The Climate, Food, and Market Conundrum: Placing Business Emissions at the Forefront

Sumit Roy, Nitin Rao, Kritika Banerjee and Shoba Suri

Abstract

Agriculture is the second-largest emitter of greenhouse gases, even as it feeds the 8-billion global population. Around 75 percent of farms, globally, are family-owned and under 2 hectares; together they produce a third of the world's food. These smallholder farms produce 15-percent lower emissions per hectare than a large farm. Yet, smallholders bear the brunt of climate change, which threatens their livelihood. Big agribusinesses, meanwhile, are making commitments to bring emissions in their supply chain to zero, promising sizeable investments to do so. Smallholders, sitting at the bottom of their supply chain, struggle with necessary support to shift to low-emission agriculture. Is this a case of missing intent? Scope 3 targets (indirect emissions in the company's value chain, including on-farm agricultural emissions) remain ambiguous. This report makes a case for agribusinesses to report and act on their Scope 3 emissions. Scope 3 accountability is critical to any credible climate strategy in global food systems.

Setting the Context: Food Systems-Led Emissions

With the rising population and the need, therefore, to produce more food, the Green Revolution propagated the massive industrialisation of agriculture during the mid-'60s. The transformation was a global phenomenon that sought to address the need to secure food systems and enhance efficiency in food production. This 'revolution' entailed the increased use of chemicals to sow high-yielding varieties of crops, enhanced irrigation, the introduction of mechanisation, and the application of agrochemicals. This, in turn, led to increased carbon emissions from the agriculture sector.[1]

In the last two decades, greenhouse gas emissions have been on the rise due to intensive farming methods like mechanisation, the excess use of fertilisers, and forest destruction. Widespread fertiliser application releases large amounts of nitrous oxide, and livestock farming—particularly cattle—produces methane emissions.[a] Deforestation for agricultural purposes dramatically raises atmospheric CO_2 and undermines the planet's ability to regulate carbon levels.[2] Emissions from Agriculture Forest and Land Use Change (AFOLU) together account for nearly one-quarter of global greenhouse gas emissions, making them one of the most critical and complex contributors to climate change.[3] AFOLU, however, is both a substantial source of emissions and a vital carbon sink.

Emissions are generated from multiple land-based activities: methane from livestock digestion and flooded rice cultivation, nitrous oxide from synthetic and organic fertilisers, and carbon dioxide from fuel use in mechanised farming.[4] Land use changes due to deforestation, the conversion of wetlands and grasslands to farmlands, and the destruction of peatlands result in the release of carbon, while inflicting damage to the natural systems. Soil degradation resulting

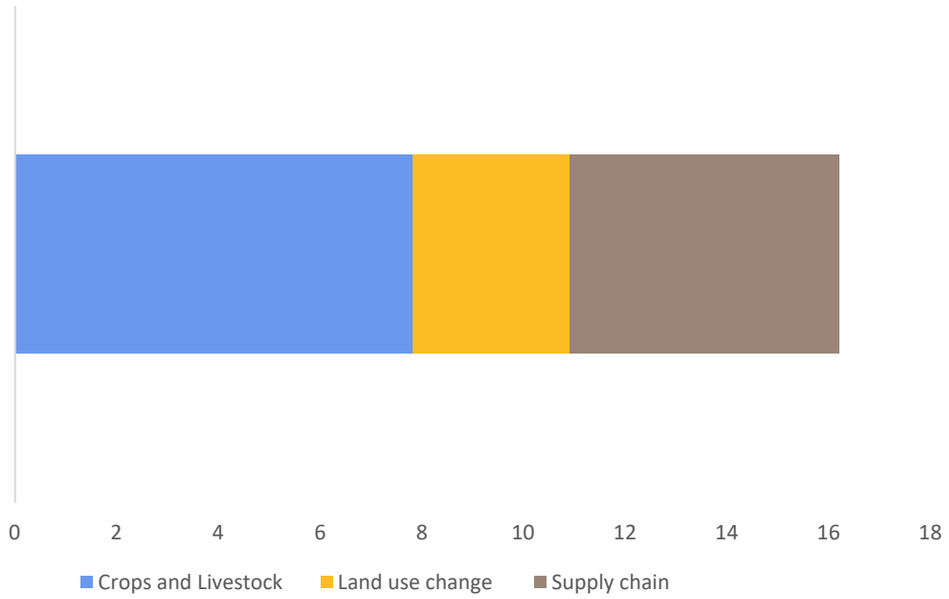
a Cattle, as ruminants, digest feed through enteric fermentation—a biochemical process in the stomach that generates methane emissions.

from erosion and heavy tillage reduces the soil's ability to store carbon. Therefore, minimising emissions and safeguarding the natural systems that support food production requires stronger land stewardship.

In 2022, global agrifood systems generated 16.2 gigatonnes (Gt) of CO_2 equivalent, which constitutes almost 30 percent of all greenhouse gas emissions. Of this, 7.8 Gt CO_2 eq, or 48 percent, was from farming and livestock activities. Changes in land use contributed another 3.1 Gt CO_2eq (19 percent). Put together, the AFOLU emissions accounted for 67 percent of the emissions produced by the agrifood systems. The remaining 33 percent was generated from supply chain activities before and after production, like processing, transportation, and retail.[5]

A trend assessment of the last two decadal (2000 and 2022) figures from the Food and Agriculture Organization (FAO) shows that total food system emissions grew by 10 percent.[6] While on-farm emissions increased by 15 percent, land-use change emissions dropped by 30 percent (deforestation-free drives and stringent forest policies), but supply chain emissions surged to 52 percent amid the urbanisation and consumption boom.[7] However, emissions from AFOLU continue to be the biggest contributor.

Figure 1: Sources of Food System Emissions



Source: FAOSTAT Analytical Brief 94[8]

Note: Emissions in Gt CO_2eq

Market Dominance in Global Food Systems

The agribusiness market is a vital actor in the food system and influences production, distribution, and consumption patterns. About two-thirds of the world's agricultural output moves to the market system whereas the rest is consumed by the producers or livestock; however, this figure fluctuates depending on the region, farm size, and crop type.[9] In high-income and developing economies, 70-80 percent of the production of the main crops, including cereals, vegetables, and livestock, enters the market.[10] This highlights how crucial the market is in making food systems work around the world.

As per the Market Growth report 2023, in 2025, the agribusiness market is valued at US$2.42 trillion, including both the upstream and downstream players.[11] The upstream market is dominated by seeds, agrochemicals, and farm machinery companies. The downstream market centres on value addition and is represented by traders, processors, food product manufacturers, and packagers.

Markets enhance efficiency by facilitating economic growth, expanding access to food, and linking producers to consumers. However, lengthy and intricate supply chains also bring risks, such as practices that accelerate biodiversity loss, increase greenhouse gas emissions or disruptions that jeopardise food security. Influencing what is produced to how it is transported from farms to consumers, agribusiness markets largely determine the environmental impact of the global food system. To achieve long-term reductions in global agrifood emissions, the market's intent and action are vital.

Food Supply Chain Emissions: Placing Scope 3 at the Centre of Corporate Climate Action

Sectoral Emissions

Different subsectors in the agribusiness market have diverse emission profiles based on the kind of production, inputs, and processes used. Globally, the dairy sector is the leading emitter, with enteric fermentation in ruminants like cattle being the primary cause, emitting large quantities of methane (a gas that is 28 times more powerful than CO_2) over a 100-year period. The sector's emissions also stem from managing manure and producing feed. Oil crops like soybean and palm oil are associated with considerable emissions resulting from deforestation and peatland drainage, especially in tropical areas. Fertiliser use also adds to the amount of nitrous oxide released. The emissions in the beverage sector—which includes coffee, tea, and cocoa—result from deforestation, inputs for growing crops, processing, and transportation.[b,12]

b Pulses, on the other hand, have a smaller carbon footprint since they fix nitrogen naturally, implying that they do not need a high dose of synthetic fertilisers, and are known to be a climate-friendly source of protein.

Table 1: Emissions from Key Agricultural Sectors, Global

Sector	Key Product(s)	Annual Production (Mt)	Intensity (kg CO_2eq/ kg)	Total Emissions (Gt CO_2eq)/ year	Percent of Agrifood Total	Main Sources
Dairy	Milk	900	3.2	2.9	18	Enteric CH_4 (50%), manure N_2O (30%), feed (20%)
Meat – Beef	Beef	60	60	3.6	22	Enteric CH_4 (45%), Land Use Change (LUC)/ deforestation (40%)
Meat – Pork	Pork	115	7.1	0.8	5	Manure N_2O (40%), feed (35%)
Meat – Poultry	Poultry meat	135	6.9	0.9	6	Feed (60%), manure (30%)
Oilseeds/ Oils	Palm oil & soy oil	480	4.0 (avg.)	1.9	12	LUC (50%), fertiliser N_2O (30%)

Sector	Key Product(s)	Annual Production (Mt)	Intensity (kg CO_2eq/ kg)	Total Emissions (Gt CO_2eq)/ year	Percent of Agrifood Total	Main Sources
Pulses	Dry pulses/ legumes	90	0.9	0.08	<1	Soil N_2O (60%), irrigation (20%)
Beverages	Coffee, tea, cocoa,	21 (10 coffee + 6 tea + 5 cocoa + 175 sugarcane)	2.2 (weighted avg.)	0.3	2.7	Coffee/ cocoa: LUC & processing
Subtotal of the selected sectors	—	—	—	10.6	65	—

Source: Multiple sources[13,14,15]

Note: LUC – land Use Change, CH4 – Methane, N2O – Nitrous Oxide.

Agribusiness conglomerates control global commodity flows, from seeds to supermarket shelves, exercise centralised power over inputs, processing, trade, and retail. This makes them both primary drivers of emissions and potential pivotal agents for the decarbonisation of the agricultural supply chain.

The Scope 3 Blind Spot

Agribusiness companies are among the world's largest GHG emitters because the larger share of their climate impact comes from land-based activities.[16] This brings the focus on Scope 3 emissions[c]—those generated across the entire value chain through agricultural production, supply chain operations, and changes in land use and product use. Scope 3 emissions routinely dwarf direct operational emissions (Scopes 1 and 2) yet remain the least addressed since they occur outside a company's immediate control.

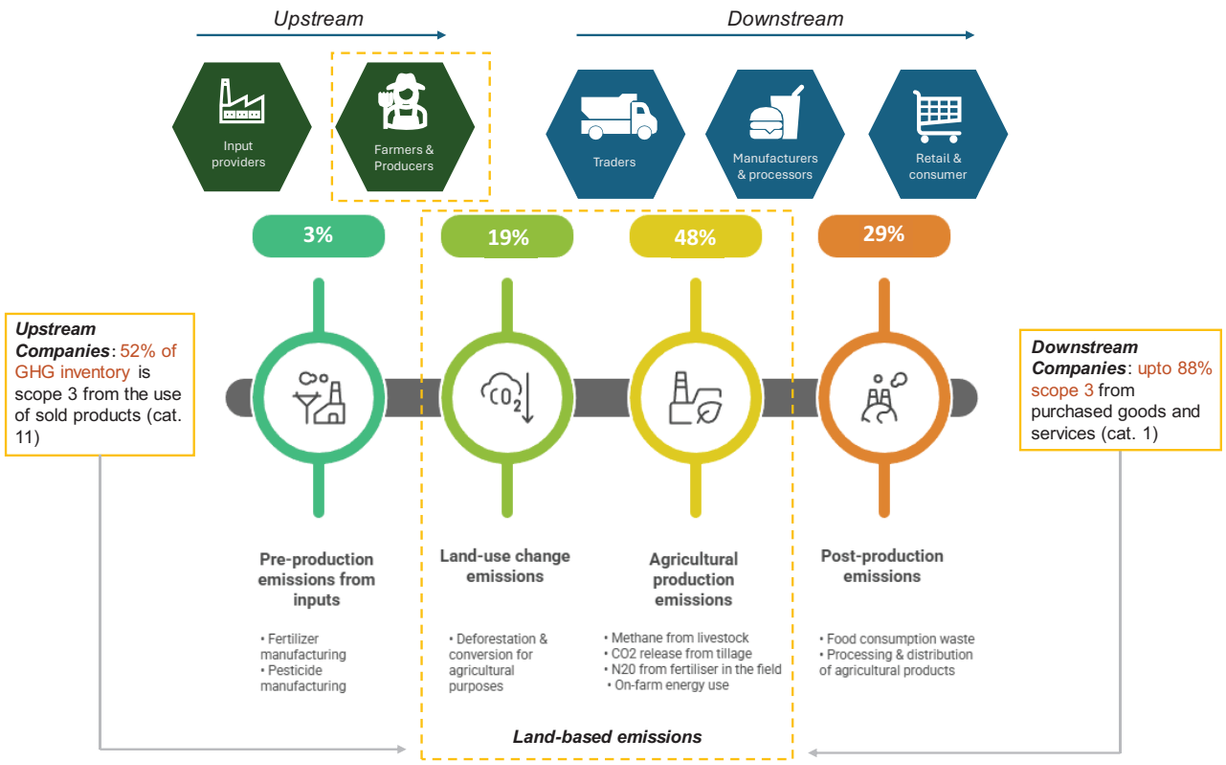
In global food systems, these indirect emissions make up the overwhelming majority of corporate climate footprint, ranging from 90 to 99 percent.[17] They capture the full lifecycle impact of food production, from on-farm practices to processing and distribution. For agribusiness companies, ignoring Scope 3 means underreporting climate impact by up to 95 percent, undermining credibility, risk management, and Paris Agreement-aligned decarbonisation. Tackling Scope 3 is, therefore, essential for credible climate action in agribusiness.[18]

For agri input companies, Scope 3 downstream emissions can comprise up to 67 percent of their total GHG footprint, while for food companies, Scope 3 upstream emissions can reach as high as 88 percent. Addressing these indirect but large emissions is critical to any credible climate strategy in global food systems.[19]

---

c Scope 1 - direct GHG emissions from sources owned or controlled by the company, for example, emissions from combustion in owned or controlled boilers, furnaces, and vehicles.
Scope 2 - indirect GHG emissions from the generation of purchased electricity consumed by a company. Purchased electricity is defined as electricity that is purchased or otherwise brought into the organisational boundary of the company.
Scope 3 – other indirect GHG emissions that allow for the treatment of all other indirect emissions. Scope 3 emissions are a consequence of the activities of the company but occur from sources not owned or controlled by the company. Some examples of these activities are the extraction and production of purchased materials; transportation of purchased fuels; and use of products and services.

Figure 2: Land-based Emissions in Agriculture



Source: TraceX Technologies[20]

Recording and reporting Scope 3 emissions is a challenge for agribusiness companies due to structural shortcomings. Given the complex and fragmented nature of the supply chain, it is difficult for companies to track emissions beyond their first-tier suppliers. This means that a sizeable part of Scope 3 emissions is not accounted for.[21] Second, data gaps are common, especially when smaller suppliers are unable to measure emissions. As a result, businesses have to rely on secondary estimates that are not always accurate.[22] The process is made exponentially more difficult by disparities in methods, lack of resources and knowledge, and the absence of a common reporting framework.[23] Finally, verification is challenging, and claims are therefore harder to establish because Scope 3 is outside a company's direct control, making agribusiness companies unsure about the data that is reported. These challenges make reporting on Scope 3 emissions uncertain, expensive, and not trustworthy.

Science Based Target Initiative: A Strategic Opportunity for Scope 3

In response to the challenges faced by agribusinesses in measuring and minimising Scope 3 emissions, the Science Based Targets initiative (SBTi)[d] has formulated the Forest, Land and Agriculture (FLAG) guidance. FLAG guidance provides sector-specific methods and pathways that make ambitious Scope 3 target-setting both feasible and enforceable for land-intensive industries. Under this guidance, agribusiness companies must set near-term (5–10 years) and long-term (net-zero by 2050) targets that cover direct operations (Scopes 1 and 2), as well as the dominant value-chain impacts in agriculture (Scope 3). The companies are required to incorporate at least 67 percent of Scope 3 emissions in their short-term goals and 90 percent in their long-term goals.[24] These goals must focus on land-use change, deforestation, and soil carbon removal action.[25] Accurate accounting for land-based emissions ensures that initiatives like deforestation-free supply chains and the restoration of ecosystems are at the heart of decarbonisation.[26]

SBTi, launched in 2015, has turned Scope 3 from a blind spot into a strategic opportunity for agribusinesses, although progress has been gradual. Less than 12 percent of the top agribusiness companies have validated their Scope 3 targets.[27] This raises questions about the sector's preparedness and intent. Also, if flexibility is exploited to omit important sources of emissions, it could affect the transparency and accountability of the companies in reducing emissions throughout their supply chain.

d SBTi is an organisation that helps companies and financial institutions set GHG emissions reduction targets aligned with climate science. It was founded by the UN Global Compact, Climate Disclosure Project, World Wide Fund for Nature, and World Resources Institute to drive corporate action towards a net-zero economy.

Silent Market: Inaction on Scope 3 Emissions

Although many global agribusiness companies have made commitments on sustainability and presented elaborate plans to reach net-zero emissions targets, Scope 3 targets, which constitute the majority of their climate impact, are largely missing from them. Most investments are made in Scope 1 and 2 categories, where emission reductions are more direct and easier to measure. This comprises renewable energy (US$336 billion annually), sustainable transportation (US$169 billion), energy efficiency, and the appropriate infrastructure.[28] Investments in Scope 3 have grown in recent years, but they comprise a fraction of the US$1.3 billion in climate finance.[29]

This mismatch is not because companies lack insights into recording and reporting; it is a strategic choice resulting from business intent and governance preferences. To reduce emissions throughout the supply chain, companies must change their ways of buying, use of raw materials, and choice of products. Transparent Scope 3 accounting would also mean exposure to external verification, scrutiny from investors, and possible legal complexities. In reality, climate goals are often seen as a way to improve the company's image rather than a primary business goal. Companies, thus, avoid dealing with the main causes of agricultural emissions. The sector's principal goal remains transactional and not transformative. The imperative is to link commercial success and environmental performance.

Food Market Pattern: Loud on 'Regenerative Agriculture', Silent on Scope 3

Between 2019 and 2021, major global agribusiness companies started considering soil health, biodiversity, and carbon sequestration as pivotal climate solutions after the Paris Agreement.[30] By 2024–2025, regenerative agriculture[e] became an important component of their net-zero narrative, courtesy big commitments and programmes made for farmers.[31,32,33] Globally, more than 100 big companies, from food manufacturers to commodity majors, have promised to implement regenerative agriculture practices across millions of hectares by 2030.[34] Regenerative agriculture has quickly become the most popular story about sustainability in industry as it offers clear co-benefits that appeal to consumers, investors, and civil society.

Yet, this enthusiasm hides a critical gap. Few of these companies have set or validated science-aligned Scope 3 targets. Only a few leading companies have committed to credible Scope 3 reduction pathways under the SBTi, revealing a disconnect between public claims and climate accountability.

Indeed, declarations about 'regenerative agriculture' allow companies to present themselves as climate solution-providers without confronting deeper emission-intensive business models. Soil carbon gains are often overstated, difficult to measure, and are reversible; meanwhile, the major drivers of the food system's emissions, including deforestation, enteric methane, and synthetic fertiliser dependence, remain largely unaddressed. The transition towards regenerative agriculture comes with an initial investment towards seed, preparation of bio-inputs, and new farming systems.[35] In many cases, the costs and risks of transition are shifted to farmers, while companies retain control over the sustainability narrative.[36]

e 'Regenerative agriculture' is a farming approach that restores soil health, enhances biodiversity, and improves ecosystem resilience while sustaining farmer livelihoods and productivity.

Regenerative agriculture cannot achieve the necessary scale of decarbonisation needed to link agrifood systems with global climate objectives without explicit Scope 3 emission reductions. Companies may improve their methods on the ground; however, if deforestation continues, methane emissions increase exponentially, or fertiliser dependence increases in the value chain, the overall effect will still be adverse.

Regenerative agriculture is separate from Scope 3 commitments, which means that big promises are made with little accountability. Companies need to connect regenerative techniques to verifiable emission reductions, set land-based goals, make sure that farmers receive a fair share of the benefits, and commit to SBTi-aligned Scope 3 targets to effect real change. A credible mechanism for systemic decarbonisation in global food systems is an urgent sustainability need.

Closing the Loop

Addressing Scope 3 Emissions: The Business Case for Companies to Invest

Addressing Scope 3 emissions is a strategic opportunity for agribusiness companies to efficiently combat climate change, unlock capital, and address the rising regulatory demands on the global food system.

Climate Resilience

Scope 3 emissions cover the entire value chain, including farming practices that are affected by climate change impacts like droughts, floods, and frequent pest outbreaks. When companies encourage suppliers and smallholder farmers in their supply chain to adopt climate-smart and regenerative farming methods, it leads to healthier soil, improved biodiversity and stable ecosystems, and together they reduce on-farm emissions.

It also makes the farming system more resilient to climate shocks and, in turn, less susceptible to supply chain disruptions, offering a win-win for both smallholder farmers and agribusiness companies. Investing in scope 3 emissions de-risks crop production through biodiverse and multi-cropping agricultural systems. Making the farmer climate-resilient is a good business strategy to ensure a consistent and improved supply of raw material. A resilient and consistent supply chain shields businesses from escalating climate risks, such as crop failures, volatility in raw material availability, and regional disruption, thereby reducing the need for costly expansion into new geographies or continual replacement of suppliers.

Investment Targeting and Climate Finance Flows

Scope 3 emissions open up access to a growing pool of climate finance, such as green bonds, sustainability-linked loans, blended finance, and subsidies designed to support the transition to low-emission value chains. As part of Environmental, Social, and Governance (ESG) requirements, investors and financial institutions are increasingly demanding full Scope 3 disclosures and plans for reducing them. Companies that make strong Scope 3 promises are more likely to attract investors, lower their borrowing costs, and take advantage of incentives for climate action.[37] Addressing Scope 3 emissions is not just good for the planet—it is good for business and society.

Carbon Insetting and Market Differentiation

Carbon insetting—a process that injects money directly into the supply chain to lower or offset emissions through initiatives like funding soil carbon projects or agroforestry—creates shared value. It can help farmers earn more income, increase product shelf life, and set companies apart in markets that are becoming more environmentally sensitive. This alignment encourages long-term supplier involvement and ecosystem services, which creates a virtuous cycle of adaptation and mitigation in line with business net-zero goals.

Inclusion of Smallholder Farmers and Suppliers

Smallholder farmers are central to the agribusiness supply chains. Scope 3 strategies that support and reward smallholders through technical assistance, regenerative project finance, or access to carbon markets enhance social inclusion and rural development while slashing emissions. Managing and mitigating Scope 3 emissions makes agribusinesses more climate-resilient. It provides the agrifood system access to climate funding and investment, and supports the sector in reducing emissions through new pathways such as insetting.

Recommendations for Agribusiness

The limited disclosure and slow progress in Scope 3 target-setting among agribusinesses show a critical gap in climate accountability. This lack of transparency weakens the credibility of corporate climate commitments and also delays sector-wide progress toward decarbonisation. There is a need for the agribusiness to rightly understand, meticulously plan, systematically act, and strategically collaborate to address Scope 3 emissions in their supply chain.

Table 2: Pathways for Addressing Scope 3 Emissions by Indian Agribusiness Companies

Understand	Establish accurate and verified emissions baselines, including land-use change, soil carbon loss, fertiliser and input use, and livestock emissions.
	Assess and prioritise areas where climate impact is high.
Plan	Fully disclose material Scope 3 emissions aligned with global reporting standards.
	Commit to time-bound Scope 3 emission reduction pathways aligned with SBTi and FLAG guidance for a 1.5°C future.

Act	Commit, allocate, and invest to address Scope 3 emissions.
	Embed decarbonisation within the core business strategy by reforming procurement, supplier engagement, and finance allocation to ensure emission reductions translate into commercial outcomes.
	Deploy digital MRV (Monitoring, Reporting & Verification), supplier data-sharing, and satellite-driven land tracking to monitor progress credibly.
	Support regenerative agriculture, agroforestry, soil carbon enhancement, and methane reduction solutions that improve farmer resilience and incomes.
	Strengthen traceability systems, collaborate with suppliers and farmers, and disclose progress regularly to demonstrate real-world impact.
Collaborate	Drive collective industry action with governments, standard-setters, and financiers to unlock climate finance and harmonise reporting expectations.

Source: Authors' own

Agribusiness companies must participate in regular, standardised tracking and disclosure of their Scope 3 commitments, policies, and performance. This necessitates creating indexation based on multiple factors like the identification of the value chain boundary and disclosure of the data, governance accountability and capabilities, business strategies to include transition, investment, suppliers' engagement and performance of the companies in setting and meeting targets of Scope 3 emission through verification. The indexation will help (a) identify leaders and laggards in value chain decarbonisation, (b) create healthy competition that rewards ambition and progress, and (c) enable peer learning and scaling of successful models across the sector. This is critical to maintain transparency and convert data into decisions through the development of a digital dashboard that allows companies to monitor emissions breakdown, risks in commodity sourcing, investment needed and mobilised, and supplier- and farmer-level engagement metrics.

Most importantly, companies must ensure that Scope 3 strategies deliver direct value to smallholder farmers who are the primary stewards of land and key drivers of land-based emissions and removals. Therefore, they need to be incentivised to transition to low-emission farming through fair pricing and buying and procurement security to support low-carbon production shifts. This has to be combined with investments in training on climate-smart and regenerative farming practices, and access to digital tools to improve productivity while reducing emissions on the farm. Finally, it is imperative to ensure equitable benefit sharing from carbon insetting, ecosystem services markets, and green financing mechanisms.

Endnotes

1 Prashant Kumar, "Green Revolution and Its Impact on Environment," *International Journal of Research in Humanities & Soc. Sciences* 5, no. 3 (2017), https://www.raijmr.com/ijrhs/wp-content/uploads/2017/11/IJRHS_2017_vol05_issue_03_08.pdf.

2 Green.Earth, 'Top 10 Causes of Deforestation,', May 17, 2023, https://www.green.earth/blog/top-10-causes-of-deforestation

3 Intergovernmental Panel on Climate Change, "Agriculture, Forestry, and Other Land Use – AFOLU," Working Group III contribution to the IPCC Fifth Assessment Report, https://unfccc.int/sites/default/files/3_tubiello_sbsta-ipcc_special_event_6june.pdf

4 Sonja Vermeulen and Eva Wollenberg, "A Rough Estimate of the Proportion of Global Emissions from Agriculture Due to Smallholders," CGIAR Info Note, April 2017, https://cgspace.cgiar.org/server/api/core/bitstreams/8f2b4a98-7712-40d2-bd94-95ab97d539fa/content

5 Food and Agriculture Organization of the United Nations, "Greenhouse Gas Emissions from Agrifood Systems. Global, Regional and Country Trends, 2000–2022," FAOSTAT Analytical Brief 94, 2024, https://www.fao.org/statistics/highlights-archive/highlights-detail/greenhouse-gas-emissions-from-agrifood-systems.-global--regional-and-country-trends--2000-2022/en?

6 Food and Agriculture Organization of the United Nations, "Greenhouse Gas Emissions from Agrifood Systems. Global, Regional and Country Trends, 2000–2022"

7 Food and Agriculture Organization of the United Nations, "Greenhouse Gas Emissions from Agrifood Systems. Global, Regional and Country Trends, 2000–2022"

8 Food and Agriculture Organization of the United Nations, "Greenhouse Gas Emissions from Agrifood Systems. Global, Regional and Country Trends, 2000–2022"

9 United States Department of Agriculture, "World Agricultural Production," *Circular Series*, September 2025, https://apps.fas.usda.gov/psdonline/circulars/production.pdf.

10 Market Growth Reports, "Agriculture Market Size, Share, Growth, and Industry Analysis, By Type (Crop Farming, Livestock Farming, Aquaculture), By Application (Food, Biofuel, Raw Materials), Regional Insights and Forecast to 2033," October 2025, https://www.marketgrowthreports.com/market-reports/agriculture-market-114117.

11 Market Growth Reports, "Agriculture Market Size, Share, Growth, and Industry Analysis, By Type (Crop Farming, Livestock Farming, Aquaculture), By Application (Food, Biofuel, Raw Materials), Regional Insights and Forecast to 2033"

12 FAOSTAT, "Emission from Crops," https://www.fao.org/faostat/en/#data/GCE

13 FAOSTAT 2024, https://www.evalforearth.org/sites/default/files/2024-11/STATISTICAL%20YEARBOOK%20FAO%202024.pdf

14 J. Poore and T. Nemecek, "Reducing Food's Environmental Impacts through Producers and Consumers," *Science* 360, no. 6392 (2018): 987-992, https://www.science.org/doi/10.1126/science.aaq0216

15 World Food and Agriculture – Statistical Yearbook 2024, https://openknowledge.fao.org/items/43ef9f2c-a023-4130-81ce-dc5ac3f825ef

16 NewClimate Institute, "Corporate Climate Responsibility Monitor 2025: Food and Agriculture Sector Deep-Dive," Berlin and Cologne, 2025, https://newclimate.org/sites/default/files/2025-07/newclimate-publication-ccrm2025-agrifood-jun25.pdf

17 Science Based Targets Initiative, "Forests, Land and Agriculture - Science Based Targets," https://sciencebasedtargets.org/sectors/forest-land-and-agriculture

18 NewClimate Institute, "Corporate Climate Responsibility Monitor 2025: Food and Agriculture Sector Deep-Dive"

19 TraceX Technologies, "Understanding Land Based Emissions in Agriculture: How to Tackle Scope 3 Challenges," January 20, 2025, https://tracextech.com/land-based-emissions-in-agriculture

20 TraceX Technologies, "Understanding Land Based Emissions in Agriculture: How to Tackle Scope 3 Challenges"

21 "Navigating the Complexities of Scope 3 Reporting," *PERSEFONI*, March 31, 2024, https://www.persefoni.com/blog/scope-3-reporting-challenges

22 "Challenges and Solutions in Measuring and Reporting Scope 3 Emissions," Deloitte, January 3, 2024, https://www.deloitte.com/nl/en/issues/climate/challenges-and-solutions-scope-3-emissions.html.

23 Maximilian Hettler & Lorenz Graf-Vlachy, "Corporate Scope 3 Carbon Emission Reporting as an Enabler of Supply Chain Decarbonization: A Systematic Review and Comprehensive Research Agenda," *Business Strategy and the Environment* 33, no. 2 (2023): 263–82, https://doi.org/10.1002/bse.3486.

24 Science Based Targets initiative, "Mandatory Five-Year Review Guidance," *Science Based Targets Initiative*, July 2025, https://files.sciencebasedtargets.org/production/files/Mandatory-Five-Year-Review-Guidance.pdf?dm=1752609607

25 Environmental Defense Fund, "Strategic Roadmaps for SBTi Forest, Land, and Agriculture Targets: Prioritizing Action for Impact," 2025, https://business.edf.org/insights/strategic-roadmaps-for-sbti-forest-land-agriculture-targets/.

26 SustainCERT, "2025 Climate Action for Value Chains and Carbon Markets," January 2025, https://www.sustain-cert.com/news/what-to-expect-in-2025-for-climate-action-in-value-chains-and-carbon-markets

27 Science Based Targets Initiative, "Forests, Land and Agriculture - Science Based Targets"

28 Science Based Targets Initiative, "Forests, Land and Agriculture - Science Based Targets,"

29 Barbara Buchner et al., "Global Landscape of Climate Finance 2023," November 2, 2023, https://www.climatepolicyinitiative.org/wp-content/uploads/2023/11/Global-Landscape-of-Climate-Finance-2023.pdf

30 Liesl Wiese et al., "Countries' Commitments to Soil Organic Carbon in Nationally Determined Contributions," *Climate Policy* 21, no. 8 (2021): 1005–19, https://www.tandfonline.com/doi/full/10.1080/14693062.2021.1969883

31 General Mills, "Regenerative Agriculture," https://www.generalmills.com/how-we-make-it/healthier-planet/environmental-impact/regenerative-agriculture

32 ADM, "2025 Regenerative Agriculture Report," 2025, https://www.adm.com/globalassets/sustainability/2023-landing/2023-policies-and-reports/adm_regen-ag-report-2025_final.pdf.

33 pepsico, "Agriculture," August 28, 2025, https://www.pepsico.com/esg-topics/agriculture

34 World Economic Forum, "100 Million Farmers: Breakthrough Models for Financing a Sustainability Transition," January 2024, https://www3.weforum.org/docs/WEF_100_Million_Farmers_2024.pdf.

35 Jack Bugas et al., "Making Regenerative Agriculture Profitable for US Farmers," BCG, August 15, 2023, https://www.bcg.com/publications/2023/regenerative-agriculture-profitability-us-farmers#:~:text=Farmers'%20Concerns,maintain%20their%20conventional%20farming%20practices.

36 Loekie Schreefel et al., "Beyond the Buzz: Analyzing Actors Promoting Regenerative Agriculture in Europe," *npj Sustainable Agriculture* 3, no. 59 (2025), https://www.nature.com/articles/s44264-025-00100-1

37 Rajeev Sinha, "Scope 3 Made Simple: Supplier Emission Tracking Across Industries," *onlygood*, September 22, 2025, https://onlygood.ai/blog/scope-3-made-simple-supplier-emission-tracking-across-industries

About the Authors

Sumit Roy *is Assistant General Manager, Solidaridad Network***.**

Nitin Rao *is Asia Lead for Planning & Innovation, Solidaridad Network.*

Kritika Banerjee *is Senior Communications Manager, Solidaridad Network.*

Shoba Suri *is Senior Fellow, Health Initiative, Observer Research Foundation.*

Attribution: Sumit Roy, Nitin Rao, Kritika Banerjee, and Shoba Suri, *The Climate, Food, and Market Conundrum: Placing Business Emissions at the Forefront*, Observer Research Foundation, November 2025.

Cover image: Getty Images/Amith Nag

Ideas . Forums . Leadership . Impact

20, Rouse Avenue Institutional Area,
New Delhi - 110 002, INDIA
Ph. : +91-11-35332000**. Fax :** +91-11-35332005
E-mail: contactus@orfonline.org
Website: www.orfonline.org