Disclosures for Investors

FOR IMMEDIATE RELEASE

Registrant Type	Disclosure Compliance Date	
	All proposed disclosures, including GHG emissions metrics: Scope 1, Scope 2, and associated intensity metric, but excluding Scope 3	GHG emissions metrics: Scope 3 and associated intensity metric
Large Accelerated Filer	Fiscal year 2023 (filed in 2024)	Fiscal year 2024 (filed in 2025)
Accelerated Filer and Non-Accelerated Filer	Fiscal year 2024 (filed in 2025)	Fiscal year 2025 (filed in 2026)
SRC	Fiscal year 2025 (filed in 2026)	Exempted

Filer Type	Scopes 1 and 2 GHG Disclosure Compliance Date	Limited Assurance	Reasonable Assurance
Large Accelerated Filer	Fiscal year 2023 (filed in 2024)	Fiscal year 2024 (filed in 2025)	Fiscal year 2026 (filed in 2027)
Accelerated Filer	Fiscal year 2024 (filed in 2025)	Fiscal year 2025 (filed in 2026)	Fiscal year 2027 (filed in 2028)

Source 1
Source 2

Scope 3 Emissions Calculation Methods

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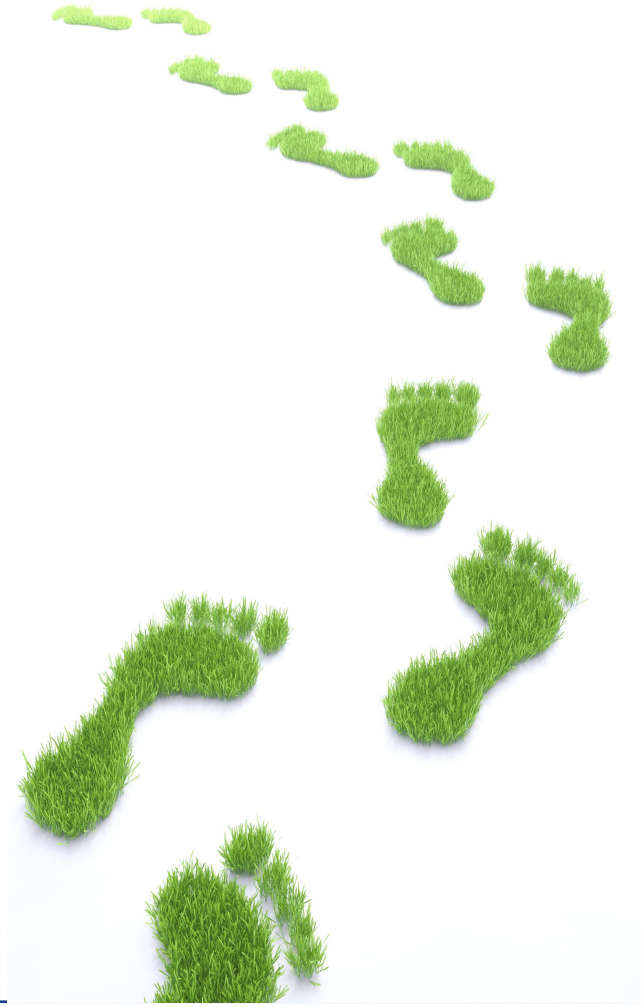
Poll: Does your company currently track Scope 3 emissions?

Please respond to the Zoom poll

Developing a Baseline

What is a baseline and why is it important?

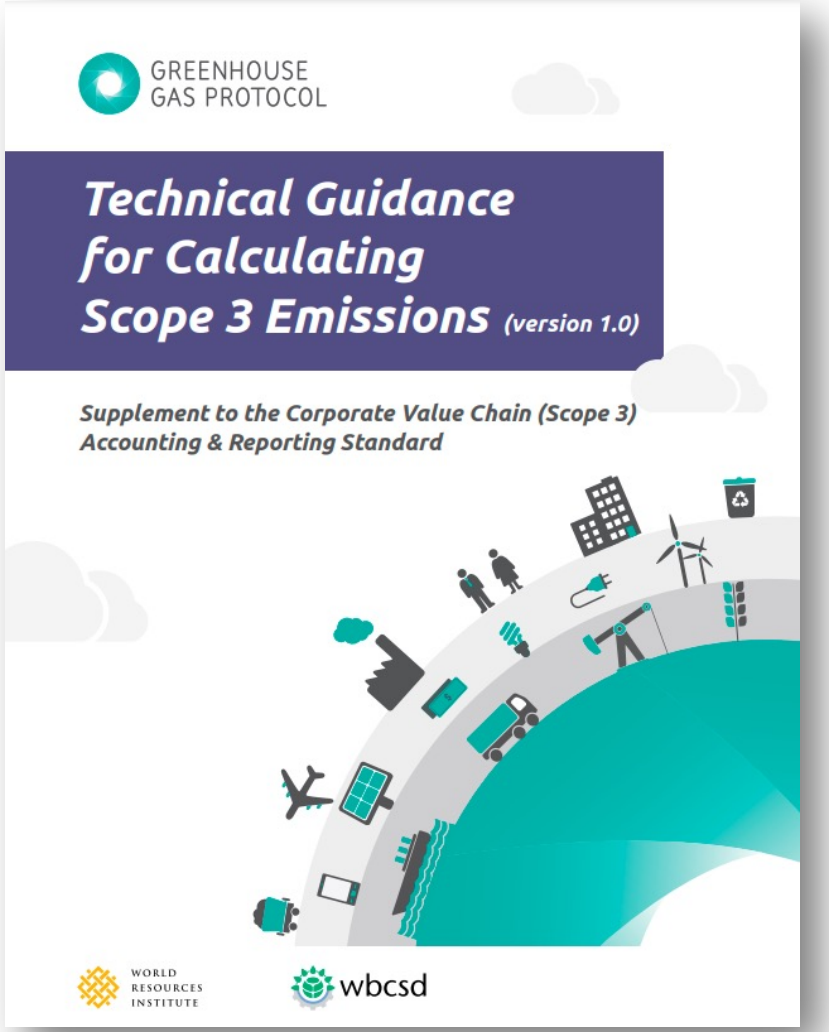
- Provides a starting point to reference, allowing the ability to monitor progress over time
- Enables establishment of realistic targets and goals
- Better understand performance and costs
- Develop material flow and spend analysis



You can't manage what you don't measure

How to Calculate Scope 3 Emissions

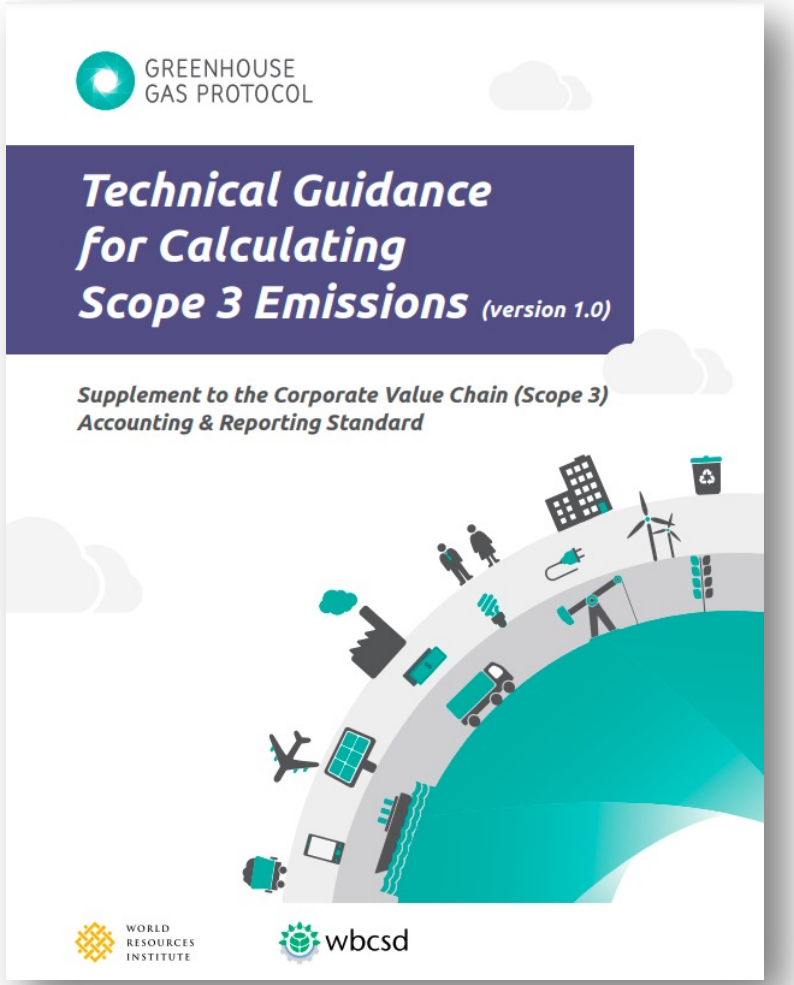
- Follow established guidelines for calculating Scope 3 emissions
  - What data is needed, how to use the data, what the thresholds are, where assumptions can be made
- A significant amount of data will be required
  - Coordination with suppliers is likely needed for some categories
  - Focus on hotspots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

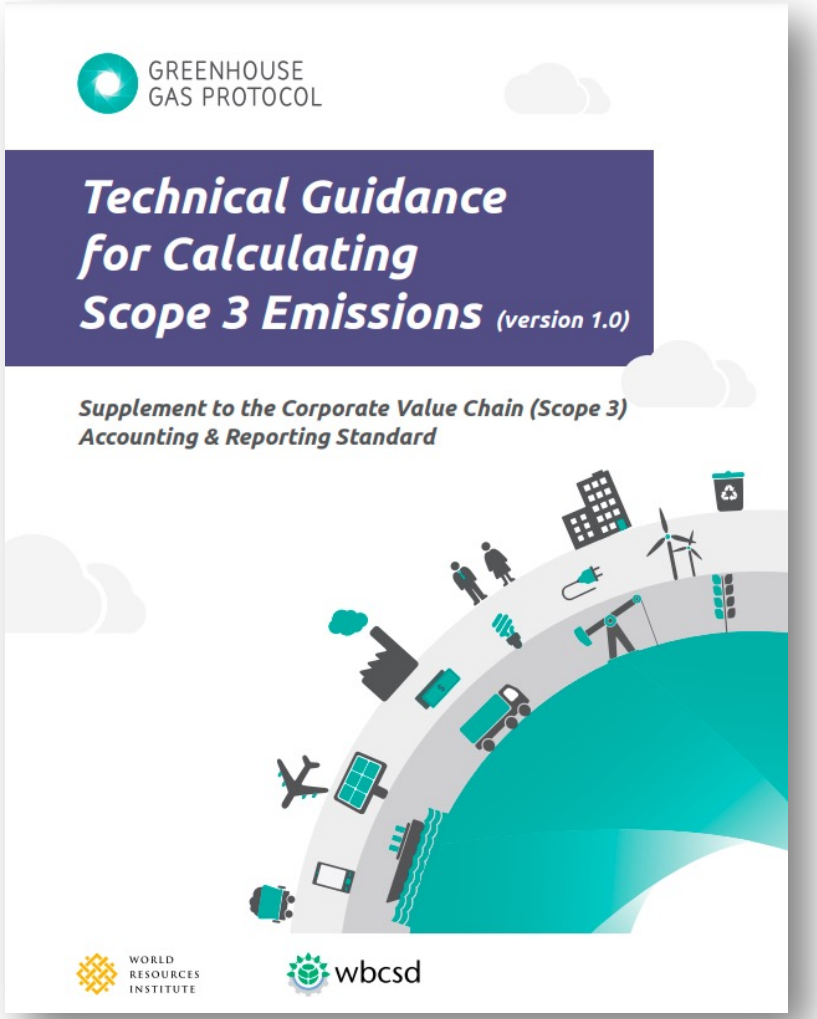


GHG Protocol – Scope 3 Calculations

- 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
  - Overtime, 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

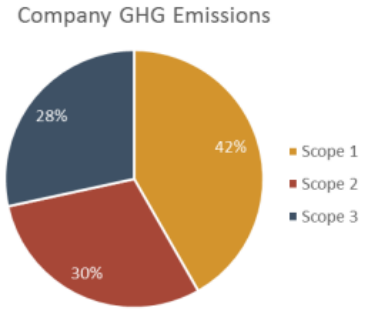
- How do we start?
  - Review Scope 3 categories and establish categories to prioritize based on:
    - Available data
    - Company focus
    - Stakeholder interests
  - Obtain data in-house and use that data to calculate emissions
  - Identify hotspot and key impact categories based on results
- How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



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%

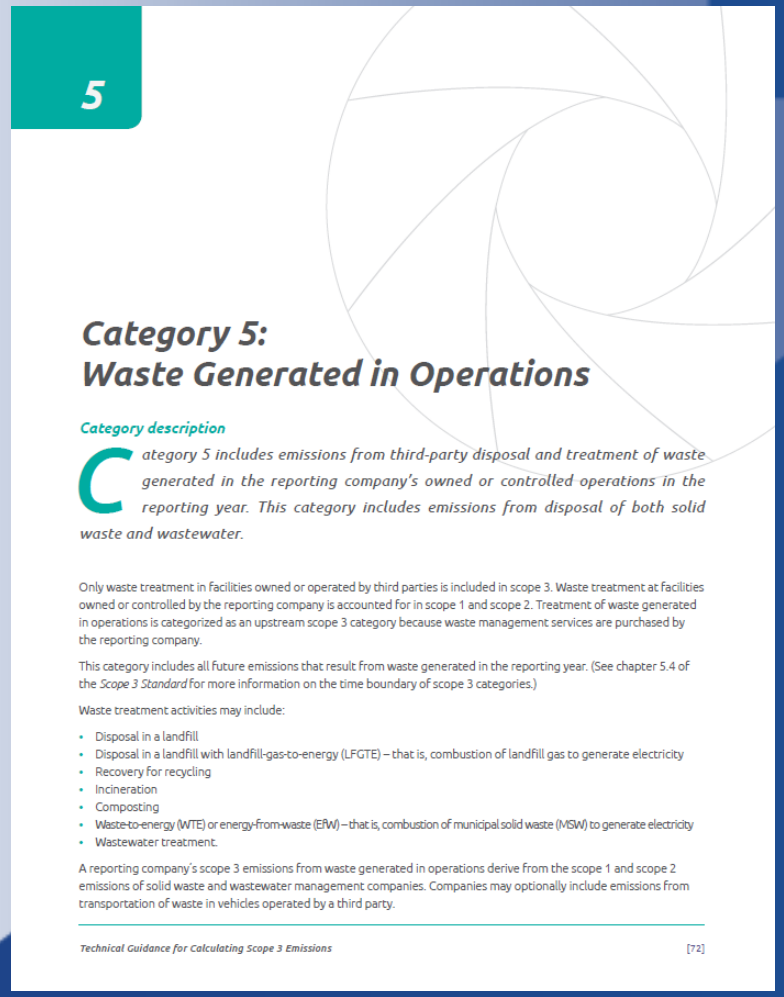
SBTi Industry Example

Review of GHG Protocol: Example

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

Please type your response in the chat

Answer: Upstream



5

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.

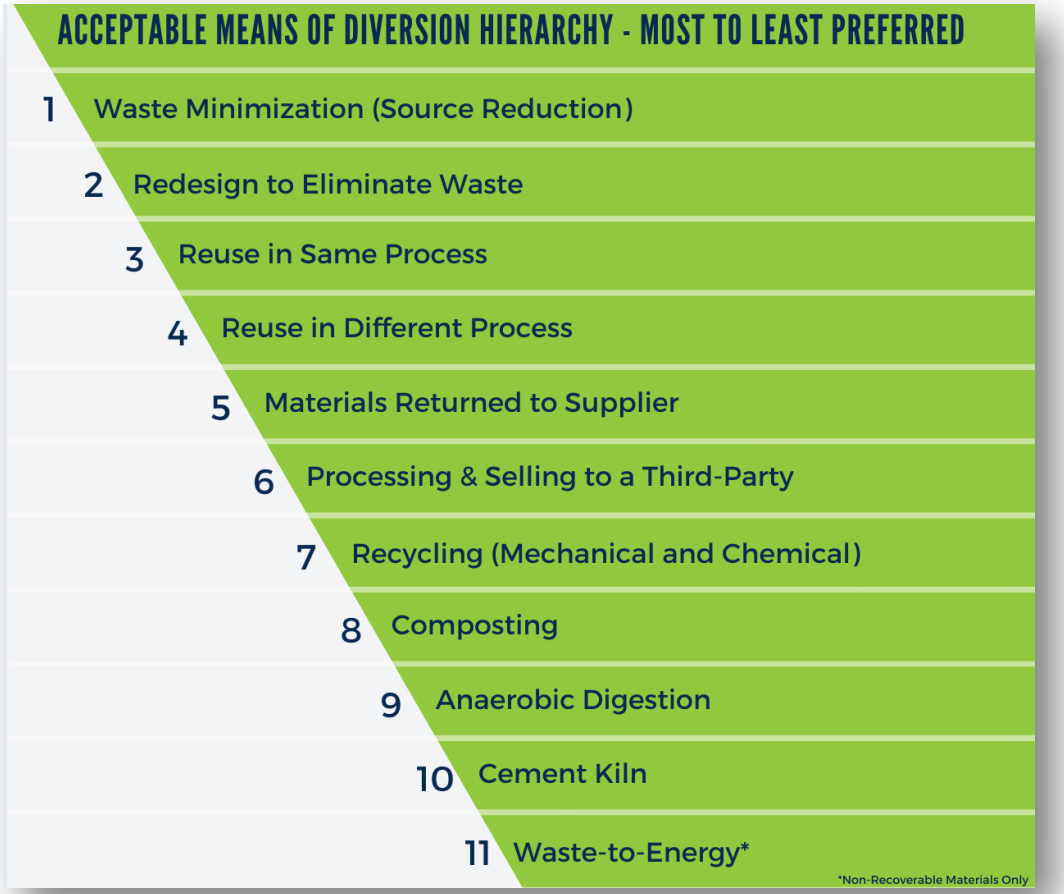
Technical Guidance for Calculating Scope 3 Emissions [72]

Evaluating Waste

- Calculating emissions related to waste treatment

U.S. DEPARTMENT OF ENERGY

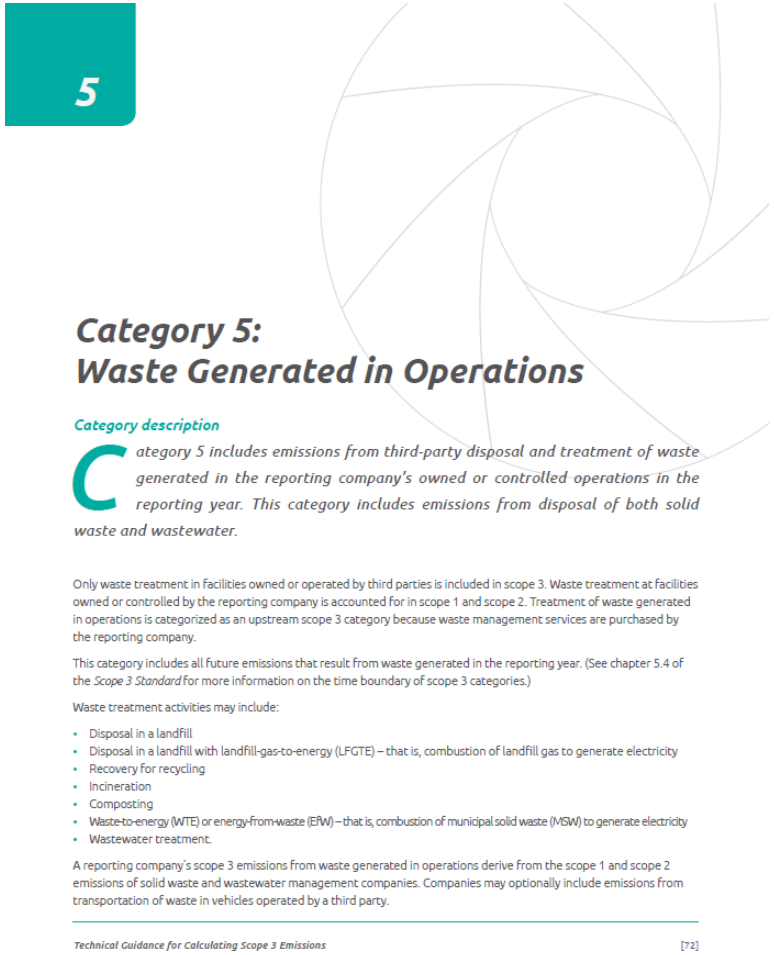
Waste Diversion Hierarchy



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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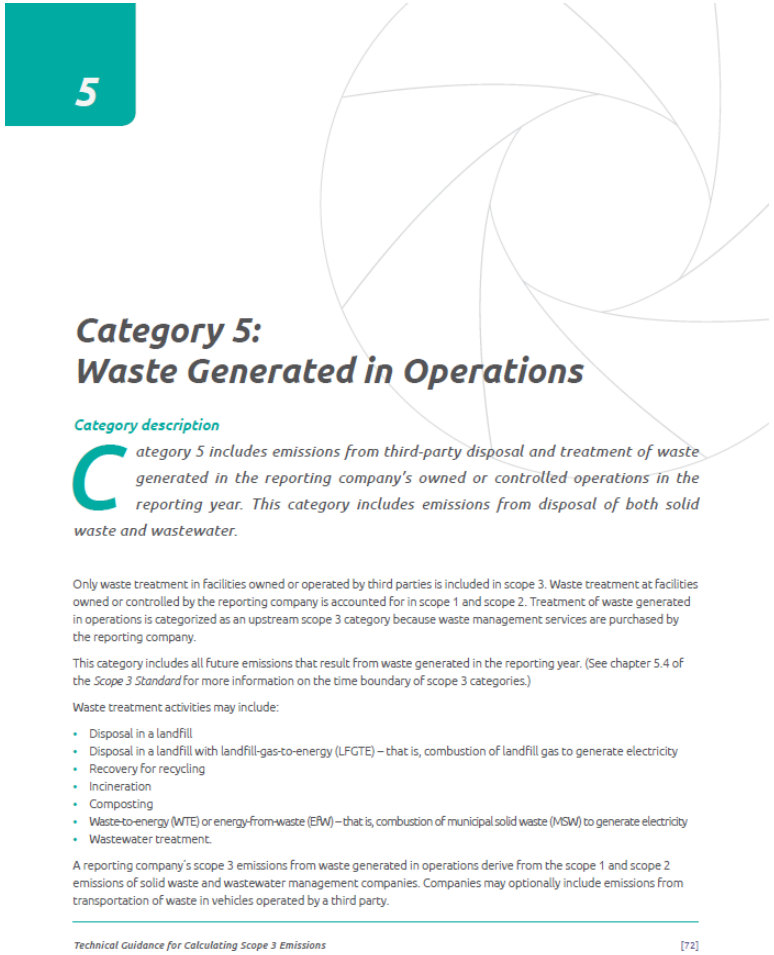
Technical Guidance for Calculating Scope 3 Emissions [72]

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 waste management practices 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)

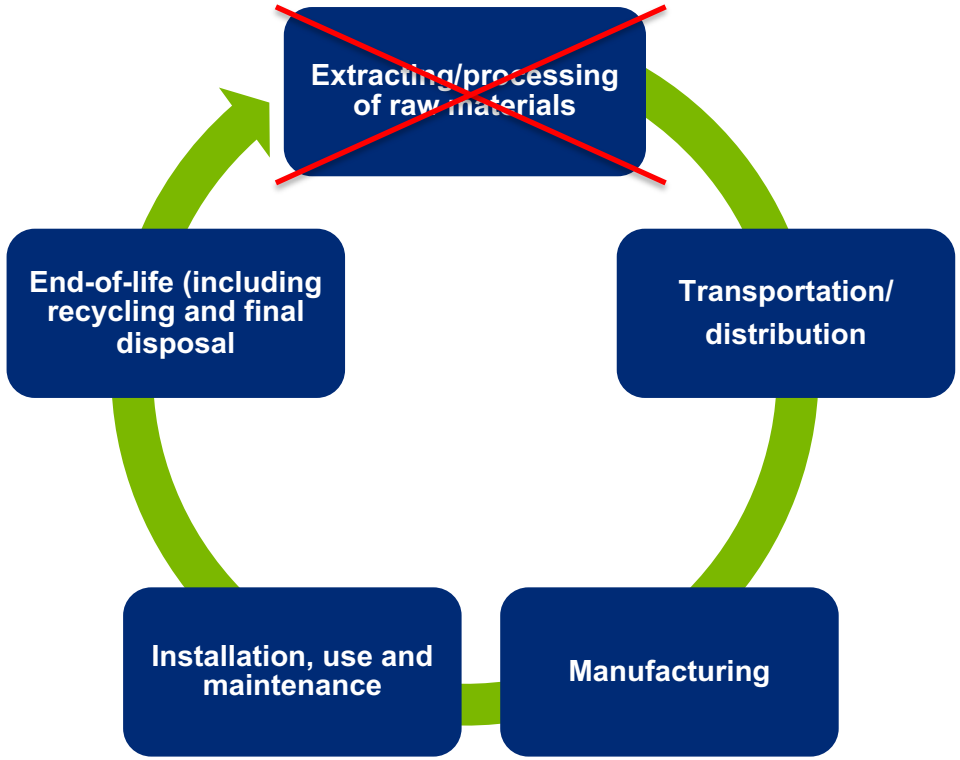
Question: What do you think negative values in waste emissions calculations represent?

Please type your response in the chat

Answer: Negatives represent offset raw materials

EPA WARM Tool

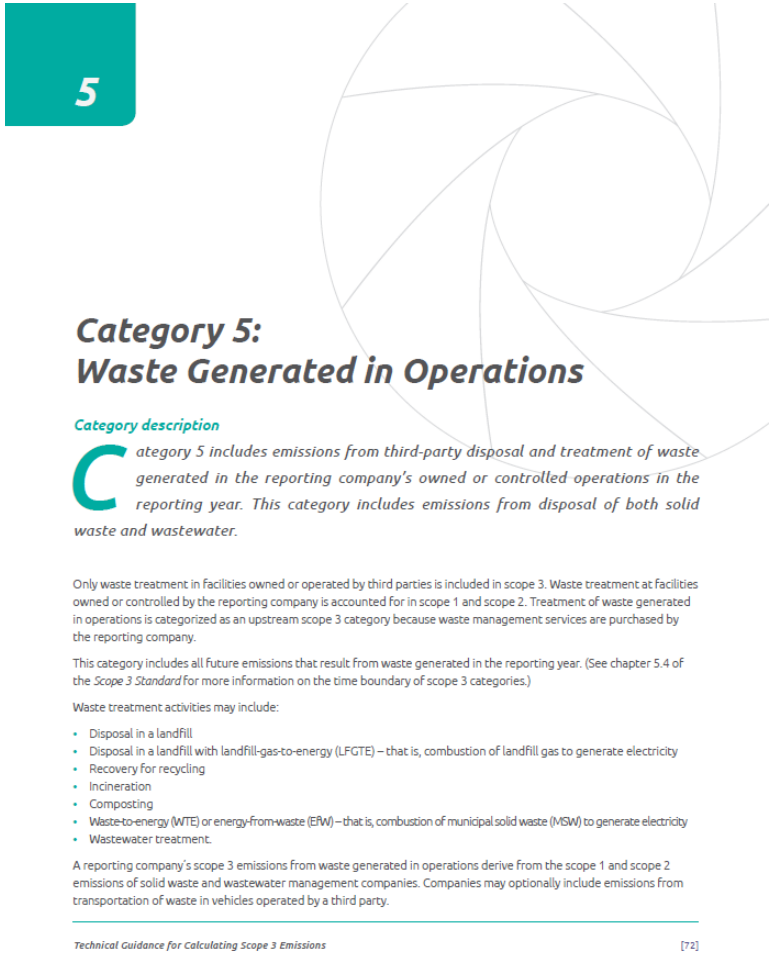
- Recall LCA thinking
  - When materials are sent to landfill their useful life ends
  - Diverting waste extends a material's lifespan, subsequently preventing or removing need for virgin raw materials
    - The EPA's WARM tool gives credit for these offset raw materials, creating "negative" emissions
  - 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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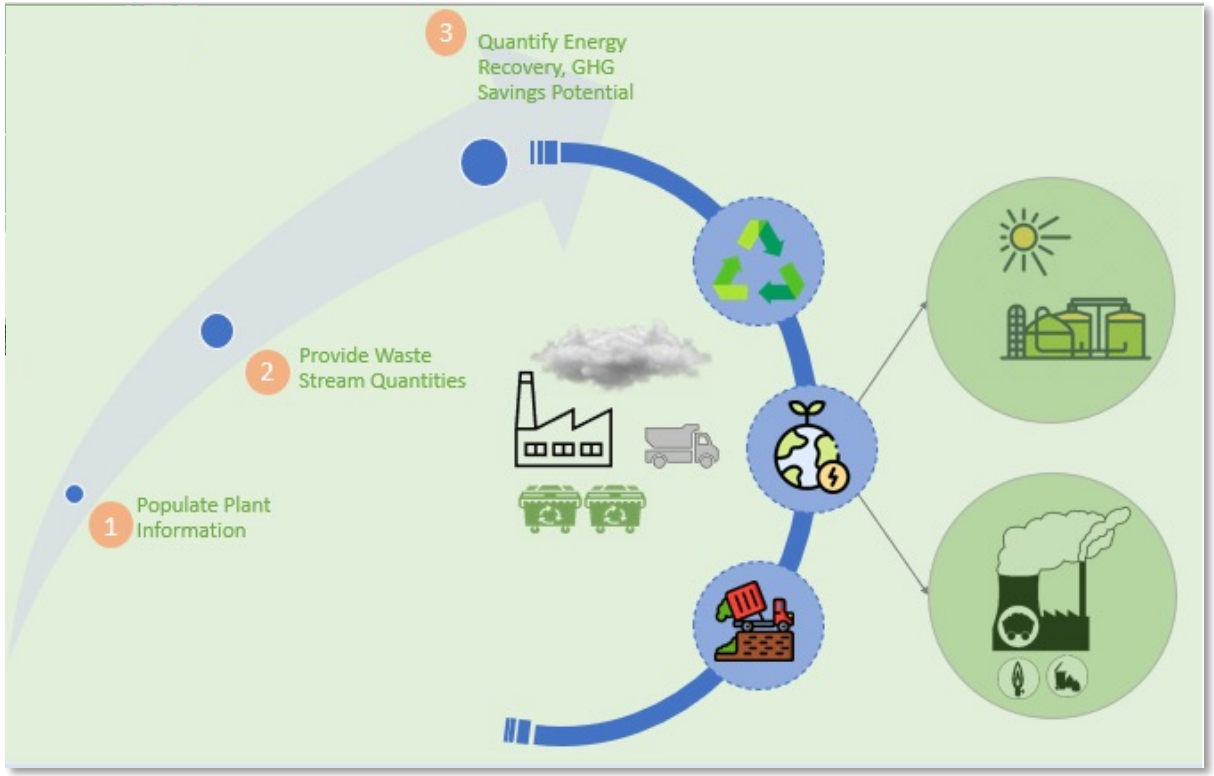
Technical Guidance for Calculating Scope 3 Emissions [72]

DOE Waste Stream Energy Content Calculator

- Is intended to quickly estimate the energy recovery potential of waste streams
- Calculator 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

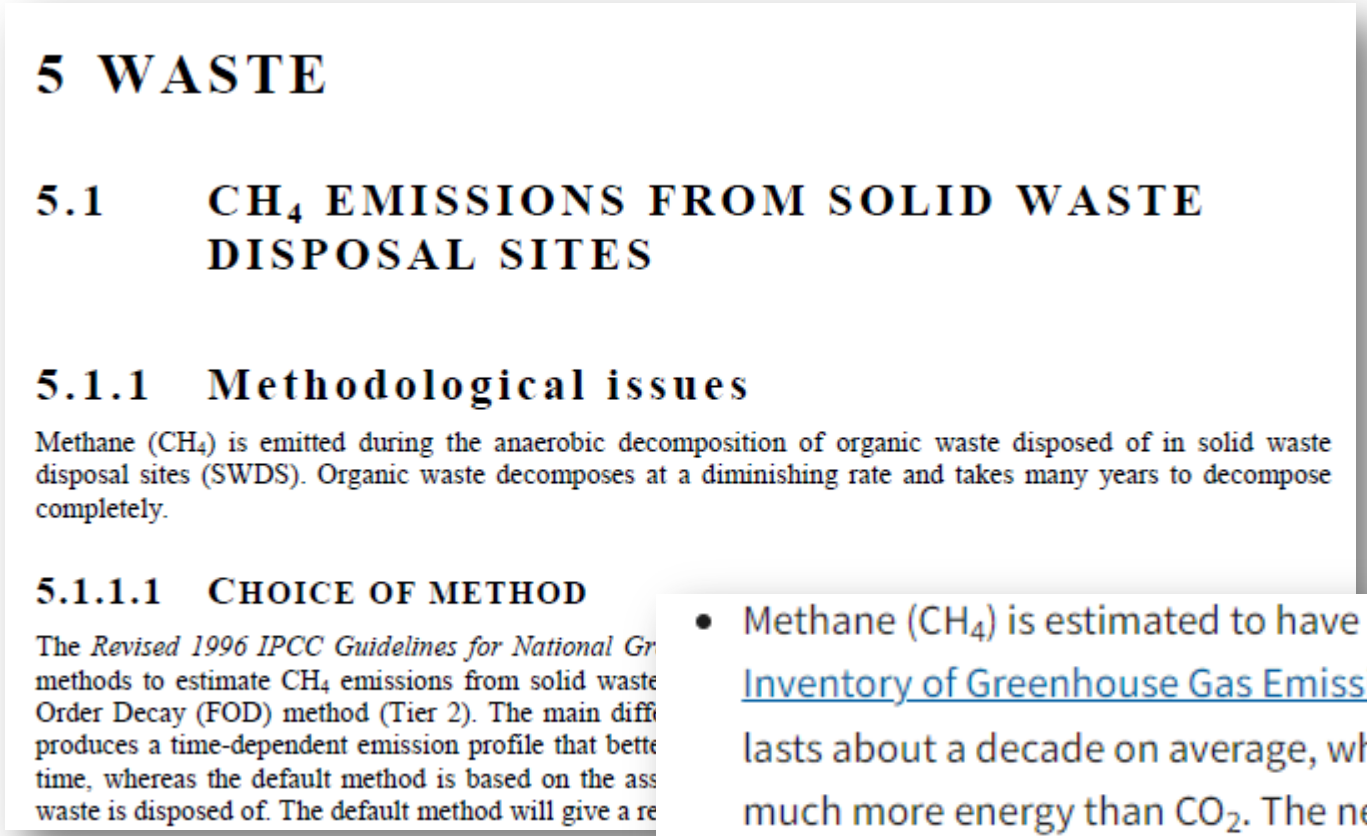


[Waste Stream Energy Content Calculator | Better Buildings Initiative]

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

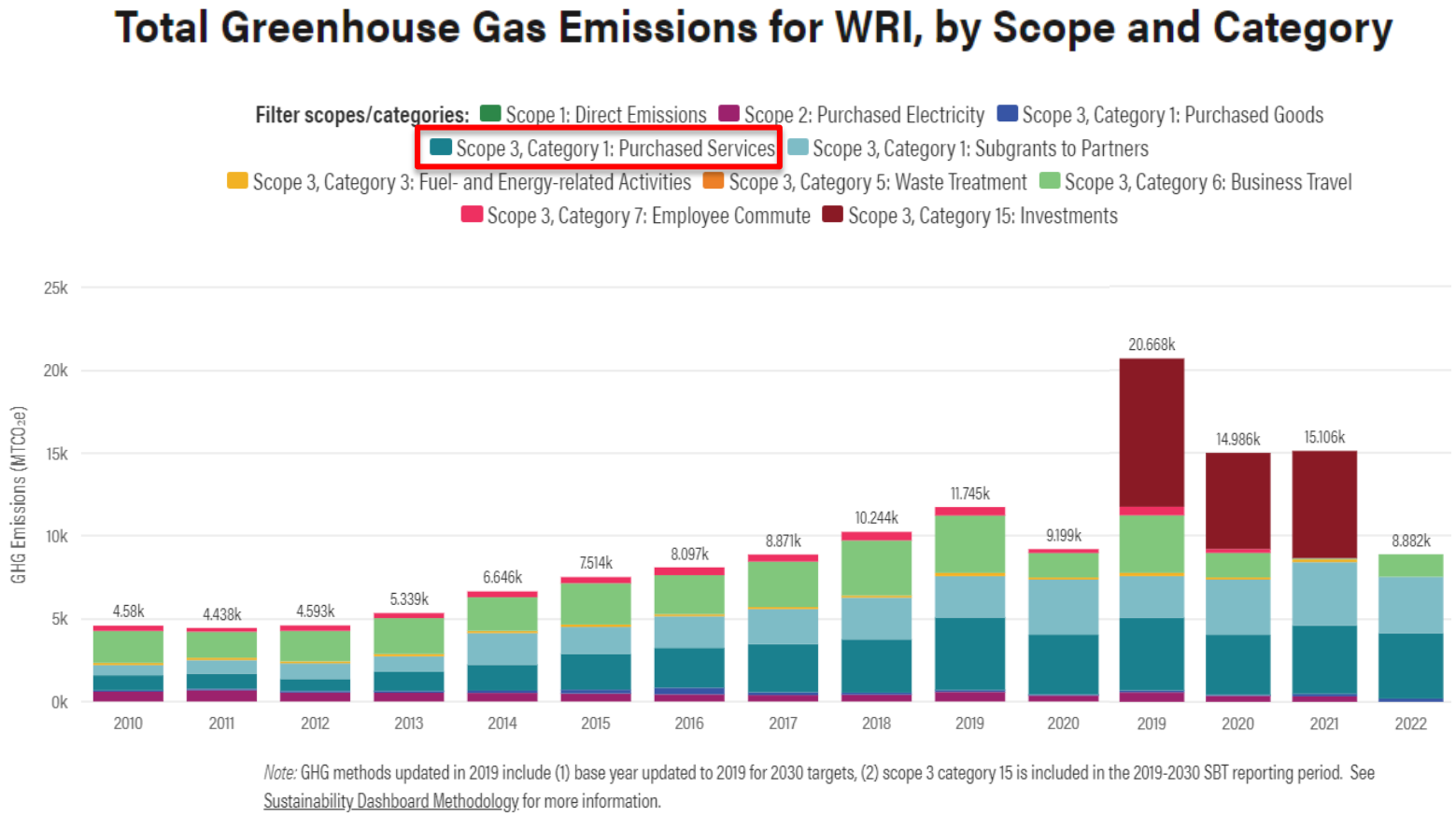
- Methane (CH_4) is estimated to have a GWP of 27-30 over 100 years (Learn why EPA's U.S. Inventory of Greenhouse Gas Emissions and Sinks uses a different value.). CH_4 emitted today lasts about a decade on average, which is much less time than CO_2. But CH_4 also absorbs much more energy than CO_2. 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

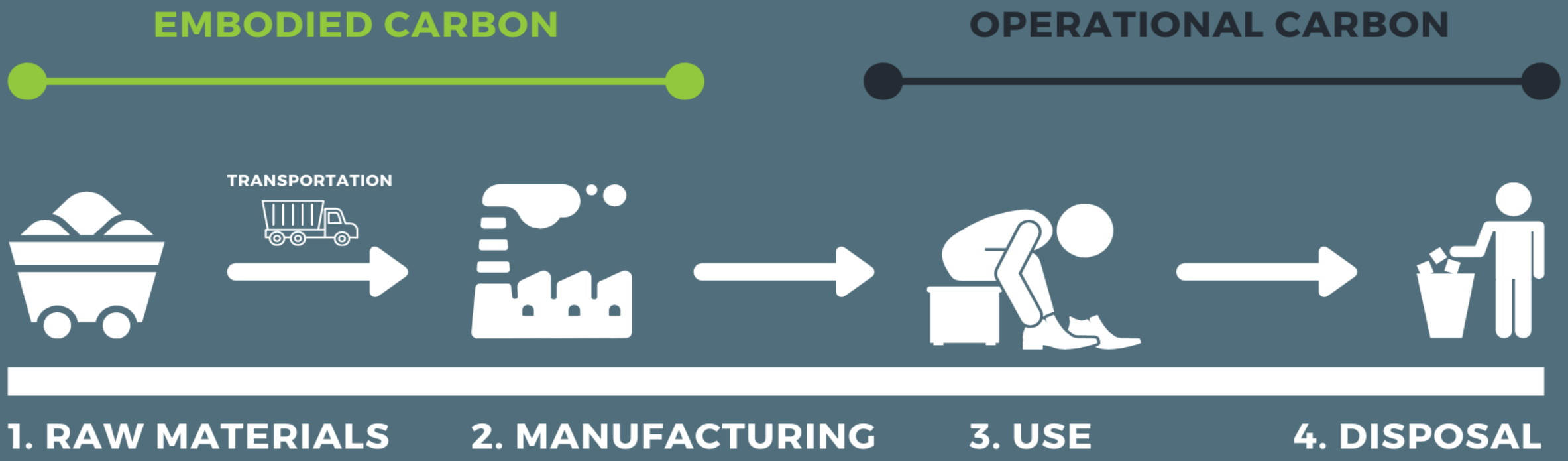
Contributions to Scope 3 Emissions

- Purchased goods and services contribute significantly to total emissions



WRI Total Greenhouse Gas Emissions

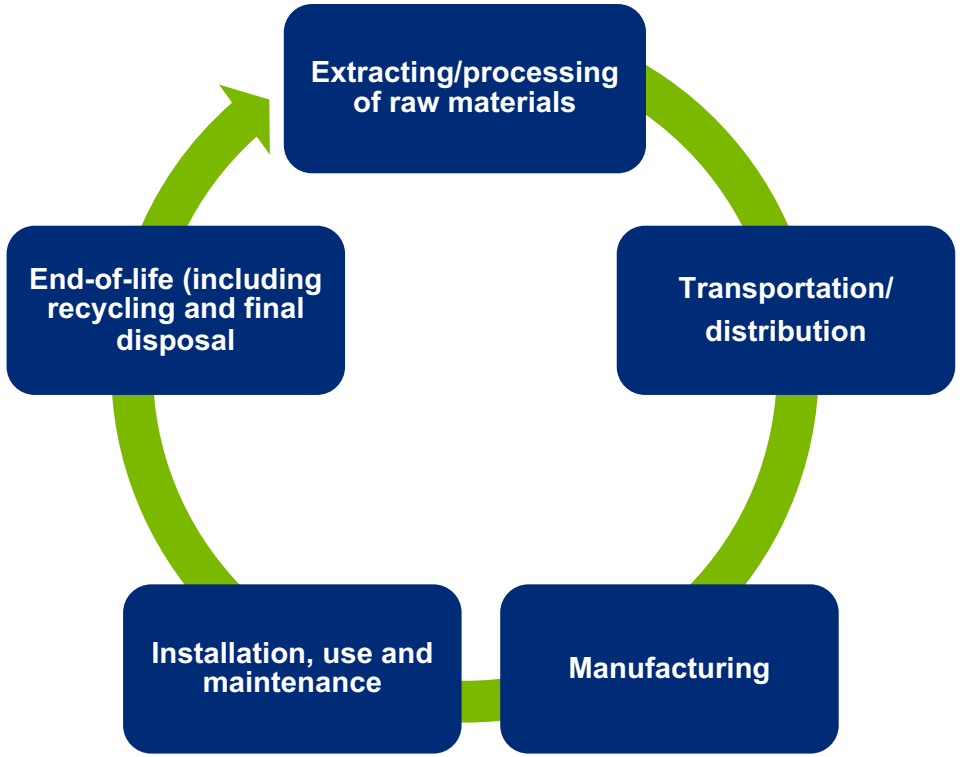
Embodied Carbon Life Cycle



Procurement and Life Cycle Assessment

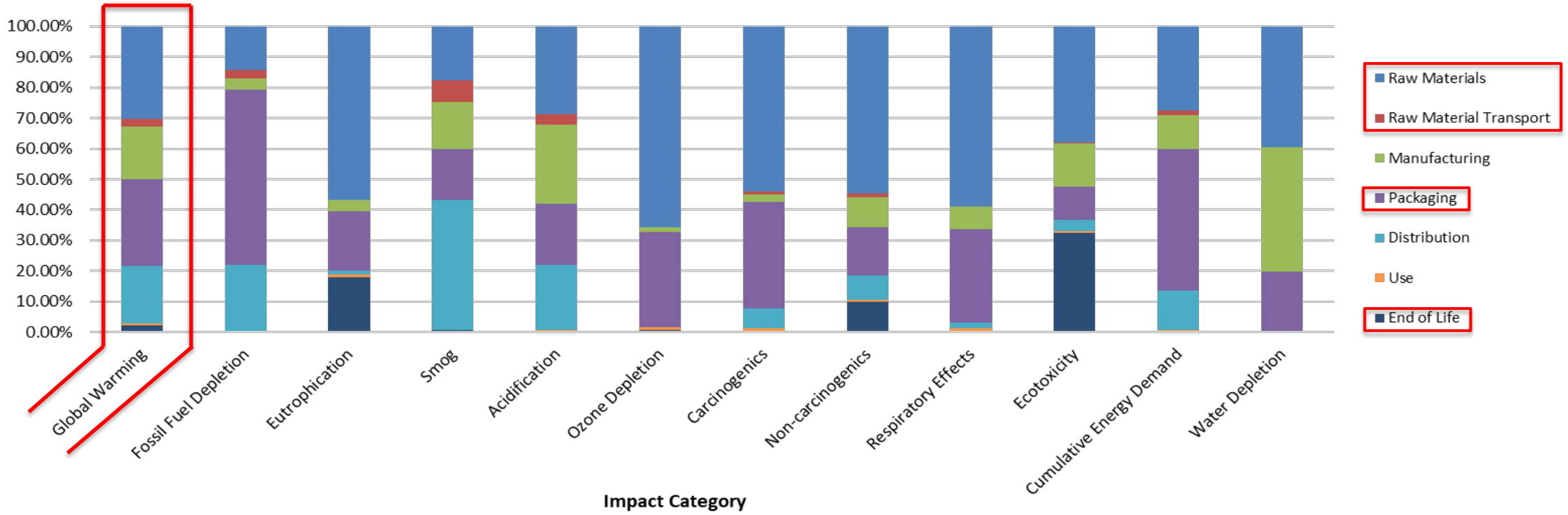
Recall life cycle thinking…

- 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



Poll: True or false - procurement is only related to the products purchased.

Please respond to the Zoom poll

Answer: False

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

- **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
  - Use this information to identify hotspots or areas of focus
    - Specific resources, suppliers, waste outlets, etc.
  - Create a list of suppliers or services who contribute to the focus area(s)

Integrating Responsible Sourcing and Procurement

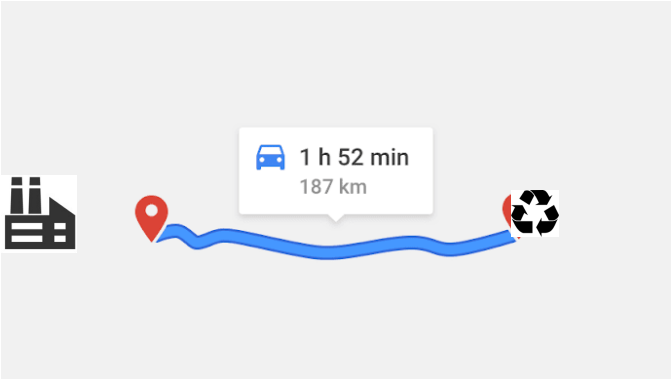
What could sustainable sourcing include?

- 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

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 or sustainability goals



Sustainable Procurement Example: Federal Agencies

- **Executive Order:** Catalyzing Clean Energy Industries and Jobs Through Federal Sustainability
  - Sec 208. Sustainable Acquisition and Procurement:
    - **Agencies shall reduce emissions, promote environmental stewardship, support resilient supply chains, drive innovation, and incentivize markets for sustainable products** and services by prioritizing products that:
      - Can be reused, refurbished, or recycled
      - Maximizing environmental benefits and cost savings through use of **full life-cycle cost methodologies**
      - **Purchasing products that contain recycled content, are biobased, or are energy and water efficient**
      - Purchasing **sustainable products and services identified or recommended by the EPA**

Integrating Sustainable Procurement

How does sustainable procurement help reduce emissions?

- "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
- Sustainable purchasing
  - Prioritizing products that have lower embodied emissions
  - Working with companies actively trying to reduce their emissions
- Innovative partnerships
  - Establishing programs to reuse materials, reduce packaging waste, or ship more efficiently

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?

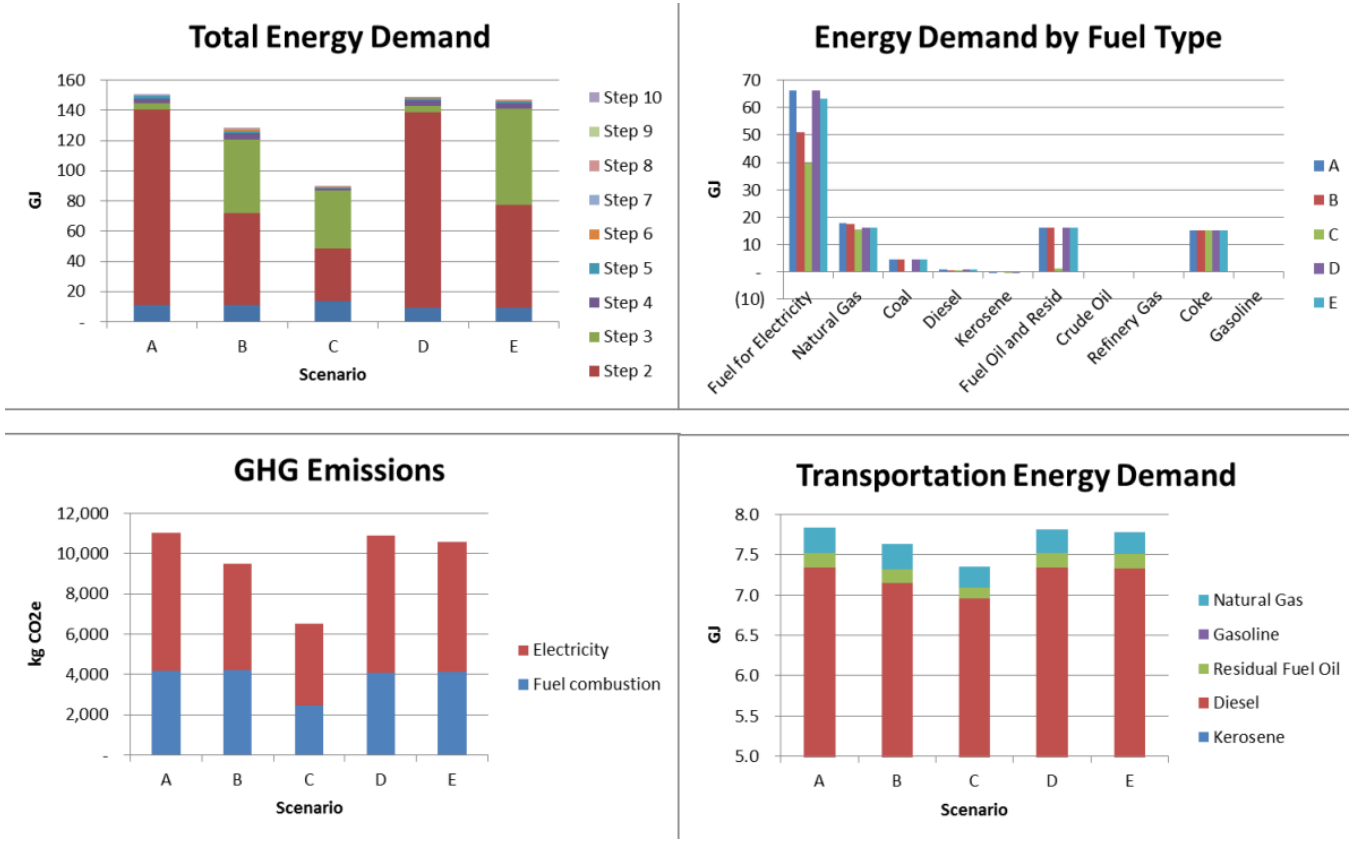
- Start with determining what sustainability criteria is most important (internally)
- Estimate how sustainable the site or company could be
  - Use data to understand baseline
  - Understand company goals
  - Establish a vision and assess its value
- Determine how your company will achieve internal 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

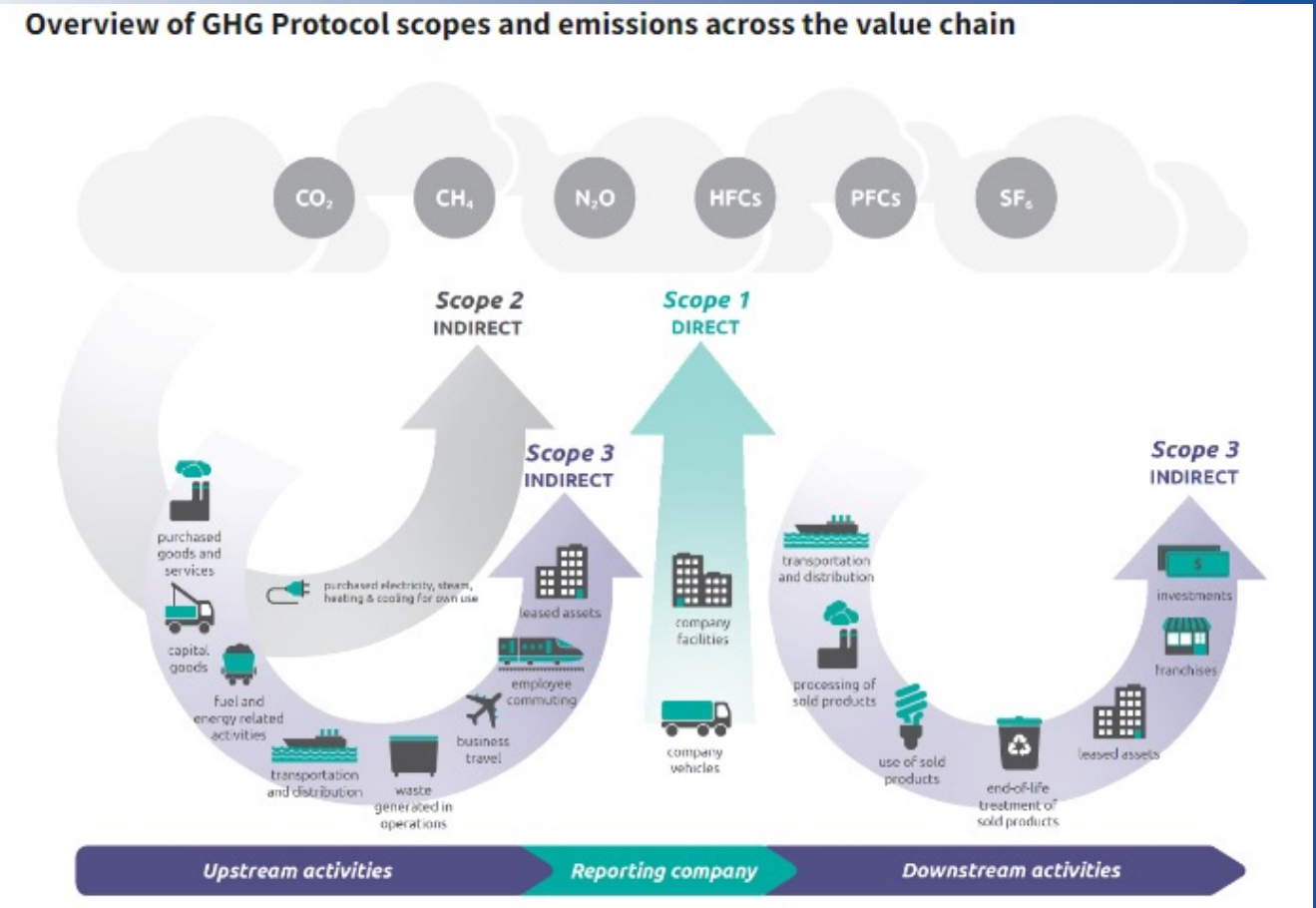
MFI Tool Example

- 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
  - June 6, 2023

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. What is the current waste diversion rate of your site and/or company? Note that some hazardous wastes may not be included in zero-waste to landfill verifications due to regulations requiring certain disposal. 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/company achieves over a 98% diversion rate.
2. Through the exercises in the previous homework assignments, are there any waste streams that were identified as being minimizable or divertible? Please note the estimated minimizable or divertible weight of each.
3. Based on the materials or streams identified in Question 2, how much would the waste diversion rate increase should potential improvements be implemented?
4. Based on the response to Questions 1 and 3, if the site and/or company is not achieving 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!

Quiz link:

Q&A