
CULTIVATING
FOOD SECURITY
ALTERNATIVE PROTEINS
UPWARD PRESSURE ON PRICES
GOOD SANITATION
EXTREME WEATHER
FARM TO FORK
OZONE DAMAGE
CLIMATE CHANGE
INCREASED MIGRATION
EDUCATION & KNOWLEDGE
FRESH FOODS
PEST INFESTATIONS
DAMAGE CROPS
QUALITY MEAT
GHG
GLOBAL WARMING
MILITARY CONFLICTS
ENERGY
VERTICAL FARMING
DESTABILISED ECONOMIES
FERMENTATION
STRAINED INTERNATIONAL RELATIONS
BIOPLASTICS
CROP YIELDS WANE
GREENHOUSE GASES
REDUCED FOOD LOSS
GREEN ENERGY

FOR DECADES, CONSUMERS IN MOST PARTS OF THE WORLD HAVE TAKEN FOR GRANTED BOTH THE SUPPLY OF FOOD AND THE STABILITY OF FOOD PRICES. But now climate change and geopolitical tensions have combined to pose severe risks to global food security. So how can we solve these problems? And what does it all mean for investors?

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THE CHALLENGES

When it rains, it pours. The world's food supply faces two severe problems. First, rising temperatures and extreme weather are reducing agricultural yields and causing harvests to fail. Second, military conflicts, deglobalisation and political rifts are further threatening to disrupt supply chains and destabilise economies, exacerbating hunger around the world and propelling waves of mass migration.

CLIMATE CHANGE

A warming atmosphere holds more moisture and energy, fuelling intense storms and monsoon-like rains. High levels of carbon and air pollution caused by global warming further challenge agriculture by damaging crops, slowing their growth and reducing their yields and nutritional levels. In addition, heat stress and extreme humidity impair the health, quality and productivity of animals raised for meat, dairy and eggs.

The increasing frequency of extreme weather events heightens the risk of multiple and simultaneous global harvest failures across major crop-producing regions. The Economist's 11th Global Food Security Index shows the global food environment deteriorated in the three years to 2022.[1] In 2023, climate-related extreme weather events were among the key drivers of this continuing trend in 18 countries, where almost 72 million people face acute food insecurity. The Intergovernmental Panel on Climate Change (IPCC) projects that more than 1 billion people could face coastal-specific climate hazards such as flooding by 2050.

As a result, millions will face a terrible choice: flight; or hunger and malnutrition.[2] One inevitable consequence will be increased migration, which is likely to have profound effects on international relations, often straining security policies and political stability.

GEOPOLITICS

Ukraine has long been known as the breadbasket of Europe. Russia's invasion highlighted the vulnerabilities in food and energy security, as well as global relations. Before the war, Ukraine was one of the world's largest producers of wheat, barley, sunflower seeds and fertilisers. Not surprisingly, the prolonged disruption to this supply has had an impact far beyond its borders. For example, the resulting high cost of fertilisers has pushed farmers in North Africa to use

1 Economist Impact
2 IPCC Sixth Assessment Report

less than they need, thus reducing yields and inflating food prices.

The Food and Agriculture Organization of the United Nations and the World Health Organization warn that almost 600 million people will be chronically undernourished by 2030, which is almost 23 million more than projected without the effects of the Ukraine war.[3] Similarly, of the more than 2 million people displaced by the civil war in Sudan, over half are now living in neighbouring Chad and South Sudan, which were already battling acute food insecurity.[4]

Some countries still face challenges from the effects of decades-old policy decisions. In the 1980s and 1990s, countries wanting to secure loans from the World Bank and the International Monetary Fund were often required to follow structural adjustment programmes. These included switching agriculture from subsistence food production to commercial cash crops – with unintended consequences. Whilst the countries often had a competitive advantage in those cash crops, they became reliant on imports from international markets to meet their food requirements. And the prices of these imported foods rose faster than the prices of the cash crop exports, thus making food in these countries less affordable and available, not more.

Food security threats are contributing to higher prices. In the long term, measures to improve food security should improve production efficiency and sustainability and thus drive prices lower. However, moving to more regenerative and sustainable food production is likely to be inflationary during the transition period because of the needed investment in infrastructure and training, the lower initial yields and the disruption to supply chains. The war in Ukraine highlighted how quickly such disruption can feed through to high inflation around the world, and that no country can afford to ignore the threat of food insecurity.

> “As a result, millions will face a terrible choice: flight; or hunger and malnutrition.”

3 Food and Agriculture Organization of the United Nations
4 World Food Programme

SOME SOLUTIONS

Attempting to produce more food using the same old methods is not the answer. The profound challenges posed by climate change, geopolitical instability and resource scarcity demand innovation and transformative solutions across sectors, countries and timeframes. Investors who position themselves in these growing sectors can expect to benefit from rising demand for sustainable practices and technologies whilst contributing to the resilience and sustainability of global food systems.

RENEWABLE ENERGY

An added complication for efforts to improve food security is that traditional farming is a significant emitter of greenhouse gases (GHGs). The IPCC estimates that agriculture and land account for some 23% of global GHG emissions.[5] Renewable energy sources such as solar and wind can improve food security by

- improving food production and storage and reducing spoilage in remote communities where grid access is limited
- enabling precision agriculture techniques such as solar sensors and automated irrigation systems to reduce waste and optimise crop yields
- reducing energy costs and GHG emissions

Unfortunately, the upfront investment is substantial. So, the speed of adoption will likely depend on government and supranational subsidies, grants and low-interest loans.

REGENERATIVE FARMING

This aims to produce food sustainably by improving the health and resilience of soil, managing water resources and preserving biodiversity. It seeks to rebuild natural resources over time, whereas conventional farming often depletes them. Regenerative techniques include

- cover cropping, which covers the land with crops in between harvests to protect the soil, prevent erosion and add organic matter
- reduced tillage, planting trees and grazing animals to restore the soil's structure and fertility
- rotating crops and livestock to enhance biodiversity
- contour farming to conserve rainwater on sloping land, by planting along rows of consistent elevation

Regenerative farming also helps to combat climate change by restoring the soil's ability to capture and store carbon from the atmosphere.

5 The Intergovernmental Panel on Climate Change

> “Vertical farming is another expanding area, where crops are grown in stacked layers, often in a controlled environment to optimise plant growth.”

AGRICULTURAL TECHNOLOGY

This applies technology to improve farming efficiency, increase yields and to reduce waste. Areas under development include low-carbon fuels, electrification, precision agriculture and natural fertilisers and pesticides. Vertical farming is another expanding area, where crops are grown in stacked layers, often in a controlled environment to optimise plant growth. Sometimes, soilless growing techniques such as hydroponics, aquaponics and aeroponics are combined with vertical farming. Agricultural machinery can also facilitate regenerative farming techniques such as cover cropping.

FAIR TRADE

Fair trade provides farmers with a reliable minimum price for their crops. This can encourage a switch to sustainable farming methods to maintain soil fertility and conserve water. Healthier soils and ecosystems contribute to more reliable crop yields, reducing food insecurity. For example, fair trade programmes in coffee-producing regions of Africa and Latin America have improved local food security by supporting farmers to invest in growing food crops alongside the coffee.

SUSTAINABLE MEAT PRODUCTION

Global meat consumption is trending higher, particularly within the burgeoning middle class in the developing markets of Asia and the Middle East.[6] This trend poses significant sustainability challenges. Meat production requires much more land, water and energy than producing an equivalent weight of vegetables, whilst contributing significantly to GHG emissions. Meat production is also a leading cause of deforestation and loss of biodiversity. Companies can gain a competitive advantage by producing meat more sustainably. Methods include more efficient feeds, rotational grazing and agroforestry, where trees and shrubs are used to provide shelter for livestock or improve arable soil quality. Alternatives to traditional meat, such as plant-based and laboratory-

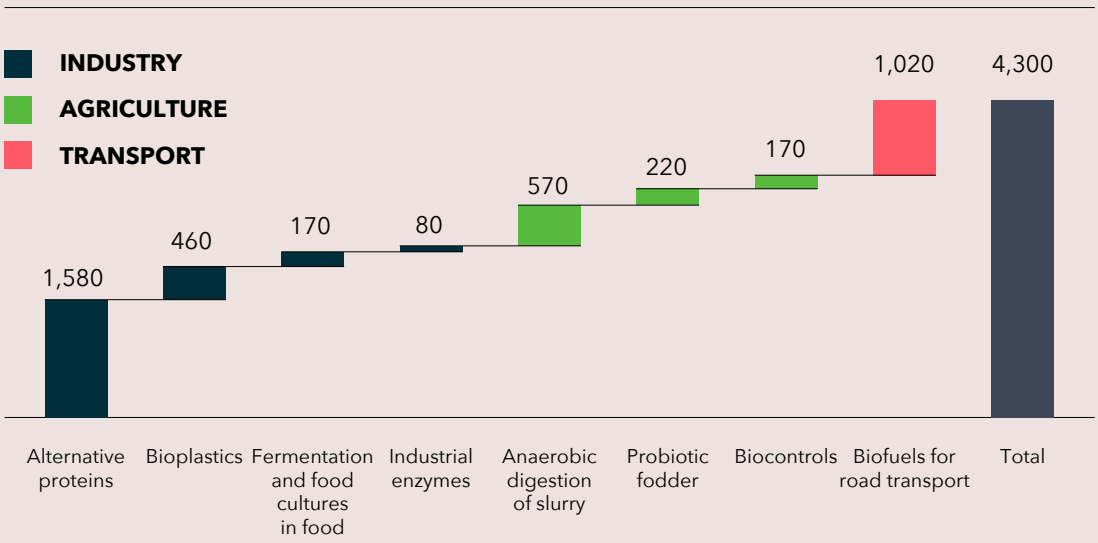
grown meat, also offer some relief to the pressure on meat production by attracting a growing consumer base concerned with health and sustainability (Figure 1).

REDUCING FOOD LOSS

The UN World Food Programme estimates that enough food is produced globally to nourish everyone on the planet, but argues that hunger is widespread because people waste or lose nearly a fifth of all food before it can be consumed.[7] People in developed countries frequently buy too much food, leading to spoiling. Mould and pest infestations damage crops in developing countries, due to inadequate storage facilities. Food waste is higher in hotter countries, and this will only get worse with global warming as rising temperatures adversely impact food storage, processing and transportation. Some farmers lack the labour, technology and financial investment to harvest their crops and so are forced to let them rot in the fields. Food loss and waste generates up to 10% of global GHG emissions – almost five times the total emissions from aviation. Investment capital can improve the food supply chain by improving farmers' access to efficient and affordable harvesting and storage facilities.

Figure 1

SELECTED BIOSOLUTIONS' GLOBAL EMISSIONS REDUCTION POTENTIAL IN 2023



Source: Copenhagen Economics report 'The potential of biosolutions'

7 World Food Programme

> “Food loss and waste generates up to 10% of global GHG emissions – almost five times the total emissions from aviation.”

THE WAY FORWARD

The dual threats of climate change and geopolitical rifts are putting downward pressure on food supplies and upward pressure on prices. As governments and businesses grapple with these challenges, they are creating opportunities in sectors such as agricultural technology, water management and sustainable food systems. Estimates of the investment needed vary widely but run as high as hundreds of billions of dollars annually. Much of this will come from public-sector programmes such as the European Green Deal’s Farm to Fork Strategy, the US Inflation Reduction Act and Japan’s Green Transformation policy.

Private sector investment will also be crucial. Besides green or social investments with clearly stated sustainability objectives, it is possible to invest in the equity or debt of companies delivering innovative agricultural and logistical solutions to help improve food security. However, many companies need to strike a delicate balance. They have to generate cash from their established businesses whilst reducing their environmental impact and also reinvesting in nascent and risky, but potentially lucrative, contributions towards sustainability. And that can curb earnings and thus returns to investors.

Achieving food security requires action by a wide range of actors, including businesses, government bodies, regulators, academics and consumers. Understanding the interconnected forces at play is therefore critical for investors seeking to navigate this complex and ever-evolving environment. Care will be needed to overcome the obstacles.

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