

Food Systems Initiative

Incentivizing Food Systems Transformation

In collaboration with McKinsey & Company

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Quotes

“ We urgently need to change the way we produce and consume food so we can feed everyone in the world while raising incomes, improving health and nutrition and protecting the planet. This report highlights four pathways for transforming food systems – at the policy, business, investment and consumer levels – recognizing the need for solutions tailored to country contexts. It is a welcome contribution as countries and their partners work to shift global and local food landscapes toward better development outcomes. ”

Laura Tuck
Vice-President, Sustainable Development, The World Bank

“ The impact of agriculture on climate change cannot be overstated – it’s both a key contributor and a promising solution. This report highlights some of the novel approaches that will be needed to ensure that agriculture takes a leading role in tackling this most complex risk facing society today, particularly in the areas of finance and risk management. ”

Alison Martin
CEO for EMEA and Bank Distribution, Zurich Insurance Group, Switzerland

“ We need to urgently change how we produce, process and consume food today. There is a historic opportunity to transform agri-food systems, which are essential to achieving the Sustainable Development Goals. The UN will convene the Food Systems Summit in 2021 to galvanize a collective leadership agenda that will be essential to deliver on food security, farmers’ livelihood and rural development, and take better care of our natural resources. Realigning incentives will be an important approach in such a transformation journey. ”

Dr. Qu Dongyu
Director General, Food and Agriculture Organization (FAO) of the United Nations

“ It is time to embark on a food systems transformation journey in Punjab that will provide livelihoods and income increase to millions of farmers who are the backbone of our economy, while addressing environmental sustainability and water issues in the state. This will not be possible for government to do alone. We need collective action and multistakeholder collaboration to implement the right incentive mechanisms that will enable this critical shift for the state and the country. ”

Hon. Amarinder Singh
Chief Minister, Government of Punjab, India

“ Delivering sustainable, healthy diets to 9 billion people within planetary boundaries is one of the greatest challenges of our time. We need fundamental change to entire food systems, and this means pressing ‘reset’ on some of the current incentive systems that too often drive unwanted outcomes – and moving to subsidizing healthy foods or production methods that are better for the health of the planet. ”

Hanneke Faber
President, Foods & Refreshment, Unilever, Netherlands

“ Farmers can offer an eloquent solution to the challenge of transforming food systems, while making agriculture more renewable, beneficial and sustainable. By focusing on finding pathways for consumer preference to reward farmers for producing more nutritious food through better farming practices, innovation will proliferate and prevail in unanticipated ways. ”

Ben Riensche
Owner and Manager, Blue Diamond Farming Company, USA

Preface



Sean de Cleene
Head of Food Systems Initiative and
Member of the Executive Committee,
World Economic Forum



Saswati Bora
Head of Food Systems Innovation,
World Economic Forum

The World Economic Forum's Food Systems Initiative is pleased to present this report on the role of incentives in enabling food systems transformation.

Driven by rapidly growing concerns about diet-related health impacts, damage to the ecosystem, links to climate change and distress among several million small-scale food producers, recognition is growing that immediate action is required to transform the way in which food is produced, accessed, distributed, valued and consumed if we are to achieve the 2030 United Nations (UN) Sustainable Development Goals (SDG).

An important aspect of this transformation is a growing recognition of the need for the realignment and repurposing of current incentives to encourage food system actors to pursue an agenda for change. This report highlights how achieving such a change will require critical transitions that support: the adoption of healthier and more nutritious diets; the reduction of food loss and waste; a higher value on more sustainable and healthier food products; more sustainable farming practices; and the protection and restoration of natural resources.

This report is consistent with the umbrella document developed for the 2021 UN Food Systems Summit entitled *A Framework for Food Systems Transformation*. This umbrella document provides a definition of efficient, inclusive and sustainable food systems, as well as identifying the challenges and potential trade-offs.

In line with the UN framework document, this report highlights the trade-offs and barriers that prevent food system actors from pursuing change and proposes actions to address these challenges, as well as the role different stakeholders can play in incentivizing these shifts. The case study on incentivizing farmers to adopt practices that reduce greenhouse gas (GHG) emissions further expands on these incentive mechanisms. Lastly, the report proposes a roadmap that can enable stakeholders to mobilize action on an agenda that is urgent.

The work on incentives forms part of the World Economic Forum's Food Systems Initiative, which is mobilizing and supporting the individual-, institutional- and network-level leadership required to shape the future of food systems. Over the past decade, the initiative has established a common agenda and platform that now enable more than 700 diverse organizations to collaborate and learn, resulting in multistakeholder partnership initiatives in more than 25 countries.

The Food Systems Initiative is part of the Platform for Global Public Goods, which enables leaders from the public and private sectors and civil society around the world to form innovative, cross-cutting communities of action that collaborate at speed and scale, harness the opportunities of the Fourth Industrial Revolution and trigger systems change to deliver integrated outcomes in line with meeting the SDGs and the Paris Climate Agreement.

As the world prepares for the important milestone of the UN Food Systems Summit in 2021, it is our hope that this incentives report will bring new perspectives and stimulate stakeholders to develop a collective leadership action agenda.

Executive Summary

There is an increasingly urgent need to transform food systems so that they can sustainably nourish a growing population while providing economic opportunities and livelihoods to urban and rural communities. Historic productivity gains in the food sector have come at alarming environmental and health costs. To meet the aspiration of establishing inclusive, efficient, sustainable, nutritious and healthy food systems capable of achieving the SDGs, a comprehensive transformation is required.

Transition pathways necessary for food systems transformation

A food systems transformation requires several transitions, including to a healthier diet, sustainable supply chains, more inclusive livelihoods and greater production efficiency. These transitions necessitate a fundamental change in the way our food is produced (including in agri-industrial operations as well as in the practices of more than 500 million smallholder farmers around the world)¹ and in the way food is consumed (including the consumption patterns of 7.7 billion individuals).² We need consumers to adopt healthier diets, reduce waste and place value on more sustainable, healthier food products; we need farmers to adopt more sustainable farming practices, protect and restore natural resources and meet the nutrition needs of a new generation of consumers.

Incentivizing food systems transformation

Several hurdles are preventing food system actors from meeting these aspirations. Without a clear economic case to achieve food systems transformation, driving the adoption of a comprehensive approach can be difficult. In addition, behaviour is driven by deeply rooted beliefs and attitudes. Current incentives do not address these hurdles. For example, governments have provided approximately \$570 billion per year in public support for agricultural producers to meet development imperatives related to food security, without sufficient focus on climate, nutrition and health outcomes.³ To spur large-scale behavioural shifts requires understanding and identifying the right incentives, which could fund behaviour change costs, while mitigating transition/switching costs and, potentially, ongoing economic costs. We also need to remove incentives that have the perverse effect of preventing those in the food system from changing their behaviour.

This report focuses on four pathways for creating the incentives needed to transform food systems:

- **Repurposing public investment and policies pathway:** Policies and regulatory frameworks can be reformed to provide positive incentives for those in the food system to produce food that is healthy for people and the planet
- **Business model innovation pathway:** Companies can redesign business models to prioritize environmental, social and financial outcomes
- **Institutional investment pathway:** Investors can set higher standards with respect to how companies target environmental and social outcomes alongside financial returns
- **Consumer behavioural change pathway:** Consumers can shift their demand to environmentally and socially responsible nutritious products

Recent progress has been made along these interconnected pathways; however, much more progress is needed to enable transformational impact.

To highlight how realigning incentives on these pathways can drive positive changes throughout the value chain, this report provides a case study focused on incentivizing farmers to adopt practices that reduce GHG emissions. Adopting such practices could lead to a reduction of agriculture emissions by around 30% of projected global agriculture emissions, which is equivalent to more than five times the annual emissions of aircraft.⁴ The report estimates that if all the available practices were implemented at full scale, the global food system could see cost savings of more than \$50 billion annually. However, all stakeholders in the global food system face a landscape of legacy incentives that do not encourage sustainable production practices. The case focuses on possible incentive solutions for farmers: funds and carbon markets to encourage investors to invest in required transitions; business model innovations to redirect corporate profit to encourage change; and policy changes to shift farmers' behaviour.

Realigning incentives is complex

Incentivizing food systems transformation will not be straightforward and will require substantial investments and efforts to manage complexities and trade-offs. Several mutually reinforcing actions, sequenced appropriately, are required at the individual actor, country, regional and global level.

In addition, incentive mechanisms in food systems will have a greater impact if they are complemented by incentives from other sectors. For example, some insurers are offering incentives to consumers to make healthier food choices. Realigning incentives will also involve making calculated trade-offs between numerous diverse yet interconnected outcomes within food systems. For instance, the higher costs of providing environmentally and socially responsible foods may make food more expensive, potentially further exacerbating the current inequities in access to nutritious food.

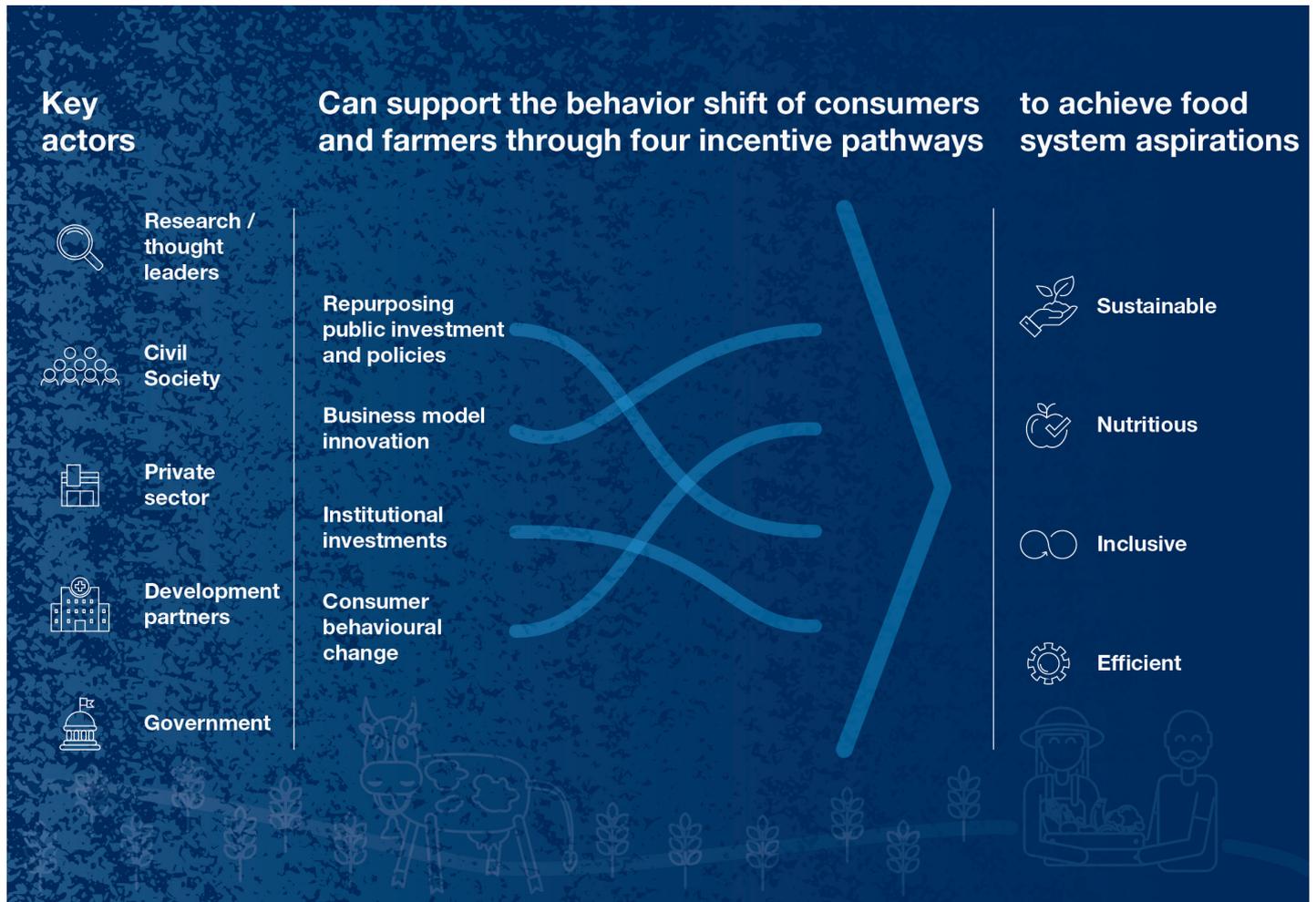
It will also be important to recognize that there is no one-size-fits-all approach for realigning food system incentives – what works in one country or subsector may not work in another. Each country and region may, therefore, choose a bespoke approach that would involve setting transition goals and choosing incentive pathways and actions that are aligned with these goals. Governments must balance several important economic, social and environmental development objectives alongside national security objectives while supporting food systems. Lastly, there may be significant transition costs associated with realigning public investments and making policy shifts, including increased cost of food for the most vulnerable segments of the population and loss of income for growers. Governments need to account for such transition costs as they make decisions regarding repurposing public investment and policies.

Roadmap for incentivizing change in food systems

Realigning incentives for food systems using the four pathways requires individual, coordinated and collective action. Five action areas can help the global community incentivize transformation. First, there needs to be **alignment from actors** on a vision for food systems that meet the needs of people and planet. Building

on this vision, stakeholders need to build a shared consensus on the challenge to be addressed using incentives, the extent of the challenge and the desired pathways. Building such consensus requires a strong analytical foundation. Second, there needs to be a focus on **identifying scalable models and approaches** across the four incentive pathways that participants in the food system can rally around for learning and prototyping in the pursuit of improvement and replication. New analytical tools and approaches could support systemic assessment including diagnosing food system challenges, analysing trade-offs and helping prioritize action across the four incentive pathways. Third, transformation requires

systems leadership and coordinated action by diverse groups of stakeholders to cultivate a shared vision for change, empower widespread innovation and action and enable mutual accountability to accomplish systems change. Such leadership must be exercised at the country, regional and global level. Fourth, **collective country-level actions** will be important in establishing and implementing an incentives agenda. Lastly, this will be complemented by **collective action at the global and regional level** including building consensus, resolving cross-border challenges and developing new partnerships and business models that manage risk and improve capital flows and investment outcomes.



Unlocking incentives for comprehensive food systems transformation

Introduction

To feed a growing population nutritious food within planetary limits, food systems will need to be transformed. Productivity gains in the food sector have come at an alarming environmental cost. Current unsustainable agricultural practices could lead to the degradation of 95% of the world's land by 2050.⁵ Twice as much water will be required for food production in 2050 compared with 2019, and yet one-quarter of agriculture is in water-stressed regions.⁶ Almost 2 billion people do not have access to safe, nutritious and sufficient food, while one in five children suffer from stunting.⁷ Nearly one-third of the food produced each year is uneaten. Food loss and waste cost the global economy \$936 billion annually and account for 8% of planet-warming greenhouse gases.⁸ A recent estimate suggests that overall, food systems cost society \$12 trillion dollars in health, economic and environmental costs – 20% more than the market value of food systems.⁹

To address these costs, a comprehensive transformation of food systems is needed, not only to address food and job security imperatives but also to meet aspirations for inclusion, sustainability, efficiency and nutrition. Achieving such a transformation requires several critical transitions – to a healthier and more nutritious diet; to more sustainable agriculture practices that protect and restore nature; to a reduction in food loss and waste; and to more inclusive and productive livelihoods, among others. Managed well, these transitions offer a historic opportunity for inclusive growth that could reduce poverty for rural communities and have a positive impact on health and environmental outcomes. Managed poorly, they will exacerbate risks relating to hunger, health, social instability and the environment.

These transitions require fundamental changes to the way our food is produced (including the practices of more than 500 million smallholder farmers around the world) and to the way food is consumed (including the consumption patterns of 7.7 billion individuals). Consumers need to adopt healthier diets, reduce waste and place value on more sustainable, healthier food products; and farmers need to adopt more sustainable farming practices, protect and restore natural resources and meet the nutrition needs of consumers. Innovations are occurring in piecemeal fashion and do not exhibit the dynamism that is needed to achieve systemic change.

Several hurdles are preventing food systems from meeting these aspirations. Without a clear economic case for these changes, driving the adoption of new solutions may be difficult. Growers will not shift to healthier products in the absence of significant consumer demand. In other cases, behaviours are motivated by deeply rooted beliefs and attitudes. For example, consumer dietary choices are manifestations of cultural values and perceptions of food. To spur large-scale behavioural shifts requires understanding and identifying the right incentives, which could fund behaviour change costs, while mitigating transition/switching costs and, potentially, ongoing

economic costs. We also need to remove incentives that have the perverse effect of preventing participants in the food system from changing their behaviour.

In most cases, incentives need to come from within the food system. For example, farmers will prioritize regenerative agriculture practices if the existing downstream businesses create enough economic incentives. Similarly, consumers will shift their diets if governments invest in educating them through cleaner and simpler labelling standards for food products.

This report focuses on four pathways for creating such incentives for food systems transformation:

1. **Repurposing public investment and policies pathway:** Policies can be reformed to provide positive incentives for food provisioning that is healthy for people and the planet
2. **Business model innovation pathway:** Companies can redesign business models to prioritize environmental, social and financial outcomes
3. **Institutional investment pathway:** Investors can set higher standards with respect to how companies target environmental and social outcomes alongside financial returns
4. **Consumer behavioural change pathway:** Consumers can shift their demand to environmentally and socially responsible and nutritious products

Each of these pathways could create incentives for participants in the food system and drive change towards comprehensive food systems transformation. While we cannot predict which pathway will prevail and in which context, we do know that they are interconnected and that progress along all four is needed to support incentives for food system participants and stimulate change towards a comprehensive food systems transformation agenda.

We are already seeing progress along the pathways, albeit on a small scale. For example, a growing number of consumers in the United States say that their purchasing decisions are significantly influenced by numerous factors including health and wellness, social impact and transparency, according to a recent report.¹⁰ Governments are increasingly pledging to address nutrition issues through the Scaling Up Nutrition (SUN) Movement.¹¹ On the investor side, a sustainable investing market has grown from niche to mass market, with one-quarter of global assets managed through sustainable strategies – in total \$30 trillion – and it is expected to grow further.¹² Many corporations also recognize that their future success and competitiveness will hinge on their commitment to helping solve society's problems, as increasing evidence shows that companies with a high level of purpose outperform the market in terms of returns on shareholder capital by 5–7%.¹³ These are encouraging

signs, but far from transformative. Poor diets still rank among the highest global health risk, and food systems are responsible for one-third of global GHG emissions.

Creating the right incentives for food systems transformation is challenging. This transformation requires mutually reinforcing actions at all levels – individual food system participant, country, regional and global. However, there is no one-size-fits-all approach for incentivizing food systems transformation. Each country and region can choose a bespoke method that would involve setting transition goals and choosing incentive pathways and actions aligned with its goals. Given these considerations, incentivizing food systems transformation will not be straightforward. Collaboration among stakeholders in the ecosystem will be important to delivering impact at scale.

Creating the right incentives are not the panacea for making the transition to more efficient, inclusive, sustainable and nutritious food systems. There is also a need for continued progress towards other investments, interventions and approaches, including, but not limited to: investing in new technologies; supporting research and development; enabling policies; raising consumer awareness; building market infrastructure; providing better products and services for farmers; and increasing climate resilience.

The report explains how participants in the food system could approach each of the four incentive pathways, the challenges in developing these incentive pathways and the actions key participants can take. The report also proposes a roadmap for change that can enable stakeholders to mobilize action on this agenda. Lastly, the report demonstrates how each of the four incentive pathways could be used to address GHG emissions from agriculture.

The report is consistent with the umbrella document developed for the 2021 UN Food Systems Summit entitled *A Framework for Food Systems Transformation*, which provides a definition for efficient, inclusive and sustainable food systems, as well as identifying the different challenges, externalities and potential trade-offs that require attention and interventions in order to be understood and minimized.

Incentives to catalyze progress along pathways

This section seeks to elaborate the four essential pathways for incentivizing food systems transformation. In particular, it explores what each of the pathways entails, barriers to the pathway and actions that food system participants could take to overcome the barriers.

Repurposing public investment and policies pathway

The actions of governments – from the local to the national level – are the most powerful drivers in the food and agriculture sector, capable of stimulating rapid and widespread change. By realigning incentives in the policy and regulatory environment and by using public sector investments, governments can change the economics that drive companies, investors and smallholder farmers. Likewise, policy and regulatory changes made by governments have been some of the most influential tools in giving consumers the power to drive change (e.g. labelling laws). The influence governments have on agri-food systems is vast, extending across land use policies, trade policies, consumer protection policies, finance policies and more.

From 2015 to 2017, 51 governments analysed by the OECD, which produce two-thirds of food globally, have provided approximately \$570 billion annually in public support for agricultural producers.¹⁴ Such investments have sometimes created incentives that work against the four stated goals for transforming food systems. For example, some developing markets use import tariffs to protect

local agricultural industry; however, such tariffs increase the price of food for consumers and could have adverse impacts on nutrition, particularly for sections of the population with lower incomes. Similarly, fertilizer subsidies can lead to overuse, which causes water pollution from fertilizer run-offs and an increase in GHG emissions from chemicals.

Governments could also use methods such as setting prices on natural resources and implementing taxes to address negative externalities associated with food systems and incentivize transitions. For instance, to drive greater water-use efficiency, policy-makers might put a price on water. However, the design of a water tax must be constructed by also considering potential trade-offs, such as negative impacts on poor family members. Ideally, such changes would discourage behaviour that produces negative externalities and instead spur market participants to tackle the environmental and social externalities of food systems.

Governments could also use national and local agency procurement policies to affect what type of food is being purchased, provided and distributed. By mandating and incentivizing specific requirements, these policies can help drive demand for and improve the availability of healthy and sustainable foods, as well as shift supply chain practices accordingly. These policies can help shape consumption behaviours – not only by introducing consumers of all ages and in many different public settings to foods that meet specific nutritional and sustainability standards but also by encouraging them to use such standards when making their own food purchases.

Governments are also underfunding critical areas of the food system. For example, only 15% of annual public agricultural spending from 2015 to 2017 supported public goods,¹⁵ even though marginal returns on investments in agriculture-related research and development (R&D), roads, irrigation and even education are 5-10 times higher than on input subsidies.¹⁶ Agricultural and food technology R&D and innovation systems continue to be underinvested in, despite evidence that the social returns on such investments have exceeded costs, especially in developing countries.¹⁷ Countries need to invest in R&D to build local capacity to tailor solutions to local contexts.¹⁸ Therefore, governments need to re-evaluate how they deploy their support and the behaviours their policies are encouraging.

The Great Lakes Protection Fund

The Great Lakes Protection Fund was created by the governors of seven states in the United States to provide long-term funding for research and projects aiming to protect the health of the Great Lakes – the largest source of fresh water in the world. Each governor provided a one-time contribution to the private, permanent endowment, totalling \$81 million. This funding is invested prudently, with the remaining income being used to fund regional projects and teams “that produce tangible improvements to the health of the Great Lakes ecosystem” and provide financing to the member states for their discretionary Great Lakes priorities. The fund has awarded \$85 million to support more than 280 projects that have had positive impacts on the basin as well as society.¹⁹ For example, one project focuses on creating a pay-for-performance programme to reduce phosphorus loss from agricultural land. The project paid farmers based on the level of phosphorus they kept out of nearby streams and rivers. The team used the findings from this project to create a toolkit to guide others in establishing similar programmes in other states.²⁰



However, such policy and investment shifts are not easy to implement. Public policy and investment decisions, however technically sound, are often politically difficult to launch and implement. Before a policy and investment agenda can be implemented, significant political issues will need to be addressed – such as those relating to power, institutions and interest groups. Many current policies are a consequence of historical development imperatives such as eliminating hunger and reducing poverty. These policies are now entrenched, with deep roots in the political economy. Uprooting any part of the current system would result in serious adjustment costs and changes in power dynamics for actors and institutions, which, if not addressed, could lead to fierce protests, violence and upheaval.

There are several political economy challenges related to making required policy and institutional shifts in the context of comprehensive food systems transformation.

Siloed decision-making: Multiple ministries and departments within a government’s institutional structure formulate policies and investments related to food systems. These can include the ministries of agriculture, food processing, rural development, trade, commerce, finance, health and environment. Lack of alignment and coordination among various government ministries and departments leads to a less-than-optimal policy response. Governments can invest in developing and piloting innovative ways to break down silos and promote collaboration across ministries and departments to ensure the consideration of alignment, coordination and management of trade-offs and unintended consequences. Championship of policies and leadership from the office of the head of state will be essential to ensure a collective strategy and alignment across ministries and agencies. International organizations can support these changes and provide ways to share findings across governments.

Lack of evidence for underlying interventions: While the impact of some interventions (e.g. R&D investments) is well understood, the

impact and trade-offs of other interventions, such as the repurposing of direct payments, are less well documented. In addition, some nutrition-related interventions take time to achieve impact, making it harder to demonstrate impact. Governments and donors should invest in targeted research in underfunded areas and use agile approaches to piloting innovative policies at a small scale to understand impact. Effectiveness and outcomes of policies should be shared across all governments.

Institutional capacity: There are significant trade-offs associated with public policies and investments. Governments have to balance economic, social and environmental objectives with national security objectives while supporting food systems. For example, governments could reduce subsidies for crops such as corn and soy and repurpose them to support crop diversification, but such a shift could threaten the livelihoods of farmers in many regions. Similarly, a change in trade policy could have a big impact on the competitiveness of a country’s industry. Public sector leaders will need talent, tools, technical skills (e.g. in data and analytics and systems analysis) and new processes to effectively make changes to policies and regulations.

Transition costs: Realigning public investments and making policy shifts may be associated with significant transition costs. These encompass increased costs borne by different food system participants, including higher food prices for the most vulnerable segments of the population and loss of income for growers. Governments need to account for such transition costs and any resulting risks, including through appropriate safety nets, as they make decisions about repurposing public investment and policies.

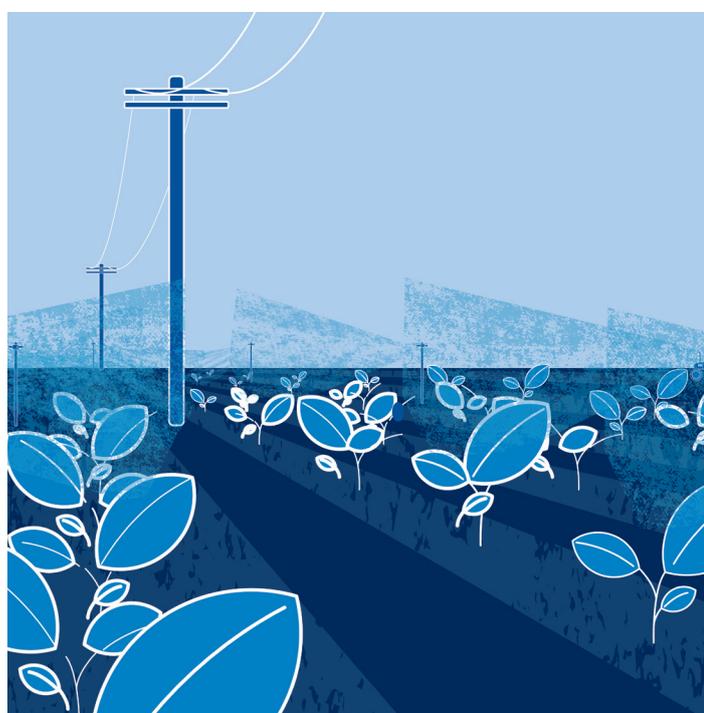
Stakeholder resistance to change: Lastly, garnering support for policy reforms from a cross-section of stakeholders is another important challenge. Any institutional or policy change will result in a redistribution of benefits or costs. Stakeholders who are adversely affected by the policy change (e.g. lost jobs, higher costs or loss of competitiveness) – whether corporations, individuals or investors –

A Just Rural Transition

A Just Rural Transition is an example of a policy coalition of developed and developing countries that want to redesign, repurpose and reinvest public support to their agri-food sectors to meet the challenges of the 21st century, with the support of knowledge and implementation partners. The coalition would help governments conduct global and country-level assessments of costs and trade-offs and provide support with design and implementation phases. The coalition will support by setting baselines and targets, and reporting progress towards them.²¹



Figure 1: Stakeholders' roles in repurposing public investment and policies pathway



A systems approach to address the electricity-water-agriculture nexus issues in Punjab, India

Over the years, India's practice of subsidizing the cost of energy for farmers has led to overuse of water resources by producers and an adverse effect on groundwater supply. For example, in the state of Punjab, while free electricity for irrigation initially led to agricultural growth, the water tables have dropped at an alarming rate, with 80% of groundwater now considered overexploited.²² The state's rice production alone requires more than three times the amount of water that Punjab receives in rainfall, leading to a need for crop diversification. Therefore, Punjab's Department of Agriculture and Power is collaborating with the World Bank to pilot a new direct-payment scheme called Paani Bachao, Paise Kamao ("Save Water, Earn Money") to provide a financial benefit to farmers who consume less electricity than a specified threshold.²³ To mitigate trade-offs arising from policy change, this scheme does not penalize producers whose consumption is above the fixed allocation. Instead, farmers receive a message about their savings and electricity consumption.

are likely to resist the proposed change. In addition, institutions tend to be resistant to change in the absence of an external shock or substantial force for change.²⁴ A consultative process during policy formulation, especially to ensure that the voices of the marginalized are heard, is essential to building public trust. For example, approaches such as citizen assemblies that bring together a group of people for several sessions to learn, debate, deliberate and recommend ways to address a complex policy challenge can build consensus and support for policy reforms.²⁵ An additional requirement is a clear articulation of the rationale for change and mitigation strategies or ways to support transition.

Business model innovation pathway

Many companies are recognizing that their future success and competitiveness will hinge on their commitment to helping solve society's problems. Increasing evidence demonstrates that companies with a high level of purpose outperform the market in terms of financial capital by 5-7% and tend to have higher profitability.²⁶ In addition, public opinion and consumer awareness are increasing pressure on companies. Employees, particularly millennials, are demanding that their employers become more

environmentally and socially sustainable. A Cone Communications survey in 2016 found that 76% of millennials in the United States consider a company's social and environmental commitments before deciding where to work.²⁷ Companies are also feeling pressure due to the increasing financial disclosure requirements on environmental, social and governance matters, specifically climate risk. Not all private sector players are responding similarly to these shifts – while some are pioneering integrated solutions designed to support social and environmental outcomes, others are focusing narrowly on meeting compliance requirements and in many cases reinforcing the use of perverse subsidies through their actions.²⁸

To truly unlock their power to incentivize transitions, companies must take a broader approach and re-evaluate their strategy, products and services.²⁹ They must restructure their organizations and business models to focus on maximizing the triple bottom line – the company's return on people, planet and profit. The private sector has a responsibility to measure its performance based on the impact on all stakeholders and to move past incremental steps to update corporate social responsibilities (CSR) and comply with regulations.

The 2030 Agenda for Sustainable Development, which is expected to identify \$12 trillion in business opportunities,³⁰ will only accelerate the trend towards developing business models that maximize the triple bottom line. These new business models could have ripple effects in food systems – by inducing food system companies to consider health, nutrition, sustainability and efficiency outcomes, the new models could prompt significant changes all along companies’ supply chains.

In order to mainstream innovation and scale win-win business models, several barriers need to be addressed:

Innovation risk: There is a significant risk associated with innovations. According to a recent study, 95% of all product innovations fail.³¹ Often, large companies are unwilling to devote significant resources towards testing innovative business models. In the case of entrepreneurs, who are more likely to pursue business-model innovations, lack of investment from investors willing to take risks precludes them from pursuing innovation. Companies can launch collaborative efforts across stakeholders to de-risk innovations. Donors could play a significant role in funding and catalysing such innovation through grant capital, patient capital and mechanisms such as challenge prizes or funds.

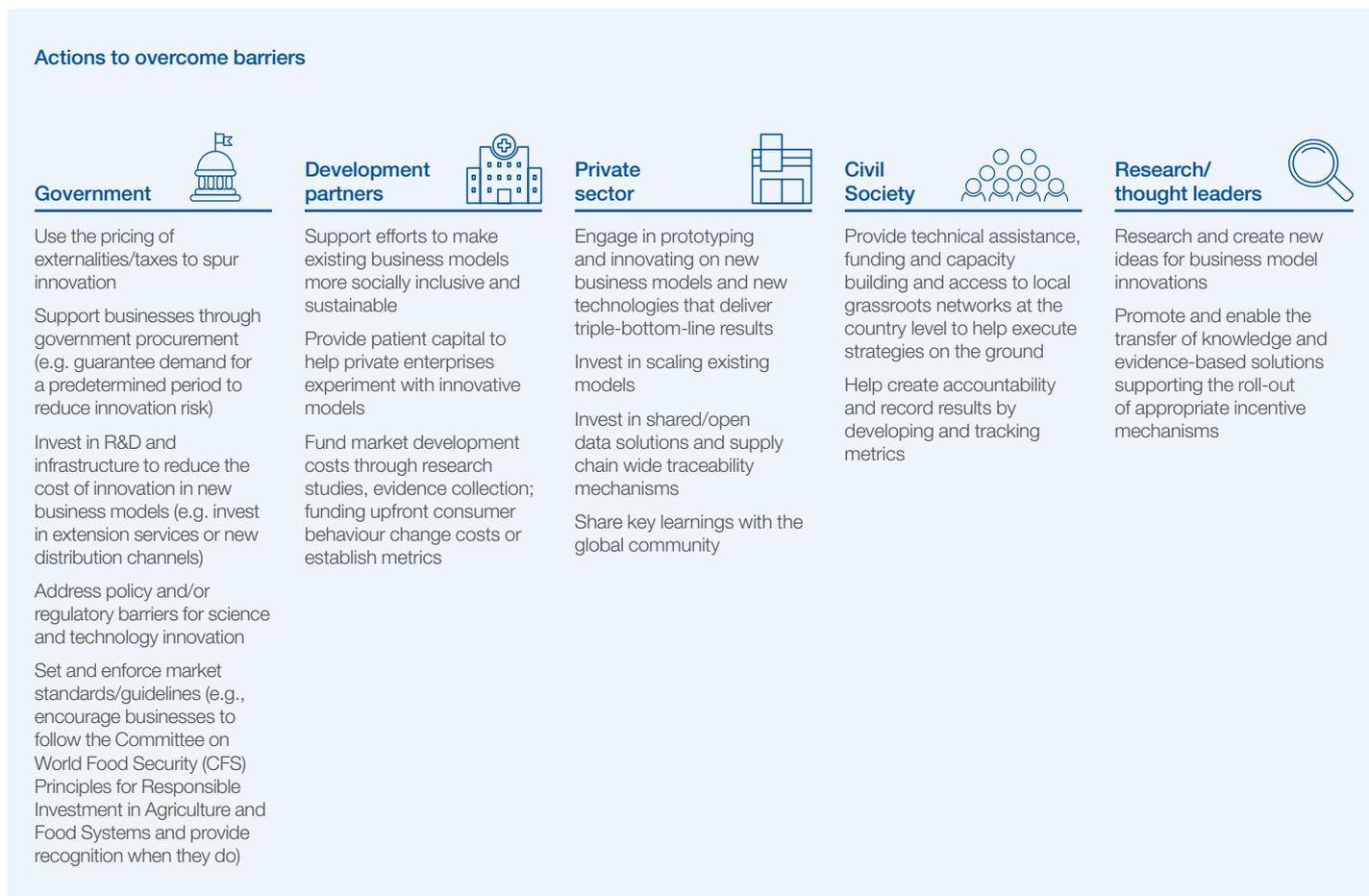
Economic returns: Often, triple-bottom-line business models do not meet economic return aspirations for the private sector. Frequently, the increased costs of such business models cannot be offset by increasing demand or price shifts. Mechanisms are therefore required to offset economic challenges in the short term. Tax breaks, subsidized financing, shared assets (for example, through co-investments in infrastructure such as roads, cold chain, etc.) could all play an important role in mitigating the economic model challenges.

Supply chain challenges: Several ecosystem or supply chain challenges are associated with these business models, particularly in developing markets. Lack of enabling infrastructures – such as roads and ports – and limited development of ancillary suppliers in local markets present bottlenecks for scaling private sector innovations. Investments from governments or public private partnerships can address these challenges. For example, the Public-Private Infrastructure Advisory Facility, a multi-donor technical assistance facility, supported activities for private sector participation in the irrigation sector in Ethiopia that led to increased availability of water for farmers. The private sector undertook the operations and maintenance services for the project. The partnership is expected to reach more than 6,000 landholdings.³²

Corporate culture change: Many organizations are still focusing on financial value creation above all else. Companies, and the individuals within them, need to undergo a shift in mindset so they can consider a broader range of goals beyond the purely financial. To do so, companies should redesign performance measures and incentive mechanisms to encourage employees to challenge the status quo and develop innovative solutions. Companies can also include externalities in financial performance assessments to reflect triple-bottom-line strategies.³³ New standards are needed to bring radical transparency into companies’ social and environmental performance and hold them accountable.

Figure 2 highlights actions that food system participants can take to address these barriers to innovative business models.

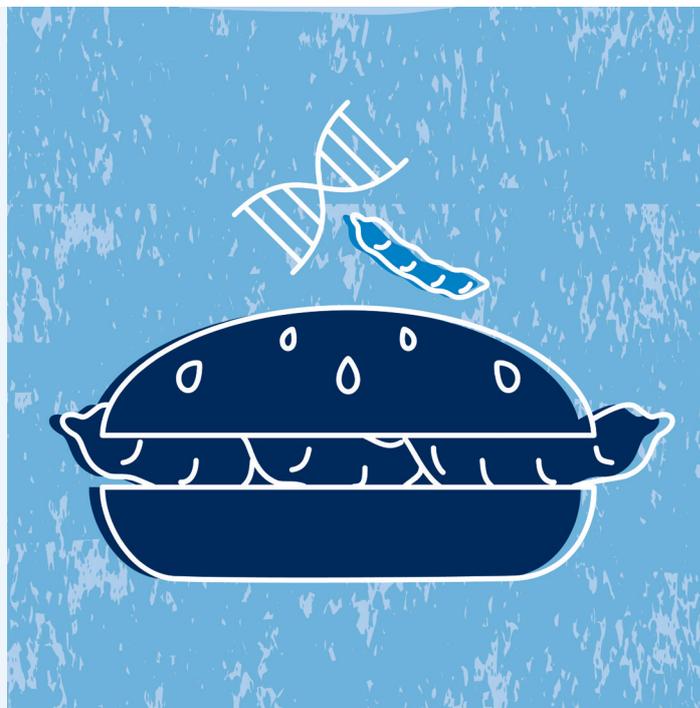
Figure 2: Stakeholders’ roles in business model innovation pathway



Impossible Burger's plant-based substitutes for meat

Many companies over the years have tried to make meat more nutritious and sustainable by making marginal process changes such as reducing feed emissions or identifying new ways to transport meat without relying on unhealthy preservatives. Instead of trying to fix the current problem, Impossible Foods attempted to create plant-based substitutes for meat products that look and taste just like the original. In doing so, the company could satisfy meat-loving consumers who were concerned about the environmental effects of traditional meat production. With the backing of investors such as Bill Gates and Google Ventures, the company raised \$687.5 million in capital.³⁴

The company's first product – multiple versions of the Impossible Burger – has been successful in meeting consumers' expectations on taste and price, while being plant-based and good for the environment. In fact, Burger King began test-marketing the Impossible Whopper in April 2019 and now sells it in Burger King outlets across America.



Institutional investments pathway

Institutional investors are increasingly seeking opportunities to address climate and societal risks that affect returns on assets. The past two years have seen a 34% increase in sustainable investment of global assets, totalling \$30 trillion at the start of 2018.³⁵ As the Global Sustainable Investment Alliance put it, “an investment approach that considers environmental, social and governance (ESG) factors in portfolio selection and management” represents 63% of assets under professional management in New Zealand and Australia, 49% in Europe and 26% in the US.³⁶ The increasing availability of reliable and consistent data on climate change and the effects of poor nutrition – and a growing realization among investors that these will have a substantial impact on near-term asset values – affect investing approaches. As the impact of these factors becomes more tangible, climate- and health-related risks will become increasingly important factors in the investment decisions of institutional investors.

To unlock institutional capital to facilitate food systems transition at scale, however, the following challenges must be addressed.

Risk-return trade-offs: Many of the investment opportunities that arise from important food systems transitions do not meet the hurdle rates of investors since returns do not compensate for the high real or perceived risk. Therefore, financial investors are faced with several risk-return trade-offs when investing in projects that support food systems transitions. These can be mitigated using blended finance mechanisms. Donor funds can also be used to create optimal risk-return profiles for private investors by investing in enabling environments (fund market development, capability building costs, transaction costs), creating flexible and favourable debt or equity or using insurance policies and guarantees to protect investors against losses as positive track records develop.

Intermediation: Fragmented food systems and the associated transaction costs of investing, especially in developing markets, mean that institutional investors must invest in financial intermediaries (banks, investment funds) that can aggregate and distribute financing to individual actors. However, there is a need to

scale credible funds or asset managers with a proven track record of investing and deploying investment capital. Few have deep technical expertise in food systems financing.³⁷ Building capabilities for existing intermediaries and investing in creating a track record of positive returns, which could be done with the help of the public sector or donor agencies, could also help build credibility.

There is also a need for investment vehicles such as green bonds, particularly in emerging markets, to attract investment in sustainable food systems projects. Such mechanisms will provide structured vehicles for investors to fund sustainability projects. As of the end of 2018, the green bond market in emerging markets was small – \$136 billion, or about 0.5% of outstanding bonds in emerging markets.³⁸ Uncertainty related to the verifiability of green label standards is a significant impediment to scaling such vehicles.

Lack of information for decision-making: Another challenge that investors face is the lack of market data – on investment opportunities or on returns versus risks associated with individual transactions, especially in developing markets. This makes it extremely challenging for investors to identify models with environmental and social benefits and model their risks to invest in underlying solutions. One solution is to use concessionary capital to fund the required shared data needed to incentivize investors to invest. In addition, increasing the transparency of market opportunities would be helpful for investors and development actors.

Enabling environment challenges: To attract investors, countries must create an enabling environment that limits risk, penalizes corruption, has a strong legal system, protects ownership rights and provides transparency.³⁹ Unfortunately, many of the countries seeking the most investments do not have these in place, limiting their markets' financial and commercial viability. Examples of ways to address this barrier are to develop an acceptable legal framework that protects the interest of investors and constituents and to simplify tax codes to ensure that projects with positive returns before taxes remain positive after taxes.⁴⁰

Figure 3 highlights several important actions that participants can take to address these barriers to institutional investment.

Figure 3: Stakeholders' roles in the institutional investment pathway



The Global Agriculture and Food Security Program (GAFSP)

The Global Agriculture and Food Security Program (GAFSP) is “a demand-led and recipient-owned global partnership and a cost-effective and flexible multilateral financing mechanism” focused on achieving SDG 2: ending hunger, poverty and malnutrition in developing countries. GAFSP brings together a range of agricultural development stakeholders, including farmer organizations, civil society organizations (CSO), donors and recipients, to prioritize programming and allocate funds.⁴¹ Investments are made in three broad areas: strengthening service providers, strengthening core value-chain actors and improving the enabling environment.

The programme’s Private Sector Window uses a range of financing mechanisms – including grants, concessional loans, technical assistance and advisory services and the International Finance Corporation’s expertise – to support projects that are not commercially attractive due to the high risk involved. These mechanisms allow GAFSP to crowd in additional investment – \$5.30 of private financing for every \$1 of public or donor capital invested – which in turn allows the fund to provide affordable financing with fewer requirements for riskier projects.⁴² That same window provides technical and financing advisory services to improve operations, productivity and standards as well as to uncover financing opportunities and create markets. To date, the Private Sector Window has invested \$311 million in 61 investment projects aimed at benefitting small- to medium-sized enterprises and smallholder farmers around the world.⁴³

Consumer behavioural change pathway

In developed countries, consumers are increasingly factoring environmental and social factors into their food purchasing decisions. The signs are everywhere: rapid expansion of new, healthier food categories; increasing demand for products that are low in sodium and sugar; avoidance of artificial colours, flavours and preservatives; and requests for plant-based and alternative proteins.

These shifts, however, are relatively minor. Poor diet still ranks among the highest global health risks, and food systems are responsible for one-third of global GHG emissions. A much bigger push in the

right direction is needed. An expansion of these trends has the potential to encourage behavioural shifts throughout the system – manufacturers could be encouraged to bring new products to market to meet consumer demands, farmers and input companies could begin adopting practices to meet consumer interest in health and wellness, governments could be pressured to put the right policies in place, and investors could be motivated to invest in companies producing these products.

There are two important barriers to unlocking consumer behavioural change at scale:

Deeply rooted consumer preferences: Consumer food patterns and behaviours are deeply rooted in habit and culture. For behaviour change to happen, consumers need to understand why they should place a higher value on sustainable and healthier foods and the tangible effects of inaction on their life and health. Consumers will also need to understand which food choices align with these values. Investing in research to establish linkages between food, health and the environment is a good starting point. Clear, simple labels and well-managed labelling standards help consumers make informed decisions concerning their diets. Dietary guidelines affect federal nutrition policy and programmes, health initiatives, and organizational and industry choices that influence consumers' behaviour.⁴⁴ Public awareness campaigns are another important lever. These actions will lay the foundation for behavioural shifts.

Increasing evidence in behavioural economics, however, suggests that awareness building campaigns are necessary but not sufficient to bring about behavioural change. Many factors shape behaviour and preference, including social norms, affordability, taste, culture, habit, lifestyle and convenience. Therefore, changing deeply ingrained dietary choices is arduous and expensive. Innovative approaches to behavioural change are required. Lessons from

decades of successful marketing campaigns and research into changing purchasing decisions should be applied in this context.

Affordability of food: The increased costs, at least in the short term, of delivering sustainable and nutritious food products will inevitably raise the price of foods. Developing sustainable and nutritious products is expensive. Significant product development costs are required in some cases, such as sugar and salt substitutes or low-cost proteins. Also, investments in infrastructure and technologies that enable identity preservation in supply chains – such as blockchain or low-cost sensors – will be required to create more transparent supply chains that enable consumers to know that the products they are buying are delivering social and environmental benefits.⁴⁵ Hence, the affordability of food products must be addressed. Strengthening public safety nets and anchoring demand for healthy foods through governments' procurement policies are ways to mitigate this trade-off in outcomes.

Figure 4 outlines the actions that governments, donors or development agencies, private sector participants and civil society organizations can take to stimulate shifts in consumer behaviour.

Figure 4: Stakeholders' roles in changing consumer behaviour



Chile's innovative food regulation act to limit unhealthy consumption

Obesity levels in Chile doubled between 1980 and 2014, leading to increases in several non-communicable diseases.⁴⁶ Estimates suggested that healthcare expenditure due to obesity would increase to approximately \$750 million per year for the next 20 years if the country continued on the same track.⁴⁷ In response, Chile formulated a food act with three essential measures.⁴⁸ The first was a mandate to include labels on packaging that highlight ingredients in which the product is exceeding an established limit of nutrients such as sugar, fat and salt. To curb childhood obesity, the act also restricts sales of certain food products in schools and surrounding areas. In addition, it limits advertising of these food products to children.

The act was rolled out in three phases from 2016 to 2019 and drew on several research studies to inform its structure. Studies suggest that the front-of-package labelling, marketing restrictions and school regulations have positively influenced nutritional preferences and behaviour and have the potential to change food norms.⁴⁹

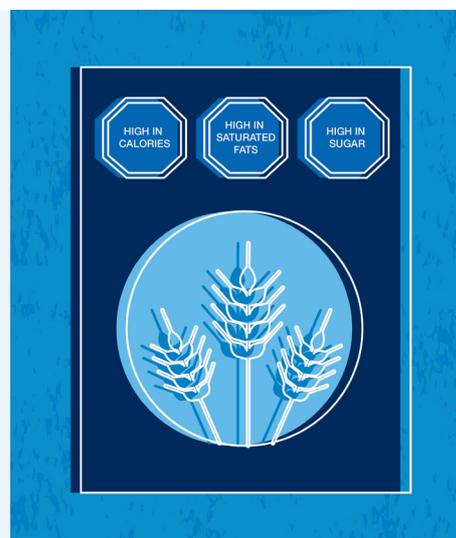


Figure 5 summarizes the imperatives for participants in the food system as we embark on this journey.

Figure 5: Overview of imperatives for food system participants

	 Repurposing public investment and policies pathway	 Business model innovation pathway	 Institutional investment pathway	 Consumer behaviour change pathway
Government 	<p>Invest in evidence-based decision-making</p> <p>Invest in financial, institutional and policy innovation</p> <p>Adopt changes to streamline collaboration across departments and ministries in governments</p> <p>Build stakeholders' commitment to change by involving them in decision-making</p>	<p>Use the pricing of externalities/taxes to spur innovation</p> <p>Invest in R&D and infrastructure to reduce the cost of innovation in new business models (e.g. invest in extension services or new distribution channels)</p> <p>Address policy and/or regulatory barriers for science and technology innovation</p> <p>Support businesses through government procurement</p> <p>Set market standards/guidelines to address</p>	<p>Create enabling environment for investment</p> <p>Provide supporting regulations through an independent regulator</p> <p>Simplify tax codes for investors</p> <p>Develop acceptable legal frameworks for investments</p> <p>Create mandatory financial disclosures</p> <p>Provide fiscal incentives to environmentally and health-friendly investments</p>	<p>Invest in consumer education/awareness</p> <p>Implement simple, front-of-box warning labels</p> <p>Create clear dietary guidelines</p> <p>Create food safety nets – e.g. food assistance programmes</p> <p>Use public channels to deliver healthier products</p> <p>Scale proven approaches to behavioural change</p> <p>Use taxation and pricing</p>
Development partners 	<p>Support government capacity for evidence-based policy-making</p> <p>Invest in transition costs where relevant</p> <p>Use contingent funding to drive behavioural change of governments</p> <p>Invest in evidence for underlying interventions</p>	<p>Support efforts to make existing business models more socially inclusive and sustainable</p> <p>Provide patient capital to help private enterprises experiment with innovative models</p> <p>Fund market development costs through research studies, evidence collection, funding upfront consumer behavioural change costs or establishing metrics</p>	<p>Use grant capital to fund market development/operational costs or reduce investor risk</p> <p>Invest in the creation of track records</p> <p>Support the creation of a track record of investment solutions and intermediaries</p> <p>Build capacity of existing financial intermediaries</p> <p>Create innovative financial mechanisms to offset risk-return trade-offs for private investment</p>	<p>Invest in researching, developing, testing and scaling novel approaches to changing behaviour</p> <p>Supplement government funding, particularly in developing economies with fiscal constraints</p>
Private sector 	<p>Use a collective and powerful voice to advocate for change</p> <p>Actively support ecosystems building</p>	<p>Engage in prototyping and innovating on new business models and new technologies that deliver triple-bottom-line results</p> <p>Invest in scaling existing models</p> <p>Invest in shared/open data solutions and supply chain wide traceability mechanisms</p> <p>Share key lessons learned with the global community</p>	<p>Provide investors with data on social and environmental performance of investments, in addition to financial</p> <p>Create profitable investment opportunities</p>	<p>Develop pre-competitive alliances for behavioural change in consumers</p> <p>Invest in new products and identity preservation</p> <p>Translate years of marketing experience to encourage consumers to purchase healthy and sustainable foods</p>
Civil Society 	<p>Use grassroots campaigns and advocacy efforts to build stakeholder commitments to change</p> <p>Hold government accountable for making the required change</p>	<p>Provide technical assistance, funding and capacity building and access to local help with execution</p> <p>Help create accountability and record results by developing and tracking metrics</p>	<p>Help with intermediation challenges through connecting investors with established in-country networks</p>	<p>Advocate for regulatory changes for products with significant externalities</p> <p>Use grassroots campaigns to change consumer behaviour</p>
Research/ thought leaders 	<p>Develop innovative policy solutions</p> <p>Support the analysis of interactions and related trade-offs, at global and country level</p>	<p>Research and create new ideas for business model innovations</p> <p>Promote and enable the transfer of knowledge and evidence-based solutions supporting the roll-out of appropriate incentive mechanisms</p>	<p>Promote collaboration in spheres of influence to create investment vehicles</p> <p>Research ways to create appropriate market guidelines</p>	<p>Contribute knowledge of powerful and cost-effective ways to influence consumer behaviour based on real-world examples</p> <p>Build interdisciplinary research and learning coalitions to share best practice approaches and lessons learned</p>

Roadmap for incentivizing food systems transformation

Realignment of incentives is central to comprehensive food systems transformation. Realigning incentives for the food system using the four pathways requires individual, coordinated and collective action. Several mutually reinforcing actions, sequenced appropriately, are required at the individual actor, country, regional and global level. In addition, incentive mechanisms in food systems will have greater impact if complemented by incentives from other sectors. For example, some insurers are offering incentives to consumers to make healthier food choices. Realigning incentives will also involve calculated trade-offs between the numerous diverse yet interconnected outcomes within the systems. For example, the higher costs of producing environmentally and socially responsible foods will make them more expensive to consumers.

There is no one-size-fits-all approach for incentivizing food systems transformation. Each country and region may therefore adopt a bespoke approach that would involve setting transition goals and choosing incentive pathways and actions that are aligned with its goals. Lastly, there may be significant transition costs associated with realigning public investments and making policy shifts. Funding these transition costs and any resulting risks, including through appropriate safety nets, is important for protecting and compensating essential stakeholders in the food system.

Given these considerations, incentivizing food systems transformation will not be straightforward and will require substantial investment and effort. In addition, constructing and delivering incentives requires a deliberate approach that ensures incentives are appropriately designed and sequenced, mutually reinforcing, complementary, innovative and adaptive.

Five action areas can help the global food systems community incentivize transformation.

1. Align on the vision for food systems transformation and build shared consensus on incentive pathways

Food system participants need to align on a vision that meets the need of people and the planet. An alignment among stakeholders on this vision and what it means for action is the first step towards developing an agenda at the global, regional and country level. Building on this vision for food systems transformation and reimagined incentives is a vital priority for food system participants, but there is no shared understanding and alignment on the path forward. Participants need a shared consensus on the challenges that require incentives, the extent of the challenge and the desired pathways. Building such consensus requires a strong analytical foundation. Global food systems need a better way to quantify the hidden costs in the food system, identify priority transitions and agree on the incentives to make those transitions.

A multilateral consultative approach such as the Food Systems Dialogues is one way to align important food system participants

on the path forward. The UN Food Systems Summit in 2021, which is designed to mobilize collective action to transform food systems towards meeting the 2030 Sustainable Development Agenda, could secure collective leadership, promote high-level endorsements and serve as the basis for accelerated and aligned efforts leading up to 2030. The consultative process could promote clear alignment on goals, priority transitions and incentive pathways among food system actors.

2. Identify scalable models across incentive pathways and build new tools and approaches

Several models and experiments are emerging across the four pathways. Some businesses are already testing innovative approaches to incentivize regenerative farming practices, while some donors are creating and launching new blended finance mechanisms to offset risk-return trade-offs for institutional investors. Similarly, several governments are already taking innovative approaches to spur behavioural changes and address negative externalities in food systems.

These approaches and models could be a rich source of learning, though a systemic assessment of these efforts is required. Such lessons will help identify replicable and scalable models across the four incentive pathways that food system participants could rally around for learning and prototyping in the pursuit of improvement and replication. Areas in which there is limited innovation could offer opportunities to design and test new models and approaches across the four pathways.

New analytical tools and approaches could support systemic assessment including diagnosis of food system challenges, analysis of trade-offs and help in prioritizing action across the four incentive pathways. Interdisciplinary research and learning coalitions could actively support the development of analytical tools and promote the sharing of best practices with those working in the food system.

3. Exercise systems leadership

Transforming food systems will require bold leadership and coordinated action by a diverse group of stakeholders – governments, companies, civil society and farmer organizations, research institutions and others – using their combined skills, assets and capabilities to achieve a shared goal. At both the country and the global level, leaders need to exercise systems leadership using a combination of traditional skills and capabilities – big-picture thinking, management and execution, technical analysis – and non-traditional skills and systems thinking such as cultivating a shared vision for change, empowering widespread innovation and action and enabling mutual accountability to accomplish systems change.⁵⁰

4. Take collective country-level action

The approach to incentivizing food system transformation will be different for each country, given the diversity of contexts and the social and economic development outcomes in individual countries. Governments, in consultation with other food system participants in the country, could play a central role in establishing and implementing an incentives agenda. Several actions can support collective action:

- **Identify priority transitions and incentive pathways:** Tackling all incentive challenges may be overwhelming, while taking on individual projects might not be sufficiently ambitious. Instead, choosing a few flagship initiatives could allow for focused, outcome-oriented action.
- **Set up a mechanism that can ensure coordination and implementation:** Establishing a multistakeholder platform could help convene stakeholders, promote inter-ministerial coordination, facilitate action and support the chosen incentive pathways. A commodity-focused or jurisdictional approach is a good starting point to mobilize action.
- **Prepare for implementation:** Spur action on the essential incentive pathways by using existing initiatives, organizations and actors; establishing goals and transition pathway priorities at the country level; and developing transparent implementation plans that include detailed milestones with responsible owners (private sector, government ministries, civil society and development actors), as well as timelines and targets.
- **Incorporate agile approaches:** Using an agile, innovative and learning-centred approach to implementation could facilitate bilateral and multilateral dialogues among stakeholders to resolve implementation bottlenecks.
- **Review, refine and scale:** Reviewing progress, adapting lessons and developing pathways could scale impact.

5. Take collective action at the global and regional level

Across the incentive pathways, some actions will require collective leadership and global and regional coordination. The global agenda can focus on building consensus and commitments among stakeholders, addressing cross-border bottlenecks to incentives and unlocking resources at a global level.

- **Develop a coalition of participants who will identify and implement incentive pathways:** Collective action is required at a global or regional level where individual countries, civil society organizations, bilateral and multilateral development organizations and private sector participants come together to identify and address cross-border challenges. For example, prioritized action at the regional and global level could involve trade policies that will have a significant impact on individual countries' ability to repurpose their support to the local agricultural sector. Similarly, another priority could be harmonizing grades and standards across a region to make it easier for farmers in individual countries to tap into certain demand opportunities.
- **Identify and scale emerging global partnerships and financing mechanisms focused on such incentive pathways:** Global partnerships and business models are needed to manage risk and improve capital flows and investment outcomes at the global or regional level. For example, there may be an opportunity to develop partnerships on new scalable financial intermediation vehicles that attract investments in sustainable food projects across countries; or to develop regional funds that build capacities for governments in making incentives-related trade-off decisions.
- **Innovate, align, build capacity and establish learning platforms to replicate and scale:** Build alignment and capacity, and showcase innovations and lessons learned. There is an opportunity to establish capacity building programmes for important stakeholders and learning platforms that allow for the sharing of best practices across regions. This would enable faster replication of approaches or models across countries.
- **Leverage key international milestones to drive progress:** Leverage momentum generated by important global milestones such as the 2020 Tokyo Nutrition of Growth Summit, the 2020 Biodiversity Conference, the 2021 UN Food Systems Summit and others to develop a decade of action. Such milestones can build on each other to showcase results and lessons learned, promote collective leadership and secure high-level endorsement that can serve as the basis of accelerated and aligned efforts in the years leading to 2030.



The Food Action Alliance

The Food Action Alliance (FAA) is an initiative that aims to nurture a next generation of value chain partnerships for large-scale food systems transformation, bringing together a coalition of partners from all sectors – government, business, civil society, international organizations and farmers associations. The FAA is positioned to serve as a platform that will deliver in-country action, supporting a vision of sustainable food systems that deliver better, faster and at scale on food security and nutrition, inclusive growth and decent jobs, and environmental sustainability and climate resilience – in line with the 2030 Agenda. The Alliance has been catalysed by the efforts and commitment of the International Fund for Agricultural Development (IFAD), Rabobank and the World Economic Forum in partnership with the Alliance for a Green Revolution in Africa (AGRA), the African Development Bank (AfDB), the International Center for Tropical Agriculture (CIAT), the World Business Council on Sustainable Development (WBCSD) and many others from business, civil society and international organizations.

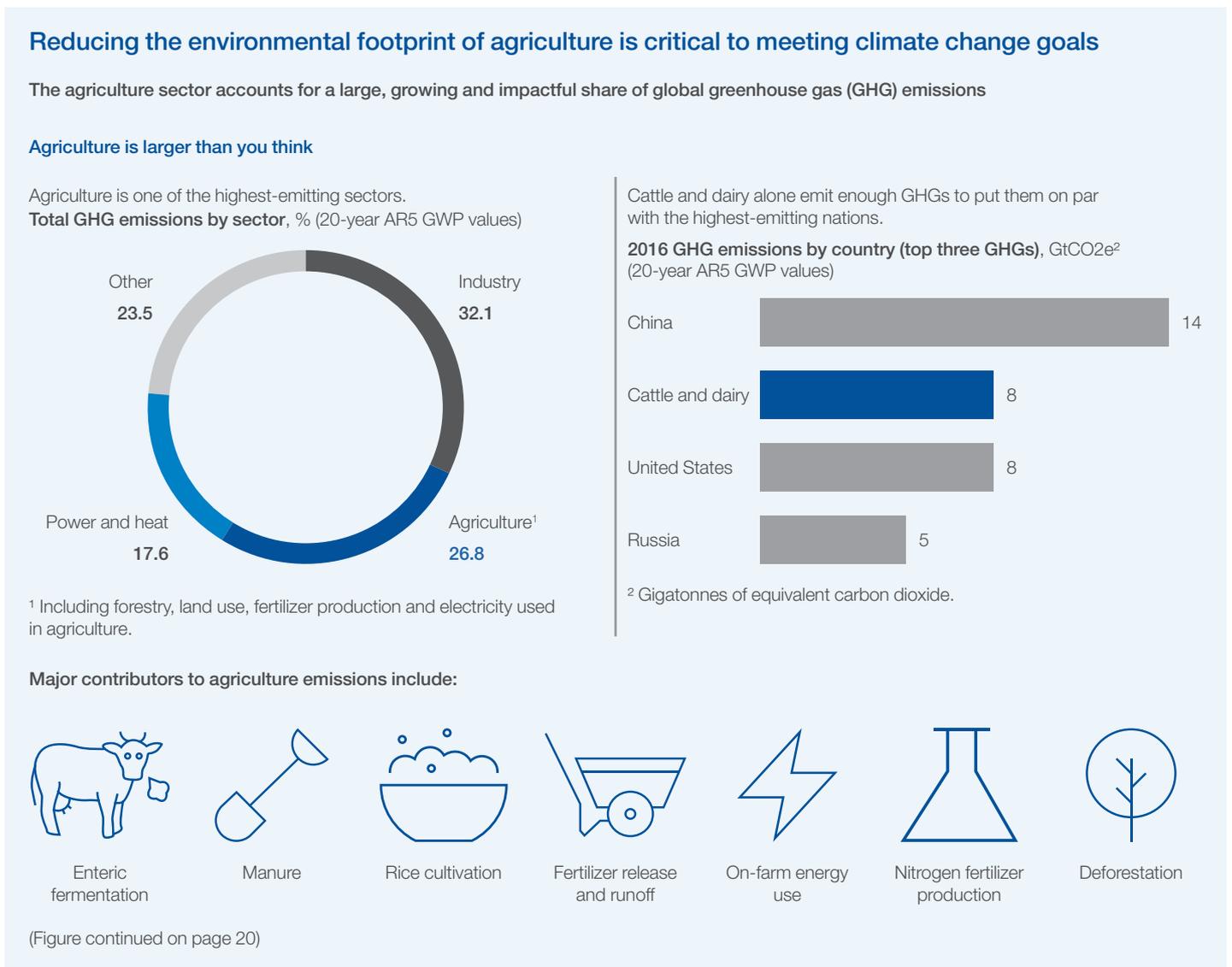
Case study: Reducing GHG emissions from food systems with incentives

Introduction

Climate change threatens global food security and stability as droughts, floods, wildfires and other extreme weather patterns reduce production yields and land productivity. These risks, as outlined by the *Special Report on Climate Change and Land* from the Intergovernmental Panel on Climate Change (IPCC),⁵¹ “are projected to become increasingly severe with increasing

temperatures” and could lead to sustained food supply disruptions globally. Food systems contribute 21–37% of total net anthropogenic GHG emissions,⁵² and feed and food growers are the largest emitters within the system. Demand for agricultural land is also the primary driver of land-use change (e.g. deforestation), furthering the importance of the agriculture sector in addressing climate change (Figure 6).

Figure 6: Impact of agriculture on climate change



Agriculture is growing faster than you realize.

Demand for agricultural production over the next 30 years will likely be shaped by two primary factors:

Population reaching **9.7 billion**

Per capita food consumption growth of **8-12%**

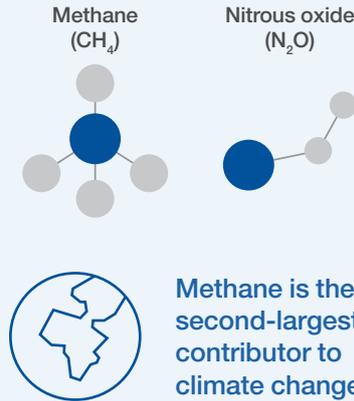
As a result, agriculture emissions are likely to increase **15-20% by 2050³**

³ Assuming current levels of production efficiency.

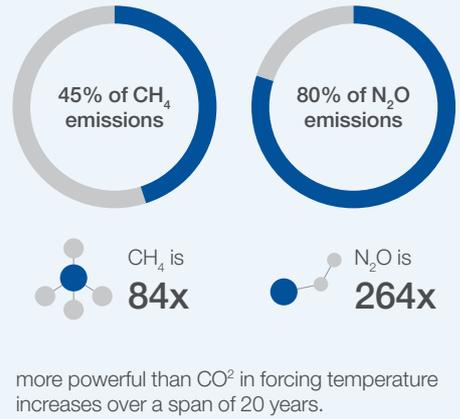
Source: McKinsey & Company. <https://www.mckinsey.com/industries/agriculture/our-insights/agriculture-plays-a-critical-role-in-limiting-the-impact-of-climate-change>.

It is also responsible for highly impactful emissions.

Agriculture is a major emitter of



Agriculture accounts for



Reducing GHG emissions from agriculture calls for a multipronged approach. This will require levers such as increasing the productivity of current production, improving the GHG efficiency of production, shifting consumer demand to less carbon-intensive proteins, reducing food loss and waste, shifting land-use patterns and scaling natural carbon sinks. Spurring innovation of next-generation technology is also critical (Figure 7).

While acknowledging the importance and need for different levers, this case study will focus on incentive mechanisms that can reduce GHG emissions through farming practices, thereby enabling agriculture to deliver on climate goals. The case study will focus on:

- Identifying the practices that farmers can adopt to reduce overall emissions from agriculture
- Highlighting ways to use the four incentive pathways to incentivize growers to adopt these practices.

Practices farmers can adopt to reduce emissions

Farmers have the potential to reduce agriculture emissions by more than 5 GtCO₂eq (gigatonnes carbon dioxide equivalent), or around 30% of projected global agriculture emissions, by implementing known and proven practices in applicable geographies globally.⁵³ This emissions reduction is equivalent to more than five times the annual emissions of aircraft.⁵⁴ Many of these practices will also lead to cost savings in the long term and result in co-benefits, including healthier soils to combat desertification and land degradation. Farmers will need to: (1) adopt GHG-efficient production practices; and (2) implement several land-management practices that increase the rate of sequestration on existing croplands and pastures.

GHG-efficient production practices: If implemented at scale, several existing practices could reduce emissions from animal, rice and crop production by about four GtCO₂eq each year, or 20-25% of annual agriculture production emissions.⁵⁵ The GHG cost curve illustrates farmers' return on investment for different practices (Figure 8).⁵⁶

Figure 7: Abatement measures

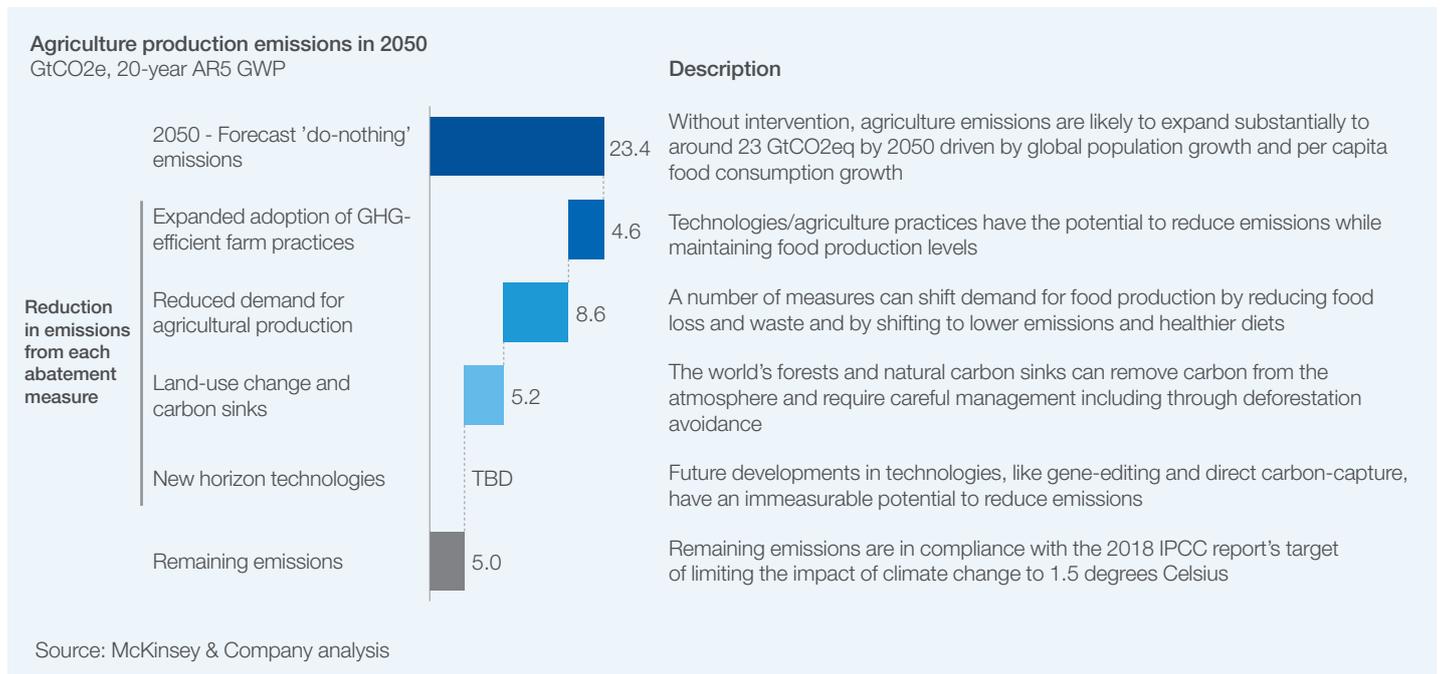
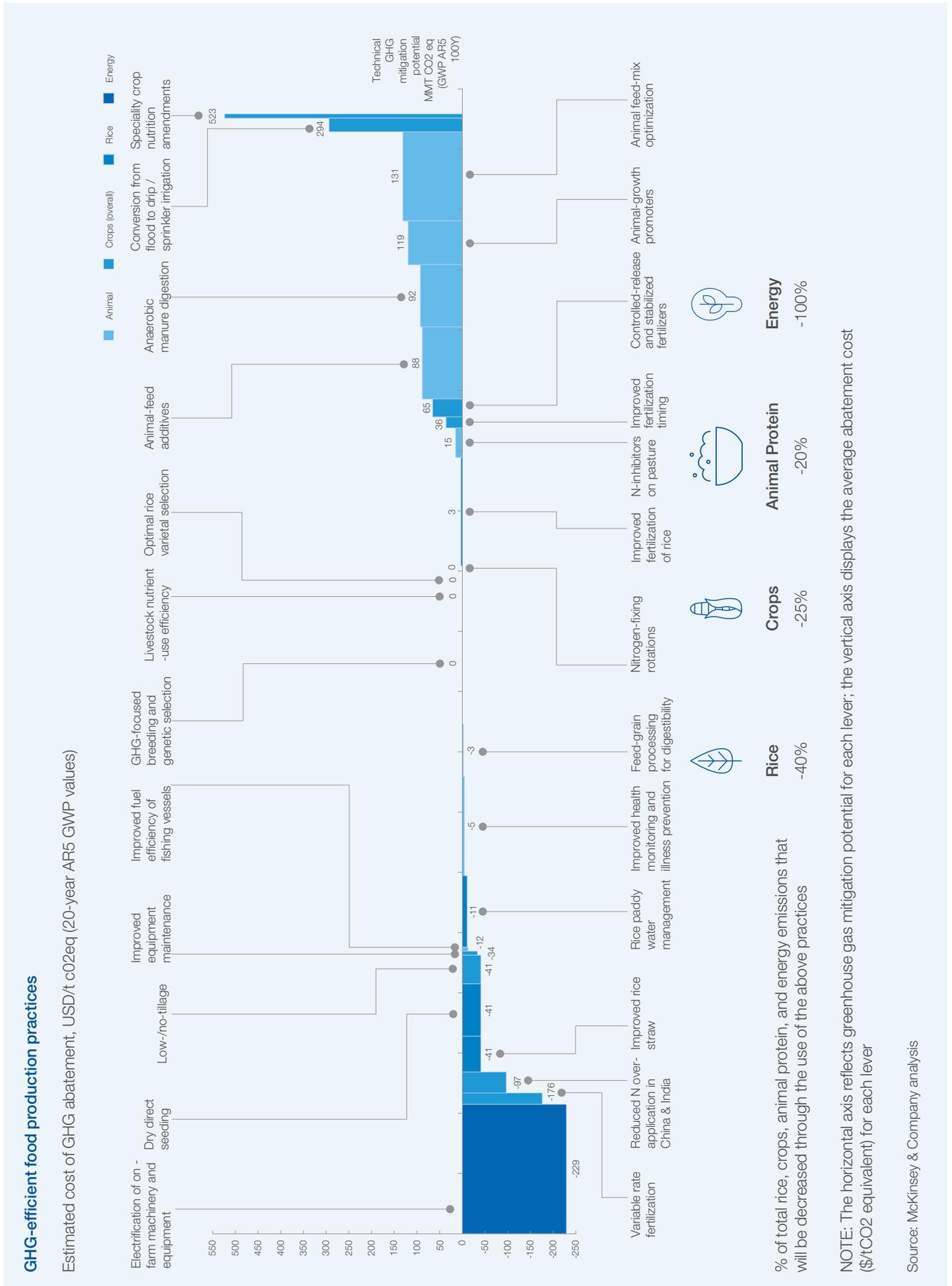


Figure 8: GHG-efficient food production practices



The GHG cost curve

The GHG cost curve quantifies a set of 25 discrete measures that reflect a bottom-up assessment of mitigation potential and cost. The column widths represent the potential reduction of annual emissions by 2050 compared with 2015. The height of each column represents the average systemic cost of abating 1 ton of CO₂eq emissions (i.e. the cost may not necessarily be borne by the producer). It is not an exhaustive list but does represent 25 of the known levers with the highest impact.

McKinsey research assumes the most ambitious possible level of uptake while accounting for potential economic and non-economic barriers across regions, farm scales and types of production system (farm types). The relative impact and costs of abatement vary by region and type, so McKinsey researchers have taken a weighted average across regions and farm types.

The model excludes behavioural changes and implementation costs, both of which vary by region and context.

A review of the practices evaluated for the GHG cost curve suggests that the switch to zero emissions on farm machinery has the highest abatement potential and has a positive economic return on investment (ROI). Switching to zero emissions on farm machinery at scale, however, will require corresponding investments in infrastructure and technology innovation. On the other hand, levers around animal protein production, such as optimizing animal feed mix to improve animals' productivity and reduce emissions, currently offer negative returns for farmers. Despite some improvements in productivity, these measures result in a cost increase and would therefore not be undertaken for reasons other than emissions reduction.

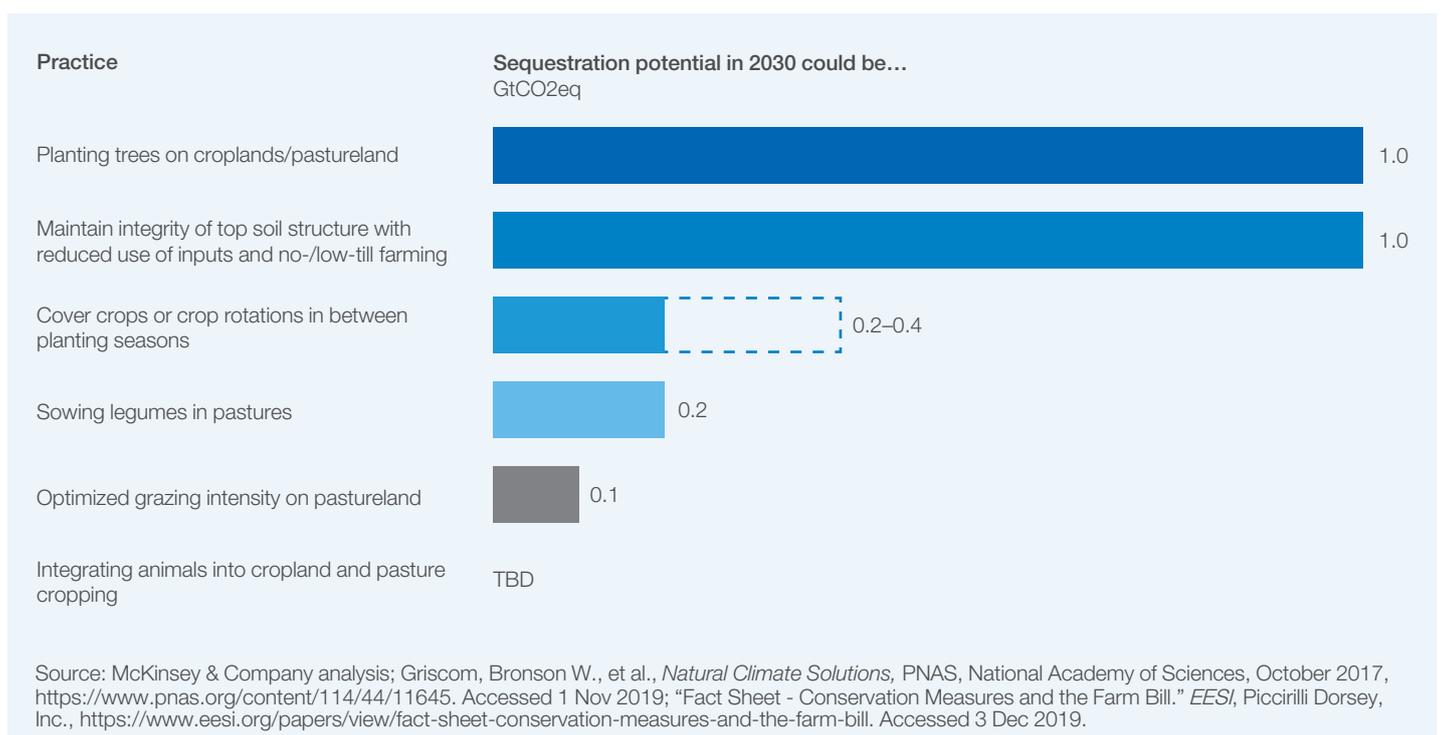
Of the GHG-efficient practices evaluated, about half are expected to net an annual profit for growers. If all of the available practices were implemented at full scale, the global food system could see cost savings of more than \$50 billion annually.⁵⁷ Depending on geographies and crops, each type of grower can adopt a different set of practices. For example, rice farmers can adopt a set of practices specific to rice farming that involve non-continuous flooding and better fertilization to improve rice-paddy water management. Adopting these practices could reduce aggregate emissions from rice farming by more than 50%.⁵⁸ For China, in particular, where rice production is economically and culturally significant, growing and implementing these levers would cost about \$1.6 billion in annual operating expenditures due to the cost of inputs such as sulphate-containing fertilizer, soil amendments and additional labour. However, if implemented consistently at scale in the country, the practices would produce net savings of \$4.7 billion per year.⁵⁹

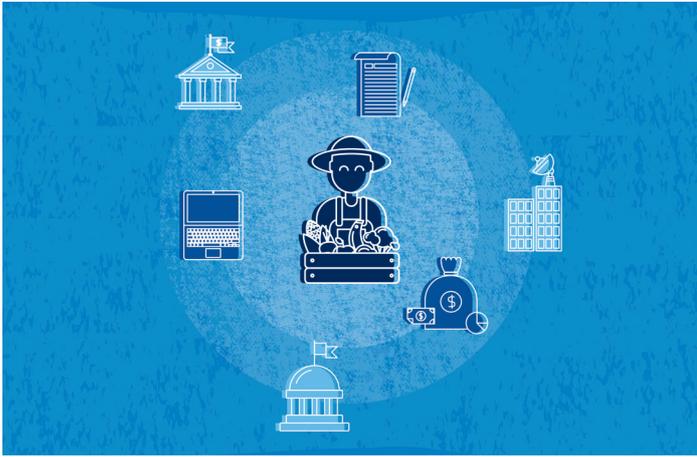
Carbon sequestration methods: The process of soil carbon sequestration removes carbon from the atmosphere and converts it into plant material or soil organic matter, thereby decreasing net

carbon emissions. McKinsey's research has highlighted six land-management practices that have the potential to contribute around 1-2 GtCO₂eq of sequestration and avoided emissions annually. In most cases, the economics of these practices are positive and provide large co-benefits to farmers over time as the increased carbon in soil improves overall soil health (Figure 9).

Many of the practices evaluated can profitably reduce emissions and result in significant co-benefits, but these practices have not been widely adopted because farmers face barriers to implementation. There may be a mismatch in the timing of cash inflows and outflows, which could make farmers unwilling to invest in solutions in anticipation of benefits far in the future. Farmers may not be aware of the potential cost savings of GHG-efficient practices or may lack the knowledge and skills to implement them. In addition, farmers are likely to be sceptical of new management practices as the practices may be perceived as contrary to past generations' experience and received wisdom (e.g. non-continuous flooding and dry direct seeding of rice). Lastly, the downside risk might be too much for farmers to bear. These barriers are even more severe for the 84% of farms globally that are smaller than two hectares.⁶⁰

Figure 9: Management practices to improve organic carbon levels in soil





Innovative financing mechanisms to enable sustainable practices

The AGRI3 Fund is an intermediary vehicle that enables private sector investors to invest in sustainable agriculture and land use. The fund aims to provide \$1 billion in financing and technical assistance to farmers applying sustainable practices through the support of Rabobank and the UN Environment Programme. Farmers will receive capital through packages with commercial banks, agribusiness companies and local governments. The Sustainable Trade Initiative (IDH) and Mirova-Althelia will structure and implement packages and serve as advisers. Risk-return imbalances are overcome through a combination of equity, debt, risk mitigation and grant instruments.⁶¹

Incentivizing the adoption of GHG-efficient farming practices

Incentive mechanisms can help identify capital outside of traditional agricultural programming and financing models. Based on the GHG cost curve analysis, practices that are net profitable require incentives that can address the challenges of cash-flow timings. For practices that are unprofitable, such as animal feed additives that reduce methane production but have little to no other benefit, incentives could offset the incremental costs associated with implementation. The adoption of many of these GHG-efficient practices will require a significant shift in the behaviour of growers and other ecosystem actors. To reach the right level of intervention and impact, the incentive mechanisms should be supported by skill building and incremental profit required to offset risk, leading to short-term additional costs.

Below, the report elaborates on how the four incentive pathways could be used to help farmers adopt GHG-efficient farming practices.

Institutional investments pathway

A significant amount of capital is required to finance profitable practices for growers, given that many cannot fund their own capital and operational expenditures. Furthermore, in the absence of large changes in the environment, several of the practices outlined in the GHG cost curve would require farmers to take a fundamental risk on crop yield and income. Current investment levels in GHG-efficient farming practices are low, even as investors are increasingly looking for opportunities in projects that mitigate climate risks. Access to capital is impeded by insufficient data on the effectiveness of practices in different contexts, lack of fund managers who can effectively deploy the capital and a poor track record of positive returns. Reaching hundreds of millions of farmers with varied levels of credit history and collateral is also a persistent challenge.

However, public and private actors could collaborate to create financial intermediation vehicles that pool capital and unlock financing. This approach could mitigate systemic risks for private investors and could help pay for upfront behaviour change costs. Public and private actors could unlock investment through instruments that provide incentives to local financiers, increasing their risk appetite in lending to farmer cooperatives and other small- and medium-sized enterprises that work with smallholders. Doing so could boost local business innovation and enable the adoption of sustainable practices at scale.

Supporting the adoption of GHG-efficient farming practices while protecting farmers' livelihoods and creating additional opportunities for incremental income requires effective vehicle design and implementation. A bottom-up approach that scopes opportunities and needs, especially at the farm level, and then develops solutions and financing mechanisms is useful.

Business model innovation pathway: Carbon markets

Between 2018 and 2019, over 1,300 companies across sectors were using or planning to use internal carbon pricing to reduce their carbon footprints.⁶² Many of these companies have purchased carbon credits on carbon markets to offset the GHG emissions they emit. As of 2018, there were 25 emissions-trading systems worldwide.⁶³

A small share of farmers benefit from carbon markets through certified projects. By adopting sustainable practices, farmers receive a carbon credit for each ton of emissions reduced, avoided or sequestered. The credits can then be sold to companies on carbon markets looking to buy credits.

However, there are several barriers to entry to these markets. For example, monitoring soil's carbon baselines and verifying the net change of carbon in soil over time is expensive and time-intensive, especially for remote smallholder farmers. Models are being developed to better estimate baselines and the amount of carbon sequestered based on soil characteristics and farming practices, but collecting enough data could take years. In addition, developing a carbon project requires enrolling in carbon registries (entities that distribute carbon credits), mobilizing farmers to join, collecting data about baseline carbon levels, verifying emissions reductions, selling carbon credits and so on – all of which are expensive and time-intensive pursuits. Furthermore, property rights limit the ability of smallholder farmers to access carbon markets. Since carbon projects have a permanence requirement,⁶⁴ the increased carbon stock or avoided loss must be maintained for long periods to use as an offset – but farmers in developing markets often do not have formal property rights. Even for farmers in developed markets, the 30-, 40- or 100-year permanence requirements are overwhelming.⁶⁵

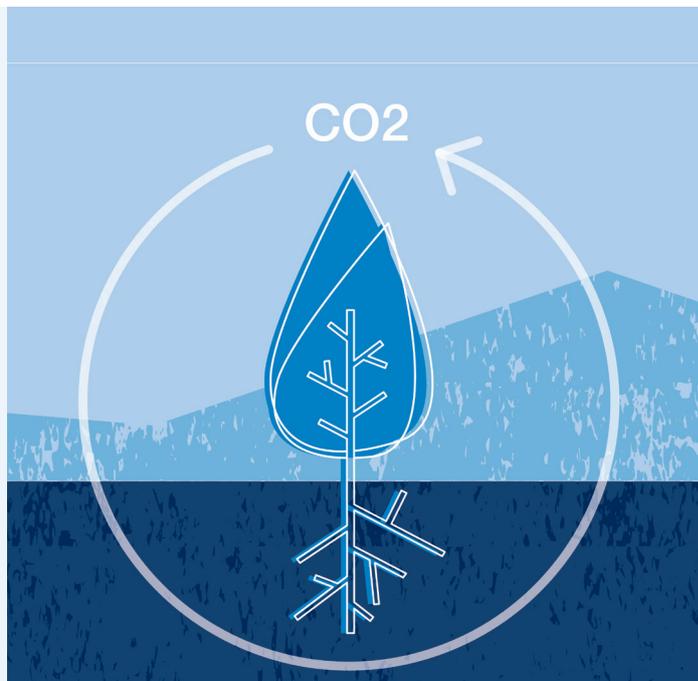
Re-examining the standards in existing carbon markets and updating the requirements for soil-carbon projects is one way to overcome these barriers. Some companies have overcome these hurdles by identifying innovative models to channel funding from carbon-offsets into these projects.

Business model innovation pathway: Consumer premiums

Markets and companies can use consumer premiums as leverage to support new business models. For instance, developed markets could incentivize the adoption of GHG-efficient farming practices by ensuring that farmers are paid premiums for their improved practices. Private companies could develop new value propositions or products, such as carbon-neutral produce, and channel consumer premiums to the farmers.

Tapping into voluntary carbon markets to incentivize farmers

The Terraton Initiative, launched by Indigo Agriculture, is focused on applying the underlying principles of carbon credits and channel payments to help farmers adopt sustainable practices that reduce on-farm carbon emissions and sequester atmospheric carbon in the soil. Indigo's field agronomists and digital platform provide farmers with technical assistance as they transition to regenerative practices. The team is developing a scalable methodology that will pair traditional soil sampling with remote sensing, satellite technology and modelling to make carbon-sequestration monitoring cost-effective. Through the Terraton Initiative, Indigo also aims to create a certification for products whose carbon footprint has been offset through the purchase of agricultural carbon credits. Indigo expects that these innovations will allow it to tap into voluntary carbon-offset markets with economics that enable scale.



Several challenges exist. Traceability across the food supply chain is limited. Addressing this issue requires investment in technological advancement and collaboration with traders and logistics providers who can offer insight into the vagaries of the agricultural supply chain. Another issue is that the increased profits from premium pricing may be disproportionately allocated to retailers and other actors further down the supply chain. Changing behaviour across the value chain requires a mechanism to ensure that farmers, who play a large role in increasing a product's value, gain a fair share of profits.⁶⁶

Overcoming these barriers demands innovation and collaboration so that product information can be shared at all points on the supply chain. Successful collaboration requires protecting each party's interests, including the interests of farmers, and enabling incentives to be spread along the supply chain.

Repurposing public investment and policies pathway

Governments could play a central role in supporting abatement and sequestration of emissions by altering incentives for food system participants through regulations, policy changes and public investments. In addition to cross-industry measures such as carbon

pricing and taxation, a government could, for instance, identify subsidies that encourage unsustainable behaviours and create a plan to repurpose the subsidies to reduce negative environmental externalities. Several emerging and developed markets currently subsidize the use of fertilizer to increase yield to meet historical development imperatives such as food security and self-sufficiency goals. Over the years, other areas, including sustainability and nutrition, have gained the attention of policy makers.

Reforming subsidies requires a systemic approach to mitigate transition costs. For example, farmers who are negatively affected by fertilizer subsidy reforms could be compensated or supported in other ways to protect their livelihoods and income. Implementing large-scale changes requires a longer time frame and extensive resources.

Given the scale of GHG emissions and of the reforms required, effective collaboration among food system participants is essential. While governments can support reforms and policy changes, the private sector, civil society and donors could also offer support by contributing resources, fostering innovation, supporting skill development and enabling incentives on farms.



Stonyfield Farm's approach to enable traceability

Stonyfield Farm, a US dairy company, helps smallholder farmers transition to organic production by providing them with training programmes and technical assistance to enable adoption of organic practices.⁶⁷ Stonyfield uses a cloud-based supply-chain-management platform that showcases the performance data of all of its suppliers, including sustainability information.⁶⁸ This approach helps ensure that the suppliers' priorities are aligned with those of Stonyfield and allows the company to manage risk (such as product contamination) through traceability. As a young company without a big marketing budget, Stonyfield used its yoghurt container lids to inform consumers about its efforts to address environmental concerns and farming issues.

China's reforms to reduce fertilizer usage

Responding to the SDG Agenda 2030, China published a new policy document with a comprehensive vision for agriculture. In addition to reforms on prices and trade, China also rolled out structural reform on the supply side by changing agricultural subsidies and highlighting ways to reduce the use of chemical fertilizers. In 2017, the government launched a programme to reduce chemical fertilizer use by at least 20% in 100 counties,⁶⁹ restrict the annual increase of fertilizer use to below 1% and achieve zero growth for most major crops by 2020.⁷⁰ The broad impact of the new policies is still unclear. However, a comparable study undertaken by a team of researchers suggested that with the right incentives and training, farmers were able to reduce the use of fertilizer and improve crop yields. The researchers conducted 13,000 field experiments across China's main agro-ecological zones to provide specific evidence-based recommendations to 20.9 million Chinese farmers on how to farm over a decade. Crop yields increased by an average of 11% and use of fertilizer decreased by 15% per crop, saving approximately \$1.2 billion on nitrogen.⁷¹



Summary

In summary, the above case study highlights how incentive mechanisms can be applied to drive adoption of GHG-efficient farming practices and examines some of the considerations for implementation. To transition to GHG-efficient practices, farmers and other stakeholders will require financial and non-financial incentives, combined with the right training and awareness building. Essential to any of these incentive mechanisms is extension, research and development support, together with technology that can enable complementary design on incentives and support farmers in making the transition. To conclude, and as highlighted in the roadmap, collective action and the coordination of food system participants, along with demonstrating proof-of-concepts, will be vital to ensuring successful delivery of incentive pathways.

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