

The Business Case for → *Scope 3 GHG Action* *in Agriculture & Food* *Value Chains*

Summary report



World Business
Council
for Sustainable
Development

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Executive Summary



Executive Summary

Transitioning the agriculture and food sector to net zero by 2050 presents a range of key business opportunities for actors across the value chain. Analysis from the Food and Land Use Coalition (FOLU) of the financial implications of mitigating agriculture and land-use change emissions for businesses, highlights the associated upsides, co-benefits or savings associated with many of these investments.¹

During a consultation process in 2022 with members of the WBCSD Agriculture & Food Climate workstream, one of the most frequently cited issues for acting on scope 3 (supply chain) emissions in agriculture and food value chains was the fact that there is no clear business case for climate-friendly agricultural products and processes. This makes it difficult to engage with and incentivize other supply chain actors to invest in decarbonization efforts and convince customers to pay more for products with a lower carbon intensity.

Yet our workshops and research show that there is a business case for individual companies in the agriculture and food sector to take action to decarbonize in line with the Paris Agreement (a maximum rise of 1.5°C in global temperatures). And there is a business case for taking collaborative action at the value chain level to decarbonize.

The business case for individual companies



For input providers:

- New and emerging input products are an important tool in decarbonizing agricultural value chains and present a range of business opportunities;
- They can achieve large cost savings by reducing resource use and emissions from input production;
- Companies can differentiate themselves in the future marketplace with products with a lower greenhouse gas (GHG) intensity;
- Longer-term supply chain partnership opportunities arise from working together with customers to adopt lower GHG emissions input solutions and growing customer demand for low-carbon inputs and technologies builds markets.



For farmers and producers:

- Decarbonization approaches can increase profitability and farm resilience, lowering labor and input costs and boosting soil health and productivity;
- New technologies increase productivity and incomes;
- They can benefit from an increase in access to additional or alternative revenue streams from ecosystem services and renewable energy production;² this is set to rise as carbon prices increase over time.



For traders:

- Decarbonization investments that have productivity and resilience benefits can help build loyalty and supplier relationships;
- Aligning with customers' decarbonization goals can open up or build on existing trading relationships;
- Growing interest in sourcing areas and production methods can provide superior traceability capabilities.



For manufacturers and processors:

- A large portion of emissions reduction efforts come from reducing energy and resource use and increasing efficiency, creating direct cost reductions, including those linked to food loss and waste;
- First movers can align with customer net-zero emissions goals, open up new markets and strengthen relationships with existing customers;
- There are growing external investment opportunities, potentially with concessional finance from impact investors and sustainability-linked bonds.



For retailers and consumer companies:

- Taking action to decarbonize agricultural value chains helps retain credibility in the marketplace;
- While there is growing demand from customers to know the carbon footprint of the products they are buying, companies can also play a role in supporting consumers to shift to healthier and more sustainable diets;
- A range of public and private sector partnership opportunities are available to help implement net-zero commitments, making it easier to deliver meaningful emissions reductions.



For financial institutions:

- There are growing external investment opportunities, potentially with concessional finance from impact investors and sustainability-linked bonds;
- Anticipating and dealing with potential climate risks associated with the sector can help better manage stakeholder expectations and take action on agricultural GHG emissions in their portfolios and client base.

A framework to address overarching challenges

There are still important overarching challenges across the value chain to realize these business opportunities. These include the question of who pays, the often longer-term nature of returns from significant upfront investments, the availability, aggregation and transparency of data across the value chain, and a lack of a supportive and consistent policy environment.

To help address these challenges, we propose a framework for cross-value chain collaboration.

This framework, while requiring upfront investment and coordination, will yield returns that far outweigh the costs.

For example, effectively enhancing productivity and farmer resilience provides the opportunity to scale up the adoption of agricultural practices that lead to decarbonization, setting the foundation for more resilient agricultural value chains.

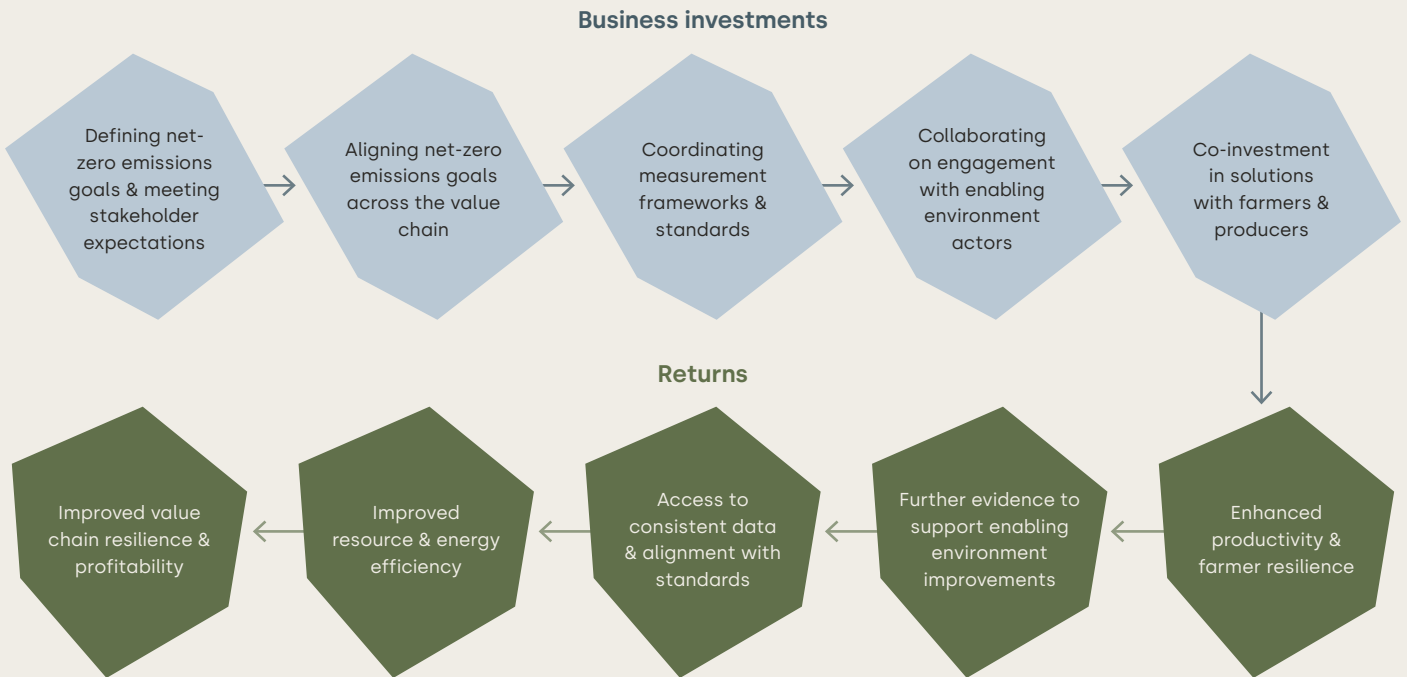
As the enabling environment for making decarbonization investments in company operations improves and benefits actors across the value chain, the value gained from making these changes become more evident to policymakers and other industry actors.

Improved alignment in the measurement frameworks and standards used to track decarbonization progress will allow for access to more consistent data along the value chain, allowing companies to better assess the scope 3 emissions associated with their products, at lower cost, and act on this information effectively.

Companies will also derive benefits from collective improvements in resource and energy efficiency and the resulting cost savings.

The drive can also improve the resilience and the profitability of the value chain, build trust between actors and lower the associated "transition" climate risks for financiers, an issue that is set to become more prominent in the decade to come.

Figure 1: Proposed framework for cross-value chain collaboration



Why we developed *this business case*



01.

01. Why we developed *this business case*

The net-zero transition in agriculture and food presents a range of business opportunities for actors across the value chain. Agriculture and food will play a large part in the overall net-zero transition. Analysis from the Food and Land Use Coalition (FOLU) of the financial implications of mitigating agriculture and land-use change emissions for businesses, highlights the associated upsides, co-benefits or savings associated with many of these investments.³

During 2022, we held a consultation with members in the Agriculture & Food Climate workstream (formerly called Agriculture for 1.5). During this consultation process, one of the most frequently cited issues for acting on scope 3 emissions in agriculture and food value chains was the fact that there is no clear business case for climate-friendly agricultural products and processes. This makes it difficult to engage with and incentivize other supply chain actors to invest in decarbonization efforts and convince customers to pay more for products with a lower carbon intensity.

To help overcome this key challenge for decarbonization efforts in the sector, we prioritized the development of this Business Case report.

The objectives of this report are to outline:

1. The business case for **individual companies** in the agriculture and food sector to take action to decarbonize in line with the Paris Agreement (a maximum rise of 1.5°C in global temperatures);
2. The case for taking **collaborative action** at the value chain level to decarbonize;
3. How to **adapt the broader "generic" business case** to catalyze action in priority value chains, via a series of case studies.

We developed this report through a combination of a literature review and two workshops. The workshops brought together members involved in the Agriculture & Food Climate workstream in November and December 2022 to provide input into key aspects of the business case, associated challenges across the value chain and the case studies.

The report's primary intended audience is large businesses operating in the agriculture and food sector. These businesses can use it as a resource in communicating the case for decarbonization with their supply chain partners and broader stakeholders. Beyond this, we aim for the report to contribute to the global policy debate on how to achieve net-zero emissions in the agriculture and food sector.

This report supports the *Future Fit Food & Agriculture series*⁴ published by the Food and Land Use Coalition (FOLU), World Business Council for Sustainable Development (WBCSD) and We Mean Business which showcases priority actions to 2030 to make the food and agriculture sector 'future fit'. The Future Fit series supports companies to understand the implications of current science-based voluntary standards and emerging regulations, identify hotspots in value chains, comprehend the cost of inaction versus taking proactive action and recognize areas where advocacy for further support from policymakers, investors and innovators is needed. This report from WBCSD complements the conclusions of this series by showcasing the business case for action for specific value chain actors.



Why collaboration is important to addressing challenges



02.





02. Why collaboration is important to addressing challenges

Before outlining the business case at each stage of the value chain, it is vital to identify the overarching challenges that have held back progress to date upfront to identify the most appropriate solutions and include them in the analysis.

Addressing these challenges and advancing the business case for decarbonization in agriculture and food requires active collaboration across the value chain. While there are isolated examples of individual decarbonization making business sense on a stand-alone basis, most of the points we highlight in this report rely on alignment with at least one other part of the value chain.

If collaboration throughout the value chain does not happen and companies continue to address the challenges raised in this report on a piecemeal basis, there is a real risk the push for decarbonization in the sector will lose momentum and net-zero goals will fall by the wayside. Similarly, if companies continue to struggle with these issues individually, without making deliberate time and resource investments to work together, they will miss out on the cost efficiencies and greater leverage value chain collaboration can achieve.

Figure 2: Overarching challenges for the decarbonization business case in food & agriculture

Challenge	Description
 <p>1. Willingness to pay/who pays?</p>	<p>Farmers and producers often need to make the greatest investments and changes to current practices to decarbonize. At the same time, they have the lowest financial resources available to do so. The lack of willingness to pay for these actions further up the value chain through price premiums, co-investment or direct financial support weakens the business case significantly.</p> <p>One fundamental barrier that comes up repeatedly at each stage of the value chain is the fact that the current pressure on profit margins due to rising inflation and the cost-of-living crisis is exacerbating this challenge.</p>
 <p>2. Up-front investments needed with medium- to long-term returns</p>	<p>In some cases there is a stand-alone business case for certain decarbonization investments, even without a payer further up the value chain (e.g., investments in agroforestry production methods or renewable energy infrastructure). However, many of these require up-front investments that achieve a return in the medium- to long-term (e.g., 5+ years) which is beyond the time horizon required for actors with lower resources and without the balance sheets to shoulder losses for a significant period.</p>
 <p>3. Data availability, aggregation and transparency</p>	<p>To know whether farmers and producers are making progress on decarbonization, the requisite level of accurate data must be available (at an affordable cost) and measured to a degree of consistency to allow for aggregation across the value chain. It also should not add a significant administrative burden. There needs to be transparency in how they measure and analyze the data to engender value chain-wide trust. At the moment, widespread data availability, consistency, cost and transparency continue to be a challenge.</p> <p>There is also a need for reliable data on which agricultural practices result in the most attractive return on investment for decarbonization to aid decision-makers throughout the value chain.</p>
 <p>4. Lack of a supportive and consistent policy environment</p>	<p>One of the strongest incentives for decarbonization action is the presence of regulation that requires it or public programs and incentives that support it. This is beginning to emerge in a number of countries but is inconsistent. Without a supportive policy environment, actors that increase their cost base through decarbonization and measurement may be at a competitive disadvantage with companies in their own jurisdictions or abroad. Moreover, most value chains are cross-border; for multinational companies in particular this inconsistency poses a significant barrier to taking action.</p>

The business case for *decarbonization at each value chain stage*

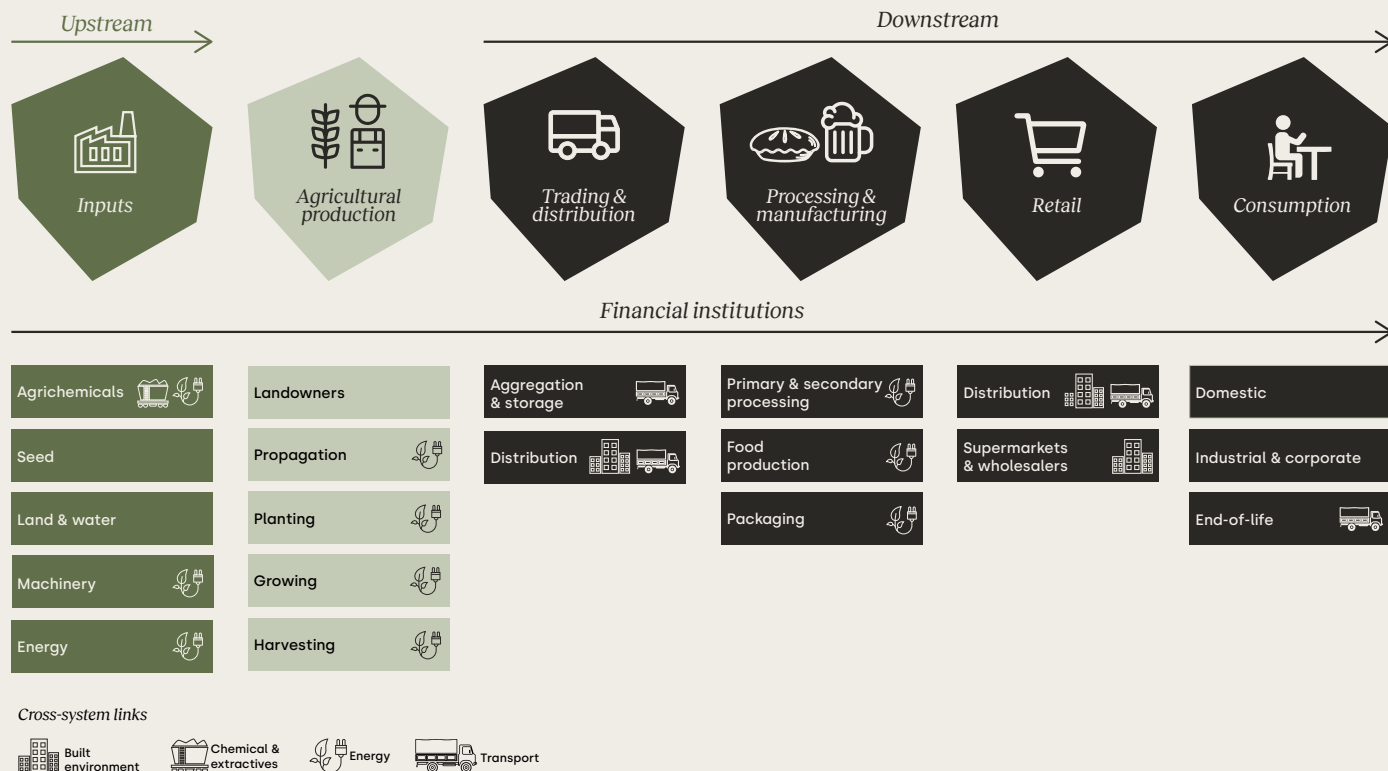


03.

03. The business case for decarbonization at each value chain stage

For the purposes of this report, we have divided the agriculture and food value chain into the following simplified stages. Below we provide a summary of the business case for decarbonization at each stage of the value chain, alongside the key challenges that stakeholders will need to address through value chain collaboration.

Figure 3: The basic agri-food value chain





3.1 Input providers

The business case for input providers to address scope 3 emissions

- There are a range of **business opportunities** for new and emerging input products. For example, estimates show the global market for precision agriculture technology will grow from USD \$8.5 billion in 2022 to USD \$15.6 billion by 2030 at a compound annual growth rate (CAGR) of 7.9%.⁵
- Stakeholders can **achieve cost savings** by reducing resource use in production. Efforts such as improved nitrogen use efficiency can lead to a 70% reduction in fertilizer emissions, though this varies region to region.⁶ This involves the application of the 4Rs⁷ – right source, right rate, right time, right place⁷ – to implement best management practices that optimize fertilizer use efficiency.
- **Companies can differentiate themselves in the future marketplace** with products with a lower greenhouse gas (GHG) intensity, which will enable their customers to meet their net-zero targets. However, the challenge around “willingness to pay” outlined above remains an issue in the current market.
- **Longer-term supply chain partnership opportunities** arise from working together with customers to adopt lower GHG emissions input solutions. The USDA in 2022 announced 14 such partnership programs with associated funding of USD \$2.8 billion to invest in climate-smart commodities.⁸
- **Growing customer demand for low-carbon inputs and technologies builds markets.** For example, Cargill aims to have 10 million acres of US farmland in its operations adopt climate-smart and regenerative practices by 2030, which will require low-carbon and sustainable input technologies to achieve.⁹

Key challenges for input providers to address through value chain collaboration

Reducing the GHG footprints of input products and technologies is technically challenging and often requires substantial upfront investment.

For example, ammonia manufacturing for fertilizer involves production in high-pressure and high-temperature environments that are energy-intensive.¹⁰ Reducing these energy requirements and substituting traditional energy sources for ammonia production is a costly process, though some believe it could be cost-competitive by the end of this decade.¹¹

Cost-competitiveness with conventional input manufacturers are particularly in a high-inflation environment.

While some input companies are leading the way in decarbonizing their products, large parts of the market continue with conventional production methods and do not have explicit plans to reduce the GHG intensity of their products in the near future. This means that companies investing in decarbonizing their products still must compete on the same playing field. And, as energy costs remain high and the cost-of-living crisis continues, customers may find it difficult to justify paying more. There is also no widespread evidence of increased demand and price premiums for low-GHG intensive fertilizer products to compensate for this. Customer sentiment in terms of what they want input providers to supply is broad.

There is a lack of visibility and connection to end-customers.

Another key challenge for input providers in tracking the contribution of their products and solutions to decarbonization is the lack of visibility and connection they have to their end customers.

A lack of recognition of nitrogen use efficiency improvements contributes to scope 3 emissions reductions in GHG accounting frameworks for agriculture and food.

Discussions highlight the fact that some corporate GHG accounting frameworks do not fully account for historic efforts to improve nitrogen use efficiency.

Case study: Carbon farming to support sustainable agriculture in Brazil¹²

Organizations involved

OCP Group, Bioline by Invivo, Agrorobótica and Sementes Tropical.

Project overview

The project aims to support cotton, soybean and corn farmers in Matto Grosso, Brazil, to adopt new technologies that sustain carbon farming. Its implementation takes place via a partnership between OCP (a global leader in plant nutrition and the world's largest producer of phosphate-based fertilizers), local agricultural group Bioline by Invivo, and agritech company Agrorobótica. As the target region provides the majority of Brazil's livestock and grains, the project will provide a scalable and replicable pilot project.

Although in its infancy, the project aims to eventually improve regenerative, sustainable agriculture and carbon sequestration in the soil for participating farmers. To ensure the project mitigates risks and forms trust between all stakeholders involved, it will obtain certification through the Verra-VCS standard. This is in addition to monitoring using soil spectroscopy technology deployed to analyze the chemical and physical composition of the soil at participating farms.

How does the project demonstrate the business case for decarbonization?

The project stems from a shared belief that soil health management is essential to improving the environment, achieving food security and working towards global net-zero emissions goals.

The technology used in this project is Agrorobótica's Laser Induced Breakdown Spectroscopy (LIBS), an artificial intelligence (AI)-led soil analysis tool that produces tailored insights from measurement, reports and verified carbon content and sequestration potential. This also has broader benefits for monitoring and analyzing soil health and fertility to inform farm management and subsequently increase yields and income for farmers.

The potential income from carbon credit sales for farmers will also help support them through the transition to decarbonize agricultural production.

OCP will also put the carbon credits that it receives from this partnership towards its own objective of achieving net-zero carbon emissions by 2040.

Key lessons for the sector

While this project is just starting, there are some aspects of the approach taken that may provide useful lessons for the broader sector:

- Using income from carbon credit generation to help finance the "transition gap" facing many farmers and producers as they seek to adopt lower carbon agricultural practices;
- Developing innovative partnerships with technology providers to help lower the costs of soil analysis and monitoring and support the scalability of decarbonization programs in agriculture;
- Adopting widely recognized and internationally credible standards for soil carbon from the outset to set off on the right footing.



3.2 Farmers & producers

The business case for farmers and producers to address scope 3 emissions

→ Decarbonization approaches can align well with **increasing profitability and farm resilience**.

The adoption of regenerative agriculture, for example, is widely associated with increased farm profits as a result of the lower labor and input costs it requires, while at the same time boosting soil health and productivity. Analysis from OP2B and BCG focused on wheat farmers in Kansas (USA) found that there can be a positive long-term business case for farmers – resulting in a 15-25% 10-year ROI – although there is likely a 3-5 year transition period where the farmer will experience a decline in profits, due to the risk of lower-than expected yields.¹³ Cornell University reports that farmers using conservation agriculture technologies **typically report higher yields (up to 45-48% higher)**¹⁴ with fewer water, fertilizer and labor inputs, resulting in higher overall farm profits. In Paraguay, net farm income from no-till farming on large-scale commercial farms **increased from under USD \$10,000 to over USD \$30,000** over a ten-year period.¹⁵

→ Opportunities to adopt **new technologies bring broader benefits**. For example, the Global Commission on Adaptation found that digital climate advisory services, a technology closely associated with the shift to farming methods with a lower carbon intensity, **increase farmer productivity and incomes by 30% and 25% respectively**.¹⁶

→ Access to additional and alternative **revenue streams from ecosystem services** and renewable energy production. For example, S&P found that in North American soil carbon markets, some companies are offering payments of USD \$75-105 an acre for carbon sequestration, depending on the crop type. This is set to rise as carbon prices increase over time.¹⁷

Key challenges for farmers and producers to address through value chain collaboration

Significant costs and the need for greater resources are inherent to the transition to new production methods and technologies.

One of the most widely cited examples of this is in the transition to agroforestry-based production – the adoption of which will need to substantially increase to achieve decarbonization in agricultural systems.¹⁸ A 2020 analysis of agroforestry systems in Northern Vietnam¹⁹ found that maize-based agroforestry systems needed two to three years before reaching a 50% chance of positive

cumulative cash flow. Simple agroforestry systems with the indigenous son tra (*Docynia Indica*) fruit took four years and Shan tea took seven years to reach a 50% chance of positive cumulative cash flow. The analysis forecast a similar time lag of seven to eight years for coffee-based agroforestry systems to compensate for initial investments, despite the early income from annual crops. These multi-year investments often go beyond the resources available to and priorities of smallholder farmers, who often rely on making a net-positive cash return on an annual or seasonal basis.

There is a trust gap between farmers and other value chain actors.

In many parts of the world, there is also a “trust gap” where farmers may have suffered the negative consequences of unkept promises made to them by other actors in the value chain or external actors, such as carbon project developers. In these instances, farming communities could be reluctant to engage with new initiatives that require them to invest time and resources without upfront compensation.

Gaining access to cost-effective, accurate monitoring systems and data can be expensive and challenging.

Measuring accurate on-farm GHG emissions data on a regular basis has been to date an expensive and technically challenging process, even with ongoing advances in agri-tech solutions. Multiple factors strongly affect emissions, such as soil types, weather and processes with high degrees of uncertainty (e.g., complex microbial processes). And changes in the amounts of carbon stored in soil and biomass do not occur at the same time as shifts in farming practices.²⁰

Tenant farmers are often not eligible to receive benefits.

In many parts of the world, tenant farmers make up a large portion of the farming population. For example, someone other than the owner farms 39% of agricultural land in the USA.²¹ However, states typically provide incentives or payments for GHG reductions from private sources to the landowner. This leaves tenant farmers with little reason to engage in new practices that may require upfront investment without receiving the financial gains associated with them.

Supporting policies and external infrastructure may not exist.

Although regulations are evolving quickly, in many cases existing policy, tax and subsidy regimes discourage rather than incentivize practices that could reduce emissions in agriculture. For example, eligibility criteria and other rules and regulations

in North America may prevent landowners from enrolling agroforestry practices in one or more agricultural and forestry tax programs.²² Governments also generally design their extension programs with conventional agricultural production in mind and the top-down nature of agricultural extension also leaves little room for innovation and novel practices.²³

Case Study: An environmental and economic path to net-zero dairy farm emissions²⁴

Organizations involved

The Net Zero Initiative, WWF Markets Institute, Nestlé

Project overview

US dairy industry stakeholders, led by dairy farmers, cooperatives, processing companies, and industry organizations, have developed the Net Zero Initiative (NZI) to demonstrate that it is possible for dairy farms to reach net-zero emissions. NZI's ultimate goal is to advance and scale access to the most effective environmental and economically viable practices on farms of all sizes across the US. Nestlé recently committed up to USD \$10 million to this initiative, although it requires additional funding from government, business and other stakeholders.

The WWF Markets Institute has produced analysis for the initiative, focusing on technologies and practices for attaining net-zero GHG emissions in milk production from field to farm gate.

The NZI is implementing a pilot based on practices outlined in the analysis to demonstrate how to reach net-zero emissions in the sector by finding the right blend of economically viable practices, technologies and incentives.

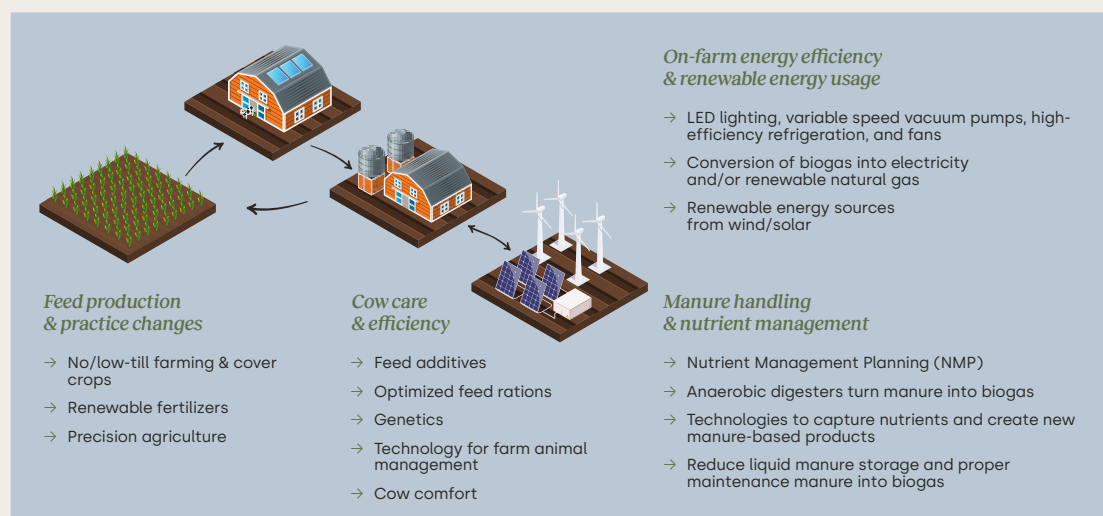
Figure 4 shows the NZI's key areas of focus to support decarbonization in dairy value chains.

How does the project demonstrate the business case for decarbonization?

For the economic analysis, the WWF Markets Institute modeled a typical pilot dairy farm based on assumptions of a large, conventional upper Midwestern US dairy operation, with the GHG emissions associated with a herd of 3,000 milking cows and approximately 500 dry cows. The assumption includes on-farm production of approximately 80% of the forage and corn grain needed for feed using 1.65 acres per cow. It excludes the impact of raising replacement heifers from the modeling as management practices vary considerably farm to farm.

Large-scale farmers can implement or are already implementing many of the mitigation practices in this analysis by leveraging

Figure 4: NZI's key area of focus²⁵



*Visuals do not represent all possible practices, technologies, or benefits. Not all practices and technologies will apply to all farms, and may vary based on farm location, size, and other factors.

current research, technology and incentives. Others may require policy shifts or enhanced incentive systems to break even on the time and investment required to achieve net-zero emissions.

Based on these assumptions, the economic modelling in Table 1 illustrates the combined estimated economic potential from each category of GHG emissions of a net-zero emissions dairy operation.

The report observes that, similar to GHG reductions, farmers will not realize these returns all at once. They illustrate the possibilities posed by this analysis and the gains described are possible over a five-year period if policy shifts occur and if producers adopt developing technologies and practices.

While achieving all of these estimated numbers would demonstrate a very strong business case, even reaching 50-75% of these results would be enough to make implementing net-zero dairy practices economically attractive for farmers. The estimated revenue potential of environmental service credits (carbon, water pollution reductions) and the sale of energy and manure-based products could create significantly higher returns than outlined in this analysis.

Key lessons for the industry

One of the overall lessons from this process has been that it is possible to achieve net-zero GHG emissions even in one of the most challenging sectors to decarbonize by combining feed production optimization,

feed efficiency, manure and nutrient management and energy generation, and circular economy practices. When combined with the right incentives, market-based approaches and supporting policies, there can be an economically viable path to improve farmer incomes and for that income to further increase if technology improves and soil carbon markets develop.

The current state of the technology and markets included in the WWF Markets Institute analysis should allow for early adoption by large-scale dairy producers, resulting in large-scale environmental benefits over the next five years while simultaneously de-risking and driving efficiencies in technology and operational costs for smaller-scale farm adoption in the future. If all dairy farms over 2,500 head were to adopt these practices, it would be possible to remove greenhouse gases equivalent to taking approximately 768,000 to 1.7 million cars off the road each year, based on the range of low- to high-end GHG reduction potential included in the study.

Finally, while existing government incentives provide crucial financial assistance for the transition to better practices and for on-farm clean energy generation, state and federal governments should develop further incentives. These could include, for example, expanding water quality trading markets, creating renewable nutrient standards, and promoting off-farm substrate usage for energy generation.

Table 1: Estimated economic potential from the GHG emissions of a net-zero dairy operation

Pilot farm (summary)	Revenue (per hundredweight – CWT)	Revenue (total)
Feed production <i>Net return (annual)</i>	USD \$0.07	USD \$69,161
Enteric emissions <i>Net return (annual)</i>	USD \$0.10	USD \$97,950
Manure management <i>Net return (annual)</i>	USD \$0.77	USD \$757,919
Energy generation and use <i>Net return (annual)</i>	USD \$0.43	USD \$426,993
Dairy farm innovation program <i>Net return (annual)</i>	USD \$0.58	USD \$576,345
<i>Net return (conventional, electric, annual)</i>	USD \$1.96	USD \$1,928,368



3.3 Traders

The business case for traders to address scope 3 emissions

- Decarbonization investments that have productivity and resilience benefits can help **build loyalty and supplier relationships**. For example, Olam's livelihood charter trained over 250,000 farmers in good agricultural practices and allowed for over half a billion dollars in trade with participating farmers over five years, with 1.3 million tonnes of sustainable product procured.²⁶
- Aligning with customers' decarbonization goals can **open up or build on existing trading relationships**. For example, ADM has partnered with customers Keurig Dr Pepper and PepsiCo to support Nebraska corn and soy farmers to boost resiliency via cover cropping, expanding procurement over an area of 15,000 acres.²⁷
- Growing interest in sourcing areas and production methods can benefit **traders through superior traceability capabilities**. For example, in 2022, Bunge achieved 100% traceability data for direct-to-farm purchases for priority areas in Brazil, Argentina and Paraguay, which aids the company's compliance with **customer demands related to its own zero-deforestation commitments and helps secure future business**.

Key challenges for traders to address through value chain collaboration

There are strong commercial reasons why traders retain flexibility in sourcing locations.

To retain their commercial competitiveness, most traders, particularly at the regional and global level, need to retain a significant degree of flexibility in terms of where they source from, what they source and the amounts they source. Volatile market conditions and pricing also influence this process. It can therefore be challenging to make the longer-term commitment to sourcing from particular producers and locations, which is often a requirement when seeking to co-invest in decarbonization in these areas.

There are counteracting forces at play, such as the drive to source more locally with lower air miles versus production that has a greater GHG intensity.

Some sourcing practices viewed by consumers as being "low-carbon", such as sourcing products locally, can have a greater GHG intensity due to the larger amount of energy needed to produce them out of season in heated greenhouse conditions. In these cases, importing food from where it is in season can be less GHG-intensive. But these nuances tend to get lost down the value chain, which can make it hard to take informed action in favor of the sourcing option with the lowest GHG intensity.²⁸

Tracing a product to its origins can be difficult.

Traders often purchase through national and regional consolidators, who in turn purchase from local consolidators. This makes tracing products to the farmer and producer difficult and consequently limits the actions traders can take to incentivize or support field-level activity to reduce emissions.



Case study: Using regenerative farming and a landscape approach to decarbonize the cocoa supply chain²⁹

Organizations involved

Touton Group in partnership with the Ghana Forestry Commission and Solidaridad⁵⁰

Project overview

Declining production due to the impacts of climate change on Ghana's ageing cocoa trees has led the Touton Group, a trading company, to invest in a series of regenerative agriculture and landscape restoration efforts in its sourcing areas. As part of this process, Touton has committed to ending deforestation in its supply chain, signed up to the Cocoa and Forests Initiative and formed a pilot for the Partnership for Productivity Protection and Resilience in Cocoa Landscapes (3PRCL). All of this has assisted in the decarbonization of the cocoa supply chain.

Based on the success of actions to date, Touton has committed over USD \$138 million to source climate-smart cocoa in the region over five years.

The project has also led to the establishment of a landscape forest governance framework, with plans to develop a Climate-Smart Cocoa (CSC) standard. This standard will be a vehicle to achieve long-term, sustainable production and development in the face of escalating climate change pressures. This in turn will support and improve local communities through an increase in productivity and income, adaptation and mitigation efforts such as ending deforestation, food security, and rural economic development.

In the coming years, Touton intends to report on all sustainability outcomes at the landscape scale using the CSC standard. This will give project partners the ability to track project goals and ensure they meet them. Additionally, the efforts and subsequent reporting will allow the Ghanaian Government to use data and knowledge to meet its national REDD+ (reducing emissions from deforestation and forest degradation in developing countries and additional forest-related activities that protect the climate) commitments. The World Bank's Forest Carbon Partnership Facility piloted and approved the Ghana Cocoa Forest REDD+ Program (GCFRP). This approach mitigates risks in future supply and allows for a platform for collaboration between Touton, project partners and the government to form a "win-win" solution.

How does the project demonstrate the business case for decarbonization?

Touton has identified environmental concerns such as climate change, unsustainable land use and deforestation as key threats to the global sustainability of the cocoa supply chain. The actions Touton has taken have helped decarbonize its supply chain and addressed these other existential threats.

The company has displayed to local communities that they can increase yields by investing in agroforestry techniques such as shade-grown cocoa. For instance, farmers in the project have seen a yield increase from 400 kg/ha/year to 670 kg/ha/year, which for the 30,000 farmers Touton has worked with is an average increase of 67%. It has also led to a number of important co-benefits stemming from a larger and more diversified income stream through intercropped timber, such as improved food security and nutrition and market access.

These improvements have cultivated supplier loyalty and created goodwill and trust in future regenerative agriculture projects that may come to the region.

Beyond the implementation of regenerative agriculture practices, the project has also had broader landscape governance benefits. For instance, this project has supported the establishment of local management boards that enforce sustainable land-use agreements covering approximately 250,000 hectares.

Another key component of this business case is the production of deforestation-free and sustainable cocoa in high forest zones in return for carbon payments. Local farmers receive premium payments for cocoa as long as they follow sustainable land-use and forest protection practices. This could generate up to USD \$11.5 million in revenue from carbon funds in key sourcing areas.

Key lessons for the industry

Touton has achieved decarbonization in its cocoa supply chain through the strategic decision to expand its supplier support model to take a landscape approach to sustainable production and increased community engagement through training and providing the resources needed in the transition to regenerative agriculture.

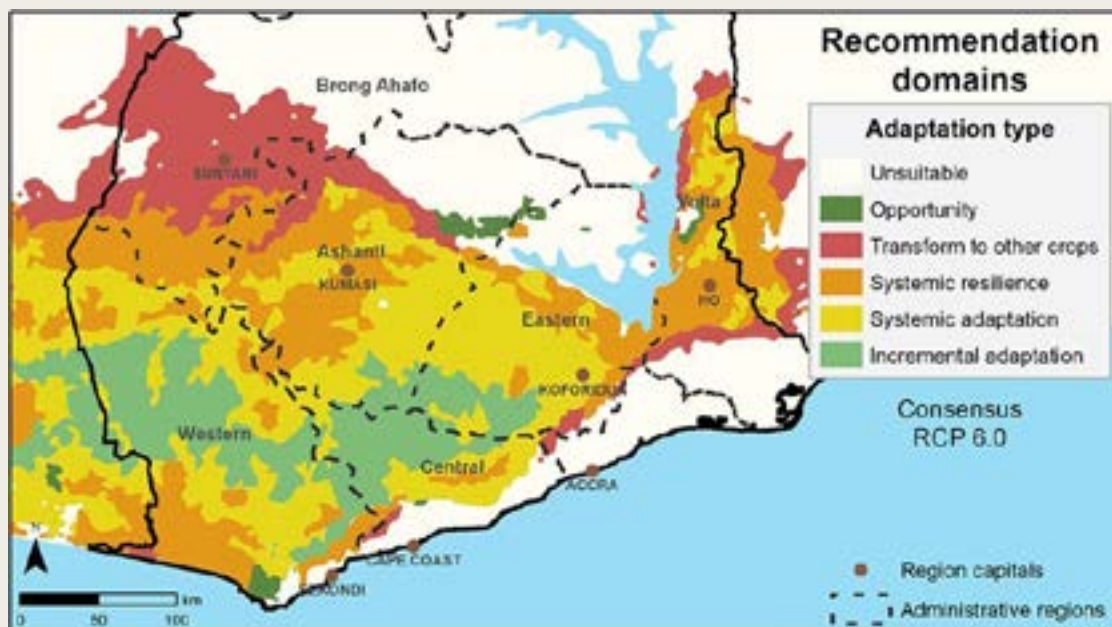
The success with which Touton established engagement with local governments and communities has allowed for resource sharing and partnership growth. Touton works closely with government entities, such as the Forestry

Commission, ensuring compliance with local laws and regulations, thereby mitigating risks. This multi-stakeholder landscape approach also provides a platform to leverage skills. For instance, Touton has employed the NGO Solidaridad to engage traditional authorities such as local chieftains to formalize land access security and tree tenure. These chieftains act as the spokespeople for the people and communities; their involvement is, therefore, essential for any engagement with local communities for the successful implementation of a forest governance framework.

Similarly, through the establishment of a landscape management board (LMB), which works with project partners and the community, it is possible to recognize a wider range of barriers and interactions. In response to this, the LMB set up a partnership with authorities that integrated satellite-based remote sensing information. This information allows for tailored agronomic interventions through regionally-specific agroforestry models.

A final key lesson of this case study is the implementation of farm business schools. Touton has formed Rural Service Centres to provide comprehensive training and services for the professionalization of farmers. The provision of training is necessary to support farmers as they transition to specific regenerative farming techniques and adopt farm-level investment planning. In addition to an information hub, this training has allowed for community buy-in and eased communication links between local farmers and authorities. Overall, Touton has found these helped change perceptions that had once led farmers to resist change.

Figure 5: Distribution of climate change impact zones and dominant adaptation typology in Ghana³¹





3.4 Manufacturers & processors

The business case for manufacturers and processors to address scope 3 emissions

- A large portion of emissions reduction efforts come from reducing energy and resource use and increasing efficiency, creating direct cost reductions. This includes addressing food loss and waste. Boston Consulting Group and the World Economic Forum calculate that 35% of the deployable decarbonization technologies in the food sector cost less than EUR €10 per metric ton,³² a low decarbonization cost compared to alternatives.
- First movers can align with customer net-zero emissions goals, open up new markets and strengthen relationships with existing customers. For example, Olam Food Ingredients (OFI) partnered with its customer Mondelez International in 2021 to create the world's single largest sustainable commercial cocoa farm in Indonesia, aligning its Cocoa Life sustainability (and low-carbon) program with Mondelez's Cocoa Compass sustainability program.³³
- There are growing external investment opportunities, potentially with concessional finance from impact investors and sustainability-linked bonds. For example, in 2021, Compass Group, the world's largest food services group, issued sustainable bonds of EUR €500 million and EUR €250 million that the group will use to progress its sustainability initiatives and deliver its global climate net-zero emissions target.³⁴

Key challenges for manufacturers and processors to address through value chain collaboration

Capital expenditure (capex) and operational expenditure (opex) costs for some decarbonization measures can be high.

In general, changing the energy infrastructure behind existing manufacturing processes is costly, particularly where it requires retrofitting, which is necessary to accelerate decarbonization at the pace needed to meet net-zero emissions goals.³⁵ Calculations show that the global "green" capex required to reach net-zero emissions across all key sectors and technologies is USD \$3 trillion,³⁶ roughly equal to the United Kingdom's annual GDP.³⁷

Geographic location may limit access to modern or cleaner fuel infrastructure.

If the location of manufacturing facilities in a country – or part of the country – lacks access to newer, lower carbon energy sources (e.g., green hydrogen networks), this can limit the speed at which manufacturing processes can decarbonize.

Stricter hygiene standards have led to growing use of heat processes in the meat and dairy industries, contributing to increased energy consumption.

This highlights the need to balance the relative importance of climate change issues versus food safety issues, which are often of more immediate commercial concern for manufacturers and processors, as they are a regulatory requirement for access to the market. There are other similar trade-offs, including animal welfare issues versus GHG reduction goals for meat processors.

Case study: Diversifying ingredients while restoring and protecting ecosystems³⁸

Organizations involved

Nestlé, Yayasan Sime Darby (YSD)

Project overview

Nestlé set up this project in Malaysia to support the implementation of regenerative agriculture, ingredient diversification and the restoration and protection of ecosystems across its sourcing locations.

- **Regenerative agriculture** – Nestlé developed a partnership with YSD to work with smallholder palm oil producers on regenerative farming practices and support them to become Roundtable on Sustainable Palm Oil (RSPO) certified. This also included the RELeaf tree planting program on a YSD plantation estate. This supported villagers to earn additional income by planting 23 different species of native seedlings, which Nestlé then purchased and used to restore migration pathways for animals along the lower Kinabatangan River. Project RELeaf aims to plant 3 million trees across Malaysia by 2023 to restore forest ecosystems, protect wildlife and protect critical water supplies.³⁹
- **Diversifying ingredients** – In a drive to continuously improve safety in its baby food products, Nestlé also initiated a collaboration with papaya growers in the landscape to embed good agricultural practices and ensure the quality and safety of its raw material.
- **Monitoring deforestation and degradation** – In pursuit of its zero supply chain deforestation goals, Nestlé has been the first international food company to implement a satellite-based service – Starling – to monitor changes in land and forest cover in areas where it sources palm oil, which it applied to the landscape.

How does the project demonstrate the business case for decarbonization?

- **Regenerative agriculture** – The efforts made in supporting farmers to transition more sustainable agriculture practices have helped Nestlé progress towards its 100% RSPO certification by 2023 goal, a key element of its global commitment to its stakeholders and shareholders.⁴⁰

- **Diversifying ingredients** – As a result of engaging in sustainable production practices with papaya farmers, these farmers have supplied a total 450 tons of concentrated papaya purée in compliance with Nestlé's stringent requirements. Suppliers and farmers supplied positive feedback after switching to natural plant protection methods despite lower yields.
- **Monitoring deforestation and degradation** – Using the Starling monitoring technology, Nestlé has mapped over 9,000 farm boundaries and the area surrounding more than 1,700 mills to determine whether origins are verifiably deforestation-free and whether the company needs to perform further supplier engagement and investigation.⁴¹ This is a vital component of the company's zero-deforestation commitment to its stakeholders, customers and shareholders.

Key lessons for the industry

This case study shows how intensive engagement with farming communities in the value chain can yield multi-faceted business benefits, ranging from the ability to diversify product sourcing and improve safety to helping meet global zero-deforestation commitments.

Some of the business opportunities created for farmers for this partnership went beyond the sourcing of agricultural products – building other business opportunities into the reforestation strategy, which further supported and diversified farmer incomes.

It is also a good demonstration of what multiple actors in the value chain can achieve when they collaborate deeply on common business goals and take advantage of one another's strengths. In this case it was YSD's direct link to farming communities combined with Nestlé's product innovation and technological capabilities that produced a range of business benefits.



3.5 Retailers & consumer companies

The business case for retail and consumer companies to address scope 3 emissions

- Some 65 of the world's largest retail and consumer companies have made science-based GHG reduction commitments⁴² that meet growing expectations from shareholders and their broader stakeholders. Most of these, however, will be undeliverable without action to decarbonize agricultural value chains. Hence, **taking action to decarbonize their agricultural value chains is a business imperative to retain credibility in the marketplace.**
- **There is growing demand from customers to know the carbon footprint of the products they are buying.** For example, **67% of Western consumers support carbon labelling on food products.**⁴³ At the same time, companies can play a role in supporting consumers to shift to healthier and more sustainable diets.
- **A range of public and private sector partnership opportunities are available to help implement net-zero commitments.** For example, the **Transform to Net Zero** initiative brings together nine companies – including Unilever, Microsoft, Starbucks and Maersk – to deliver guidance and business plans to enable a transformation to net-zero emissions and research, advocacy and best practices to **make it easier to deliver meaningful emissions reductions.**⁴⁴

Key challenges for retail and consumer companies to address through value chain collaboration

Variations in national policy and regulation are especially challenging for multinational companies when it comes to decarbonizing global operations.

Inconsistency in regulatory environments and incentives systems means that policies and regulations reward decarbonization efforts in some jurisdictions but not in others. This is a significant challenge for companies with products and value chains spanning multiple countries.

Public trust in in-house sustainability standards and certifications that evidence decarbonization activities is relatively low.

Widespread third-party certification is costly and logistically challenging.⁴⁵

Some decarbonization actions come with high upfront investments in technology or new production methods that can be difficult to justify.

This is of particular concern in the current inflationary and economic environment.





3.6 Financial institutions

The business case for financial institutions to address scope 3 emissions

- There are a range of **new business opportunities for financial products and services aligned with decarbonization**, such as sustainability-linked bonds and loans. The green and sustainable bond market has been on an exponential upward trajectory, growing by an average of 70% over the five years to 2021, reaching a value of EUR €1.9 trillion.⁴⁶
- Given their unique position in the economy, banks will play **an important role in the agriculture sector's climate transition**. Banks themselves cannot reduce emissions, but they can play an important role in leading actors across the sector to adopt sustainable strategies, shaping the value proposition for farmers, and helping to finance the net zero transition in agriculture. Many banks have already signed onto the Net-Zero Banking Alliance (NZBA) and have committed to setting emissions targets for high-emitting sectors, including agriculture. The WBCSD-convened **Banking for Impact on Climate in Agriculture (B4ICA)** secretariat has developed additional guidance for banks focused on setting emissions targets for the agriculture sector.⁴⁷
- At the same time, when financial institutions **anticipate and manage potential climate risks** associated with the sector to manage stakeholder expectations, they can better manage stakeholder expectations and take action on agricultural GHG emissions in their portfolios and client base. This means they need to understand frameworks such as Task Force on Climate-related Financial Disclosures (TCFD) **(80% of companies disclosing in line with at least 1 of the 11 recommended disclosures in 2021)**.⁴⁸ In the context of increased scrutiny of the role of environmental, social and governance (ESG) concerns in investment processes, financial institutions should send clear signals about the types of climate-related disclosures the private sector expects.

Key challenges for financial institutions to address through value chain collaboration

Data gaps, accounting complexity and low digitalization of GHG emissions across different regions and agriculture products and practices hamper efforts.

This makes data difficult to analyze for financial institutions and to take action to help their clients reduce emissions in this sector.⁴⁹ There is also a risk of double-counting emissions reductions when providing financial services to different parts of connected food value chains, which exacerbates the data challenge.

In a competitive financing landscape, it can be difficult to place additional conditionality on financing terms linked to decarbonization.

With interest rates rising around the world, placing additional decarbonization-related conditionality and requirements on borrowers is increasingly challenging.

Investors and lenders have little risk appetite for transition technologies.

The commercial case for some of the technologies required for the agriculture and food net-zero transition is not yet proven. This can mean these technologies exceed the risk appetite of large parts of the financial sector.

Banking institutions often have limited influence on the actions of their clients.

While at an individual level, financial institutions may not yield substantive influence on their clients, at a collective level, sector-wide initiatives (as demonstrated by the TCFD) may be able to encourage and accelerate a greater focus on decarbonization in the agriculture and food sector.

A framework for agriculture and food businesses to collaborate on decarbonization across the value chain

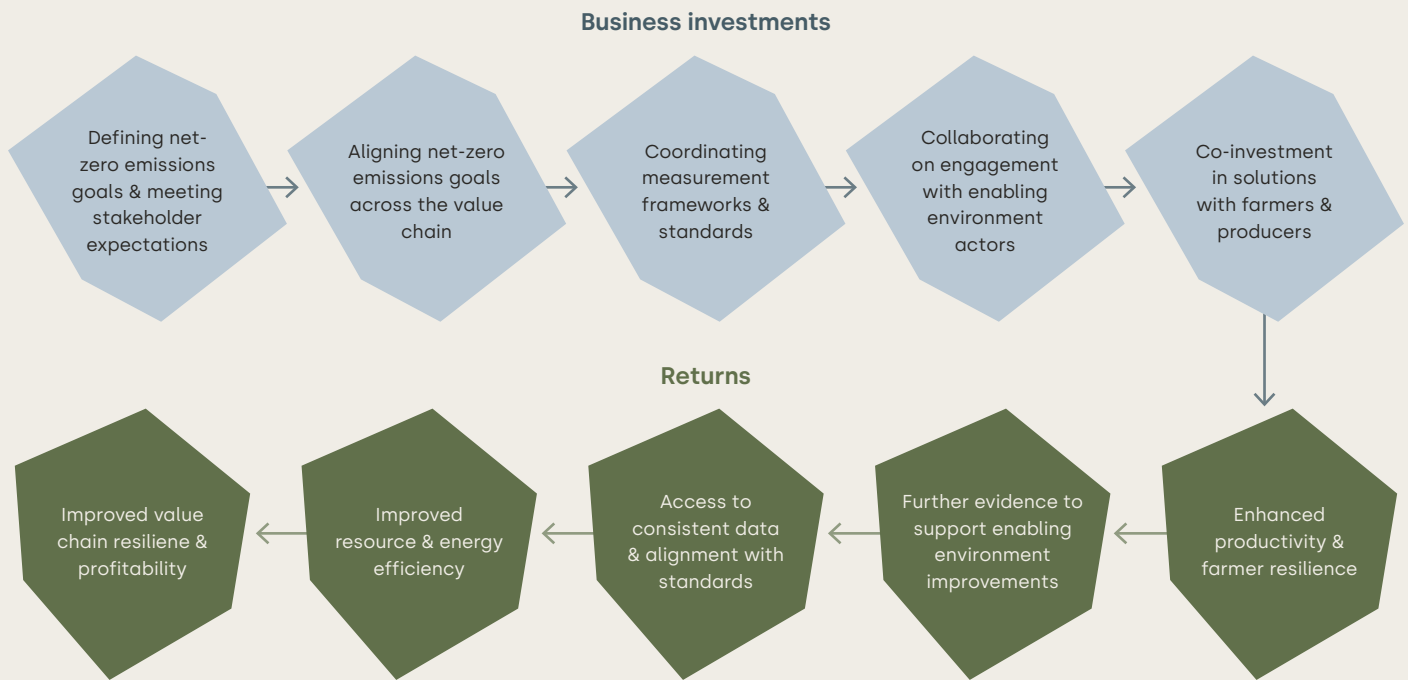


04.

04. A framework for agriculture and food businesses to collaborate on decarbonization across the value chain

In efforts to decarbonize global food systems by maximizing the potential of agriculture as a solution, Figure 6 provides a proposed framework for collaboration across the value chain. It shows the business investments needed to make this happen and the returns gained from doing so.

Figure 6: Proposed framework for cross-value chain collaboration



Business investments

1 *Defining net-zero emissions and meeting stakeholder expectations*

The first step in the collaboration process is to ensure that each value chain actor has a common understanding of what net-zero emissions means in the context of the agriculture and food sector and that the scope 3 emissions reductions goals that companies set out use the same or similar definitions and parameters. As part of this process, we recommend engaging with broader civil society, the scientific community, consumer bodies and public sector stakeholders to help align these definitions with how wider stakeholder groups understand them.

2 *Aligning net-zero emissions goals across the value chain*

The second step is to align on goals throughout the value chain. With many companies having already spent years calculating, defining and setting their goals, aligning net-zero goals across the value chain will largely be a process of finding areas of common ground to work from. Specific goals will be particular to each company and its stage in the value chain. But the broad levels of ambition and timeframes adopted should be similar enough to mean that major differences with other parts of the value chain do not constrain value chain actors.

At the same time, few – if any – farmers will be familiar with setting “net-zero emissions goals” and have the time and resources to engage with this process. Therefore, we recommend making efforts to translate this concept into something practical and relatable to farm management and that brings good incentives. For example, Regen10 is seeking to address this opportunity through a farmer-centric approach to accelerate regenerative and agroecological approaches to transform food systems to achieve global goals on food security, climate and biodiversity.⁵⁰

3 *Coordinating on measurement frameworks and standards*

Step 3 addresses the prerequisite for improving the lack of effective data coordination and sharing: getting companies to use similar and aligned measurement frameworks and standards. This process is already underway and WBCSD supports it through engagement with the [GHG Protocol Land Sector & Removals Guidance](#), the [Science Based Target initiative \(SBTi\) Forest, Land and Agriculture Guidance \(FLAG\)](#) and the [Accountability Framework Initiative \(AFI\)](#). This includes providing feedback to these initiatives on common issues encountered in applying them and ongoing coordination as companies adopt them more widely.

We recommend the development of a global list of uniform mitigation priorities, with equity in the rules regarding what businesses account for, to enable actors in different parts of the value chain to work toward them in collaboration.

To better incentivize businesses to contribute high-quality data to demonstrate decarbonization progress, we recommend studying the possibility of adding a “quality tag” to data provided on decarbonization, which may also feed into improved “price tags” that carbon reduction efforts attract.

4 *Collaborating on engagement with enabling environment actors*

Step 4 aims to address the challenge of limitations placed on companies by enabling environment restrictions, whether it be regulations surrounding how they can use land or the lack of access to cleaner energy sources. Engagement with the public sector and other stakeholders who influence the enabling environment will likely be more effective on a collective basis, bringing together actors across the value chain that have an interest in addressing common barriers.

We recommend beginning this process with prioritizing those challenges that are both most critical and where the potential for change is highest – in a given value chain of common interest.

5 *Co-investment in solutions with farmers and producers*

Step 5 targets one of the most intransigent issues that remains a barrier to substantive progress on decarbonization: the investment and risk that farmers and producers often need to take on to transition to new or adapted production methods and technologies. Farmers frequently reference trust (or a lack thereof) as a reason why they may not be willing to take these risks without upfront assurances of the return on their investment.

To make decarbonization progress at the pace needed, we recommend companies and their partners find ways to invest upfront with farmers and producers to share the risk they face and help build trust over time. While it may be unreasonable to expect individual companies to shoulder that financial burden, it becomes more manageable when shared collectively. Having a group of influential companies act in a particular value chain may also help attract greater interest from third-party investors and funders, further spreading the financial burden.

This is also not just about financial resources. Building trust also means that farmers and producers can be confident that, across their customer base, companies are putting their “money where their mouth is”. Collective action in this regard helps build that trust further.

Companies can also implement this process using the “landscape approach” – plugging into existing landscape governance frameworks to reach scale quickly and use established channels to engage with and support farmer and producer communities. It could also help in engaging with local decision-makers during step 4 above.

Returns gained

Enhanced productivity and farmer resilience

Effectively implementing step 4 above provides companies with the opportunity to scale up the adoption of agricultural practices that lead to decarbonization and enhance farmer productivity and climate resilience over time. Achieving this on a broad basis sets the foundation for more resilient agricultural value chains.

Further evidence to support enabling environment improvements

Depending on the outcome step 4 above, the enabling environment for making decarbonization investments in company operations will improve, benefitting actors across the value chain. These benefits will provide more evidence to policymakers and other actors overseeing the agriculture and food industry of the value from making these enabling environment changes.

Access to consistent data and alignment with standards

Improved alignment in the measurement frameworks and standards used to track decarbonization progress (step 3 above) will allow for access to more consistent data along the value chain. Subsequently, companies should be better able to assess the scope 3 emissions associated with their products, at lower cost, and act on this information effectively. This will also enable more effective coordination across the value chain as different actors have the same understanding in terms of decarbonization.

Improved resource and energy efficiency

As the result of an effective, coordinated drive towards decarbonization across the value chain, companies will benefit from the collective improvements in resource and energy efficiency made and the resulting cost savings going forward.

Improved value chain resilience and profitability

A well-coordinated drive towards decarbonization resulting from the actions laid out above can improve the resilience and the profitability of the value chain. Improved communication and collaboration across the value chain should have broader benefits stemming from greater trust and mutual knowledge of how each actor operates. Beyond this, decarbonizing agriculture and food value chains will lower the associated "transition" climate risks for financiers, an issue that is set to become more prominent in the decade to come.

05. Next steps

We will be taking the business case for decarbonization in agriculture and food value chains forward through our [Positive Agriculture](#) project.

This ambitious project aims to transform global food systems by maximizing the potential of agriculture as a solution for climate, nature and farmers. In 2024 this will include a workstream on unlocking climate action and resilience, with a focus on access to trusted scope 3 data.

Endnotes

- 1 FOLU Future Fit Food and Agriculture report <https://www.foodandlandusecoalition.org/knowledge-hub/future-fit-food-and-agriculture/>.
- 2 S&P Global (2022). Carbon Farming: Opportunities for agriculture and farmers to gain from decarbonization. Retrieved from: https://www.spglobal.com/esg/insights/carbon_farming_investment_research_report.pdf.
- 3 FOLU Future Fit Food and Agriculture report <https://www.foodandlandusecoalition.org/knowledge-hub/future-fit-food-and-agriculture/>.
- 4 FOLU Future Fit Food and Agriculture report <https://www.foodandlandusecoalition.org/knowledge-hub/future-fit-food-and-agriculture/>.
- 5 Future Farming (2022). Precision farming market to grow to USD 15.6 billion by 2030. 27 April 2022. Retrieved from: <https://www.futurefarming.com/smart-farming/precision-farming-market-to-grow-to-usd-15-6-billion-by-2030/#:~:text=The%20precision%20farming%20market%20is%20expected%20to%20grow%20from%20USD,the%20latest%20report%20by%20MarketandMarkets>.
- 6 International Fertilizer Association (IFA) & Systemiq (2022). Reducing emissions from fertilizer use. Retrieved from: <https://www.systemiq.earth/reducing-emissions-fertilizer/>.
- 7 For more information, see: 4R Nutrient Stewardship. The Fertilizer Institute. Retrieved from: <https://nutrientstewardship.org/4rs/>.
- 8 United States Department of Agriculture (USDA) (2022). Partnerships for Climate-Smart Commodities Project Summaries. Retrieved from: <https://www.usda.gov/sites/default/files/documents/partnerships-climate-smart-commodities-project-summaries.pdf>.
- 9 Bloomberg NEF (2022). Crop Buyers Call for Greener Farming to Lock Up Carbon. 1 July 2022. Retrieved from: <https://about.bnef.com/blog/crop-buyers-call-for-greener-farming-to-lock-up-carbon/>.
- 10 Manthiram, K. & Gribkoff, E. (2021). Fertilizer and Climate Change. MIT Climate Portal. Retrieved from: <https://climate.mit.edu/explainers/fertilizer-and-climate-change>.
- 11 Systemiq, University of Exeter and Bezos Earth Fund (2023). The breakthrough effect: How to trigger a cascade of tipping points to accelerate the Net Zero Transition. Retrieved from: <https://www.systemiq.earth/wp-content/uploads/2023/01/The-Breakthrough-Effect.pdf>.
- 12 Adapted from: WBCSD (2022). OCP Group, Bioline by Invivo, Agrorobótica and Sementes Tropical launch their first carbon farming and certification project to support sustainable agriculture in Brazil. Member Spotlight. 24 November 2022. Retrieved from: <https://www.wbcd.org/Overview/News-Insights/Member-spotlight/OCP-Group-Bioline-by-Invivo-Agrorobotica-and-Sementes-Tropical-launch-their-first-carbon-farming-and-certification-project-to-support-sustainable-agriculture-in-Brazil>.
- 13 OP2B and BCG (2023) Cultivating farmer prosperity: Investing in Regenerative Agriculture <https://www.wbcd.org/contentwbc/download/16321/233420/1>
- 14 Cornell University (2015). Advantages of Conservation Agriculture. Retrieved from: <http://conservationagriculture.mannlib.cornell.edu/pages/aboutca/advantages.html>.
- 15 Gianessi, L.P. (n.d.). Importance of Herbicides for No-Till Agriculture in South America. CropLife Latin America. Retrieved from: <https://www.croplifela.org/en/whats-new/news/importance-of-herbicides-for-no-till-agriculture-in-south-america>.
- 16 Global Commission on Adaptation (2021). A Blueprint for Digital Climate-Informed Advisory Services: Building the Resilience of 300 Million Small-Scale Producers by 2030. Retrieved from: <https://gca.org/wp-content/uploads/2021/07/A-Blueprint-for-Digital-Climate-Informed-Advisory-Services.pdf>.
- 17 S&P Global (2022). Carbon Farming: Opportunities for agriculture and farmers to gain from decarbonization. Retrieved from: https://www.spglobal.com/esg/insights/carbon_farming_investment_research_report.pdf.
- 18 Burbidge, A. (2022). Agroforestry 'essential' for net zero targets. Farmers Guardian. 18 November 2022. Retrieved from: <https://www.fginsight.com/news/agroforestry-essential-for-net-zero-targets-131986>.
- 19 Do, H. and Whitney, C. (2020). Decision analysis of agroforestry options reveals adoption risks for resource-poor farmers. In *Agronomy for Sustainable Development* 40. Article 20 (2020).
- 20 Russell, S. (2012). Managing GHG Emissions from Agriculture: A unique but solvable challenge. *Greenhouse Gas Protocol*. 14 May 2012. Retrieved from: <https://ghgprotocol.org/blog/managing-ghg-emissions-agriculture-unique-solvable-challenge>.

- 21 Basche, A. and Carter, A. (2021). Training future agriculture professionals in landowner-tenant conservation decision making. In *Natural Sciences Education*. Volume 50, Issue 1, 2021.
- 22 Chizmar et al. (2022). Challenges and opportunities for agroforestry practitioners to participate in state preferential property tax programs for agriculture and forestry. In *Trees, Forests and People*. Volume 7, March 2022.
- 23 Day, C. and Cramer, S. (2022). Transforming to a regenerative U.S. agriculture: the role of policy, process and education. In *Sustainability Science* 17, 585-601 (2022).
- 24 Summarized from: WWF Markets Institute (2021). *An Environmental and Economic Path Toward Net Zero Dairy Farm Emissions*.
- 25 Source: U.S. Dairy (2022). U.S. Dairy Net Zero Initiative. <https://www.usdairy.com/getmedia/1447e35f-251d-4149-8e93-875c42e8f02d/US-Dairy-Net-Zero-Initiative-Game-Changer.pdf>.
- 26 Olam (2015). 8 principles, 5 years of impact. Retrieved from: https://www.olamgroup.com/content/dam/olamgroup/files/uploads/2014/02/OLC-brochure-2015_screen.pdf.
- 27 Field to Market (2022). Unique Cross-Sector Project Recognized for Supporting Nebraska Farmers to Boost Resilience Via Cover Cropping. Retrieved from: <https://fieldtomarket.org/case-studies-series/2022-collaboration/>.
- 28 Early Metrics & CapAgro (2021). Decarbonisation of the Agricultural & Food Industry. Retrieved from: <https://earlymetrics.com/wp-content/uploads/2021/06/White-paper-Decarbonisation-of-food-Early-Metrics-x-Capagro-2021.pdf>.
- 29 Content in this case study adapted from IDH The Sustainable Trade Initiative's "Landscape Case Study Series" (https://www.idhsustainabletrade.com/uploaded/2018/06/IDH_Business-case-study_Touton_Ghana_cocoa-1.pdf) and a report published by the Africa Regenerative Agriculture Study Group on Regenerative Agriculture, an opportunity for businesses and society to restore degraded land in Africa (commissioned by IUCN and the United Nations Framework Convention on Climate Change (UNFCCC); <https://www.iucn.org/resources/grey-literature/regenerative-agriculture-report-opportunity-businesses-and-society>).
- 30 Although not mentioned in this case study, the following have also been involved in the work described: The Ghana Cocoa Board, Agro Eco-Louis Bolk Institute, Nature Conservation Research Centre (NCRC), SNV-Netherlands Development Organisation, traditional authorities, and a number of NGOs and private sector actors.
- 31 Source: IDH The Sustainable Trade Initiative (2018). Landscape Case Study Series: TOUTON: The business case for a landscape approach to sustainable cocoa production in Ghana. Retrieved from: https://www.idhsustainabletrade.com/uploaded/2018/06/IDH_Business-case-study_Touton_Ghana_cocoa-1.pdf.
- 32 BCG & World Economic Forum (2022). Winning the Race to Net Zero: The CEO Guide to Climate Advantage. Retrieved from: <https://www.weforum.org/reports/winning-the-race-to-net-zero-the-ceo-guide-to-climate-advantage/>.
- 33 Mondelez (2021). Partnership with Olam to Create Largest Sustainable Commercial Cocoa Farm. 21 April 2021. Retrieved from: <https://www.mondelezinternational.com/News/Partnership-with-Olam-to-create-largest-sustainable-commercial-cocoa-farm>.
- 34 Compass Group (2022). Compass Group Issues First Sustainable Bonds To Support Net Zero Ambitions. 13 September 2022. Retrieved from: <https://www.compass-group.com/en/media/news/2022/compass-group-issues-first-sustainable-bonds.html>.
- 35 Early Metrics & CapAgro (2021). Decarbonisation of the Agricultural & Food Industry. Retrieved from: <https://earlymetrics.com/wp-content/uploads/2021/06/White-paper-Decarbonisation-of-food-Early-Metrics-x-Capagro-2021.pdf>.
- 36 Goldman Sachs Asset Management (2022). Green Capex: Capturing the Opportunities. 1 April 2022. Retrieved from: https://www.gsam.com/content/gsam/us/en/institutions/market-insights/gsam-connect/2022/Green-Capex_Capturing_the_Opportunities.html.
- 37 World Bank (n.d.) World Development Indicators. Retrieved from: <https://databank.worldbank.org/source/world-development-indicators>.
- 38 Content in this case study adapted from One Planet Business for Biodiversity (OP2B) (2021). Case Studies. <https://www.wbcds.org/contentwbc/download/14067/203116/1>.

- 39 Sime Darby (2022) Nestlé Malaysia and Sime Darby Plantation Commence Reforestation Collaboration under Project RELeaf. 28 March 2022. Retrieved from: <https://sime-darby-plantation.com/nestle-malaysia-and-sime-darby-plantation-commence-reforestation-collaboration-under-project-releaf/>.
- 40 Nestlé (2022). Sustainably produced palm oil at Nestlé: 2021 Progress Report. Retrieved from: <https://www.nestle.com/sites/default/files/2022-03/responsible-palm-oil-sourcing-2021.pdf>.
- 41 Nestlé (n.d.). Responsibly sourced palm oil. <https://www.nestle.com/sustainability/sustainable-sourcing/palm-oil>.
- 42 Bhargava, A., Hoffman, S. & Jakic, N. (2022). Climate sustainability in retail: Who will pay? McKinsey & Company. 4 May 2022. Retrieved from: <https://www.mckinsey.com/industries/retail/our-insights/climate-sustainability-in-retail-who-will-pay>.
- 43 Packaging Insights (2020). Consumers support product carbon labelling as climate change concerns heat up. 27 April 2022. Retrieved from: <https://www.packaginginsights.com/news/consumers-support-product-carbon-labeling-as-climate-change-concerns-heat-up.html>.
- 44 Unilever (2021). Climate Transition Action Plan. Retrieved from: <https://assets.unilever.com/files/92ui5egz/production/bbe89d14aa9e0121dd3a2b9721bbfd3bef57b8d3.pdf/unilever-climate-transition-action-plan-19032021.pdf>.
- 45 Hicks, R. (2020). Public faith in sustainability reports is rising globally – but more than half of people still don't trust company claims. Eco-Business. 14 October 2020. Retrieved from: <https://www.eco-business.com/news/public-faith-in-sustainability-reports-is-rising-globally-but-more-than-half-of-people-still-dont-trust-company-claims/>.
- 46 Natixis (2022). Green Bonds Review 1Q22: The green & sustainable bond market starts to mature. Retrieved from: [https://home.cib.natixis.com/articles/green-bonds-review-1q22-the-green-sustainable-bond-market-starts-to-mature#:~:text=Green%20%26%20sustainable%20\(G%26S\)%20bonds,the%20five%20years%20to%202021](https://home.cib.natixis.com/articles/green-bonds-review-1q22-the-green-sustainable-bond-market-starts-to-mature#:~:text=Green%20%26%20sustainable%20(G%26S)%20bonds,the%20five%20years%20to%202021).
- 47 WBCSD An Introductory Guide for Net Zero Target Setting for Farm-Based Agricultural Emissions <https://www.wbcsd.org/contentwbc/download/15359/224482/1>
- 48 Taskforce on Climate-related Financial Disclosures (2022) Taskforce on Climate-related Financial Disclosures 2022 Status Report. <https://assets.bbhub.io/company/sites/60/2022/10/2022-TCFD-Status-Report.pdf>
- 49 WBCSD (2021). Leading banking institutions join forces in new initiative to support decarbonization of the agriculture sector. 8 November 2021. Retrieved from: <https://www.wbcsd.org/Programs/Food-and-Nature/News/Leading-banking-institutions-join-forces-in-new-initiative-to-support-decarbonization-of-the-agriculture-sector>.
- 50 See the Regen10 website at <https://regen10.org/>.

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