

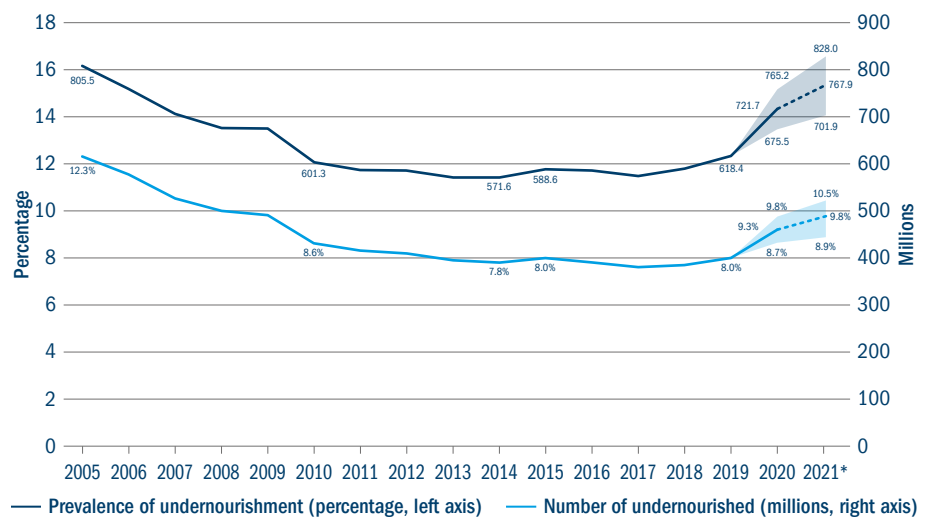


Food security challenges put spotlight on sustainable transition



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Figure 1: number and percentage of population that is undernourished



Source: FAO, IFAD, UNICEF, WFP and WHO, The State of Food Security and Nutrition in the World 2022, 6 July 2022.

For many around the world, 2022 has seen a dramatic rise in food prices. This has been caused by the compounding effects of climate change, supply chain interruptions linked to the Covid-19 pandemic, trade disruptions and rising energy prices resulting from the war in Ukraine. While prices have come down from the highs seen earlier this year, the global food situation may remain tight until 2023 or beyond due to declines in grain stores, low/ending commodity stocks, high fertiliser and energy prices and the impact the conflict in Ukraine is also having on agricultural production.

Unfortunately, this risks a continuation of the upward trend seen in global food insecurity since 2019 (Figure 1). It also increases the risks of social and political disruption, particularly in countries most dependent on food and fertiliser imports, while increasing inequality in developed countries.

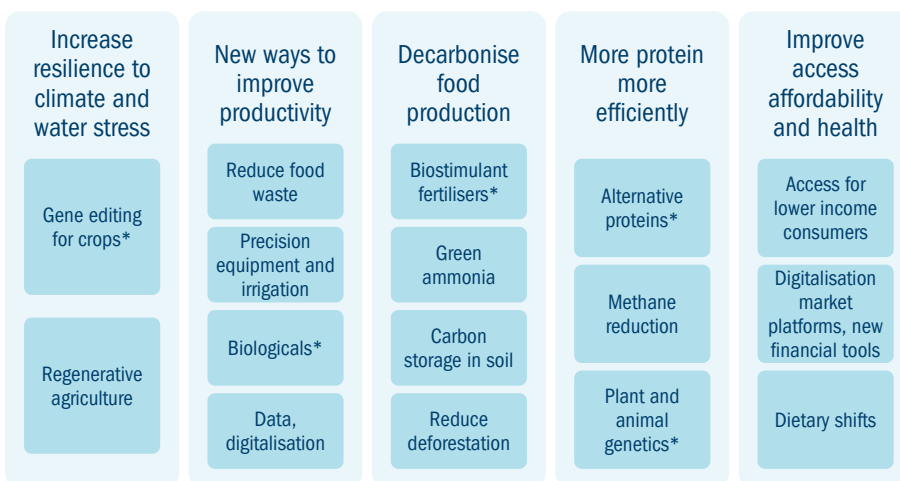
The convergence of events affecting the food system between 2020 and 2022 has been remarkable, but it may not be a rarity in the future. The physical impacts of climate change, volatility in energy pricing along with the energy transition, increasing water stress and

the degradation of biodiversity will only further increase pressures on the food system over the coming years and decades. As we have seen this year, such pressures and shocks can lead to protectionism and disruption to trade and have an impact on food security.

In our view, the increased awareness of these pressures will accelerate the shift toward a more resilient and sustainable food system. Recent policy developments have begun to highlight this, drawing connections between food security issues and sustainability. For instance, the US Inflation Reduction



Figure 2: mapping the elements of the sustainable food transition



*Gene editing as an enabling tech

Source: Columbia Threadneedle Investments, 2022.

Act (IRA) passed in August includes funding for “climate smart agriculture”, while the recent White House summit on biotechnology highlighted the role of innovations such as synthetic biology in achieving food security and environmental objectives.

The transition towards a more sustainable food system will be wide-ranging and multi-faceted. To identify the investment implications of this shift we have developed a framework of five cross-cutting themes that will underpin and shape the transition: increasing resilience to climate and water

stress; finding new ways to improve productivity; decarbonising food production; producing more protein, more efficiently; and improving access, affordability and health outcomes.

Ultimately, each of these five themes will need to be pursued concurrently and in ways that are complementary and mutually reinforce one another. As highlighted in Figure 2, each theme will require the adoption of policy measures and a scale-up of related technologies, bringing risks and opportunities for the food sector.

Looking ahead we plan to use this framework to explore the sub-themes, supporting technologies and implications for both incumbent food and agricultural companies and potential disruptors.

A wasted opportunity?

Taking the theme of “new ways to improve productivity” as an example, a major area of focus is food waste. With a third of food estimated to be lost or wasted across the value chain, reducing waste is arguably among the most critical drivers needed to improve productivity in the food system. Reducing food waste could also mitigate around 8%-10% of global greenhouse gas emissions and lessen environmental pressures through reducing the water, land and agricultural inputs required to produce the food which is currently wasted. In addition, there are social benefits that will come from improving efficiency and availability of food.

Food waste is a well-known problem but, due to its complexity, the historically low price of food and misaligned incentives, addressing it has generally not been a high priority. However, with global food price inflation

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Figure 3: opportunities in the food chain

Stage of production	Food production lost/wasted (%) ¹	Risks and costs	Opportunities	Company examples
<p>Pre-harvest</p> <p>Key drivers of food loss:</p> <ul style="list-style-type: none"> ■ Pests and disease ■ Drought and extreme weather ■ Inadequate harvesting techniques, lack of adequate or economic labour 	8% ²	<p>Increased costs and volatility within food supply chain</p> <p>Lost revenues for producers</p>	<p>Biocontrol (enzymes and microbes)</p> <p>Early pathogen detection and biopesticides</p> <p>Predictive pest analytics</p> <p>Machine learning for rapid molecule development for pests</p>	<p>Novozymes</p> <p>Greenlight Biosciences</p> <p>FMC</p> <p>Enko</p>
<p>Harvest to processing</p> <p>Key drivers of food waste:</p> <ul style="list-style-type: none"> ■ Lack of infrastructure and energy for crop drying and refrigeration ■ Lack of storage and transport infrastructure 	13% ³	<p>Increased costs and volatility within food supply chain</p> <p>Lost revenues for producers</p>	<p>Digital marketplaces and logistics</p> <p>Clean label packaging or coatings</p>	<p>Innoterra</p> <p>Indigo</p> <p>Apeel</p> <p>Greenlight Biosciences</p>
<p>Retail, food service and consumer</p> <p>Key drivers of food waste:</p> <ul style="list-style-type: none"> ■ Inaccurate demand forecasts ■ Lack of consumer awareness, overbuying due to grocery promotions 	17% ⁴	<p>Lost revenues through wastage</p> <p>Costs to consumers through food waste at home</p> <p>Lost value from food by-products</p>	<p>Sensors and AI to optimise inventory</p> <p>Supply chain innovation and collaboration; engaging customers through food waste awareness</p> <p>Food retail business models that capture value of surplus food</p> <p>Direct to consumer models with ingredient sizing</p> <p>Upcycling of food by-products</p>	<p>Afresh</p> <p>Tesco</p> <p>Grocery Outlet, Misfits Market</p> <p>Hello Fresh</p>



and increased awareness of food insecurity we believe this will change with the introduction of more incentives for consumers, companies and governments to reduce food waste.

As this unfolds, companies will increasingly need to account for, and take action to reduce, food waste within their operations and supply chains. This must become an integral component of relevant companies'

routes to meeting both net zero and biodiversity goals.

Despite the challenges that reducing food waste brings, it also provides opportunities (Figure 3). At each stage of the food value chain, reducing food waste can create markets for new technologies, products and business models; help companies to engage customers; spark innovations in supply chains; and reduce costs.

Continued research and collaboration across our fundamental and responsible investment teams will help us identify implications that will arise as this theme evolves and enable us to advise our portfolio companies on how they can reduce costs and capture the opportunities coming from food waste strategies.

1 Columbia Threadneedle analysis, figures are estimates and cannot be summed due to denominators using different methodologies, September 2022.

2 WWF, Driven to waste: the global impact of food loss and waste on farms, 2021.

3 FAOSTAT, Food Loss Index, 2020.

4 UNEP, Food Waste Index, 2021.



Food & Materials transition engagement: Food security and biodiversity

Company



Sector and country

Chemicals, USA

Why we engaged

We wanted to better understand the integration of sustainability considerations within FMC's research and development (R&D) efforts and product portfolio, as well as the company's plan to reduce crop loss and enhance productivity using biologicals.

How we engaged

Video call with Chief Sustainability Officer and Investor Relations, analysts, and portfolio managers.

What we learnt

With regards to agricultural productivity, FMC reported that physical impacts from climate change such as shifting pest populations have already become a material factor for crop health in some instances. This will increasingly influence product development and demand levels. In FMC's next long-term plan, it will have more to share on how it is integrating this into strategy.

The company believes it is well positioned for the shift to more precision-targeted approaches to agriculture, with products becoming less harmful as they become more targeted. All products are assessed against sustainability parameters as part of the R&D process, and development is not pursued unless a product performs better in at least one area when compared with a primary alternative product on the market.

The company's Arc tool provides analytics and field monitoring to assess and predict pest presence, and more precisely determine where and when treatment may be needed, helping reduce crop losses as well as the overuse of insecticides. This builds engagement and customer loyalty. So far, Arc is available to 60%-70% of customers with a focus on Latin America. Roll out will continue.

Biologicals appear a promising route to growth, with FMC focused on products based on pheromones and peptides. Biologicals account for only \$200 million of revenue but have grown at two to three times the rate of chemicals. This growth could be further heightened by EU regulatory changes in late 2022 that will reduce the regulatory requirements for biologicals, which until now have been regulated as chemicals. FMC believes it is well positioned to bring scale and access to growers and that there are opportunities for biologicals to grow and develop, even though this will take time given how fragmented the market is.

Outcome

We took a positive view of the company's integration of sustainability factors into its R&D and mergers and acquisitions activity. We encouraged the company to continue to take steps to reduce the toxicity of its product portfolio over time, particularly in view of potential regulatory changes. We will follow up in due course on FMC's forthcoming nature strategy and disclosure.

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