Notebook LM

- Study Aid

Key Issues in Supply Chains

Module #2: Key Issues in Supply Chains				
Tues, Sept 16 Lecture 7	Sustainability and Supply Chains	O'Rourke (2014)	•Lecture •Discuss readings	Overview of challenges and foci
Thurs, Sept 18 Lecture 8	Traceability vs. Opacity	Fripp et al (2023); Zu Ermgassen et al (2022)	•Lecture •Discuss readings	Strategies for traceability
Tues Sept. 23 Lecture 9	Market-based Governance	Lambin et al (2018)	•Lecture •Discuss readings	Key governance mechanisms and strategies
Thurs, Sept 25 Lecture 9	Certification	Vanderwilde et al (2023)	•Lecture •Discuss readings	Private Sector Initiatives
Tues, Sept. 30 Lecture 10	Government-Led: EUDR (Guest lecture: Charlotte Sedlock)	Chandra et al (2024)	•Lecture •Discuss readings	Multilateral government efforts
Thurs, Oct 2	Scope 3 Emissions	Stenzel and Waichman (2023)	•Lecture Discuss readings	GHG supply chain accounting
Tues, Oct 7	Midterm Exam Review	No Required Reading	•Review material for exam	
Thurs Oct 9	Midterm Exam	No required reading	•Multiple choice and short answer exam	MIDTERM

SCOPE 3 EMISSIONS

Lecture 11

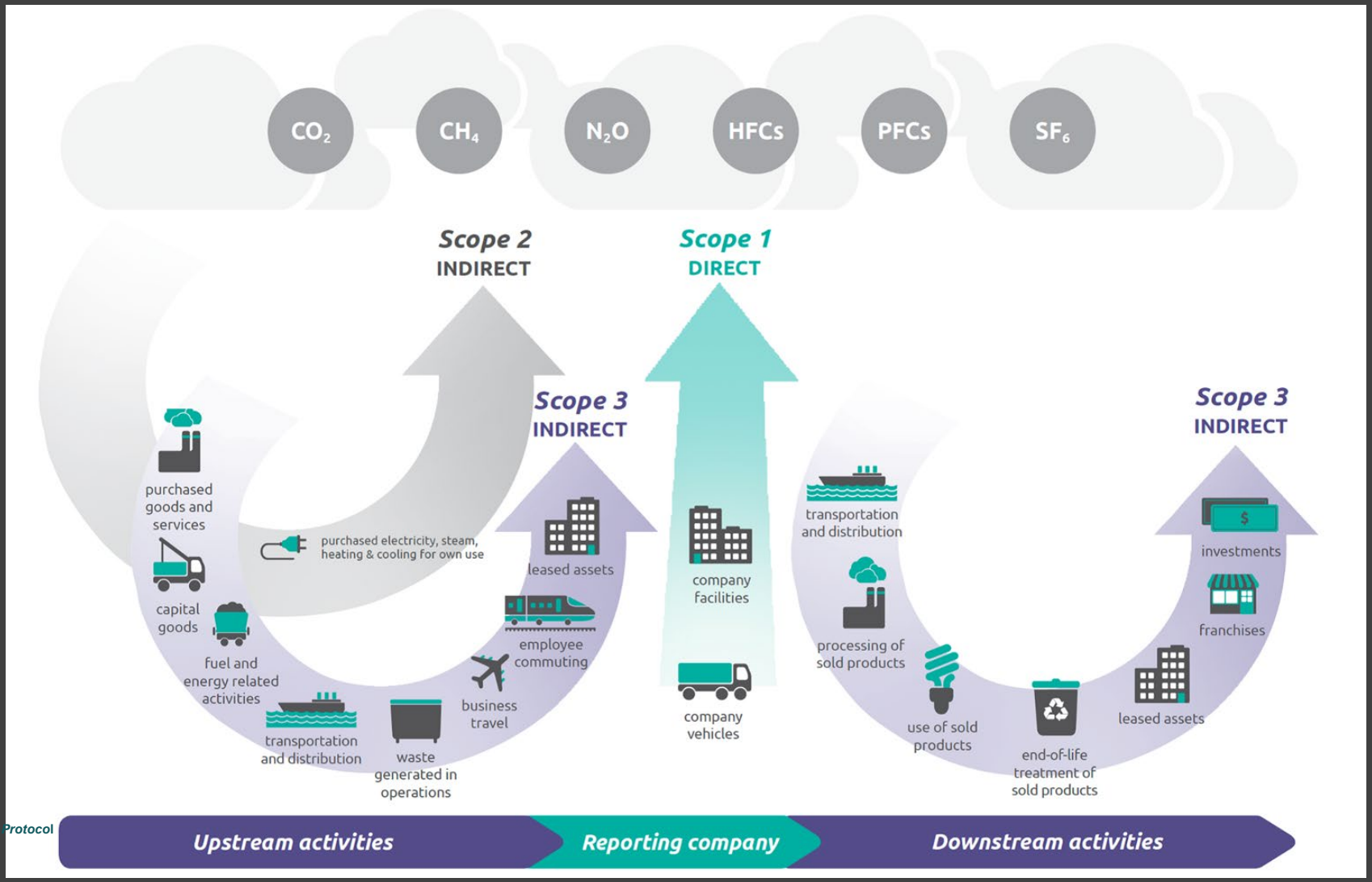
EAS 501

Tuesday, October 2, 2025

Structure

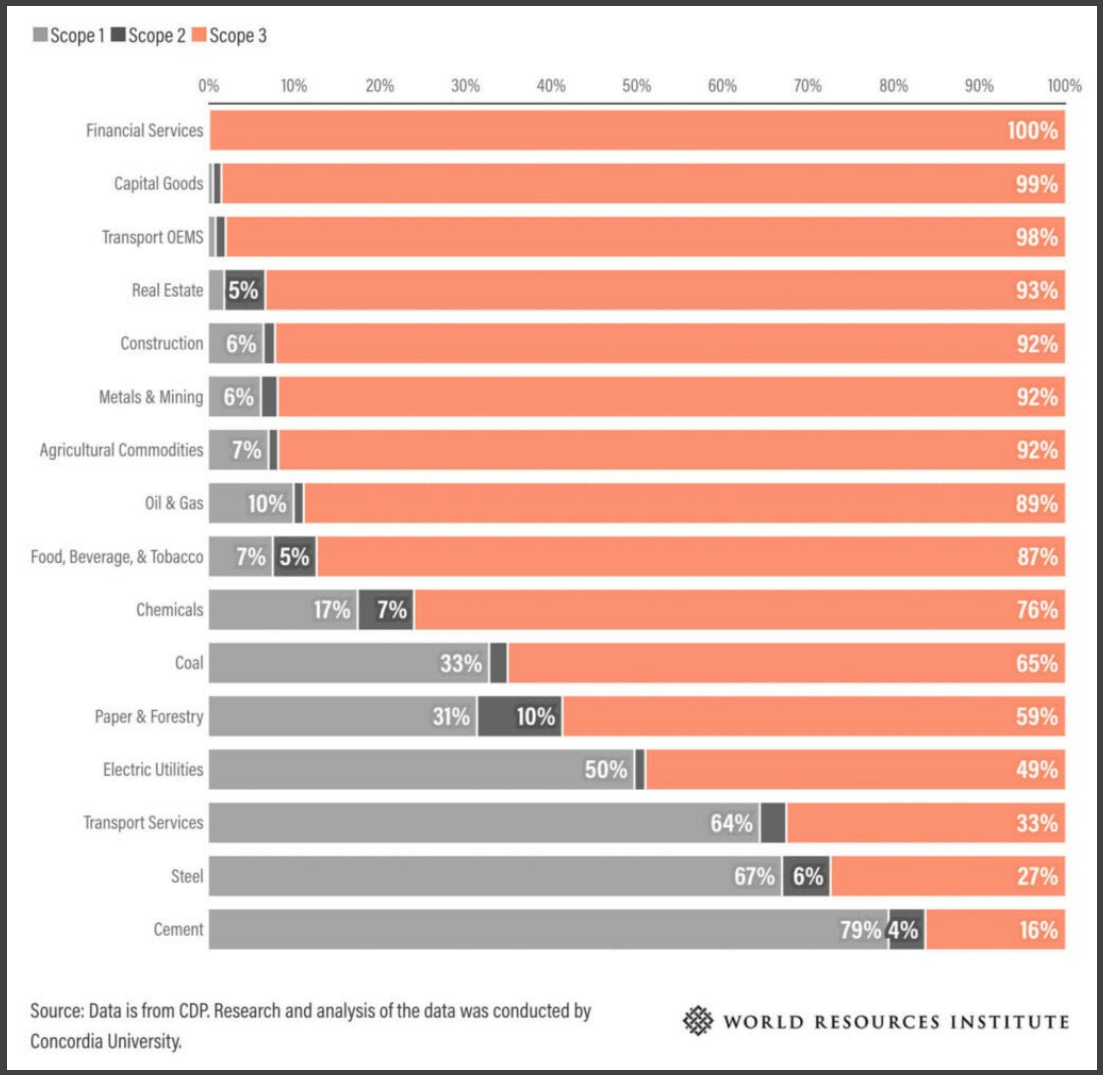
- Overview of Scope 3 emissions
- How to Calculate and Challenges
- Scope 3 Emission How-to-Videos
- Dig into Scope 3 – Choose a company and dig into how they calculate – Work in groups

Scope 1, 2, and 3 Emissions



Source: GHG Protocol

Scope Emissions by Industry



Source: Pathfinder

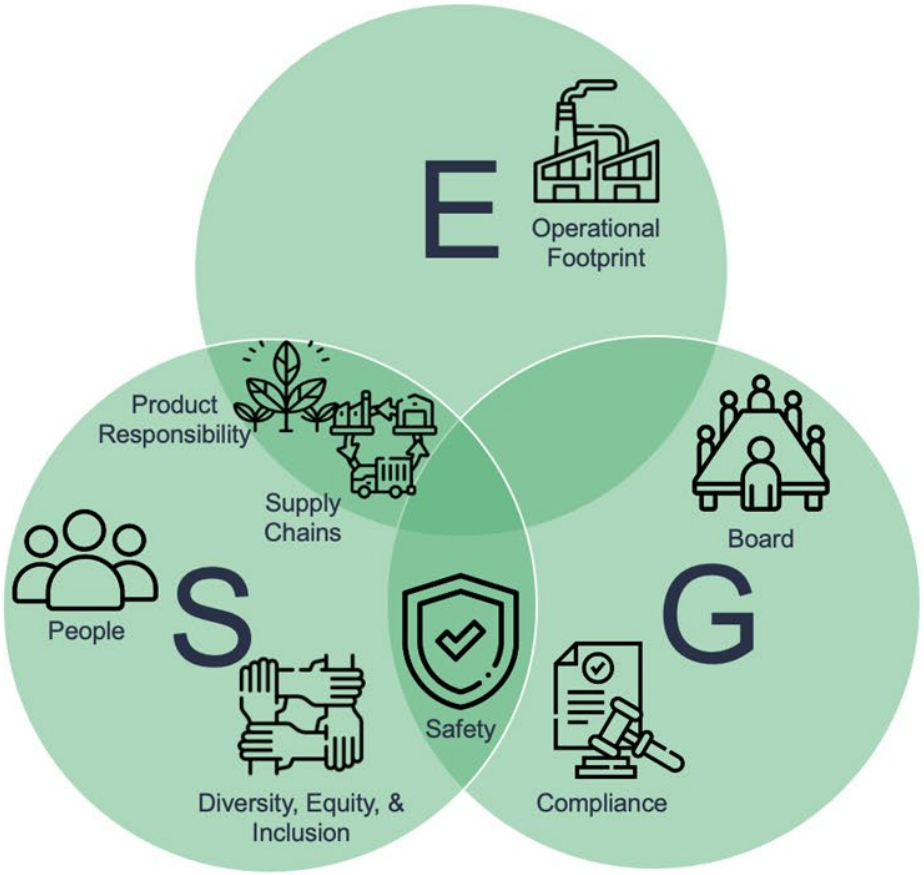
SCOPE 3 IS THE LARGEST & MOST UNDERREPORTED EMISSIONS CATEGORY

Corporate Sustainability Stems From Stakeholder Pressure To "Do Less Bad" To Mitigate Financial Risk

Environmental, Social, Governance (ESG)

- **"Traditional" corporate sustainability**
- **Influences non-financial enterprise value**
- **Global voluntary reporting standards adopted by stakeholders**
- **Mandated on certain stock exchanges and public listings**
- **Foundation for a modern corporate sustainability strategy**

Corporate ESG Categories



ESG Categories Overlap & are Categorized Differently Based on the Company

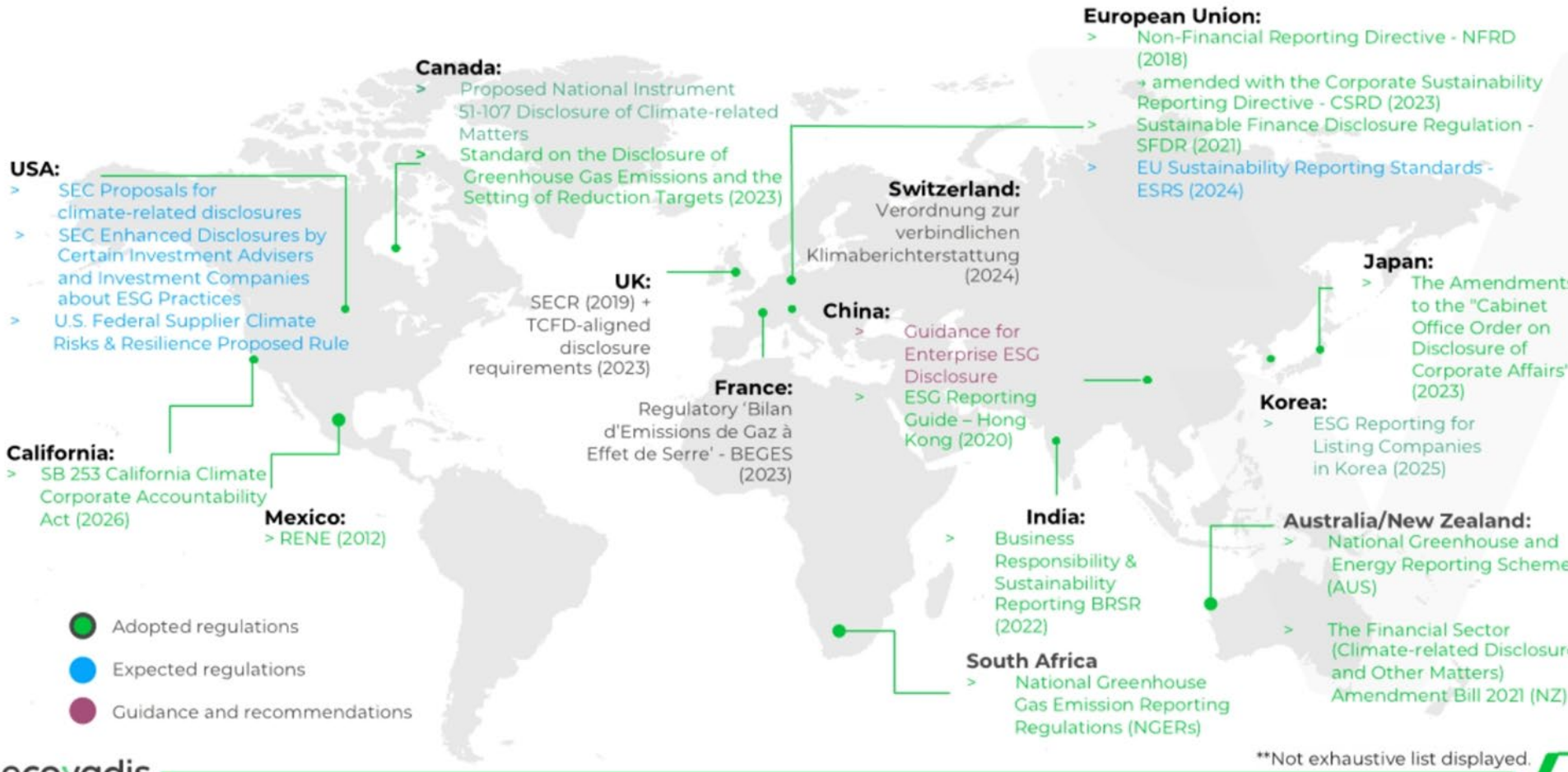
Voluntary Sustainability Standards (Alphabet Soup) Pressure Companies to Mitigate Social & Environmental Risk

In All of These Standards, Reporting On Scope 3 Emissions is Voluntary

TOPIC	METRIC	CATEGORY	UNIT OF MEASURE	CODE
Greenhouse Gas Emissions	Gross global Scope 1 emissions	Quantitative	Metric tons (t) CO_2-e	FB-AG-110a.1
	Discussion of long- and short-term strategy or plan to manage Scope 1 emissions, emissions reduction targets, and an analysis of performance against those targets	Discussion and Analysis	n/a	FB-AG-110a.2
	Fleet fuel consumed, percentage renewable	Quantitative	Gigajoules (GJ), Percentage (%)	FB-AG-110a.3
Energy Management	(1) Operational energy consumed, (2) percentage grid electricity and (3) percentage renewable	Quantitative	Gigajoules (GJ), Percentage (%)	FB-AG-130a.1
Water Management	(1) Total water withdrawn, (2) total water consumed; percentage of each in regions with High or Extremely High Baseline Water Stress	Quantitative	Thousand cubic metres (m^3), Percentage (%)	FB-AG-140a.1
	Description of water management risks and discussion of strategies and practices to mitigate those risks	Discussion and Analysis	n/a	FB-AG-140a.2
	Number of incidents of non-compliance associated with water quality permits, standards and regulations	Quantitative	Number	FB-AG-140a.3
Food Safety	Global Food Safety Initiative (GFSI) audit (1) non-conformance rate and (2) associated corrective action rate for (a) major and (b) minor non-conformances	Quantitative	Rate	FB-AG-250a.1
	Percentage of agricultural products sourced from suppliers certified to a Global Food Safety Initiative (GFSI) recognised food safety certification program	Quantitative	Percentage (%) by cost	FB-AG-250a.2
	(1) Number of recalls issued and (2) total amount of food product recalled[1]	Quantitative	Number, Metric tons (t)	FB-AG-250a.3
Workforce Health & Safety	(1) Total recordable incident rate (TRIR), (2) fatality rate, and (3) near miss frequency rate (NMFR) for (a) direct employees and (b) seasonal and migrant employees	Quantitative	Rate	FB-AG-320a.1
Environmental & Social Impacts of Ingredient Supply Chain	Percentage of agricultural products sourced that are certified to a third-party environmental and/or social standard, and percentages by standard	Quantitative	Percentage (%) by cost	FB-AG-430a.1

Legislative Push for Corporate Scope 3 Reporting

Worldwide GHG Disclosure Regulations



**Not exhaustive list displayed.

Limitations of Government Regulations

"Users are also interested to know the efforts made by companies to effectively reduce absolute GHG emissions as part of their climate mitigation and adaptation strategies, including scope 1, scope 2 and, where relevant, scope 3 emissions." (Directive (EU) 2022/2464)

"Scope 3 emissions calculations that detail acceptable use of both primary and secondary data sources, including the use of industry average data, proxy data, and other generic data in its scope 3 emissions calculations." (CA SB 253)

"Indirect emissions from upstream and downstream activities in a registrant's value chain (Scope 3), if material, or if the registrant has set a GHG emissions target or goal that includes Scope 3 emissions, in absolute terms." (SEC)

WRI Guidance for Quantifying Scope 3 Emissions

WORLD RESOURCES INSTITUTE

GREENHOUSE GAS PROTOCOL

Methods for Quantifying Scope 3 Emissions

Table [7.1] Quantification methods

Quantification method	*Description*	*Relevant data types*
Direct measurement	Quantification of GHG emissions using direct monitoring, mass balance or stoichiometry **GHG = Emissions Data x GWP**	Direct emissions data
Calculation	Quantification of GHG emissions by multiplying activity data by an emission factor **GHG = Activity Data x Emission Factor x GWP**	Activity data Emission factors

Source: GHG Protocol

Companies Use Two Data Types to Calculate Scope 3 Emissions

Table [7.3] Types of data

Data type	Description
Primary Data	Data from specific activities within a company's value chain
Secondary Data	Data that is not from specific activities within a company's value chain

Upstream scope 3 emissions

Category	Examples of primary data	Examples of secondary data
1. **Purchased goods and services**	• Product-level cradle-to-gate GHG data from suppliers calculated using site-specific data • Site-specific energy use or emissions data from suppliers	• Industry average emission factors per material consumed from life cycle inventory databases

Source: GHG Protocol

Efforts Quantify Scope 3 Emissions

1.

Install Utility Meters on Our

2.

Substitute LCA Primary Data

3.

Utilize the USEEIO Emission Factors/$ (USD) Database/BEA Codes + Annual Company Spend

Account Description	BEA sector	EF (kg CO2/
Product COGS	Vegetable oils and by-products	1.173730737
Inventory Adjustments	Vegetable oils and by-products	1.173730737
Cost Adjustment		
Freight COGS	Couriers and messengers	0.4918312388
Supplier COGS		
Travel COGS	Air transport	0.967629248
Meals COGS	Full-service restaurants	0.2644411563
Other COGS	Commercial equipment rental	0.1535985532
COGS Repairs & Parts	Commercial machinery repair	0.1520861378
Produce Costs - COGS	Fresh fruits and tree nuts	0.3919700724
Merchant Account Fees		
Health and Life Insurance	Direct life insurance carriers	0.03307967511
Workers Comp Insurance	Insurance carriers, except direct life	0.04038242616
Recruitment Fees	Insurance carriers, except direct life	0.04038242616
Recruiting Travel	Air transport	0.967629248
Recruiting M&E-50%	Full-service restaurants	0.2644411563
Relocation Costs	Air transport	0.967629248
Training and Seminars	Other educational services	0.1389524165
Payroll & Benefits Processing	Accounting, tax preparation, bookkeeping, and	0.05882895128
Employee Benefits - Other	Insurance agencies and brokerages	0.03732824848
Airfare	Air transport	0.967629248
Transportation - Ground	Passenger ground transport	0.526035738
Lodging	Hotels and campgrounds	0.2067385955
Meals - 50%	Full-service restaurants	0.2644411563
Travel - Other	Full-service restaurants	0.2644411563
Entertainment - Non Deductible	Blood sugar, pregnancy, and other diagnostic te	0.1030919586
Legal - Corporate Governance	Legal services	0.06694976285
Legal - Compliance	Legal services	0.06694976285
Legal - Contract	Legal services	0.06694976285
Legal - Disputes & Litigation	Legal services	0.06694976285
Legal - Employment	Legal services	0.06694976285
Legal - Intellectual Property	Legal services	0.06694976285
Legal - Mergers & Acquisitions	Legal services	0.06694976285
Consulting / Other Prof Fees	Management consulting	0.08667068946
PR / Press Announcements	Advertising and public relations	0.1354336573
WebSite	Internet publishing and broadcasting	0.1433783001
Tradeshows	Advertising and public relations	0.1354336573
Agency Fees	Advertising and public relations	0.1354336573
Research & Strategy	Marketing research and all other miscellaneou	0.08282808038
Video & Production	Movies and film	0.06723751493
Shopper Marketing	Advertising and public relations	0.1354336573
Paid Media	Advertising and public relations	0.1354336573
Chemicals	Medicinal and botanical ingredients	0.4487169322
Lab Supplies	Analytical laboratory instruments	0.06784087034
Produce	Fresh fruits and tree nuts	0.3919700724
Rent	Buildings and dwellings services	0.1768221838
Building Maint. Supplies, Svcs	Buildings and dwellings services	0.1768221838

Glaring Limitations of Quantifying/Reporting Scope 3 Emissions

1.

Materiality

Companies choose which Scope 3 Categories they will measure and report.
Companies can avoid measuring "hotspots".

2.

Proxy Data

"Garbage in, garbage out"
Reliance on proxy data & input/output models inaccurately capture Scope 3 emissions.

3.

Traceability/Transparency

Companies cannot accurately quantify their Scope 3 emissions (Capital Goods & Services) if they do not have complete insight into their supply chains.

4.

Interoperability

You can't compare companies Scope 3 emissions nor can they exchange supplier specific information.

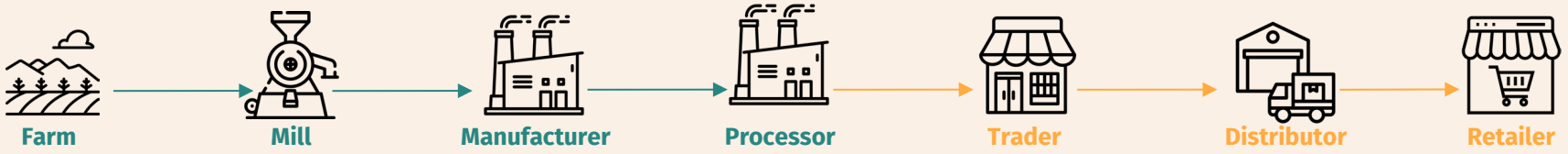
If Nike Can't Just Do It, Who Can?

Scope 3 Emissions by Category and Operational Boundaries

○ Not in SBT Scope ● In SBT Scope

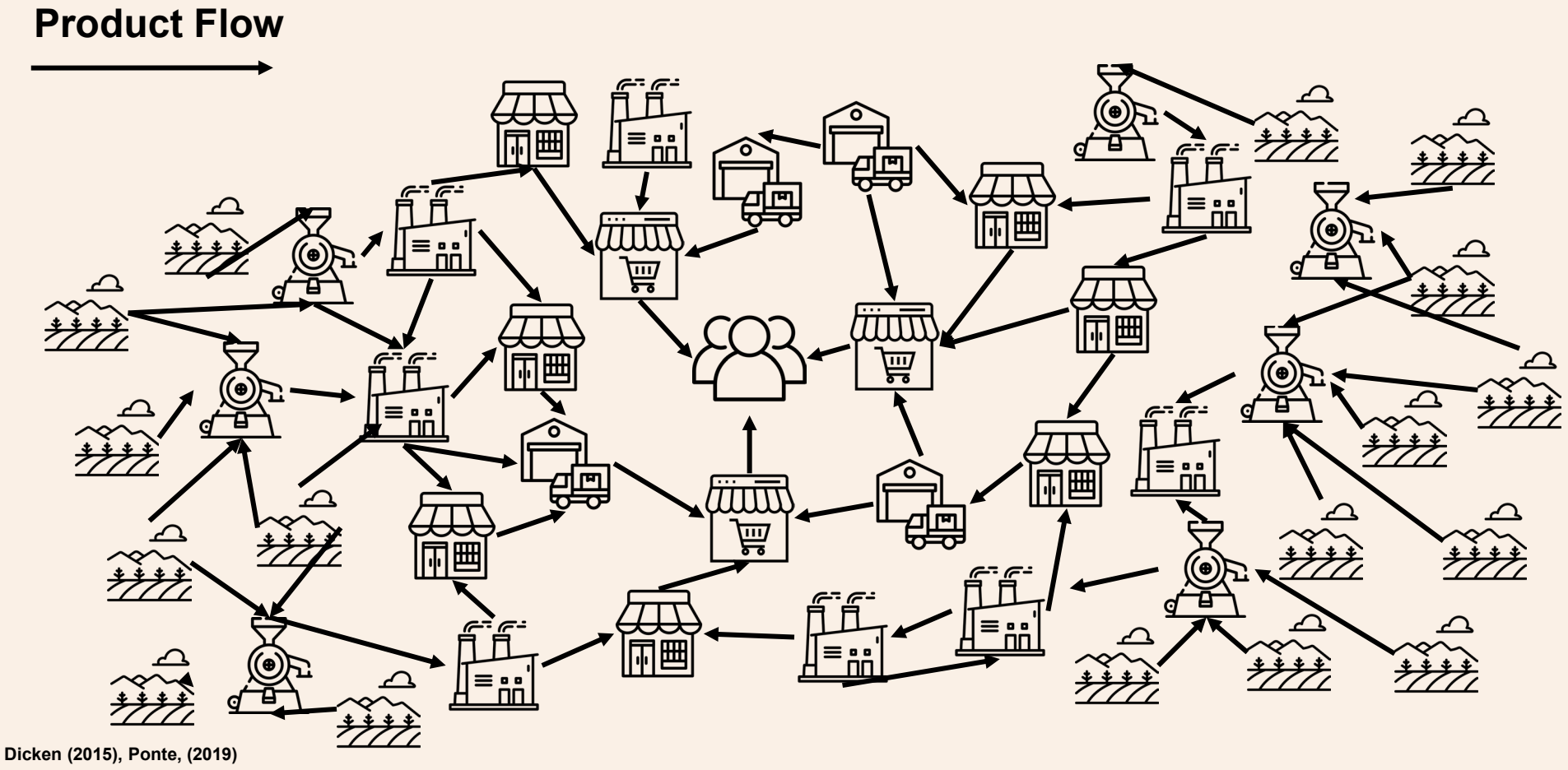
Emissions Sources		FY22 Metric Tons CO_2e and/or Evaluation Status	Scope of Reported Emissions	Emissions Calculation Methodology	% of Emissions Calculated Using Data Obtained From Suppliers or Value Chain Partners
Upstream					
1 Purchased Goods and Services	●	8,476,358	Includes emissions across NIKE brands and product engines, including from raw materials production, materials manufacturing, materials finishing, finished goods manufacturing, packaging materials, and transactions via RTFKT (since acquisition in FY22). Starting with FY22 data, end of life emissions from packaging have been migrated from Category 1 to Category 12 (End-of-Life Treatment of Sold Products) as more granular data has become available.	Emissions data is calculated using primary activity data and extrapolations. CO_2e emissions include CO_2, CH_4, and N_2O. NIKE Brand and Converse footwear finished goods manufacturing emissions data is derived from 97% primary data; apparel from 63% primary data. For this subset, vendors provide monthly energy consumption: from the local utility grid, onsite generators, other fuels, and purchased steam. For electricity: kWh values are multiplied by CO_2e emissions factors for electricity purchased from the local utility grid by the country/region in which the factory resides. For onsite generation and other fuels: CO_2e emissions are calculated using the IPCC bottoms up calculation methodology. CO_2e methodologies are used for emissions estimates outside of footwear finished goods manufacturing based on lifecycle analysis data applied to product creation data, and employ conservative assumptions to avoid understating NIKE's footprint. To evaluate NIKE's value chain footprint, we identified and quantified CO_2e emissions created at each stage of the value chain. The impact of each individual product differs considerably, based on its profile, materials used, size and weight, method of manufacture, and location of production, use, and disposal. Several internal and external tools were used to develop this estimation including NIKE's Materials Sustainability Index, Enablon, and COMPASS (life cycle packaging tool). As of FY22, we've aligned with the latest version of updated Sustainable Apparel Coalition's Higg MSI (Higg MSI) lifecycle emission factors. See GRI 305-3: Other indirect (Scope 3) GHG emissions section for details.	31%
2 Capital Goods	○	Not relevant	NIKE does not have significant investment in capital goods as most manufacturing equipment is owned and operated by contracted factories.	N/A	N/A

What We Think Supply Chains Are Like



Dicken (2015), Levy (2008)

What Supply Chains Actually Look Like



Dicken (2015), Ponte, (2019)

Scope 3 Challenges – Stenzel and Waichman

Table 1. Obstacles to data sharing and current approaches.

	Legal clarity and regulatory concerns	Missing data and action interoperability	High risk in sharing sensitive data
Description	Firms not having access to supply-chain data and facing (contractual) limitations to use and re-share (e.g., anti-trust); data localization measures limiting cross-border data flow; high levels of uncertainty leading to high regulatory costs for firms to report emissions.	Lack of harmonized standards to measure Scope 3 emissions – existing standards and sector guidelines leave room for interpretation; absence of a common infrastructure to technically exchange emission data across IT systems.	Risk of exposing data and enabling reverse engineering (e.g., product composition, supplier networks).
Current approaches	Move to mandatory and Scope 3 reporting; move to timely, reliable, and verifiable emission data; commitment to future reporting policy; regulations for the free flow of non-personal data.	Coalitions consisting of companies from a range of industries, technology players, industry-focused initiatives, standard-setting organizations, reporting bodies and regulators to define overarching standards and technical infrastructures.	Neutral data trusts to empower data holders and provide a technical environment for data processing and analysis while holding everyone accountable for his or her actions; decentralized data storage combined with homomorphic encryption technologies; cybersecurity firms will protect confidential data and information.

Scope 3 Categories Explained

- https://www.youtube.com/watch?v=XgWyU65pvVA

How to calculate emissions

- youtube.com/watch?si=hl01m33Y_3Gqk31P&v=EYABnV5yqHQ&feature=youtu.be

Examples

- https://www.oatly.com/en-us/oatly-who/sustainability-plan/sustainability-report
- https://corporate.walmart.com/purpose/esgreport
- https://impossiblefoods.com/impossible-impact-calculator