Reducing Greenhouse Gases with Incentives at the Farm:

How companies are moving from setting climate targets to delivering on them

Global climate goals are unattainable without substantive change in agriculture, as the food system is responsible for about a third of global greenhouse gas (GHG) emissions.[1] While the negative environmental and social impacts of agriculture must decrease, we need to produce more food more efficiently and with less waste, as well as ensure its affordability, to sustain a growing human population.

Many corporations have set target GHG reductions from both their own operations (Scopes 1 & 2) and from their value chains (Scope 3). For companies in the food sector, most (often over 90%) of their value-chain emissions are Scope 3, and the majority of those are on farm.

Figure 1: GHG emission sources from agriculture

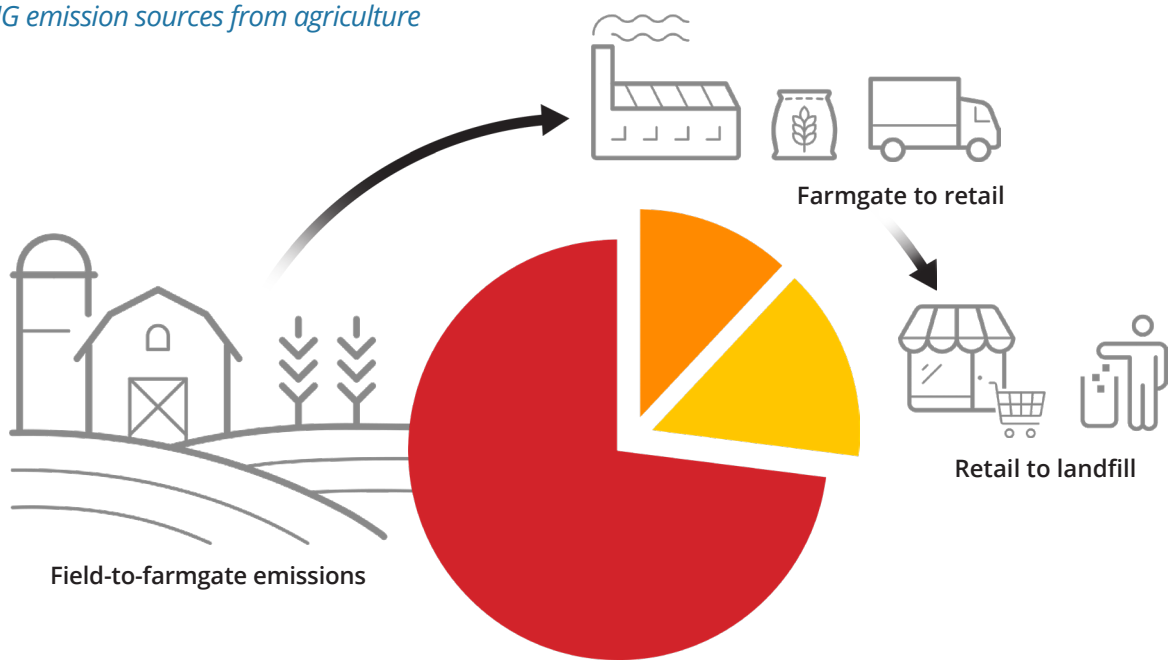


Table 1: GHG emissions from agriculture

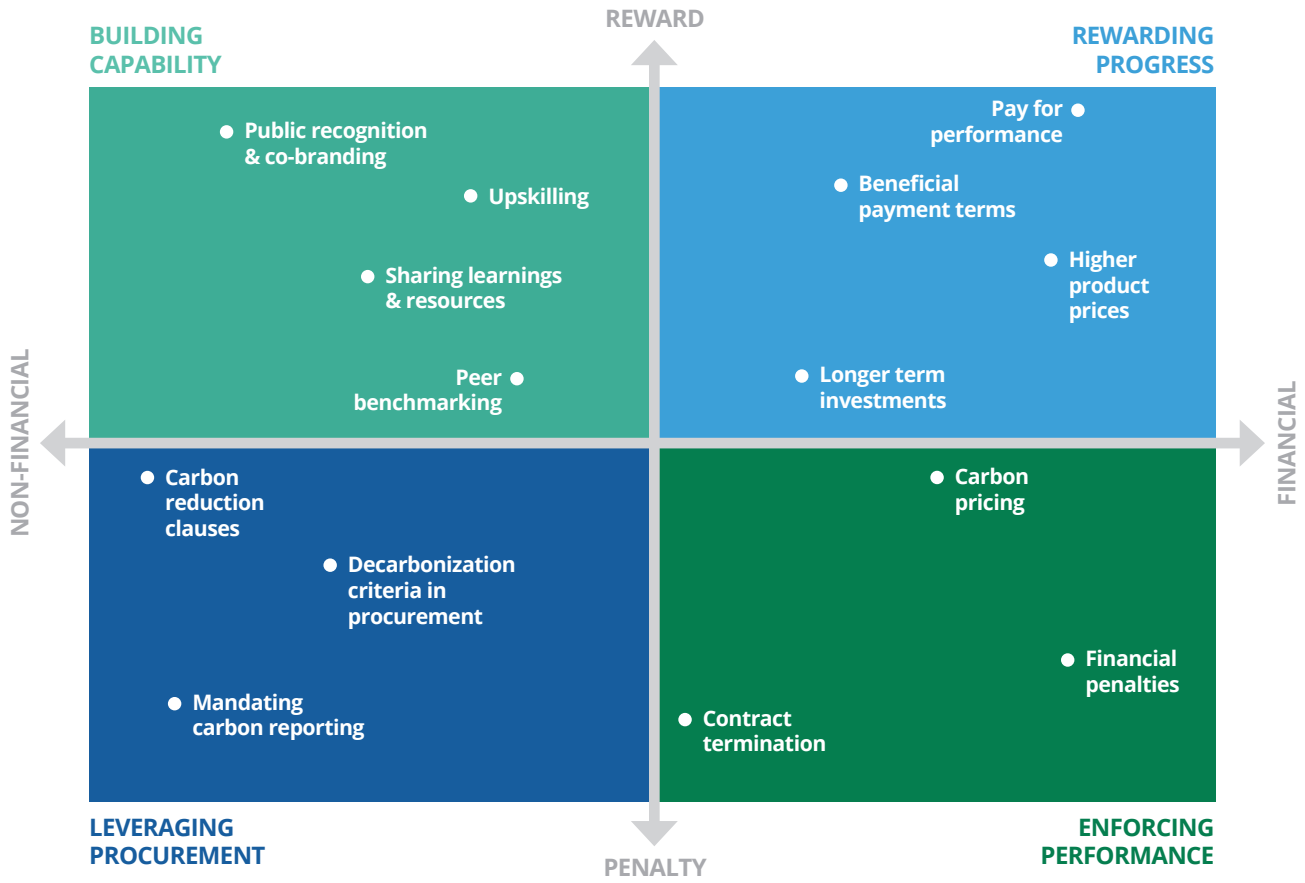
	Field-to-farmgate emissions			Farmgate to retail			Retail to landfill		
	Deforesta-tion and other land use change	Agronomic practices - Land	Agronomic practices - Non-land	Transport	Processing	Packaging	Retail	Consumption	End of life
Contribution[2]	32%	34%	6%	5%	3%	5%	4%	3%	9%

Over 70% of food-related GHG emissions are from agricultural practices (Figure 1 and/or Table 1). For companies that have set ambitious climate targets, the big question now is how to deliver on them.

These on-farm GHGs come from varied sources including deforestation and conversion of natural habitats like savannahs and wetlands into crop or pastureland, emissions of nitrous oxide from soils, methane from rice paddies, and enteric fermentation and manure. IPCC climate modeling, which is also deployed in the Science Based Targets initiative, affirms that in addition to mitigating emissions from these sources, on-farm sequestration will also be required to limit warming to 1.5 degrees.[3]

The good news is that there is also a wide range of potential actions that can be taken to mitigate these emissions. However, these actions require financial capital, technical expertise, and culturally appropriate local adaptation. Downstream companies aiming to decrease their emissions need to effectively measure and mitigate GHGs across many farms with which they typically do not have direct contact. Traceability is a critical factor for many of the examples included in this paper, which illustrates both its importance, as well as its feasibility. At the same time, farmers often operate with thin or negative profit margins, making their own investments into sustainability challenging. If companies are not able to address the on-farm emissions that constitute a majority of their total footprint, we will not make sufficient progress towards the Paris Agreement targets and companies will not meet their Scope 3 goals.

Figure 2: Reaching net zero: incentives for supply chain decarbonization



Source: WBCSD

Appropriate programs and incentives designed to shift behavior on farms to mitigate GHG emissions will be critical, although this type of effort is relatively nascent in practice. Companies have many options available in their toolbox, ranging from rewards to penalties, financial or otherwise; WBCSD has recently highlighted some of these options for supply chains.[4] In Figure 2, we focus on the "rewards" part of the toolbox.

Determining which practices to reward or mitigation goals to pursue is its own challenge. For example, for soil carbon, the permanence (or guarantee that the carbon will stay out of the atmosphere) is not the same as for fossil pools. Measurement and modeling uncertainty also vary across different processes; for example, nitrous oxide is emitted from fertilizer application as well as from its production. While both are related to emissions for fertilizer, the rate of emissions from soil application has much greater uncertainty that we do not address here.

For programs that want to provide incentives linked directly to the GHG reduction amounts, the ability to measure these emissions is critical.

After interviewing more than 90 experts from corporations, industry associations, and civil society groups, we developed a typology of incentives and examples of their use. This list is not comprehensive and, in many cases, draws on incentives developed not just for GHG mitigation but also for other farm-relevant sustainability outcomes. The incentives for these other outcomes are likely relevant for GHG mitigation as well. The examples comprise different incentives across geographies and products.

We have grouped these incentives into 5 broad categories: price premiums, financing, knowledge sharing, new products/markets, and contracting. Note that many examples do not fit neatly into a single category; companies often use multiple incentives simultaneously.

Acknowledgements

This work was funded by The Gordon and Betty Moore Foundation. It benefitted from expert feedback from The Sustainable Food Lab, WWF-IT, WWF-CH, WWF-UK, many colleagues at WWF-US, and from the dozens of companies that were interviewed.

GORDON AND BETTY MOORE FOUNDATION

Disclaimer: *Inclusion of examples does not constitute endorsement by WWF of these brands, their strategies, or the specific agricultural practices proposed for reducing GHG emissions. In order to meet climate goals, all production, regardless of method, must become more sustainable. WWF's position on carbon offsets can be found* ***here.***[5]

Furthermore, agriculture also has many impacts beyond climate that are critical to address. Reducing GHG emissions alone will not make suppliers sustainable, but it will reduce their impacts and the embedded emissions passed on to consumers in products.

Enabling Conditions

While incentives targeted at the farm are essential, interviews with companies suggest that incentives within a corporation and from external entities represent critical enabling conditions and often contribute to the final form of the farm-focused incentives.

Why work with suppliers to reduce Scope 3 emissions? Companies are increasingly incentivized to engage on climate mitigation and adaptation through mechanisms like:

- **Social License to Operate:** Positive performance and progress toward ESG principles are increasingly seen as necessary as a license to operate. For example, the Business Roundtable moved away from shareholder primacy to include other stakeholders.[6]
- **Shareholder Pressure:** Recently, shareholders have put forward proposals for environmental disclosures and progress for several publicly traded companies, suggesting an increasing perspective of climate as a material risk to company performance. Firms that disclosed climate risk after shareholder pressure saw a more-than 1% rise in stock prices in following days.[7]
- **Regulatory Pre-positioning:** 113 national governments have set climate targets,[8] and many are considering legislation to curb emissions. Already, over 1,770 legislative and executive policies have been promulgated targeting mitigation.[9] Companies may seek to work on climate now to ensure their ability to operate in or export to countries adopting ambitious regulations.
- **Employee Retention:** Younger employees increasingly care about the climate. About 40% of millennials based a job decision partially on corporate sustainability;[10] 75% of university-aged students indicate their future employers' stance on global issues will influence their job choice.[11]

Why engage on sustainability and GHG reduction as a business-unit? For companies with the most mature sustainability programs and action, sustainability is embedded across the organization from procurement to marketing to R&D. How to promulgate sustainability across an organization is a key challenge, and how sustainability roles are distributed across the organization may also play an important role. Some financial incentives include:

- **Internal carbon price:** Many companies use an internal carbon price to determine how emissions affect the potential profitability of parts of their business.[12] Of 100 companies sampled by McKinsey, 23% used internal carbon pricing with median prices between $18-27 depending on the region.[13] Some companies may use this price for planning, while others may charge the fee to the internal department and invest it in further sustainability efforts.[14] Some companies like Kering have gone further and conduct this accounting across multiple environmental impacts.[15]
- **Executive compensation:** A relatively small number of companies have linked executive compensation to sustainability goals; this practice is more prevalent in Europe than the US.[16]

Incentives:
Price Premiums

Increased payment for more sustainably produced products is perhaps the most obvious type of potential incentive. Price premiums for sustainability attributes have historically been associated with voluntary certifications, like organic or Roundtable on Sustainable Palm Oil (RSPO). This area has been historically challenging as these certified products often remain niche, premium products.

Another lens with which to consider offering premiums is whether a company will reward a practice or an outcome. While outcomes are fundamentally how environmental impacts are measured and allow flexible, innovative approaches to delivery, measurement may be difficult.

1| Truterra

Land O'Lakes collaborated on a program to reward growers for sustainability improvements through a public-private partnership with Dubuque County in Iowa. The Truterra™ Insights Engine tool was used to make a baseline and predict the impact of beneficial practices. The program allocated $100,000 to participating farmers throughout 2021 and 2022. The program rewards Dubuque County farmers for improving soil health and water quality by leveraging the Truterra sustainability tool and sustainability score. In 2022, 33 farmers across 43 farms and 3,447 acres were enrolled. 2,338 acres implemented advanced nutrient management, 1,484 acres implemented cover crops, and 508 acres implemented reduced tillage practices. The carbon program pays farmers based on the amount of carbon stored as calculated with the Truterra tool, verification with Colorado State, and soil testing.

Initial results for 2022 include:

- Truterra™ sustainability score increased by 14 points
- Sheet and rill soil erosion reduced by 20%
- Net GHG emissions reduced by 602 lbs/ac/yr (0.7 tCO_2e/ha/yr)
- Average nitrogen runoff reduced by 26.3 lbs/ac and P by 3lbs/ac

2| Grupo Daabon organic palm oil

While Grupo Daabon offers a price premium for certified organic and sustainable palm oil, it quickly found that this alone was not sufficient to engage with smallholder palm oil producers in Colombia. Deep engagement is critical to support a stable supply chain, even in the face of shocks like a devastating bud rot disease. A big part of this engagement is offering opportunities for entire families of farmers to create value beyond palm oil: Daabon works with farms to diversify the farm products to include vegetables, chicken, and fish for their own consumption; it creates job opportunities related to brand (e.g., uniform embroidery); and it created new agronomy roles for women who were previously excluded from heavy, manual farm work. The intent is to help farms stay in business over generations.

On the price side, in addition to the price premiums, it supports certification under an umbrella group, which simplifies the process. Daabon has also explored removal projects that pay producers for emissions reductions taking into account that the process allows for a methane recapture in its processing plants. The structure for contributing back to the smallholders was designed by the Wharton International Volunteer Program and the first phase of delivery is set for August 2023.

Recently, Daabon has begun to offer trainings on identifying better seeds and on agronomic practices to combat diseases like bud rot; it sees this as an opportunity to improve practices and bring back natural areas. Without this information, small farmers may also struggle to interpret some of the more complicated requirements from the certifications. The company currently engages with about 100 smallholder farms.

3| Straus Family Creamery

Straus Family Creamery is a mission-oriented company that sources from 12 certified organic dairy farms in Marin and Sonoma Counties in Northern California. It aims to have all purchased milk climate-positive by 2030 via a carbon-neutral dairy farming model through a collaborative approach with the dairies, deploying a combination of interventions that it has piloted and refined locally: red seaweed feed additives, biodigester use, electrification of on-farm vehicles, and regenerative soil management. It uses Cool Farm Tool, Comet Farm, and direct measurements (on new practices like seaweed in diets) to get baseline farm emissions from suppliers that capture some of the uncertainty in measurement. One farm, the Straus Dairy, has served as the model for the other farms and plans on reaching its carbon-neutral dairy farming goal by late 2023.[17]

In January 2023, it launched a new incentive program for these more sustainable farming activities as part of its contract with the dairies. It offers a schedule of incentives over time for activities like developing a carbon farm plan, implementing that plan, as well as for the above climate interventions. Some activities, like the carbon farm plan, must be completed by a particular date, after which the incentive will phase out. The incentives are paid with each milk check, and participation has already doubled in some of the activities.

Straus built this effort on longstanding, close relationships with its sourcing farms; it meets quarterly with farmers to understand challenges and hand-delivers payments to facilitate dialogue. This allowed its climate interventions to be locally tailored to farmer needs. Straus is also providing technical assistance for completing the farm carbon calculators and for deploying interventions. It continues to refine its toolkit of interventions to be practical and cost-effective so that the farms have easy solutions. For example, current anaerobic digesters are poorly suited for smaller and pasture-fed dairy farms like those it sources from, so Straus has been focusing on innovating the digesters with upgraded technology.[18,19,20]

4| Carta del Mulino from Mulino Bianco

Barilla Group's Mulino Bianco brand collaborated with WWF Italy and leading universities to create the Carta del Mulino project to improve sustainability for soft wheat flour. The project has 10 annually updated rules to support continuous improvement in quality, farming communities, and environmental health in wheat production. Some rules include dedicating 3% of fields to flowers, prohibiting insecticides harmful to bees, and rotating crops. The participants must keep their product physically segregated. Finally, all members must ensure through contracts that economic benefit is given to all supply-chain actors as a "percentage or absolute value of the reference price … in these contracts." Mulino Bianco pays a premium for its purchases and covers the costs of the independent third-party verification used on all supply-chain activities.[21]

5| Farmer's Business Network's (FBN) Gradable

Gradable is FBN's technology and services arm that provides the infrastructure and modeling for farmers to communicate the environmental benefits of their production to buyers. Through the program, farmers can voluntarily score their farms for environmental outcomes, allowing them to participate in premium programs for climate-smart practice adoption and share identity-preserved environmental impacts with buyers. Downstream brands have used this platform to assess the climate footprint of their purchases and help monitor progress toward sustainability goals.

For climate impacts, FBN is model-agnostic and supports a variety of programs demanded by downstream markets. This includes Argonne National Lab's GREET model and Field to Market's Fieldprint Calculator, among others. Cover crop and tillage verification, land use change, irrigation detection and more are tracked via satellite data.[22] FBN's partnerships with large processors such as ADM and POET, coupled with its own network of more than 60,000 growers across 100 million acres in North America, make this platform available to most row crop producers in the United States.

Incentives: Financing

Price premiums are not the only type of financial incentive and may be poorly suited to situations where initial investment in infrastructure or transitions to new practices impose additional costs or risks, or where markets exist for cheaper product regardless of how it is produced.

Preferential rates: *Lenders offer preferential finance rates for more sustainable performance. These differ from green bonds in that the funds can typically be used for any activity, but the interest rate varies based on performance.*[23]

1| Tesco

Tesco, a major multinational retailer, offers, in partnership with Santander Bank, a preferential payment condition for invoices for suppliers who are willing to disclose their carbon data and set targets. Depending on the suppliers' climate performance, they are distributed in three tiers: bronze, silver, and gold, with the latter being the most demanding from a sustainability perspective but also the most attractive financially. First-year suppliers join the program at the bottom tier and have the opportunity to stay in the program or climb to higher tiers in subsequent years by improving the quality and ambition of their disclosures. As such, the gold tier demands suppliers to submit accurate carbon data, set reduction targets for their business, and then track these reductions on a yearly basis, aligned with a 1.5 degree pathway. Some of the largest suppliers have saved as much as €2-3 million a year with these rates, and several other smaller suppliers have been encouraged to join the race to net zero because of the ability to get liquidity and fast payment from this program.[24]

2| Farmers Business Network and Environmental Defense Fund (EDF): FBN Regenerative Agriculture Finance Fund

In its pilot phase, this $26 million program enrolled 42 U.S.-based farmers who grow corn, soybeans, or wheat. Farmers who achieve soil health and nitrogen efficiency standards receive a 0.5% discount from the base rate for a one-year line of credit, regardless of whether their practices are new or pre-existing. The soil conservation component is determined by having at least 70% of farmed acres using practices like minimal tillage and live roots in the soil for over 70% of the year and high-density soil sampling within the last four years. Nitrogen efficiency requires an EDF N balance score within a specified range. A subset of farmers will have 3rd party on-site validation, while all will provide 1-3 years of data on farming practices.[25]

FBN sees this as a complementary approach to other incentives like cover-crop cost share and price premiums to collectively reduce barriers to new practices. To scale the fund, FBN plans to use the pilot data to understand the link between regenerative agriculture and farms' financial risk. Over 5 years, the fund is expected to grow to $1 billion.[26]

Funds: *Funds in general pool money for a specific purpose and show promise as a way to allow groups of investors to influence collections (or landscapes) of farms in a strategic way.*

3| Fisheries Improvement Fund

In April 2023, WWF and Finance Earth launched an innovative funding mechanism, the Fisheries Improvement Fund (FIF), which raises capital to provide upfront and ongoing funding for fishery improvement projects (FIPs). The FIF is managed by Finance Earth and targets global fishery recovery in order to support more sustainable livelihoods, food security, and climate resilience. There is an increasingly compelling business case for seafood supply chain companies to secure the natural resources that underpin their business models in the face of the decline of global fisheries and the increasing threats of climate change. The FIF proposes to harness this incentive, enabling participating companies (such as Cargill and Skretting) to contribute a volume-based fee into the FIF based on how much they buy from target fisheries. This makes it scalable, replicable, and equitable. The FIF model will also allow for broad supply chain participation from downstream buyers as well as upstream producers, through annual in-kind or financial contributions. The FIF then funds improvements in the target fisheries through experienced Service Providers based on a credible and robust third-party verified workplan. Historically, piecemeal fundraising efforts with ad hoc contributions have led to inconsistent and inefficient funding of FIPs, delaying or limiting progress. The FIF model ensures that funding from the project is secured from the outset, and it also allows participating companies to spread the cost of the project over time, with agreements on minimum payments and verifiable volumes. Thus, buyers are investing in long-term sustainability of their supply chains, but not providing all capital upfront. It also means that companies are embedding the cost of sustainability into the cost of the product thereby addressing the trend of externalizing environmental costs, while also creating a scalable way to support FIPs that moves away from limited corporate philanthropy budgets. The fund is currently accepting proposals for fisheries projects seeking funding.[27]

4| Co-op Coffees

Co-op Coffees is an importing cooperative with the mission of building direct, beneficial relationships with small coffee farmers. In 2021, it partnered with multiple organizations to use the Cool Farm Tool to measure climate impacts on coffee farms. It provided farmer training to use the tool and recently released initial data on the wide range of GHG impacts across 250 farms — including many with net carbon sequestration.[28] The tool can help inform future interventions.

Roasters paid a voluntary soil carbon premium based on the results.[29] The project also collects climate impact funds from the roasters by voluntarily adding 3 cents per pound of coffee and is in the process of determining the best method to disburse these funds to reward farmers for their positive impacts, and to inform and incentivize improvements.

Incentives: Knowledge Sharing

Across interviews, a repeated theme was the need to tailor interventions to the local geography and farmer needs. Thus, new techniques often need adaptation before they are implemented, and sharing lessons from previous efforts is critical to effective further uptake.

Flagship recognition: *Many companies recognize farmers or ranchers with exemplary performance. Often, these farmers are profiled so lessons can be shared with other suppliers.*

1| Corteva Climate Positive Leaders Program

In 2021, Corteva launched a competitive program to recognize early-adopters of farming practices that sequester carbon, with the aim of amplifying successes. Winners receive communication training, soil-carbon measurements, and engagement with a variety of experts.[30]

Training: *Incorporating new farming techniques requires local tailoring and can often take several harvest cycles to perfect. Many farmers report that lack of technical support is a barrier to starting new practices. Offering training is a common way for companies to interact with farmers, but the degree of engagement and support differs. There are many different models for how technical training is provided.*

2| Croplife International Farmer Stewardship Training

Under a 'train-the-trainer' model, CropLife International and its global network provides training to lead farmers or extension workers, who can then deliver the same trainings to larger groups and communities. These lead trainers can turn their knowledge into commercial endeavors whereby they charge for specific services, such as crop protection application. As of 2022, 20,000 service providers have been trained, and each one reaches 10 farmers on average. Further regionally appropriate tools are developed and deployed by these service providers, such as a mobile stewardship application in Latin American countries with various modules to support farmers' needs. In 2021, around 18 million farmers were trained by CropLife associations and member companies via this model.[31]

Container Management: Crop protection products play a vital role in agriculture to control the pests and diseases that threaten our global food supply. CropLife International, its global network, and member companies are leading the safe and responsible management of empty, properly rinsed pesticide containers. Between 2005 and 2021, the global CropLife network collected, from the environment, more than 1.3 million metric tons of packaging in 60 countries. In 2021, 84% of the 140,000 tons that were collected was recycled. Thanks to extensive training and educational programs, more and more countries are taking up container management programs. In Latin America, for

example, 81,500 metric tons of empty containers in 18 countries were collected and recycled in 2021, and 264,500 people were trained. In Brazil, an agricultural powerhouse, more than 94% of plastic collected was recycled.

3| General Mills Regenerative Agriculture

General Mills is piloting regenerative agriculture training in areas of the US, including coaching on implementation. Results will be compared with control farms.[32]

4| McCormick and Company

McCormick and Company, a global flavor manufacturer and distributor, has aligned its climate commitments with the Paris Agreement, to limit global warming to 1.5°C above preindustrial levels and has set a corresponding near-term (2030) target and a long-term target of net zero by 2050. Scope 3 emissions account for the vast majority of the Company's carbon footprint and therefore it is taking a multi-pronged approach to emission reductions in its supply chain.

McCormick joined forces with Mars and PepsiCo to support Guidehouse in establishing the Supplier Leadership on Climate Transition collaborative (S-LoCT), which officially launched in March 2021. Since then, the project has grown to include more than 20 brands. The program is designed to mobilize collective climate action by providing suppliers with resources, tools, and knowledge to support their own climate journeys. Through S-LoCT, McCormick suppliers receive training and mentorship on how to develop Science-Based Targets and implement greenhouse gas (GHG) emissions reduction strategies while being recognized for their achievements toward these milestones. In turn, supplier progress will accelerate McCormick's and the other participating companies' ability to deliver their own science-based targets to reduce emissions in their supply chains.

In addition, McCormick has introduced its Grown for Good framework, which defines the Company's methodology for sustainable sourcing. To comply, farmers must be trained and independently certified in sustainable farming techniques, including those which can reduce environmental impact. To incentivize suppliers to introduce and maintain these standards, McCormick partnered with Citibank and IFC to provide suppliers with discounted rates on short-term working capital financing. The higher the supplier's performance level in relation to sustainability standards, the greater the discount they may receive on their cost of financing. Performance relates not only to environmental impact but also labor conditions, health and safety practices, crop management, farmer resilience, and women's empowerment. To date, the program has been implemented in nine countries following the pilot programs in Vietnam and Indonesia.

Peer-to-peer networks: *Seeing a neighboring farm effectively deploying a strategy or tool is consistently cited as a powerful tool for behavior change for farmers. Facilitating these exchanges and lessons can reduce the burden on farmers alone to do this.*

5| The Cool Soil Initiative: A "Paddock to Plate" Partnership

The Cool Soil Initiative is an Australian farmer-driven, precompetitive sustainable sourcing platform grounded in science-based recommendations. Conceived in 2018 with initial funding from Mars Petcare in partnership with the Sustainable Food Lab, the Cool Soil Initiative ("CSI") is administered through Charles Sturt University. It is made up of more than 185 "leading-edge" farmers producing on 193,000 hectares of wheat, maize, canola, and more alongside some of the largest grain aggregators, processors, and multi-national consumer packaged goods (CPG) brands in Australia. PepsiCo ANZ, Mars, Kellogg's, Manildra Group, Allied Pinnacle, Corson Grain, and Food Agility CRC make up the current investor membership. CSI enables food and beverage companies to procure low-emissions crops, while

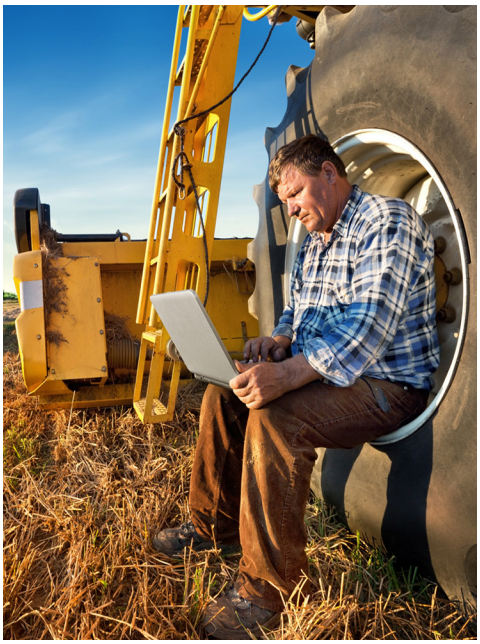
supporting farmers in the adoption of regenerative agriculture practices. CSI's model includes research, development, and extension to demonstrate the viability of lesser-used (or known) stewardship practices to unlock incremental uptake in the cropping systems of New South Wales and Victoria, where many farming operations are already "advanced" in conservation practices such as reduced/no-till and controlled-traffic farming.

Cool Soil's "paddock-to-product" approach offers value at every node of the supply chain. Farms enrolled in CSI have the option to take part in "innovation paddocks" – fully funded test plots that allow CSI farmers to experiment with soil building practices without having to shoulder the financial risk themselves.

CSI then connects producers to timely advice by way of Farming System Groups – regionalized, membership-based associations – that supply CSI farmers with critical decision support, data collection, and seasonal planning. Recognizing that farmers are a frequently surveyed demographic, Cool Soil has been careful to limit the data-entry burden, collecting only the information required to deliver agronomic insights back to the farmer, evaluate the efficacy of "climate-smart" practices within a region, and facilitate impact reporting for CSI investors.

CSI farmers receive individualized reports that distill on-farm emissions into discrete categories, highlighting areas where an operation can improve to unlock greater cost savings, environmental gains, and storytelling opportunities linked to government programs and commodity markets that put a premium on environmental attributes. Crop-specific assessments from the Cool Farm Tool paired with technical support from Farming System Groups guide producers toward management regimes that are regionally adapted and climate resilient. CSI runs economic analyses alongside its soil health testing, and innovation paddocks works individually with farmers to build the business case for adoption of legume and livestock integrations, split fertilizer application, and deep nitrogen sampling, among other strategies.

An open governance structure affords member companies an equal say in budgeting decisions and strategic direction. Through pooled funding, company investment can go further, while funding the "innovation paddocks," soil testing, and learning forums minimizes the downside risk to farmers, also providing them with cutting-edge agronomic services.



Incentives: New Products or Markets

Historically, markets have ignored the loss of ecosystems services as habitat was converted to farmland. Now that is changing. Today, it is clear that farmers and society as a whole need to bring these services back into areas of production. The issue is how to incentivize them through new markets. The ecosystem services provided by changed practices historically have been excluded from financial markets. Starting with improving water quality and year-round stream flow as with the NYC system of reservoirs, farmers began to be paid for such services. Reducing nutrient pollution and now extending to carbon credits, there have been efforts to make payments for these services to those who provide them. Currently, this marketplace is ad hoc and differs widely across geographies and even products just as ecosystems services do. However, climate-friendly agricultural practices often involve growing additional crops (e.g., cover crops, polyculture, intercropping), which may necessitate new strategies to incentivize producers when current markets are insufficient to promote the changes needed. Payments for ecosystem services alone are often insufficient to cover the costs for such practices, so there has been great interest in creating market pull for these "new" crops. Creating markets for either environmental attributes or new products that are better aligned with environmental performance could be powerful incentives for producers. These are a few examples of how this is happening.

Initial buying agreements: *For novel products, some companies have agreed to be an initial commercial buyer.*

1| General Mills & Kernza®

Since 2014, General Mills has worked alongside The Land Institute and the University of Minnesota to research Kernza, a perennial grain with climate and other environmental benefits. In 2017, General Mills' Cascadian Farms invested $500,000 to support advanced research to measure the potential of Kernza to significantly reduce greenhouse gas emissions associated with food production, determine best management practices for sustainable production, and increase Kernza yields through breeding. General Mills also agreed to purchase an initial amount of the resulting crop.[33] In 2019, the launch was scaled back due to smaller-than-expected yields, but General Mills remains committed to pushing the commercial viability of the climate-friendly crop.[34]

Indeed, Cascadian Farm Climate Smart cereal with Kernza perennial grains was launched in 2021 as a Limited-Edition product at Whole Foods Markets nationwide. After this successful launch, it will no longer be only Limited Edition and instead will become part of the overall product line. Starting in April 2023, more national retailers began carrying the item. And General Mills is looking at more ways to expand the use of Kernza as a replacement for annual wheat in other products as well, as part of its commitment to the successful commercialization and scaling of this regenerative and climate-smart crop.

As a perennial grain, Kernza enables farmers to reduce tillage, maintain living roots and keep the soil covered, which are critical principles for regenerative agriculture. Kernza's long root length (upwards of 10 feet) and long lifespan enable the grain to provide measurable soil health benefits, improved water quality (from a 99%–reduced nitrogen leaching compared to corn production), and drought resistance while preventing soil erosion and storing nutrients.

Purchase of polyculture or rotational products: *Production of inter-cropped or polyculture grown crops can introduce a new crop as a revenue stream, but selling the new crop can be challenging in small markets or if the crop has a niche market. Currently, we see most examples of polyculture for forest and tree-crop products (e.g., shade-grown coffee), but limited deployment of incentives for these integrated systems. This is an area of intense research and innovation development.*[35]

2| Blacksheep Regenerative Resource Management / Rewild Organics

Blacksheep Regenerative Resource Management is a mission-driven agroforestry company in Costa Rica that aims to regenerate degraded lands, protect vulnerable ecosystems, perpetuate local ownership of resources, and provide good livelihoods for shareholders, employees, and worker-owners. It is co-creating a grassroots network of small farms across the country to bring hundreds of small farmers' crops to an international, value-added market. Those farms mix native trees with timber, and cash and food crops. Blacksheep also launched an endconsumer brand (the US-based Rewild Organics) in November of 2020 to reach consumers directly. To achieve its goals, it employs multiple incentives and strategies that work together to reinforce each other and transform the existing paradigm of production; a few are listed here.

Multiple products: Recognizing that long-term investment in restoring and producing sustainable products could be at odds with short-term economic and environmental needs, Blacksheep promotes growing multiple forest crops that bring both economic value and nutrition and improve farm health over time. It plants timber on previously cleared land to restore fertility, reduce erosion, and provide long-term timber harvest. It adds leguminous trees that support emerging profitable vine crops like black pepper and vanilla, and it grows short annual cash crops like turmeric and ginger to provide short-term cash flow. Nitrogen-fixing crops like pigeon peas and mucuna are used for soil health and for sale or food. Finally, many edible species (sorillo, peppers, citrus, cacao, peach palm (pejibaye), jackfruit, breadfruit, breadnut) are used locally as food.

Market creation: Without an established market, one must be created, which is a huge barrier to entry for small farmers and prevents many from reaching beyond the local market. Pricing can be particularly difficult, since environmental and labor costs are treated as externalities in both local and global economies. Blacksheep has done a lot of work to find buyers who pay for more sustainable and equitable practices. Offtake agreements are particularly valuable for getting past the barrier of entry into the market.

Processing capacity: Small farmers in the area don't possess sufficient capital to invest in equipment, transport, or certifications. Having cooperative-level processing services locally available has created economic viability and allows farms to be competitive in both retail and wholesale markets. For example, a lack of local processing for turmeric necessitates using a third-party located 100 kilometers from the village, with transport costing almost as much as processing without creating local value. Blacksheep is working on cooperatively owned local processing for turmeric and other crops to address this issue.

Peer knowledge sharing: The co-op (CoopePuriscal) has created a network that provides inputs like training, seeds, and resources as well as group purchases and buying power. Its experts, engineers and consultants help distribute trees and seeds as an interface between small landholders and bigger government organizations and programs. *(continued on next page)*

Blacksheep Regenerative Resource Management/Rewild Organics *(continued)*

Neighboring success completely changes the game. Seeing others (especially Costa Rican-owned farms) succeed is crucial to the momentum and morale of the small-farmer movement in Costa Rica. It inspires and enables others to dream bigger, to take risks, to use their imagination and creativity, and to have hope. Campesino culture is inherently collaborative, so with the success of a comrade comes the sharing of knowledge, seeds, and access. Individual success, if shared, is community success.

Ongoing challenges: Measuring the impact of the company's work remains a challenge. Changes to the local community are especially difficult to characterize, but critical to understand. Impacts to water quality (from local streams) in downstream communities and potential climate impacts are two areas where the company has yet to quantify or receive outside support for the benefits created. Continued access to buyers is also an ongoing challenge that Blacksheep works on as it expands its supply chain.

© Blacksheep Regenerative Resource Management/Rewild Organics

Infrastructure for new products: *Diversified cropping systems, planting of new crops that are more suited to an area due to climate change or changing markets, or harvesting damaging species all can deliver sustainability benefits. However, identifying markets, much less getting products to processing or markets, is often a major hurdle. When value-added processing can be added close to production, the creation of jobs and wealth can be an additional incentive.*

3| Pezzy Pets

Pezzy Pets works with small-scale fishermen in Mexico to remove invasive devil fish by creating a market for them as pet treats.[36] These invasive fish devastate local ecosystems and fisheries by displacing native species. The Pezzy team initially engaged with devil fish in an educational role, then started selling these fish products locally in 2018; it launched a short-lived jerky brand, El Diablito, and received acclaim for its

environmental and social impacts. However, the lack of demand for dried fish and the huge amount of education to get people to try the food ultimately led it to look at a different consumer: pets. It created a line of pet treats in 2021.

To judge its success, Pezzy Pets tracks the quantity of fillet produced (it estimates overall fish removed as well), amount paid/average earnings for fishermen and processors, and number of jobs created.

Pezzy Pets provides a market for a product that is a problem for local communities, but it requires local processing to be able to engage with local fisheries to source this product. A primary determinant of success in its sourcing is pre-existing infrastructure and cooperative structure. For example, in Quintana Roo, there was a robust fishing industry specifically focused on exports, so it was easy to find processing partners for another invasive fish: lionfish. In areas like Tabasco and Chiapas, by contrast, willing cooperatives are hard to engage due to lack of basic electricity and water infrastructure on which to build processing facilities, which greatly inhibits the company's ability to expand into these areas.

Insets © Sorce Freshwater Co.

4| Sorce Freshwater Co.

Sorce produces whitefish products from an invasive species, the Asian carp. When the invasive carp are thinned out through more intensive fishing, fishermen report that they see predatory fish they hadn't seen in years, as well as iconic species like otters and eagles. Ideally, the harvest of invasive carp will prevent the fish from expanding further and entering, for example, the Great Lakes. The carp were previously only marketable to low-end markets, and competition among fishermen and processing plants led to low fishing levels, wasted catch, and low incomes. Sorce worked to transform the value chain, from fishing grounds to consumer.

Contracting: On the fishing side, Sorce works with a fishing cooperative and guarantees a consistent purchase price across fishermen. It advertises the quantity needed, so fishermen do not have to travel between processors, unsure if they will be able to sell. This allows Sorce to buy the needed quantities at a known price. With this new consistency, and state subsidies for invasive removal, some of the most successful fishermen participating are able to earn over $100,000 per year and many have increased their investment in boat and hauling capacity. *(continued on next page)*

Sorce Freshwater Co. *(continued)*

Peer knowledge sharing: The fishermen now work cooperatively (e.g., to help haul in an unusually large catch), and learn best fishing practices through an apprentice system.

New markets: On the other side of the value chain, a critical element was to create demand for a higher-value product — fish for human consumption. The invasive carp had a bad reputation locally as a trash fish, despite widespread consumption worldwide. Sorce worked hard to get its product in front of people at state fairs and other events and experimented with a variety of forms (dips, burgers, fillets) to test products and see which are most palatable. A rebranding campaign by the state to call the fish "copi" may also help — as the re-naming of Chilean sea bass (from Patagonian toothfish) or orange roughy (from slimehead) illustrate.

As it worked to establish a market for the fish, state subsidies from the Asian Carp Collaboration Committee for removal of the invasive fish have been a critical bridge. The subsidy allowed fishermen to make a living while catching the fish and producing enough to start building a market for the meat. In the future, Sorce is confident that the high-quality product will take hold and a sustainable fishery will not need these subsidies.

New sustainability markets: *Ecosystem services have not traditionally been traded on global markets, despite the high value they can generate for local and global communities in specific markets. Increasingly, there is an interest in quantifying and trading these benefits, including for climate mitigation. Historically, payments for ecosystem services to producers have been focused on nutrient run-off and water quantity and quality. These have been mostly local or watershed based. While climate forestry and energy projects have been promulgated for decades, they have not taken off and payments for agricultural climate mitigation are relatively new, largely because of the technical difficulties in measuring and verifying benefits. Uncertainty, expense, and credibility of measurements remain challenges for these new markets. In addition, for climate actions to count towards Scope 3 reductions, these actions must occur within a company's supply chain.*

Both compliance and voluntary carbon markets have been developed, and recently, several of these markets have begun to target agriculture.

5| Bayer Carbon Initiative

Initially launched for American and Brazilian growers, the Bayer Carbon Initiative has since expanded to Europe, Argentina, and launched key partnerships with other industry leaders. Since the launch in 2020, over 2,600 growers were enrolled from 10 different countries, 1.4 million acres were added, and 500,000 tons of carbon was sequestered in the soil. In addition, $4 million was returned to farmers.[37]

6| Ecosystem Services Market Consortium

This consortium launched the Eco-Harvest market program in 2022, focusing on soil carbon, GHG emissions, water quantity and quality, and water conservation as "stacked credits." ESMC's Eco-Harvest is an outcomes-based program. ESMC imposes no enrollment fees and requires no purchase of any agricultural products or services to participate. Current Eco-Harvest market program regions include the Midwest Corn and Soy Belt, Northern Great Plains, Southern Great Plains, and Great Lakes regions for corn, soy, wheat, alfalfa, and oats cropping systems. Producers enroll in 5-year contracts with Eco-Harvest market projects. ESMC works in Scope 3 markets. When the measured outcomes from mitigation activities are within a company's supply chain, Eco-Harvest Scope 3 impact units can be used in corporate supply chain reporting. They represent environmental improvements associated with the supply chains of companies within the food, agriculture, and beverage sector.[38]

7| Soil Capital

Soil Capital works with arable farms in Belgium, France, and the UK that are growing a range of crops on mineral soils to regenerate their farmland. Expert agronomists work with farmers to implement the following regenerative techniques: reduce tillage practices; use cover crops between cash crops; rotate crops with nitrogen-fixing legumes; avoid monocultures; switch to organic fertilizers; and, in some cases, create agroforestry systems where trees are planted on arable fields.

Farmers are eligible to participate in a sequence of 5-year projects for up to 20 years, as this is how long the Intergovernmental Panel on Climate Change advises mineral soils can continue to sequester carbon. After every harvest cycle, a monitoring report will be produced via the Cool Farm Tool assessing the reduced GHG emissions and increased carbon sequestration achieved by the project's farmers in that period. The assessment is made annually via a standard plan (€980) or a basic plan (no subscription fee). Each ton reduced or removed generates an ISO Certificate. ISO Certificates are not issued by ISO itself but rather are generated when a third-party verifier (Tuv-Rheinland) independently certifies reported emission reductions and removals against ISO standard 14064-3.

Farmers are paid a minimum of €27.5 per certificate as it is an evolving price. After the first year, farmers were paid €31.70 per certificate. Overall, €1 million were paid to the first cohort of 100 farmers in June 2022. In 2 years, more than 650 farmers signed up, which represents up to 150,000 hectares in the 3 geographies. The program is entering its fourth year (as of 2023) and has more than 1,000 farmers covering over 300,000 hectares.

Most of Soil Capital's clients purchase certificates with the goal of being able to make value chain claims. Certificates do not permit offsetting but can be used for voluntary results-based claims.[39]

8| Corteva

Pays for carbon sequestered or abated through cover cropping, reduced tillage, and increased nitrogen efficiency in select states in the US for 2022. It can be used with the digital crop-planning software Granular Insights and offers soil sampling; credits are offered in conjunction with Indigo. Farmers are guaranteed $15/credit and 75% of value when prices increase.[40]

Incentives:
Supplier Contracting

Contracts are commonly used to define various elements of purchase agreements that go beyond volume, price, and delivery date. They also can make other environmental performance levels a condition of sale or the basis for increased price. Participation in some of the previous incentives is also offered or enforced through contracts. However, the structure and content of contracts themselves can also serve as incentives when they provide security, reduced risk, market access, proof of viability as a business, etc.

Long term contracts: *Long-term contracts are contracts for purchasing production over multiple harvest cycles. These long-term contracts are generally associated with longer-term and closer relationships between the producer and buyer. The security of a buyer can act as an asset for collateral and make investments in longer-term farm improvement less risky and enable producers greater access to financing; offering these long-term contracts is often touted as an alternative to strict price-premiums, though some of them offer premiums for achieving one or more results. Several companies mentioned that these relationships are critical for more sustainable results as their length can mirror the timeframe of investments needed to make producers more resilient. However, some companies have mentioned long-term commitments can at times be burdensome.*

1| Smartwool

Smartwool has had a 10+ year relationship with most of their major suppliers for wool sourcing, which contributes to quality product.[41]

Supplier terms: *In some cases, suppliers make certain performance standards a requirement to do business. These terms can be bright-line rules that exclude suppliers or tiered standards upon which suppliers can improve. Industries tackling difficult issues like labor violations often use the tiered approach to help suppliers improve. The due diligence on ensuring these terms are met can be onerous for the company imposing them and for the potential supplier.*

2| Unilever

Unilever's in-depth sourcing protocols are often referred to by others when discussing how rigorous vetting a supplier could be. Their supplier terms, defined by the Unilever Sustainable Agriculture Code (SAC)[42] are a mix of bright-line rules, expectations (including traceability of materials back to their origin), and leading practices that encourage suppliers toward continuous improvement. Suppliers complete certification audits on the farms they source from, and compliance is reassessed annually;[43] select external certifications are also accepted. As of 2022, over 80% of their key ingredients were sourced sustainably according to this code.

Once suppliers meet the terms in Unilever's SAC, they may establish programs through the Unilever Regenerative Agriculture Principles (RAPs),[44] released in 2021, to address the continued sustainability challenges in the agricultural supply chain — from

decline in soil health to biodiversity loss. These practices cover diverse impacts that are quantified through specific metrics on impacts ranging from soil (e.g., organic matter and earthworm numbers), water (e.g., footprint, nitrate levels), climate (e.g., habitat conversion, nitrogen use efficiency, fossil fuel use on farm), biodiversity, and livelihoods.

The Unilever Regenerative Agriculture Principles provide detailed guidance on how farms can deliver positive outcomes in terms of nourishing the soil, increasing biodiversity, improving water quality and climate resilience, capturing carbon and restoring and regenerating the land for different types of geographies and crops. They also provide guidance on monitoring. Unilever invests in and works with farmers, suppliers, and partners on different crops in different geographies globally in order to find locally adapted solutions that can be shared to their supply-chain and through pre-competitive collaborations like the SAI platform.

Challenges

Developing and deploying incentives to address Scope 3 GHG emissions is no small feat, especially for the food sector. With regional differences, crop and farmer diversity, thousands of products in some supply chains, and further challenges, there is no one-size-fits-all solution. For every success story, many hurdles have been overcome or failed attempts abandoned. This is a critical part of the learning process, but we need to learn faster to address climate change's existing and growing impacts; we no longer have the time to make the same mistakes twice.

Across the various types of incentives, some companies have shared a few of the challenges they have encountered. While not comprehensive, we hope that others can learn from the difficulties so that they can learn more quickly and adapt further incentives to address some of the challenges.

- **Price premiums:** Price premiums are simply not possible for all products. For commodities in particular, price premiums can be difficult due to the sheer volumes that need to be purchased. To move the commodity market forward, which by its very nature is not niche, price premiums do not work as a scale-based solution, though they can serve as a transition solution for certain regions or pilots, provided there is a strategy to ensure the transition occurs. One company noted that an initial, short-term provision for a premium, explicitly used for setting up initial infrastructure, was funded by its sustainability budget as a way to facilitate its procurement team's unexpected increase in cost.

  In addition, often the majority of emissions come from a minority of farms, generally those

with inefficient production. Rewarding the top farmers with premiums has not historically moved the poorer performers, who may face many barriers to improvement. To make change happen at scale, price premiums are not a long-term solution for large commodity markets.

- **Intervention scale:** For capital investments for green or more sustainable infrastructure, the scale may require aggregating farmers, something that farmers have often resisted. In addition, smaller farms may struggle to take advantage of programs that require large volumes sold to recoup the time or capital costs of participating.

- **Monitoring and accounting:** Currently, most emissions calculations are based on averages that do not give sufficient insight for companies to know which farms produce the most impacts or which actions are necessary to mitigate them. While some companies are using farm-level calculators to address this, several mentioned that differences in outputs from GHG calculators, especially across geographies and products, limited their ability to set credible benchmarks against which to compare farm progress.

  Companies expressed that a lack of clarity around which buyers can count the GHG benefits from interventions in a single crop (e.g., adding a crop) has proven to be an impediment to collaboration between companies. This has particularly been the case for longer-term interventions involving extended crop rotations or intercropping — a hallmark of many regenerative systems — with different buyers for the different crops.

  In addition, many companies expressed concern about investments in farms that sell to many buyers, including their competitors. They were concerned that if the amount of mitigation they can account for is limited to their offtake, they are effectively subsidizing competitors. Farmers who use carbon credits to finance costly interventions may limit their ability to make claims about their net operations and how they represent their farm operations to buyers in a way that is fundamentally different than if that financing were available from either their buyers or banks.[45] As climate change shifts where products can be grown, companies may also need to shift sourcing regions, which complicates the determination of where incentives should flow.

Overall, how to scale these programs — whether from selected farms or from niche product lines — is the big challenge.[46]


© Audra Melton / WWF-US

Moving Forward

Farmer-focused incentives are a necessary tool for shifting behavior at the source of most food GHG emissions. However, we only have 7 harvests before our 2030 climate goals, which means that deploying effective incentives and retiring ineffective ones needs to happen on a much broader, faster scale. Incremental improvement in in-house emissions (Scope 1) or from the energy purchased (Scope 2) is not going to produce the dramatic reductions we need to keep our climate livable. It is clear that on-farm is where the problem is, as well as the mitigation opportunity, so we need bold solutions that not only target the problems, but also transform performance.

Companies that haven't yet engaged in GHG mitigation efforts with their supply-chain to reduce emissions need to act now. They need to implement these types of incentives in their own supply chains. For those companies that have engaged with their supply chains, accelerated efforts to scale them across their entire supply chain and, better still, across their sector or commodity group will be critical in meeting ambitious climate targets. Traceability, pre-competitive collaboration, public-private partnerships, and engaging with financial and academic institutions are critical to help us move towards transformational shifts.

Companies all need to learn faster, and to do that they need to learn from each other to highlight lessons from their various incentives journeys. If your company is implementing or scaling incentive programs focused on your supply chain and would be willing to share your experiences with others as well as learn from them, we would love to hear about what you have been doing . Please email **GHGcommodities@wwfus.org**.

Katherine Devine
Director, Business Case Development
Markets Institute, World Wildlife Fund
Katherine.Devine@wwfus.org

Emily Moberg
Director, Scope 3 Carbon Measurement & Mitigation
Markets Institute, World Wildlife Fund
Emily.Moberg@wwfus.org

WWF

MARKETS INSTITUTE
Change at the speed of life

GORDON AND BETTY MOORE FOUNDATION

Citations/Footnotes

All photos/art: © iStock/Getty except where otherwise noted

1 See IPCC Special Report on Climate and Land Use (2019); range 21-37%.

2 Crippa et al., "Food Systems Are Responsible for a Third of Global Anthropogenic GHG Emissions." Note that the remaining emissions are split between retail, consumption, and end-of-life.

3 IPCC AR6, etc., Based on climate modeling from the Science Based Targets Initiative: https://sciencebasedtargets.org/sectors/forest-land-and-agriculture.

4 https://www.wbcsd.org/download/file/13278.

5 https://wwfint.awsassets.panda.org/downloads/wwf___beyond_carbon_credits_blueprint.pdf.

6 Updated Statement Moves Away from Shareholder Primacy and Includes Commitment to All Stakeholders, "Business Roundtable Redefines the Purpose of a Corporation to Promote 'An Economy That Serves All Americans,'" accessed August 30, 2021, https://www.businessroundtable.org/business-roundtable-redefines-the-purpose-of-a-corporation-to-promote-an-economy-that-serves-all-americans.

7 "Shareholders Are Pressing for Climate Risk Disclosures. That's Good for Everyone.," accessed August 30, 2021, https://hbr.org/2021/04/shareholders-are-pressing-for-climate-risk-disclosures-thats-good-for-everyone.

8 UNFCCC reported 113 parties' NDCs as of Oct. 2021. https://unfccc.int/process-and-meetings/the-paris-agreement/nationally-determined-contributions-ndcs/nationally-determined-contributions-ndcs/ndc-synthesis-report.

9 https://climate-laws.org/legislation_and_policies accessed Oct 13 2021, filtered by 'mitigation' focus.

10 Adele Peters, "Most Millennials Would Take a Pay Cut to Work at an Environmentally Responsible Company," Fast Company, February 14, 2019, https://www.fastcompany.com/90306556/most-millennials-would-take-a-pay-cut-to-work-at-a-sustainable-company.

11 "Cambridge Global Perspectives Survey Results," accessed August 30, 2021, https://www.cambridgeinternational.org/programmes-and-qualifications/cambridge-global-perspectives/survey-results/.

12 "Nearly Half of World's Biggest Companies Factoring Cost of Carbon into Business Plans - CDP," accessed August 30, 2021, https://www.cdp.net/en/articles/media/nearly-half-of-worlds-biggest-companies-factoring-cost-of-carbon-into-business-plans.

13 "McKinsey," accessed August 30, 2021, https://www.mckinsey.com/business-functions/strategy-and-corporate-finance/our-insights/the-state-of-internal-carbon-pricing.

14 "Future-Proof Your Climate Strategy," *Harvard Business Review*, May 1, 2019, https://hbr.org/2019/05/future-proof-your-climate-strategy.

15 https://www.kering.com/en/sustainability/measuring-our-impact/our-ep-l/

16 "Combating Climate Change through Executive Compensation," Willis Towers Watson, accessed August 30, 2021, https://www.willistowerswatson.com/en-US/Insights/2020/09/Combating-climate-change-through-executive-compensation.

17 https://www.strausfamilycreamery.com/carbon-neutral-farming/carbon-neutral-farming-infographic/.

18 https://www.strausfamilycreamery.com/carbon-neutral-farming/organic-dairy-farms/.

19 https://coolfarmtool.org/2022/09/straus-family-creamery-uses-cool-farm-tool-to-pave-its-path-to-a-carbon-neutral-dairy-supply-by-2030/.

20 https://www.strausfamilycreamery.com/carbon-neutral-farming/carbon-neutral-farming-infographic/

21 https://www.mulinobianco.it/lacartadelmulino.

22 https://www.gradable.com/post/satellite-imagery-to-monitor-regenerative.

23 "Sustainability-Linked Finance Takes Off in 2020," n.d., 8.

24 feednavigator.com, "Tesco to Launch Sustainability Linked Finance Scheme for Suppliers," feednavigator.com, accessed August 30, 2021, https://www.feednavigator.com/Article/2021/04/30/Tesco-to-launch-sustainability-linked-finance-scheme-for-suppliers.

25 https://go.fbn.com/rs/197-HFR-752/images/REVIEW-COPY_FBN-Farmer-Regenerative-Agriculture-Rebate-Program-Agreement.pdf?_ga=2.94167321.508121576.1673453655-1564287032.1663256838.

26 https://www.edf.org/media/farmers-business-network-and-environmental-defense-fund-launch-new-farm-operating-line-credit.

27 https://files.worldwildlife.org/wwfcmsprod/files/Publication/file/6udiqglhgm_FINAL_FIF_One_Pager.pdf?_ga=2.161413246.257609211.1683305658-362656783.1649181524.

28 https://coopcoffees.coop/organic-agroforestry-as-a-climate-solution-cool-farm-tool-pilot-project-findings-and-lessons-learned/.

29 https://drive.google.com/file/d/1U-Rc2vflE9-c7chLrRuK5nhmLF7WoRYv/view.

30 "Join the Climate Positive Leaders Program," accessed August 31, 2021, https://www.corteva.com/sustainability/climatepositive/leaders-program.html.

31 "Farmer Stewardship Training: SSPs, GAP and Partnerships," CropLife International, accessed August 31, 2021, https://croplife.org/case-study/farmer-stewardship-training-ssps-gap-and-partnerships/.

32 "For Farmers," accessed August 31, 2021, http://www.generalmills.com/en/Responsibility/Sustainability/Regenerative-agriculture/For Farmers.

33 "Cascadian Farm Invests in Kernza® Perennial Grain with Promising Restorative Benefits for Farms," accessed August 31, 2021, http://www.generalmills.com/en/News/NewsReleases/Library/2017/March/kernza-3-7.

34 "Cascadian Farm Pulls Back on Kernza Cereal Launch," accessed August 31, 2021, https://www.foodbusinessnews.net/articles/13604-cascadian-farm-pulls-back-on-kernza-cereal-launch.

35 E.g., see recently funded work in Europe to develop value chain models for intercropping and to reduce barriers to adoptions: https://cordis.europa.eu/project/id/101081973.

36 https://pezzypets.com/blogs/news/about-pezzy-pets.

37 "Bayer Launches Carbon Capture Program for U.S. and Brazil Farmers," Reuters, July 21, 2020, sec. Commodities News, https://www.reuters.com/article/us-bayer-farming-cl imate-change-idUSKCN24M2CE.

38 https://ecosystemservicesmarket.org/farmers-ranchers/.

39 "Programme - Soil Capital Carbon Programme," accessed August 30, 2021, https://soilcapital.com/program/.

40 "Corteva's Carbon Initiative," Granular, accessed August 30, 2021, https://granular.ag/carbon/.

41 "Smartwool® Supply Chain - Sheep to Shop," accessed August 31, 2021, https://www.smartwool.com/discover/supply-chain.html.

42 https://www.unilever.com/files/92ui5egz/production/555201fc976d5389fbdf9845099c15b61d1ceb53.pdf.

43 https://www.unilever.com/files/2848d9d8-6947-4869-b255-d11aba0a3d64/unilever-sustainable-sourcing-programme-for-agricultural-raw-materials---scheme-rules.pdf.

44 https://www.unilever.com/files/92ui5egz/production/489410442380812907bc3d97be02ccda1a44ab4b.pdf.

45 https://www.dropbox.com/sh/fdbcce92hjtwlzi/AABlSianF11Letebp0grPYRba?dl=0&preview=General_Proposal_Innovation+Center+for+U.S.+Dairy.pdf.

46 See, for example: https://fieldtomarket.org/media/2022/01/FTM_Blueprints-for-the-Value-Chain-Report-WEB.pdf.