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Unlocking the sustainable transition for agribusiness

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Abbreviations

ASF	animal source foods
CBD	Convention on Biological Diversity
COP	Conference of the Parties
ESG	environmental, social and governance
FAO	Food and Agriculture Organization of the United Nations
GBF	Kunming-Montreal Global Biodiversity Framework
GHG	greenhouse gas
IFC	International Finance Corporation
IPCC	Intergovernmental Panel on Climate Change
IPES-Food	International Panel of Experts on Sustainable Food Systems
OECD	Organisation for Economic Co-operation and Development
R&D	research and development
SEEA	System of Environmental Economic Accounting
SDGs	Sustainable Development Goals
TNFD	Taskforce on Nature-related Financial Disclosures
UNCCD	United Nations Convention to Combat Desertification
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
UNFSS	United Nations Food Systems Summit
WFP	World Food Programme
WWF	World Wildlife Fund

Glossary

agribusiness: There is no single definition of agribusiness; it is a term used in many different ways across different settings and geographies (Ioris 2018). For the purposes of this report, we define agribusinesses as those businesses engaged in capital-intensive, input-intensive, industrialized agricultural value chains, from the input stage through to retail.

cheaper food paradigm: A set of political norms that have shaped policy, regulation and legislation to incentivize and support ever-increasing production volumes and to further drive down production costs and food prices.

environmentally net-positive farming systems: Farming systems that are regenerative in that they create positive benefits (rather than less harmful impacts) for the environment, including storing more carbon than released, improving water quality, biodiversity and so on.

externalities: When an outcome or impact generated within a system has costs, or benefits, outside the system. For example, any industrial process that pollutes the environment benefits the processors (by reducing the costs inherent in preventing the pollution, thereby increasing their profits) but creates a cost levied on the environment (such as through biodiversity loss), on public health (through the health risks associated with air pollution, for example, or toxins in water and food supplies), or on society as a whole (through clean-up costs or reduced access to a clean environment).

gender-responsive: An approach that recognizes and addresses the different needs, roles and contributions of women and men.

investment path dependencies: Arising from past investment in technologies, techniques and practices that increase productivity and maximize profits, path dependencies occur when the scale of previous investment makes change to new models difficult.

Jevons paradox: Named after the 19th century economist WS Jevons, the Jevons paradox arises when efficiency gains in the use of a resource reduce prices and stimulate demand, thereby leading to greater overall use of the resource, even if the production of unit of product uses less resource.

lock-in: A lock-in is the dominant paradigm or condition that sustains today's system by creating barriers to change or transition – these can be perceived barriers (where an ideology is so dominant it is difficult to imagine doing things in different ways), technical (where technology to enable any transition is not available at scale), institutional (where institutions do not have capacity for change) or economic (where the costs of change are greater than the benefits of the status quo. In the context of this report, lock-ins also lead to high risk and costs for actors committed to a sustainable transition.

market concentration: Where significant economic or political power results from the concentration of interests in a small number of incumbent people, institutions or countries. This leads to significant vested interests among incumbent market powers to maintain the status quo.

oligopolistic: In an oligopoly, a market is shared by a small number of companies, creating near monopoly conditions.

oligopsonistic: In an oligopsony, only a small number of buyers exist for a product, which can enable significant downward pressure on suppliers.

Executive summary

This report shines a spotlight on agribusinesses, on the potential role they could play in fostering transformative change in the food system at scale and at pace, and on the political and market structures, or "system lock-ins", that are not only stifling this potential but are entrenching current food systems practices and behaviours.

Therefore, despite increasing political will and overwhelming scientific evidence that show the negative impact that current food systems have on the health of people, animals and the planet, any meaningful change towards food system transformation is proving very difficult to achieve.

Three such lock-ins are identified and analysed. First is the cheaper food paradigm entrenched in current political norms and market structures and incentives. Second is the degree of market consolidation and vested interests that characterize the global food system and that sustain business-as-usual practices. Third are the investment path dependencies trapping businesses, farmers, policymakers and citizens in unsustainable, unhealthy patterns of production and consumption.

The report looks at how these lock-ins create the "rules of the game" for agribusiness that disincentivize shifting from business-as-usual practices to more sustainable business models. And, consideration is given to the actions that governments – with support from intergovernmental organizations, financial institutions, the private sector and civil society – can take to change these rules, firstly through signaling a political commitment to transformative, system-wide change and secondly through building a strong business case for a sustainable transition.

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01 Introduction

1.1. Purpose of this report

The global food system is in crisis. In recent years, its vulnerabilities have become more and more clear. Our food system is vulnerable in the face of the triple planetary crisis of climate change; nature and biodiversity loss; and pollution and waste. Moreover, our food system is contributing to that crisis through the degradation of the natural resource base and ecosystem services on which its resilience depends (Boxes 1 and 2). The inaugural United Nations Food Systems Summit (UNFSS) in 2021 brought governments together with the private sector and civil society to explore avenues to transform the way food is produced, traded and consumed and, ultimately, to deliver a food system that is sustainable, health-supporting and just.

Despite growing agreement that food systems should be transformed, the pace of change has been insufficient to meet globally agreed goals on climate mitigation and adaptation, biodiversity conservation, pollution and sustainable development. To meet these goals, we need to rapidly accelerate our efforts to transform food markets and value chains.

This report shines a spotlight on agribusinesses – on the potential role they could play in fostering transformative change in the food system at scale and at pace, and on the political and market structures, or "system lock-ins", that are stifling this potential.

This report analyses three such lock-ins. First is the cheaper food paradigm entrenched in current political norms and market structures and incentives. Second is the degree of market consolidation and vested interests that characterize the global food system and that sustain business-as-usual practices. Third are the investment path dependencies trapping businesses, farmers, policymakers and citizens in unsustainable, unhealthy patterns of production and consumption.

The report looks at how these lock-ins create the "rules of the game" for agribusiness that disincentivize shifting from business-as-usual practices to more sustainable business models. And, this report considers the actions that governments – with support from intergovernmental organizations, financial institutions, the private sector and civil society – must take to change these rules, firstly through signalling a political commitment to transformative, system-wide change and secondly through building a strong business case for a sustainable transition.

Box 1: The global food system and the triple planetary crisis

The global food system is a major contributor to the triple crisis of climate change; nature and biodiversity loss; and pollution and waste. It is responsible for a third of greenhouse gas emissions contributing to climate change (Crippa *et al.* 2021). Its carbon dioxide emissions – equivalent to roughly 20 per cent of all human-driven carbon dioxide emissions – result from activities along the supply chain including fertilizer production; transportation; storage; food processing and packaging; and waste disposal (Food and Agriculture Organization of the United Nations [FAO] 2021; Tubiello *et al.* 2022). Methane emissions from enteric fermentation of livestock and from rice cultivation account for over half of all global human-driven methane emissions, while nitrous oxide emissions from manure and from the use of chemical fertilizers account for nearly 80 per cent of all human-driven nitrous oxide emissions (FAO 2021).

The food system is the leading driver of land-use change, deforestation and biodiversity loss (Intergovernmental Panel on Climate Change 2019; Benton *et al.* 2021a). The conversion of ecosystems to large-scale agricultural commodity production and livestock grazing, and the homogenization of farmland to support this, are driving the loss of biodiversity and forests. Half of all global forest disturbance between 2001 and 2015, and up to 80 per cent of deforestation between 2000 and 2010, was driven by the expansion of agricultural land (Kissinger, Herold and de Sy 2012; Curtis *et al.* 2018). The intensification of agriculture – involving greater use of inputs such as pesticides and fertilizers, and the consolidation of farmland into large plots to support machinery-heavy production – further threatens local biodiversity by reducing the availability and quality of water sources, food sources and habitats for wildlife (FAO 2019a; Benton *et al.* 2021a).

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The food system is also a major source of environmental pollution, including nutrient overloading in waterways and plastic pollution (Organisation for Economic Co-operation and Development [OECD] 2017; Ringler *et al.* 2022; United Nations Environment Programme [UNEP] 2022a). Large-scale livestock production and excessive use of chemical fertilizers contribute to nutrient pollution in rivers and oceans through run-off from farms and through leaching through soils (Tully and Ryals 2017). Agriculture accounts for 70 per cent of global freshwater withdrawals, and up to 95 per cent of freshwater withdrawals in low-income countries (FAO 2017a). Together, the food and beverage sectors account for around 40 per cent of total plastic use (OECD 2022a). Chemical fertilizers and pesticides; exhaust fumes from agricultural machinery; animal manure; and emissions from transport, processing and waste disposal along the food value chain also contribute to air pollution (Balasubramanian *et al.* 2021). Air pollutants resulting from the food system are estimated to be responsible for 22 per cent of global deaths due to poor air quality (Crippa *et al.* 2022), with women and young children being the most vulnerable as they are disproportionately affected by air pollution due to their roles in caregiving and resource management, which can expose them to contaminated air pollutants causing adverse health outcomes.

At the same time, our food system is failing to deliver positive outcomes for individuals and communities. For nearly ten years, the global rate of malnutrition has been on the rise (United Nations Sustainable Development Goals [SDGs] n.d.). More than half of the global population is suffering from diet-related health problems, with about two billion people overweight or obese, two billion with nutritional deficiencies and more than 800 million affected by hunger (FAO, International Fund for Agricultural Development [IFAD], United Nations Children's Fund [UNICEF], World Food Programme [WFP] and World Health Organization [WHO] 2022). Two-thirds of people affected by hunger are women, and 80 per cent live in areas where they experience high levels of climate vulnerability. A large portion of food produced never gets consumed; around 14 per cent of all food produced is lost between harvest and retail; and 17 per cent of food is wasted among households, retail and food service (FAO 2019b; UNEP 2021a). Almost 3.1 billion people cannot afford a healthy diet (FAO, IFAD, UNICEF, WFP and WHO 2022). Poor diets are now a leading global health burden, responsible for more than 20 per cent of premature deaths (Afshin *et al.* 2019). Such dietary health risks are expected to worsen at the global level as diets transition towards an increase in animal products and processed foods high in starch, oils and sugars in many regions of the world (Springmann *et al.* 2018).

The triple planetary crisis to which our food system contributes poses a significant threat to the future capacity to deliver healthy and affordable diets for all. By 2050, the food system will need to provide for an additional 1.9 billion people, but climate change has already slowed global agricultural productivity growth (Ortiz-Bobea *et al.* 2021). And, greater climate variability and more frequent climate extremes in years to come are expected to bring rapid and unpredictable declines in crop yields and quality (Raza *et al.* 2019). Declines in pollinator populations are further threatening crop yields as well as wider terrestrial ecosystems (Potts *et al.* 2010). Worsening air quality is damaging global crop production (Crippa *et al.* 2022). The natural carrying capacity of the planet to produce sufficient and nutritious food is dwindling (King *et al.* 2023).

Gender-responsive approaches are crucial for achieving a sustainable agribusiness transition. Women are the backbone of sustainable livelihoods, producing more than 50 per cent of food grown worldwide, making contributions at both the household and community level. Yet, they are the first to bear the burden of climate-related effects, surging food prices and inflationary pressures and play key roles in smallholder farming systems and not as farmers and economic agents.

1.2. The urgent need for food system transformation

Recent global events have brought a new sense of urgency to act on the need for more sustainable and resilient food systems. Both the COVID-19 pandemic and the Russian Federation's invasion of Ukraine led to major disruptions to global food trade and have prompted a shift in how food security, and the role of government in ensuring food security, are understood. The fragility of globalized supply chains governed principally by global market forces has been thrown into sharp relief, and governments around the world are increasingly looking to invest in greater self-sufficiency in the interests of both resource security and national security. The cascading effects of major disruptions to the global trade in food across society and their potential to contribute to broader economic insecurity and social instability have seen food systems – and the urgent need to build their resilience as a means to tackle rising economic insecurity and global inequality – become a priority (Box 2). This includes the United Nations (UN) system (United Nations 2022) and other major multilateral and intergovernmental organizations and fora, including the European Union, the G7, the G20, the International Monetary Fund, the World Bank and the World Trade Organization (G7 Germany 2022; G20 Indonesia 2022; Council of the European Union 2023; International Monetary Fund 2023). The economic case for food system transformation is increasingly evident. Beyond the direct human suffering caused by food system disruptions and by long-running inequities in access to nutritious diets, particularly among women and youth, today's food system generates significant costs that are not reflected in market prices and which instead are externalized to society. A 2021 World Bank report estimated that, in total, the food system generates US$12 trillion in hidden social, economic and environmental costs (World Bank Group 2021). A more recent analysis puts this estimate considerably higher, at US$20 trillion in environmental and health costs (von Braun and Hendriks 2023). These externalities and their lack of inclusion in decision-making and/or accounting frameworks are constantly eroding the ecological foundation of the global food system, perpetuating dependence on external inputs and eroding resilience to system shocks.

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The State of Food and Agriculture report from the Food and Agriculture Organization of the United Nations (FAO) (2023) estimates the costs of ill health from poor diets at US$9.3 trillion, of which some two thirds are in high income economies. Social and environmental costs, which may be underestimated in this report, adds another US$3.4 trillion. This means that externalised costs from the food system are exceeding 10 per cent of global gross domestic product. The transformation of farming practices and diets both hold significant potential to reduce these costs. Globally, the adoption of a healthy plant-based diet could reduce healthcare costs in 2050 by US$1,067 billion a year, provide value-of-life benefits (the economic values associated with avoiding early deaths) of US$30 trillion, and reduce annual costs related to greenhouse gas (GHG) emissions in 2050 by US$570 billion (Springmann *et al.* 2016).

Incremental improvements to the global food system, its structure and its functioning are insufficient to drive the scale of change needed. Significant gaps remain between global targets and national policies, between national commitments and delivery on those commitments, and between required resources and funding committed (Deutz *et al.* 2020; Harwatt *et al.* 2022; Morrison 2022; Bizikova *et al.* 2023; World Wildlife Fund [WWF] 2023). On current consumption and policy trajectories, the continued expansion of agricultural land is inevitable, and a continued increase in food system-driven GHG emissions and biodiversity loss, together with worsening dietary health, are highly likely (Global Nutrition Report 2022;

King *et al.* 2023). Transformative change is required within the next decade to tackle the triple planetary crisis; halt the growing global burden of diet-related disease; and meet global targets on climate change, biodiversity conservation, pollution management, food and nutrition security, and global public health.

While there remains considerable debate around exactly what sustainable production within a transformed food system should look like at global, national and local levels (Benton and Harwatt 2022), there is increasing convergence around the need for "net-positive" or "nature-positive" approaches to agricultural systems that simultaneously tackle the three environmental challenges of climate mitigation, biodiversity loss and pollution (deClerck *et al.* 2023). Such approaches include elements of a range of sustainable production systems, including agroecology, regenerative farming and organic farming, and build on some elements of indigenous and local knowledge systems (Box 3). There is a growing consensus that farming systems need to shift from a largely extractive model – in which land, soil, water and nutrient resources are used and degraded but not replenished or protected – to a more regenerative model of farming that minimizes the conversion or disturbance of native ecosystems and habitats, that protects biodiversity on and around farms, that maintains carbon and water in soils, that minimizes GHG emissions and pollutants and that reduces chemical input use.

Box 2: Increasing political interest in food system transformation

Over the past five years, growing attention has been paid in multilateral political fora to the urgent need for more sustainable food systems. In 2021, UN Secretary-General António Guterres hosted the inaugural UNFSS, marking the first time that UN member states together with stakeholders from across the food system came together to discuss solutions "to transform the way the world produces, consumes and thinks about food." Member states submitted statements and pathways for shaping national food systems (United Nations Food Systems Coordination Hub n.d.) and many are receiving technical and financial support from the UN system to implement those pathways.

Food systems are becoming more central to climate and biodiversity negotiations, though commitment to transformation is lacking. In international climate negotiations, food systems and agriculture have been rising up the political agenda; although they continue to be addressed only partially within the UN Framework Convention on Climate Change (UNFCCC) itself (Harwatt *et al.* 2022). There has been a proliferation in recent years of campaigns, initiatives and commitments that recognize the importance of food system change in a holistic way, but countries' Nationally Determined Contributions continue to focus principally on direct emissions from agriculture, with significant variation in scope (UNEP 2022b, Chapter 6). Efforts to broaden the scope of the Koronivia Joint Work on Agriculture (KJWA), established at COP23 in 2017, from agricultural interventions to food system transformation have been largely unsuccessful (FAO n.d.). At COP27 in 2022, the KJWA was relaunched as the Sharm El-Sheikh Joint work on implementation of climate action on agriculture and food security, but work over the next four years is set to focus exclusively on agricultural production, despite calls from a global coalition of more than 90 organizations to expand its remit to food systems (see WWF *et al.* 2022).

At COP28 in 2023, 159 countries signed the Emirates Declaration on sustainable agriculture, resilient food systems and climate action (COP28 United Arab Emirates 2023), which, while retaining a focus on agriculture, acknowledges the need to transform food systems.

An important breakthrough in the multilateral commitment to food system transformation came in December 2022 with the agreement of the Kunming-Montreal Global Biodiversity Framework (GBF). The GBF, agreed to at COP15 of the Convention on Biological Diversity (CBD), sets out a range of biodiversity targets and milestones for 2030 and 2050, a number of which necessitate rapid and transformative action on food production and consumption this decade, including: reducing subsidies for practices most harmful to biodiversity by at least £500 billion; reducing nutrient loss and the risk from pesticides and highly hazardous chemicals by half; and protecting at least 30 per cent of land for nature (Convention on Biological Diversity 2022). Achieving such targets by 2030 would require concurrent action from multiple stakeholders in the food system, including governments, input suppliers, farmers, food manufacturers, investors, retailers and consumers – all at an unprecedented pace and depth.

1.3. The role of agribusiness in accelerating system transformation

Silver bullet interventions will not drive food system transformation; change is required in all parts of the food system and by all food system stakeholders. There is no one intervention or stakeholder group that can single-handedly transform the food system; achieving meaningful change requires collective efforts from all stakeholders involved.

The global food system is a complex entity and altering it can be challenging due to the intricate and dynamic connections between its various components. At the most basic level, the food system can be understood as being shaped by three core constituencies: policymakers who shape the structure of the markets (through, for example, taxes, subsidies and regulations); market actors who work to deliver food and make profits within the market rules set by governments, of which the most powerful are large agribusinesses; and citizens who give both the political mandate to policymakers but also, as consumers, give social license to market actors through their purchasing decisions. Besides policymakers, market actors and consumers/citizens, other stakeholders clearly hold considerable direct and indirect influence, particularly the investor community and farmers. Interventions by one of those constituencies alone is unlikely to be feasible without adequate support from the others.

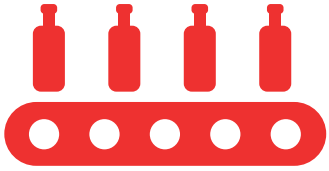
Aligning the interests of all stakeholder groups seems, at times, insurmountable. It is important to recognize that the food system is dynamic, and while alignment of the major constituencies is needed to effect transformative change, each group's interests change over time and are influenced by events – such as climate impacts or conflict – which opens up space for action. As the food system externalises significant costs, and is key for global security, disruptive events that affect food security are likely to become increasingly common. Events may increasingly drive the political dynamics that make change possible. While system transformation is challenging and complex, there exist certain points along global food value chains at which interventions may yield positive ripple effects across the wider system. The global food system is highly complex, fragmented and dynamic, but the market power of large agribusinesses offers an opportunity to drive change at scale.

Whilst there are an estimated 616 million farms (Mehrabi 2023) at the production end of value chains, and nearly four billion people buying food through formal markets (Kharas and Fengler 2021) at the other, value chains are dominated by a small number of agribusinesses at certain points (Box 3 and Figure 1). The concentration of power in such a small number of institutions offers opportunities: if they were to change, the system would change with them. There is no single definition of agribusiness; it is a term used in many different ways across different settings and geographies (Ioris 2018). For the purposes of this report, agribusinesses are defined as those businesses engaged in capital-intensive, input-intensive, industrialized agricultural value chains, from the input stage through to retail (Box 3 and Figure 1). Their focus is on bulk agricultural commodities: high-volume, low-value commodities such as staple grains (wheat, maize and barley, for example), oilseeds (soybean but also rapeseed and oil palm) and sugar crops. The largest agribusinesses are often (though not always) multinational companies supplying international markets, but often domestic markets as well. They are often active in multiple supply chain stages (and thus vertically integrated) and in multiple agricultural commodity markets (and thus horizontally integrated).

Box 3: Agribusiness definitions

Agricultural input companies: These are companies involved in the manufacture and sale of chemical inputs such as fertilizer, pesticides and herbicides; in the breeding and sale of seeds; or in the manufacture and sale of farm machinery. They are often also involved in pharmaceuticals and other related industries such as livestock genetics, and are increasingly active in the provision of digital agricultural technologies and advisory services linked to their products (Birner, Daum and Pray 2021).

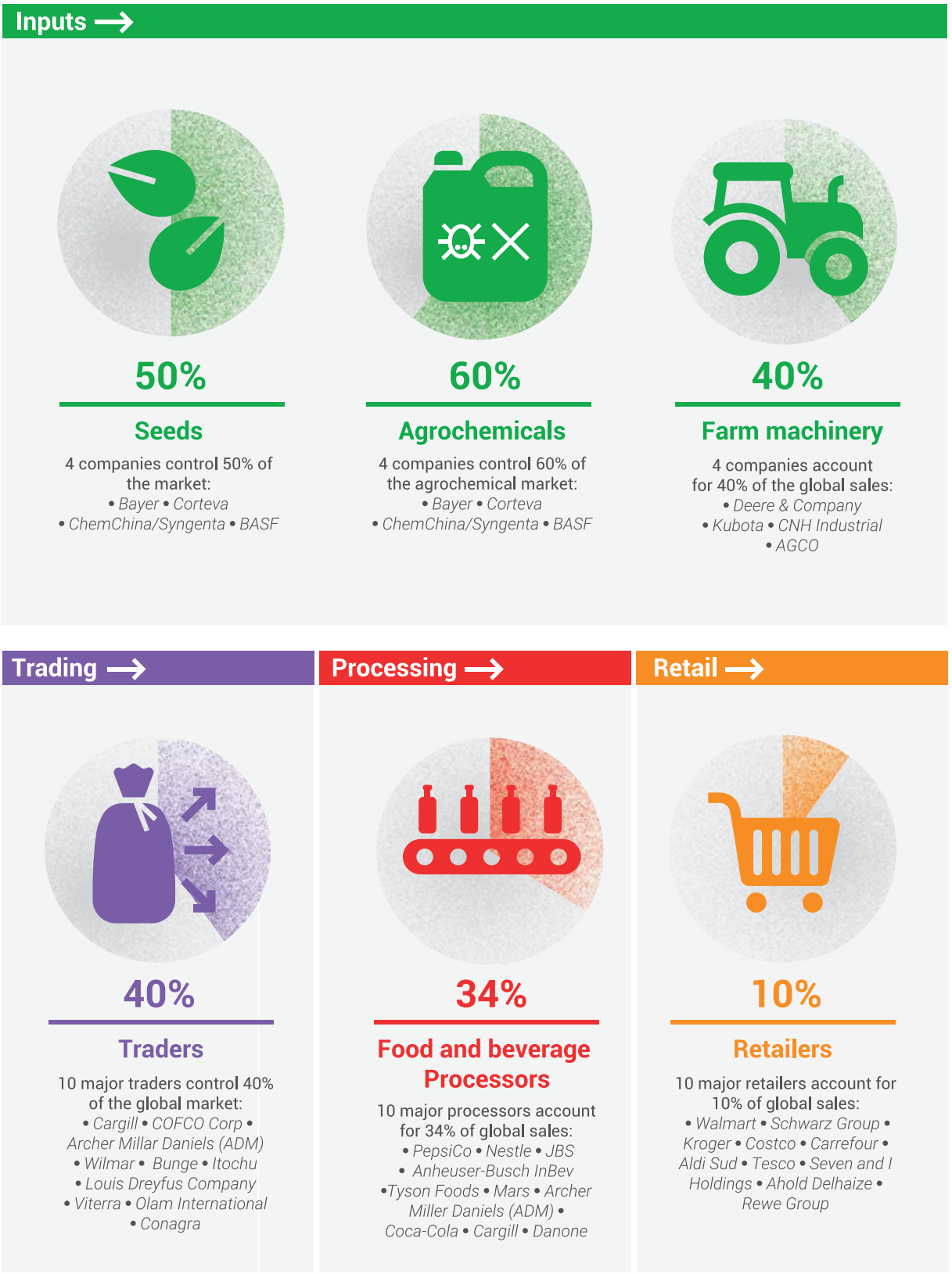
Agricultural commodity trading companies: Also referred to as aggregators or processors, these are very large companies dealing in bulk agricultural commodities such as grains and oilseeds and whose activities are highly integrated. They handle agricultural commodities in their raw or minimally processed form, sourcing or producing grain, oilseeds, meat and other commodities before the point of processing and manufacture into food products for retail and food services. Traders may or may not be active further upstream or downstream in supply chains, for example in the manufacturing of agrochemicals or of processed food products but, to be categorized as traders, they deal in the aggregation and sale of agricultural commodities in bulk. Traders' operations and those of their subsidiaries will often span multiple supply chain stages, and usually a combination of: production and sourcing (known as "origination"); early-stage processing (crushing of oilseeds or milling of grain, for example, or meat processing); and logistics, including storage and shipping. Traders dealing in grain, oilseeds and vegetable oil will sell their products not only to food processors and manufacturers but also to buyers in the animal feed, biofuels and bioplastics industries.



Food processing companies: Food processing companies – also referred to as food manufacturing companies – take raw or minimally processed agricultural commodities such as cereals and oilseeds and use industrial processes to turn those into specialized ingredients (in the case of processors) such as flour, and/or finished food products (in the case of manufacturers) such as bread. The largest food processors and manufacturers tend also to be active in the manufacturing of beverages.

Major retailers: Grocery retail is a highly fragmented sector, and vast numbers of formal and informal small- and medium-sized businesses are involved in the sale of food to consumers around the world. A small number of multinational retailers have nevertheless established a global presence, often operating through a network of subsidiaries.

Figure 1: Market Concentration in the Food Chain



Source: Authors' compilation adapted from Bailey (2017) and based on ETC Group (2022) and Food Engineering Magazine (2021)

Large agribusinesses hold particular potential to transform, at scale and at pace, the way in which food is produced, as well as to transform the nature of the food that we consume. They are the connectors between a highly fragmented production base of smallholder farmers and the wider corporate structure through which commodities are handled, transformed and distributed across global markets (Grabs and Carodenuto 2021). Their reach and influence are such that if they adopted and promoted alternative strategies for food production and processing, they could prompt changes in behaviour and practice among both upstream and downstream actors in the value chains to which large agribusinesses are central.

Large agribusinesses could support the shift to more sustainable and more health-supporting food value chains (Box 4), but to do so would be a considerable departure from current business models. For a large agribusiness to thrive in a future food system transformed to deliver net-positive outcomes for climate, biodiversity and human health – where there may be reduced demand for staple agricultural commodities – they will need to find alternative strategies to value generation (Box 4). These alternative strategies cannot depend on the continued expansion of demand, per capita average consumption and food waste, underpinned by ever increasing volumes of production. Net-positive farming systems will likely be less input- and technology-intensive but more diverse at landscape scales and more knowledge-intensive, relying on expertise in ecosystem services and how they can be harnessed to support – and can be protected through – farming (Carlisle *et al.* 2019). As awareness spreads about the environmental and social outcomes of farming systems, there will be greater value attributed to indicators of environmental and social impact, including the amount of carbon sequestered in farmland, the quality of water sources surrounding farms, the emissions intensity of a given value chain and the nutritional quality or health impact of a particular company's product range. Remaining competitive and retaining a strong reputation are likely to depend more on a company's ability to demonstrate high environmental and social (including nutritional) value than on their output or sales.

Large agribusinesses will need to adjust their strategies for value generation. In a transformed food system, providing more sustainably produced, healthier foods, yet where climate change creates multiple challenges, will require adjustments like:

- Among input companies, knowledge provision and technical support in net-positive farming systems may become more profitable than the sale of chemical inputs and emissions-intensive technology and machinery; and more diverse production – to provide healthier diets and agricultural resilience – will require new technologies (including seed systems and animal genetics) and equipment for precision agriculture of more diverse, integrated and low-input systems.
- Among traders, supporting and demonstrating strong environmental and social performance across a more diverse supply base may become more important than maximizing production volumes of today's commodity crops.
- Among meat processors, lower volumes of high-quality, low-impact, high-welfare products may generate greater profits than high-volume sales of low-quality, high-impact, low-welfare goods. Furthermore, novel plant-based meat, cultivated meat and fermentation-derived foods show potential for reduced environmental impacts compared to many conventional animal source foods (ASF), though further research is needed to understand the potential socioeconomic and nutritional implications of novel ASF alternatives (UNEP 2023).
- Among food manufacturers and retailers, managing reputational risk may depend increasingly on demonstrating a commitment to healthy and nutritious product development, and diversification away from ultra-processed foods narrowly based on today's commodities.

Box 4: Net-positive farming systems – implications for agribusinesses

Achieving environmentally net-positive farming systems requires a number of significant transitions for those agribusinesses involved in the large-scale production of cereals, oilseeds and animal products:

- To minimize disturbance to native ecosystems, any further expansion of agricultural activity enabled by the market will need to be limited.
- To protect biodiversity, traders will need to source not from large-scale monocultural landscapes but from more heterogenous landscapes with greater inherent diversity of production that provide diverse habitats for biodiversity and allow carbon storage alongside or integrated with agriculture (non-cropped areas or agroforestry).
- To enhance carbon storage and thus water retention in soils, traders will need to incentivize among their farmers carbon-sequestering methods such as crop rotations, reduced tillage, cover crops and mixed crop-livestock farming.
- To minimize GHG emissions and pollutants, input companies will need to reduce sales and the development of fossil fuel-dependent machinery and chemical inputs; meat processors will need to source from less intensive production systems; traders will need to stipulate and support better waste management on farms; and food manufacturers and meat processors will need to switch to less fossil fuel-dependent manufacturing processes.
- To reduce chemical input use, input companies will need to scale down development and sales of chemical inputs and instead support the development and use of circular farming techniques to encourage nutrient cycling and to develop supplies of organic fertilizers, as well as supporting greater access to precision farming technologies and investing in more diverse seed varieties. Traders will need to incentivize and support mixed farming and crop rotations, habitat protection for birds and insects to provide natural pest control and the selection of crop varieties that are suited to local agroclimatic conditions.

A transformed food system that operates within planetary boundaries requires deep change not only to production systems but also to diets. While significant variation still persists from region to region and between high-, medium- and low-income populations, diets across the globe are nevertheless converging around a pattern of excessive consumption of processed products from commodity crops (starch, oils, sugars, protein), intensive animal farming (enabled by the intensive production of feed from commodity crops) and inadequate consumption of fruits, vegetables, nuts, legumes and whole grains (Khoury *et al.* 2014). This pattern is conducive neither to good public health, as evidenced by the growing global burden of diet-related ill health and disease, nor to environmentally sustainable farming systems. Demand for cooking oils, sugars, processed foods and animal products is driving the intensification of agricultural systems and their expansion into native ecosystems.
Changing the composition of diets to enable healthy lives requires significant shifts in supply chains and is necessary both to change the demand for land and enable production with lower total environmental footprints (Benton *et al.* 2021a). At the moment, relative to a healthy diet, the world overproduces grains by around 50 per cent, vegetable oils by around 300 per cent and sugar by more than an order of magnitude, yet underproduces fruit and vegetables by about two thirds (KC *et al.* 2018). Relatively small shifts in the composition of diets to healthier patterns and in particular towards more plant-based patterns have the potential to free up significant amounts of land for the production of those nutritious foods that are currently underproduced. For the large agribusinesses on which this report focuses, this potential shift in what is grown has numerous implications:

- Input companies will need to expand the development of alternative crops and varieties, with less focus on starches, oils and sugar, and more focus on horticulture.
- Traders will need to support mixed farming systems and crop rotations that produce a greater variety of crops and agricultural outputs and will need to adopt more regionally tailored value chains to support the production of crops suited to regional dietary preferences.
- Meat processors will need to transition to less intensive production systems that deliver high-quality products more sustainably or promote alternative protein sources.
- Food manufacturers will need to become less reliant on staple cereals and oilseeds across their product lines, diversifying into healthier products that make use of a more varied ingredient base, and with a greater focus on whole foods over ultra-processed foods.

1.4.Political and market structures inhibiting sustainable transition among agribusinesses

Today, the business case for such deep change to business models is weak. The current dominant political paradigms and market structures in the food system create a set of rules of the game for agribusinesses by which disruptive, transformative change to existing business models is financially risky and reputationally unnecessary. As explored in Chapter 2, policies, regulations and legislation are shaped by the cheaper food paradigm, an entrenched political commitment to meeting growing demand through an ever-increasing supply of food that is cheap to produce and cheap to buy but costly for the environment and human health in the long term. That, coupled with market structures that encourage increasing market concentration along global food value chains and a suite of investment path dependencies that incentivize input-intensive and environmentally harmful forms of agriculture, have created a business environment in which efficiency and scale are valued more highly than good environmental stewardship. Those businesses that seek to embrace more sustainable practices face significant financial and operational barriers to doing so, while those that continue per business as usual thrive.

The rules of the game for agribusiness must change if those businesses are to see a compelling case for a sustainable transition. As discussed in Chapter 3, it is governments that must lead the way in rewriting the rules of the game. They must signal a strong commitment to transformative, system-wide change to current food systems, and put in place the right policy and financial incentives for change while raising the financial and reputational costs of business-as-usual practices. Intergovernmental organizations, financial institutions, business and civil society also all have a role to play in creating an enabling and attractive business environment for more sustainable value chains. Only with ambitious change on the part of these stakeholders can the catalyzing potential of agribusinesses to drive system transformation at scale and pace be unlocked.

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02 Food system lock-ins and the rules of the game for agribusiness

This chapter introduces the concept of system lock-ins (Box 5) that shape the rules of the game by which large agribusinesses operate. Three key lock-ins are presented that are of particular importance in inhibiting the sustainable agribusiness transition, and the ways in which these lock-ins manifest and interact in a dynamic, complex system are discussed.

Box 5: Lock ins – a definition

This report defines a system lock-in as the dominant paradigms or conditions that sustain today's system by creating barriers to change or transition—these can be perceived barriers (where an ideology is so dominant it is difficult to imagine doing things in different ways), technical (where technology to enable any transition is not available at scale), institutional (where institutions do not have capacity for change) or economic (where the costs of change are greater than the benefits of the status quo). In the context of this report, lock-ins also lead to high risk and costs for actors committed to a sustainable transition.

2.1. Global food system lock-ins make business as usual hard to change

The global food system is complex, and there exists no governance framework to guide decision-making. The system has evolved over decades from the decisions of myriad actors who have cumulatively shaped food system outcomes. And, the system continues to evolve. Changing market structures, technological advances and shifting demand patterns are among the forces prompting changes to the direction of policy, investment and business innovation.

Despite the food system's dynamism, it has, over time, developed a high degree of internal resilience. As events in 2007/8, 2010/11 and 2019–2023 show (Box 6), the functioning of the food system may lack resilience – in terms of food price volatility and local availability – but its inherent structure is resilient to change. It is locked in in a number of important ways that make changing its structure risky from political, social and market perspectives. And that creates barriers to a sustainable transition both for agribusinesses and for other food system actors.

Below are three key system lock-ins of particular relevance in shaping the operating environment for agribusinesses:

- The cheaper food paradigm – a set of political norms that have shaped policy, regulation and legislation to incentivize and support ever-increasing production volumes and to further drive down production costs and food prices;
- Market concentration – the result in part of the cheaper food paradigm and a drive for efficiency through scale, which has led to significant vested interests among incumbent market powers to maintain the status quo;
- Investment path dependencies – born from decades of investment in technologies, techniques and practices that increase productivity and maximize profits, and that lock businesses and farmers into unsustainable patterns of production.

Box 6: The 2022 global food crisis – resilience of structure not function

In 2022 there was market turmoil within the food system following supply chain disruptions due to COVID-19, some extreme weather events and, particularly, the Russian Federation's ongoing invasion of Ukraine. Rising energy prices, the reduction in fertilizer availability and the potential impacts on the interdiction of supply from Ukraine and the Russian Federation drove food prices rapidly to unprecedented levels and increased the number of malnourished people especially women and children globally, creating a range of significant impacts across the world (Benton, Froggatt and Wellesley 2022). These events revealed the global food system's lack of resilience, especially because since 2007/2008 food prices have periodically spiked, driving up food insecurity and food poverty across the world, including in developed countries (Benton, Froggatt and Wellesley 2022). The 2022 events further demonstrated that the existing system is no longer delivering on the low and fairly stable prices that have underpinned the "cheaper food paradigm" and justify the status quo. If food prices (or availability) are only intermittently cheap, or if food is only intermittently available, the market is not providing food security solutions.

The political and social discourse of 2022 illustrated that the immediate solutions were to shore up the supply side and maintain the existing market structure and functioning. Rather than taking the opportunity to "build back better", the predominant discourse was to "build back fast" and increase planting and availability of staple grains, including by converting nature areas to food production. Subsequent analysis has indicated that while the economic costs of rising food prices have largely been borne by the economically marginalised, where, with a large-scale absence of social safety nets people have been forced to trade down and buy less, market actors have increased their profits (including windfall profits in agribusiness [Weber and Wasner 2023] and speculators [Tadasse *et al.* 2016]).

Political discourse and incumbent interests largely meant the potential of demand-side solutions was actively ignored. One analysis indicated that a marginal change in European diets involving reduced consumption of chicken and pork could have freed up as much grain as was blockaded in Odessa for export to import-dependent and low- and middle-income countries, and could therefore have mitigated much of the impacts of the conflict on global food prices (Benton, Froggatt and Wellesley 2022).

Fiscal spending on food system interventions in the wake of the pandemic has totalled US$230 billion across 87 of the largest economies – including the subsidizing of fertilizers and other agricultural inputs, and emergency food relief for vulnerable households – but only 2.6 per cent of that funding has been directed to measures that support improved environmental sustainability, greater equity or improved rural livelihoods in the near or long term (FAO, United Nations Development Programme [UNDP] and UNEP 2021; Green Fiscal Policy Network 2021).

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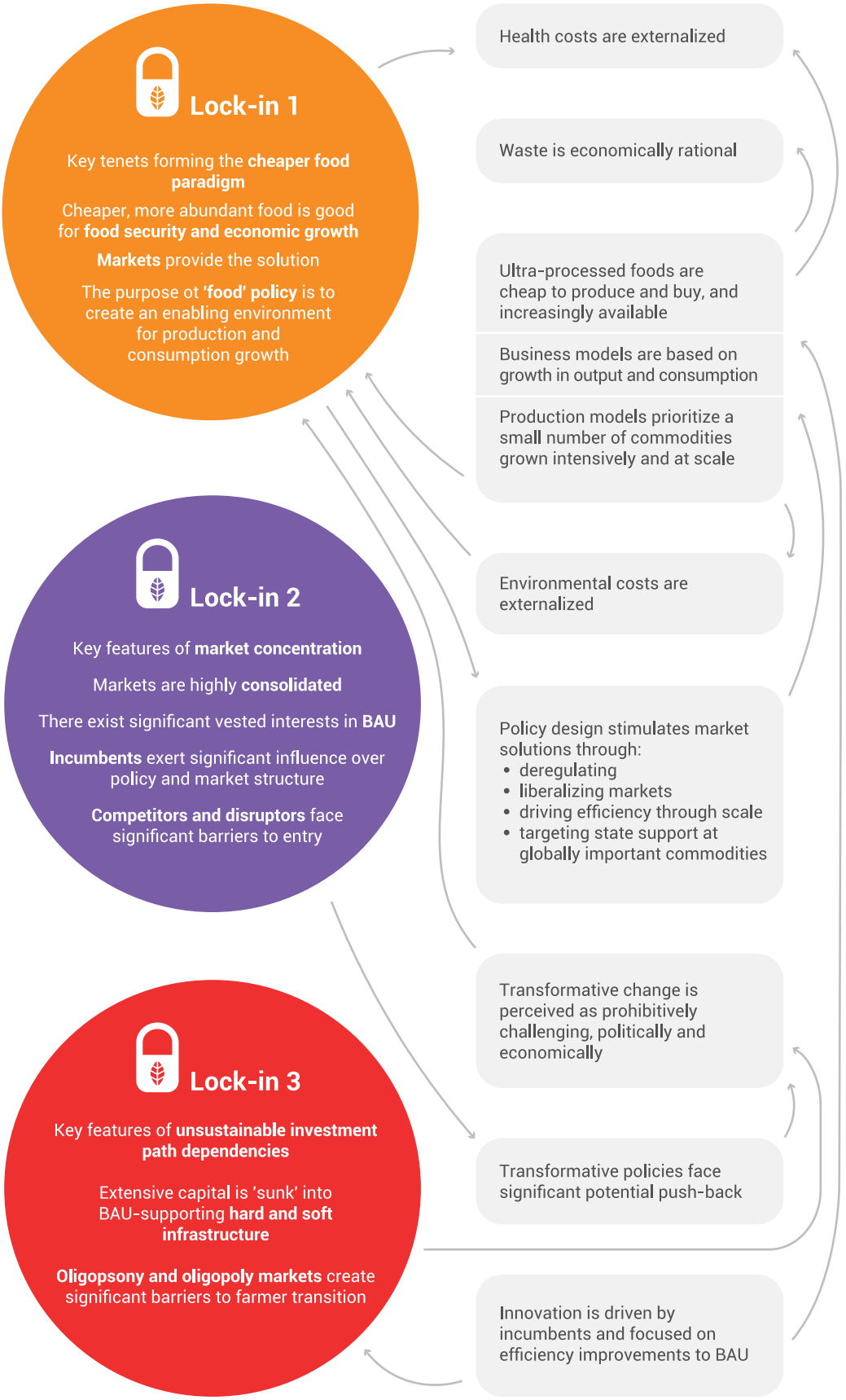
The three lock-ins discussed in this chapter capture particularly intractable forces that shape the rules and incentives under which the largest agribusinesses operate. Together, the lock-ins interact to create a system in which high-volume, environmentally unsustainable and health-harming production systems and products are permitted by deregulated markets and incentivized by policy support and investment flows. They create the market conditions under which the environmental and health costs of food supply chains are externalized; opportunities for the emergence and scaling-up of alternative, more sustainable practices, behaviours and relations are limited; and political, financial, knowledge and behavioural barriers to a sustainable transition are significant (Figure 2).

This report will discuss each lock-in before considering the externalities to which they give rise. The implications of their combined effects on the plausibility and feasibility of disruptive, transformative change among the largest agribusinesses towards net-positive farming systems and more sustainable, responsible value chains are also discussed.

Figure 2: Three system lock-ins, and their interactions and effects on policy norms, market structures and environmental and social outcomes



2.1.1.
Lock-in 1: The cheaper food paradigm.

The cheaper food paradigm, also called the "productionist paradigm" (Lang and Heasman 2004) or the "feed the world" narrative (International Panel of Experts on Sustainable Food Systems [IPES-Food] 2016), refers to a set of ideologically driven tenets that have shaped food system policy over the past eight decades. The central tenet is that the pursuit of cheaper, more abundant food is in the interest both of food security and of broader economic growth. More food means more people can be fed, and cheaper food means citizens have more disposable income to spend elsewhere, thereby driving growth across the economy.

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From this tenet emerge two other interconnected tenets or assumptions. One is that free markets provide the best mechanism through which to achieve cheaper, more abundant food. The other is that the purpose of food policy is to create an enabling environment for market solutions to drive production and consumption growth (Benton *et al.* 2021a). The cheaper food paradigm has shaped a set of policies, regulation and legislation that incentivize over-production (relative to global nutritional needs and particularly of grains, sugar, oils, meat and dairy), reward high quantities over quality (nutritional quality, but also environmental and social qualities of production) and keep food prices artificially low by externalizing costs to the environment and healthcare (Box 4) (Simons 2015; FAO, UNDP and UNEP 2021).

A key outcome of the cheaper food paradigm has been a widespread drive for deregulation in agricultural markets. In high-, middle- and low-income settings alike, the cheaper food paradigm has focused policy attention on supply-side measures to stimulate and meet growing demand, while measures to reduce overall demand for resource-intensive goods have been used sparingly. Fear of price rises has inhibited the introduction of taxation on heavily polluting or unhealthy foods seen as everyday staples, with meat, dairy and ultra-processed foods among them. At the same time, a failure to account for the true environmental and social costs of food production and activity along food value chains has diluted the economic and political case for government intervention to minimize those costs, leading to widespread incentives for the externalization of costs onto the environment (Box 7). Governments have held back from setting stringent standards or requirements for the management of negative environmental and social outcomes from food production and processing, while international trade regulations intended to facilitate the global distribution of affordable and plentiful food have reinforced the emphasis on high-volume, low-value commodity production by disincentivizing the widespread use of border measures to distinguish imports and exports based on factors beyond food safety and quality.

As food systems transform to a sustainable food systems model which prioritizes the availability of, and access to, healthy and sustainable diets, a just transition needs to be affordable to the most vulnerable in society, and ensure that farmers, producers, and consumers are supported. Consumers should be able to meet their nutritional needs during the transition, and not experience hunger or hardship due to increases in cost of food (Principles for Just Food System Transitions 2023).

Box 7: Externalities – a definition

Externalities occur when an outcome or impact generated within a system has costs, or benefits, outside the system. For example, any industrial process that pollutes the environment benefits the processors (by reducing the costs inherent in preventing the pollution, thereby increasing their profits) but creates a cost levied on the environment (such as through biodiversity loss), on public health (through the health risks associated with air pollution, for example, or toxins in water and food supplies), or on society as a whole (through clean-up costs or reduced access to a clean environment). "Internalizing" these externalities would mean placing responsibility for mitigating and covering these costs – through pollution prevention and clean-up operations, for example – on the person(s) or institution(s) generating the pollution.

This is the basis of the "polluter pays" principle: whoever is responsible for polluting must bear the cost. For businesses, this cost can either lead to reduced profit margins or can be managed through the adoption of non-polluting practices or through the raising of product prices. Under the cheaper food paradigm, government policy has incentivized efficiency gains through economies of scale. Across the world, agricultural policy has prioritized the intensification and commercialization of food value chains to meet rising demand through productivity gains. This trend has dominated policy not only in lower- and middle-income countries where population growth and food consumption growth are most rapid and where significant yield gaps remain, but in high-income countries where agricultural production is already threatening planetary boundaries (Lencucha *et al.* 2020).

A central component of this policy drive has been the provision of very significant levels of public subsidies and state support for the production of globally important commodities. US$540 billion is spent on agricultural producer support in the form of subsidies or price incentives each year (FAO, UNDP and UNEP 2021), the vast majority of which is directed at producers supplying high-volume, globalized markets in low-value, undifferentiated commodities that are highly valuable as generic ingredients in foods and some industrial processes (starchy or protein-rich grains, vegetable oils, sugar), easily grown at scale and readily transported and processed in bulk (unlike, for example, many fruits and vegetables).

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Public investment in agricultural research and development (R&D), which has been falling as a share of total investment since the early 2010s (before which public institutions accounted for around three-quarters of total global investment) (Fuglie 2016; Fuglie 2018), tends to target the intensification of staple crop production. For example, of the 19 per cent of total spend by the United Kingdom Biotechnology and Biological Science Research Council that was directed at crop science in 2012, 72 per cent was invested in wheat, barley, rice and potato research (United Kingdom Biotechnology and Biological Science Research Council 2013).

Trust in the power of free markets to deliver ever more abundant, ever cheaper food has diluted the role of the state in ensuring food security. Governments, particularly in high-income countries, have often made little provision, or withdrawn from the provision, of widespread social safety nets (Long *et al.* 2020), both domestically and, to an extent, in provision of the necessary funding for the WFP (WFP 2022). This rolling back of consumer-centred government support, together with the increasing consolidation of market power among a handful of multinational companies (as described in Lock-in 2, below) was permitted through a non-interventionist approach to competition law enforcement in key jurisdictions including the United States of America and the European Union. It has had a reinforcing effect on the cheaper food paradigm: policy responses to the 2022–2023 food crisis and cost-of-living crisis from many governments around the world have sought to ease environmental requirements on producers and to increase producer subsidies to counteract inflationary pressures on food prices (Benton, Froggatt and Wellesley 2022). This has further entrenched the narrative that liberalized markets are the most effective conduit to greater food security, with only modest amounts of public funding being channelled to social safety nets and direct support to the most vulnerable particularly women and children.

2.1.2. Lock-in 2: Market concentration and vested interests in maintaining business as usual

As a consequence of environmental deregulation and market liberalization on the one hand and anti-environmental subsidization – or pro corporate agribusiness subsidization – on the other hand, under the cheaper food paradigm, a small number of large corporations dominate activity at key points along global food value chains (Figure 1). Through large-scale mergers and acquisitions, companies can operate across countries and have significant geographical reach. Their operations can be integrated vertically along value chains, from production towards processing and manufacture, and horizontally across different products' value chains.


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As a result of their extensive reach, these businesses command significant – often oligopolistic or oligopsonistic (Box 8) – influence over global agricultural commodity and input markets. Deregulation of financial speculation in agricultural commodity markets, by which financial capital is used to generate profits through the trading of agricultural commodity contracts as opposed to of agricultural commodities themselves, has permitted the rapid expansion of this lucrative activity among large agribusinesses and investors. This has driven growth among already-large financial and agribusiness players and enabled continued expansion and asset acquisition, further consolidating market power among the largest corporations (Ashwood *et al.* 2022; ETC Group 2022).

While a small number of new players have emerged in recent years to challenge the long-standing market leaders, the scale of investments made by industry leaders creates significant barriers to entry for smaller competitors (a form of path dependency, see Lock-in 3). Through realizing economies of scale, the largest agribusinesses generate vast profits that can then be re-invested into efficiency-enhancing innovations and further growth, thus continuing the cycle of consolidation.

Box 8: Oligopsonies and oligopolies – a definition

Oligopolies and oligopsonies are forms of markets dominated by a small number of large companies, inherently reducing competition. In an oligopsony only a small number of buyers exist for a product, which can enable significant downward pressure on suppliers. In an oligopoly, a market is shared by a small number of companies, creating near monopoly conditions.

Market concentration creates barriers to disruptive change. A high degree of market concentration, and the market influence with which this comes, incentivizes incremental, productivity-boosting changes to existing practices and technologies among incumbents to increase profits and reduce costs. This also disincentivizes more disruptive, more costly and more risky innovation (see Lock-in 3). It also limits the transformative agency of farmers: concentrated input markets mean they have few choices when it comes to procuring the inputs they require, and oligopsony and vertical integration beyond the farm gate constrain price-setting powers and transfer them from producers to buyers (Murphy, Burch and Clapp 2012). Facing high prices for fertilizer and seeds and commanding low prices for the goods they produce, small-scale farmers (including women and youth) of staple commodities are able to generate only minimal profit. This leaves them little financial, or sometimes contractual, capacity to invest in alternative crops, more sustainable production methods that may reduce productivity, or – more fundamentally – new business models or relationships.

The market power of the largest agribusinesses, coupled with weak or absent regulation of corporate political engagement, has paved the way for regulatory capture by certain agribusinesses looking to protect vested interests (OECD 2014; OECD 2022b). The role of these businesses as major employers and service providers affords them significant leverage when seeking to lobby against regulatory intervention and or advocate for direct or indirect financial support (IPES-Food 2016; United Nations Conference on Trade and Development 2018; FAO 2022). A lack of transparency around corporate lobbying practices and weak rules against "revolving door" hiring – whereby departing public officials are hired by corporations to assist them in their political engagement, or where departing corporate employees are hired by governments to support the policy-making process – has permitted the largest agribusinesses to exert their influence on policy, law and decision-making concerning social and environmental issues. This is especially true for law-making and regulatory processes relating to the interaction of agriculture with the environment, on issues such as, inter alia, pesticide management, genetically modified organisms, food labelling, economic incentives for the industry and the management of protected areas (see, for example Friends of the Earth Europe 2022; Robinson n.d.)

The consolidation of agrifood markets serves to further entrench the cheaper food paradigm. High-volume, low-value agricultural commodities in which the largest agribusinesses trade – cereals,

oilseeds and sugar, for example – are often the prime ingredients in the production of ultra-processed foods, consumption of which is rising rapidly (Popkin and Ng 2022). Those agribusinesses offering the lowest price to their buyers are rewarded with higher sales, and so food prices remain low. Consumers are accustomed to these low prices and to the discretionary spending in other aspects of life that is made possible for those prices staying low. That spending drives economic growth, and so governments continue to prioritize an enabling operating environment – with minimal regulation or intervention – for those businesses able to sustain the supply of cheap food. As the market has facilitated mass-produced, cheap and highly palatable foods, foods with high environmental and social costs have come to be seen as everyday staples among high- and middle-income populations and as aspirational among low-income populations. Large agribusinesses have responded to rising demand by increasing supply through efficiency improvements and through the externalization of their environmental and social costs (Box 7). Continued growth in the supply of high-volume, low-margin commodities has suppressed farmgate prices, necessitating even higher public support to keep smaller producers in business (Suppan 2020) and further bolstering the belief among governments that economies of scale and liberalized markets are the answer to stabilizing food prices and meeting voter expectations of abundant, cheap food.

2.1.3. Lock-in 3: Investment path dependencies

Over decades, the scale of concentration in agricultural markets (Lock-in 2) and the pursuit of more abundant, cheaper food (Lock-in 1) have generated a multitude of investment path dependencies: return on investment – for the leading agribusinesses and their investors – has become contingent upon the system continuing to function as it currently does, making use of the assets and commodities for which it has been optimized through investments over many decades. These include investments in capital-intensive assets (including laboratories, production and processing facilities, machinery and logistics infrastructure); in technological innovation (biotechnologies, gene editing, digitalization and precision farming, for example); in substantial R&D programmes; in education and training; and in long-standing, far-reaching and high-volume business relationships.

These investment path dependencies are not a static feature of today's food system; the scale of sunk costs in infrastructure, the time lag before agricultural R&D comes to fruition, and the impact of education and training programmes on mindsets and approaches of future generations of producers and food system actors all mean that current investments will shape inputs, production practices and value chains through to 2050 and beyond.

Past capital investments create a strong incentive for agribusinesses to focus further investment and innovation on boosting efficiencies and sales (Bailey 2017). Among seed companies and traders, investment is focused on staple agricultural commodities, with an estimated 50 per cent of total private-sector R&D spending on crops directed at maize and soybean. Wheat, rice, other oilseeds and sugar crops account for a further 26 per cent (Fuglie 2016). Relative to the total value of their production, maize, soybean and oilseeds receive the equivalent of 1.8 per cent, 2.3 per cent and 1.6 per


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cent respectively, far outstripping relative investment in other crops (Fuglie 2016). For food processors, the focus of R&D spending (Fuglie 2016) is principally on improvements to manufacturing processes to increase efficiency, to profit margins and sales, and to the development of new products that can further stimulate sales and demand growth – a form of the Jevons Paradox (Benton and Bailey 2019). The Jevons paradox, named after the 19th century economist WS Jevons, arises when efficiency gains in the use of a resource reduce prices and stimulate demand, thereby leading to greater overall use of the resource. As food has become cheaper in many markets, so levels of consumption and waste have increased (Benton and Bailey 2019).

The scale of investment directed at incremental improvements to the current system creates barriers to more fundamental system reform. In 2020, nearly 60 per cent of total global investment in agriculture (public and private) was in high-income countries and China. Spending per capita in high-income countries was over five times greater than in sub-Saharan Africa, four times greater than in South Asia and three times greater than in Latin America and the Caribbean (FAO 2022). Smaller competitors are rarely able to invest on a comparable scale, and have come to rely on major agribusinesses and on the products, infrastructure, services and knowledge they provide. This contributes to a self-reinforcing cycle in which the largest agribusinesses continue to dominate investment at key points along agricultural commodity value chains, further embedding existing modes of production and processing (Birner, Daum and Pray 2021). Restrictive intellectual property protections limit opportunities for competitors to experiment with, or build on, innovations developed by those companies with the largest R&D budgets. The accrual of R&D capacity and intellectual property protections among the major agribusinesses associated with consolidation of market position (Howard 2015; Scherrer 2021) reduces the scope for the application of privately developed technologies and techniques for alternative, less input-intensive farming systems. And, with public R&D falling as a share of overall investment, increasingly limited resources are channelled into pre-competitive innovation around, for example, the development and scaling of disruptive technologies, practices and production systems that are less resource-intensive, less polluting or more circular in their resource use.

Investment path dependencies among the largest agribusinesses in turn create path dependencies for farmers, by which reliance on major supply companies for seeds leads to reliance on input-intensive

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crop management practices. The largest input companies sell both proprietary seeds and proprietary agrochemicals, with the latter being tailored to deliver the best protection and growth support for the former. Increasingly, these companies are also offering digital advisory platforms to support farmers in decision-making around effective usage and application (Bonny 2017; Birner, Daum and Pray 2021). Once farmers – or large agribusinesses running contract farming or estate farming operations – have "bought into" the company through the purchase of patented seeds, their capacity to diversify into alternative production systems or crops, for example fruits and vegetables, may be limited. And this could potentially be for many years if those investments are critical to business survival. Their future demand for seed-specific crop protection and advisory products is almost guaranteed.

This reliance affords major input companies the opportunity to raise prices – and thereby increase profits – without fear of losing customers. Options for bypassing the major input companies are limited, not only among smaller farmers but for governments procuring inputs for distribution in domestic markets too – given the near-oligopolistic nature of the global input market (Bonny 2017; Clapp 2021). In addition, governments supporting market access for their domestic products drive investments where the returns will be greatest, leading to a further focus on commodity production (including through the promotion of formal, commercialized seed systems) (Westengen *et al.* 2019).

The digital revolution occurring across societies is adding to existing investment path dependencies among both major agribusinesses and smaller agricultural producers. For smaller agricultural producers, certain digital agricultural technologies create new incentives to adopt mechanized farming methods: precision farming technologies, for example, hold significant promise for more efficient use of inputs but are designed for – or integrated within – agricultural machinery of a kind suited to large farm sizes, with little utility in small, minimally mechanised farms (Birner, Daum and Pray 2021). For stakeholders along the value chain, investment by the largest agribusinesses in digital agricultural platforms is creating additional dependencies. The concentration of market analytics capacity and market information among major players positions them as critical


Photo: Etienne Gerardet / Unsplash

cornerstones not only of physical commodity supply chains but of global market transactions (see FAO 2022). For smaller scale producers, digital technologies can support more efficient resource use and allow greater access to extension services and weather forecasting (Buckley *et al.* 2022). But the increasing penetration of digital advisory platforms owned by major input companies – and thus focused principally on chemical input management and input-dependent farming – is thought by some to contribute to the de-skilling of farmers in ecologically based soil and pest management, further heightening dependence on those chemical inputs and associated advisory platforms to improve yields (Wyckhuys *et al.* 2019; Hu 2020).

In summary, investment path dependencies, shaped and embedded by the cheaper food paradigm and by a high degree of market concentration, have raised the political and economic risks of food system transformation. Over eight decades, the global food system has become highly complex, highly globalized and highly commodified. Consumers have come to expect artificially low food prices. Farmers have come to depend on public sector support and private sector expertise to remain in business. Agribusinesses have honed their business models based on a policy and regulatory environment that rewards incremental efficiency gains and incentivizes the continued growth in output and consumption. Governments derive much of their political license to govern from the votes and endorsements of these three constituent groups.

2.2. The "rules of the game" for agribusinesses and their environmental consequences

The global food system, shaped by the cheaper food paradigm (Lock-in 1), by a high degree of market concentration (Lock-in 2) and by investment path dependencies (Lock-in 3), generates a set of rules of the game for agribusinesses that incentivize practices that often negatively impact the environment. The pressure to maximise productivity and other forms of efficiency, licensed by a market with inadequate regulation and often fed by public sector subsidies, has encouraged food production systems that depend heavily on chemical inputs (fertilizers, pesticides and herbicides) and that are based on linear resource use. Nutrients, water and land are used and depleted and degraded without replenishment or restoration. These systems have caused significant environmental harms including but not limited to:

- GHG emissions from (Crippa *et al.* 2021): fertilizer production and use; deforestation and land clearance and the consequent release of sequestered carbon; livestock, aquaculture and crop production; food processing, packaging and transport; food waste incineration and its dumping in landfills (food waste itself being incentivized by the low cost of agri-food products)
- Habitat and biodiversity loss (Benton *et al.* 2021a) from: the conversion of natural landscapes to cropping and livestock grazing, and from intensification of agriculture
- The depletion of soil fertility (Kopittke *et al.* 2019) through: monoculture cropping; nutrient overloading; repeated planting and compaction by machinery
- The pollution of water sources from: nutrient and effluent run-off (Chaudry and Malik 2017).

Incentives for agribusinesses to continue investing in industrialized, input-intensive and homogenized value chains has also incurred high social costs. As a result of market-enabled nutrition transitions globally, whereby diets have increasingly become dominated by staple grains, processed foods, fats, salt and sugar (Global Nutrition Report 2021) the incidence of diet-related health problems has been rising rapidly for over 30 years (NCD Risk Factor Collaboration n.d.; Lin *et al.* 2020). In many parts of the world, food environments are increasingly obesogenic, meaning they promote weight gain, with heavily processed, calorie-dense, nutrient-poor foods cheap and ubiquitous (Swinburn *et al.* 2011; Benton and Bailey 2019; Benton *et al.* 2021a). While research indicates that private-sector R&D in agricultural inputs has positively impacted global agricultural productivity (Fuglie 2016), the concentration of investment among major agribusinesses and in industrialized, bulk agricultural commodity farming systems – together with the path dependencies that this concentration engenders and, in turn, reinforces – has been linked to negative livelihood and welfare outcomes, especially, but not exclusively, among smaller scale producers. Concerns over the impact of oligopolistic seed markets and restrictive seed patent protections are widely expressed and contested – within many countries where small-scale producers are being encouraged to adopt agricultural technologies (Beumer and Swart 2021).

According to today's rules of the game, agribusinesses are not financially or operationally penalized for the environmental or social harms incurred along their supply chain. These costs are not reflected in production costs or in food prices but are instead externalized (Box 7). Within the parameters of today's system, those businesses delivering high-volume goods at low cost and at low prices for consumers are the businesses that thrive. Those that contribute to environmental or social harms face little financial penalty, while those implementing strategies to deliver positive environmental and social outcomes enjoy minimal rewards. As a result of this system, the largest agribusinesses have little incentive to internalize these costs, and they are borne instead by society. Recent estimates put the costs to human life from food system outcomes at US$11 trillion, total environmental externalities at US$7 trillion and other economic costs at US$1 trillion, adding up to externalities worth twice the total market value of global food consumption at US$9 trillion (Hendriks *et al.* 2023).

2.3. From incremental to transformative change: Why new rules of the game are needed

Many of the largest agribusinesses are actively integrating positive action on sustainability through a variety of engagement types. But, with the current rules of the game enabling and rewarding business as usual, action on the part of agribusinesses to drive change to food markets and value chains has been piecemeal and incremental in nature rather than transformational.

Many agribusinesses have supported action on issues including food and nutrition security, farmer empowerment, climate-smart agriculture and local nature conservation into their corporate social responsibility initiatives; many others participate in in-house or third-party certification schemes (Wellesley *et al.* 2020; Grabs and Carodenuto 2021; Yates *et al.* 2021). Others have made voluntary commitments to sustainable or responsible sourcing, and participate in multi-stakeholder platforms aimed at identifying sustainable food system pathways (Dentoni and Peterson 2011; Grabs and Carodenuto 2021). Several have committed publicly to ambitious targets and company-level initiatives to drive positive environmental and social impacts through their operations, including Olam International's AtSource platform, an advanced supply chain transparency and traceability tool that includes environmental and social impact metrics along the supply chain, and Nestlé's commitment to sourcing 20 per cent of its key ingredients (including grain, palm oil, sugars and meat) through regenerative agriculture methods by 2025, and 50 per cent by 2050 (Nestlé 2022).

Voluntary commitments on more sustainable sourcing or production practices have tended to focus on particular commodities or sourcing regions, and have not delivered step-changes in rates of deforestation, GHG emissions, environmental pollution or rising malnutrition and food insecurity (Grabs and Carodenuto 2021). Their impact has been limited by a number of factors, including a lack of effective monitoring and evaluation; a lack of complementarity across similar but distinct standards frameworks; loopholes allowing for the circumvention of standards; high compliance costs and barriers to entry for small-scale farmers and producers; limited integration with legal and regulatory frameworks; and a narrow definition of "sustainable" sourcing (UNEP 2013; Ruysschaert and Salles 2014; Tayleur *et al.* 2016; FAO 2017b; Henry and Pechevy 2017; Lambin and Thorlakson 2018; Smith *et al.* 2019; Dietz and Grabs 2022).

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Even for forest-risk commodities such as soybean and palm oil, which have been the focus of numerous voluntary corporate initiatives on sustainable sourcing, action on the ground has not met expectations. In 2021, WWF and Global Canopy produced the first round of results from their Soy Traders Scorecard and found that of the 22 companies assessed – representing over two-thirds of global soy exports – no single company is taking sufficient action to tackle deforestation or land conversion associated with their soy supply chains (Thomson and Krebsbach 2021).

Promising private-sector and multistakeholder initiatives have emerged in recent years that address more holistically and explicitly the need for a new way of doing business. The recent initiatives pushing for higher ambition on corporate action in support of food system change include:

- the Taskforce on Nature-related Financial Disclosures (TNFD), a "market-led, science-based framework" intended to support businesses and financial institutions in accounting for nature-related externalities in their decision making (TNFD 2023)
- the Capitals Coalition, a global, multistakeholder collaboration working to facilitate the inclusion of natural capital, along with social and human capital, in corporate, financial and governmental decision-making (Capitals Coalition 2023)
- the Food Action Alliance, a multistakeholder platform aimed at scaling sustainable innovation in support of food system transformation (Food Action Alliance 2023)
- the Business for Nature-coordinated CBD COP15 Business Statement for Mandatory Assessment and Disclosure, a joint advocacy call from businesses ahead of the CBD COP15 calling for the adoption of a target on mandatory corporate reporting of biodiversity-related dependencies and externalities.

Engagement in these initiatives by the largest agribusinesses nevertheless remains limited: only a handful of the largest input companies, traders, food processors and retailers (Figure 1) are involved in one or more of these four initiatives. In 2022, Anheuser Busch InBev, Carrefour, Danone and Nestlé had signed up to the business call ahead of the CBD COP15; Anheuser-Busch InBev, Ahold Delhaize, BASF, Bayer, Bunge, Cargill, Coca-Cola, Corteva, Danone and Nestlé were participating as members of the TNFD; Coca-Cola, Nestlé, Olam International and Walmart were members of the Capitals Coalition; and Bayer, Cargill and PepsiCo were partners in the Food Action Alliance. Analysis of corporate delivery on SDG-aligned commitments suggests that the majority of companies are failing to make a meaningful contribution to the sustainable development agenda, and only a minority have taken steps to integrate sustainability objectives into corporate strategies (Urlings 2021).

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03 How to change the rules of the game for agribusinesses

The largest agribusinesses have enormous potential to catalyse system transformation, but they cannot be expected to wield this potential in a food system that incentivizes unsustainable production. There must be acknowledgement and exploration by advocates of food system transformation of the degree to which other food system actors—chief among them governments—set the guardrails within which those businesses operate. And there must be acknowledgement of the effect of wider system dynamics in disincentivizing the adoption and scaling up of truly sustainable business models.

Cracks are already forming in the system lock-ins that inhibit transformation.

On the face of it, calls to depart from the cheaper food paradigm, to disrupt vested interests in business-as-usual practices and to overcome investment path dependencies may seem overly optimistic or blind to the political economy challenges of realizing such change. But, in practice, pressure is mounting from multiple sides for these lock-ins to be challenged.

The food system transformation agenda is itself founded on the recognition that the drive for ever more, ever cheaper food is failing to deliver on its initial aim of improved food security. Supply chain impacts and externalized costs are being made more visible through supply chain traceability tools, whether industry-, government- and civil society-led (see, for example, the tools in the Trade Tools Navigator). Attention is being drawn by civil society to the incremental steps within multilateral discussions on food system transformation, and to the risk of corporate capture in policy dialogues that are not sufficiently transparent and inclusive (Montenegro de Wit *et al.* 2021; Yates *et al.* 2021). There is increasing attention to the need for a just transition that needs to be affordable for the most vulnerable in society, and ensures that farmers, producers and consumers are supported. Impact investing is increasing as a share of total assets invested by private financiers and by development finance institutions (International Finance Corporation 2021), and the flow of capital into technologies and knowledge to accelerate a sustainable transition in food systems is increasing (see, for example, the Good Food Finance Network). Among multilateral environmental agreements, the GBF has been significant in establishing key biodiversity targets and milestones for 2030 and 2050 that require transformative actions in food production and consumption, such as reducing harmful subsidies.

What is needed now are a suite of actions that amplify these nascent pressures to unlock the lock-ins. What is needed are mutually reinforcing actions that collectively rewrite the rulebook for the largest agribusinesses, so that the transformative power of this group – one of the most influential in the food system – can be leveraged to accelerate transformation at scale and at pace.

Ultimately, it is governments that hold the power to write new rules for agribusinesses – rules that prohibit and regulate harmful practices and that set clear and common standards for net-positive production and supply chains. Intergovernmental institutions, large agribusinesses, investors and civil society all have a role to play in inverting the incentive structures that guide corporate strategy. They also have a role to play in removing important policy, financial and behavioural barriers to transition for businesses as well as for farmers, consumers and policymakers. But it is governments that must make the first move in signalling a departure from the cheaper food paradigm that has shaped food system policy and practice for eight decades. This report suggests this primarily requires signalling a commitment to transformative food system change (Section 3.1), and creating the incentives that enable a strong business case for transformation (Section 3.2)

3.1. Signal political commitment to transformative, system-wide change

If the agribusiness operating space is to change in a meaningful way, governments will need to rapidly raise their ambition to change food systems and food system policy.

3.1.1. Articulating a clear vision and pathway for food system transformation

The first step in this process will be for governments and intergovernmental organizations to articulate a clear vision for food system transformation. Countries' priorities for food system outcomes will differ, and there is no one-size-fits-all approach to balancing supply and demand in a way that respects the local environment while delivering good nutrition and health for the population. Partly for this reason, definitions of "food system transformation" have remained ambiguous and contested, leaving the door open for approaches founded on incrementalism rather than true transformation.

In order to provide the guardrails for transformative change, and, implicit in that, disruptive policy changes, governments will each need to develop a compelling vision for transformed national food systems, and the outcomes and characteristics. Important progress towards the integration of policy across government in support of food system transformation was made at and around the UNFSS in 2021. Nearly 120 governments submitted national food systems transformation pathways, setting out national objectives for food systems and strategies for delivery on those objectives. But many focused their priorities and plans more narrowly on development of the agricultural sector. Ministries of agriculture, environment, health, trade and industry will need to be brought together to agree on a shared vision for food system transformation, and heads of government or heads of state will need to ensure the necessary institutional mechanisms are in place to coordinate cross-ministerial action on delivery.

Governments and intergovernmental organizations, supported by civil society, will need to develop science-based targets for national and global net-positive food system transformation that align with Paris Agreement climate change commitments to hold the increase in the global average temperature to well below 2°C above pre-industrial levels and to pursue efforts to limit the temperature increase to 1.5°C above pre-industrial levels. They must also align with commitments made under the GBF to targets on pollution reduction (Target 7), nature-positive agriculture (Target 10), corporate nature-related disclosure (Target 15) and finance for sustainable transition (Target 19) in particular.

Beyond target-setting, governments will need to put in place robust mechanisms by which to measure and track progress towards multilateral environmental agreements. The GBF, agreed to in 2022, marks a sea change moment and a significant opportunity to drive food system transformation this decade, with multiple targets necessitating radical change to food policy and agricultural practice. But its success depends on its effective translation into national- and company-level action. Governments will need to develop suitably ambitious plans for implementing the GBF in its entirety, starting with an update of National Biodiversity Strategies and Action Plans in 2024.

Under the UNFCCC, governments should raise their ambition by aligning Nationally Determined Contributions with national visions for food system transformation, as agreed within COP28's Emirates Declaration (COP28 United Arab Emirates 2023). They should also commit to interventions that go beyond supply-side emissions mitigation towards transformative system changes, including dietary change and the repurposing of agricultural resources from the production of staple commodities to the production of environmentally sustainable and health-supporting crops such as legumes.

Intergovernmental organizations will need to support the adoption of a systems approach to food policy at the national level by spearheading greater coherence and alignment between the so-called "Rio Conventions" – the UNFCCC, the CBD and agreed GBF, and the United Nations Convention to Combat Desertification (UNCCD) – and by continuing to build momentum for the inclusion of food system transformation within these via the UNFSS process (Box 9).

The Global Environment Facility, with its broad remit covering, inter alia, climate change, environmental management and biodiversity conservation, has committed in its most recent institutional strategy to acting as an "uber-integrator" across the three conventions. By promoting synergistic action through integrated programming and financing, the root drivers of environmental degradation – including economic and social drivers – can be addressed. Formal linkages to enable policy coherence between the UNFCCC, CBD and UNCCD can mitigate the risk of inefficiency from siloed interventions (Global Environment Facility 2021).

Box 9: Soil health as unifying element across the three Rio Conventions

Global food systems are a key driver of – and solution to – the triple planetary crisis of climate change; nature and biodiversity loss; and pollution and waste. Because healthy soils form the foundation of sustainable food systems, restoring ecosystems through a healthy soils approach is a key entry point to delivering progress on UNEP's mandate of countering the triple planetary crisis and creating a more sustainable future for all. Healthy soils sit at the centre of the UN conventions on desertification, climate change and biodiversity – and are critical to delivering on several SDGs and GBF targets. There is no food security without healthy soils. Soil health, defined as "the ability of the soil to sustain the productivity, diversity and environmental services of terrestrial ecosystems" (Intergovernmental Technical Panel on Soils and FAO 2020) is the cornerstone of life on earth. It is estimated that 95 per cent of our food is directly or indirectly produced on our soils (FAO 2015). Healthy soils are critical for life, acting as a water filter, nutrient source and habitat for billions of organisms that comprise one of Earth's most diverse ecosystems. The diverse community of soil organisms maintained by healthy soils helps to control plant disease and insect and weed pests. The organisms form beneficial symbiotic associations with plant roots, recycle essential plant nutrients, improve soil structure with positive effects for soil water and nutrient holding capacity, and, ultimately, improve crop production (FAO 2015). To highlight the resilience benefits of healthy soils: one cubic metre of soil can store up to 600 litres of water, allowing crops to grow even during dry periods (FAO and UNEP 2021).

Despite being fundamental to life on Earth, human pressures on soil resources are reaching critical limits (FAO 2015). The shrinking area and health of soil are one of the biggest threats to future global food security (Shelton 2020). Modern agricultural practices are degrading the planet's soil at an accelerated rate, driven by practices such as intensive monocropping, ploughing and excessive use of fertilizers, pesticides and other chemicals; contributing to the long-term loss of ecosystem function and productivity. Currently, 40 per cent of land is degraded globally (United Nations Convention to Combat Desertification [UNCCD] 2022), 33 per cent of the Earth's soils are moderately to highly degraded, and over 90 per cent could become degraded by 2050 (UNCCD 2020). The resulting rapid loss of topsoil is a huge concern as it has been estimated to take 500 to 1,000 years to form one cm of healthy topsoil (FAO 2015). As soil quality degrades, productivity is compromised. To counteract degradation and maintain crop yields, this often leads to overapplication of pesticides and nutrients, further aggravating the capacity of soil to function as a living ecosystem.

Healthy soil practices such as minimizing soil disturbance, planting diverse cover cropping mixes and integrating livestock produces multi-beneficial outcomes for the environment and human health that are key to halting the triple planetary crisis and strengthening the resilience of farmers to climate change. On farm, the application of healthy soil practices improves soil moisture retention, bolsters above and below ground biodiversity and reduces the need for inputs, thereby reducing pressure on up and downstream ecosystems. Healthy soils further contribute to water quality and availability, hydrogeological risk reduction and carbon mitigation efforts. After the oceans, soil is the largest active carbon store. Food grown in healthy soils has higher healthier food nutritional content, with positive impacts on physical and mental health.

3.1.2. Creating the political space for change through greater transparency

As detailed above, greater political ambition for disruptive change to food systems is made more likely when outside support for change from voters and from the private sector is heightened. Financial institutions and civil society organizations with an interest in driving food system transformation should amplify calls for government-led action. Investor-led coalitions such as the FAIRR Initiative, Climate Action 100+ and Nature Action 100+, together with the UN-supported investor network Principles for Responsible Investment, are pushing the envelope of ambition on responsible business and investment and sending a strong signal to decision makers – in business, in governments and in intergovernmental organizations – that there is increasing appetite for accountability mechanisms to drive change among large businesses. The commitment from FAO to develop a global food system transformation roadmap in response to a recent open letter from a group of investors, coordinated by the FAIRR Initiative, is an indicator of the power of collective investor voices (FAIRR 2022).

Greater public and private-sector pressure for political and policy change nevertheless depends first on building transparency around food markets, their functioning and their externalities. And it requires improving both the access to and the usability of data on the environmental and natural capital risks associated with business-as-usual practices. Considerable work is ongoing in a number of quarters to improve data and metrics on both positive and negative supply chain externalities, but important gaps remain. A lack of harmonization across different environmental, social and governance (ESG) frameworks limits the comparability of these metrics and the usability of corporate disclosure for investors looking to reduce their exposure to environmental and social risks.

The complex structures of many of the largest agribusinesses and their involvement in multiple commodities, multiple business segments and multiple regions make it even more challenging for all stakeholders to access ESG data platforms – to monitor and interpret agribusinesses' contributions either to the planetary crises or to a sustainable transition. Proposed requirements for corporate disclosure (see below) should improve the quality, comparability and accessibility of data provided by companies in those jurisdictions, but both public and private food system stakeholders have a role to play in consolidating and harmonizing the plethora of reporting metrics and frameworks that currently exist.

Corporate disclosure requirements and due diligence regulations offer another important means of driving greater transparency over the nature and extent of supply chain externalities. While broader environmental impact disclosure is gradually becoming part of mainstream discussions (Refinitiv and FTSE Russell 2021), helped by the launch of the TNFD in 2021, most jurisdictions have prioritized climate-related disclosure requirements over more wide-ranging environmental disclosure requirements, and there remains considerable divergence between jurisdictions on attitudes and approaches to environmental impact disclosure. Greater alignment and harmonization of disclosure requirements at the international level is needed to drive institution-wide change among multinational companies and to prevent a race to the bottom in terms of corporate transparency between jurisdictions. The proposal for a such a harmonizing mechanism under the International Sustainability Standards Board (International Financial Reporting Standards n.d.) must be broadened beyond climate-related disclosure to include recommendations for nature-related disclosure being developed by the TNFD if it is to contribute to more meaningful and comparable disclosure in support of a transformative sustainable transition in the agrifood sector and beyond. At the national level, governments should put in place mandatory due diligence requirements that go beyond the current focus on social risks and human rights (Global Reporting Initiative 2023) to include requirements on environmental risk-related disclosure.

Since societal resistance to cost increases for everyday food items is likely to be significant under any circumstances, especially in the current economic climate, efforts to build understanding and trust among consumers of the notion of the "true cost" of food will be an important element in increasing citizen acceptance of food price changes and to building political licence for the policy interventions discussed in this report (Wellesley and Froggatt 2015; Taufik *et al.* 2023). Prioritizing availability and access to a

healthy and sustainable diet, and ensuring the most vulnerable in society can meet their nutritional needs during the transition to sustainable food systems, and not experience hunger or hardship due to increases in the cost of food, is essential.

Interventions that raise consumer awareness and support for more disruptive policy changes further down the line will likely need to include mandated front-of-pack labelling, changes to public procurement standards and food offerings in public settings (such as schools and hospitals), and public health guidance on healthy eating. Governments will also need to create an enabling environment for citizen-led advocacy, for example through the formal incorporation of views into policy development via citizen assemblies (Lacelle-Webster and Warren 2021) and participatory dialogues (such as the UNFSS dialogues), and through policies that enable rather than restrict peaceful public protest.

3.2. Build the business case for transformation

If the largest agribusinesses are to see a strong business case for transformative change to their practices and strategies, it must be financially and reputationally beneficial to invest in production systems and value chains that deliver net-positive outcomes.

3.2.1. Rebalancing financial incentives

Reform of public support for agriculture should be a priority for governments. Agricultural subsidies require deep reform if they are to support truly sustainable (net-positive) agriculture. Subsidies are an important way to incentivize certain means or outcomes of production, as well as of easing liquidity constraints among producers (FAO, UNDP and UNEP 2021), but they must be decoupled from specific commodities and redirected according to environmental outcomes-based standards if

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they are to offer financial incentives for practices such as no-till production, wastewater recycling or agroforestry. These practices may entail higher labour costs and a material (if temporary) reduction in production volumes without currently commanding any price premium. Public investment in R&D – both by governments and by intergovernmental organizations and public financial institutions – will also need to increase significantly and be redirected towards foundational research on critical elements of a sustainable transition in food systems, both to tackle knowledge barriers to transition and to create an enabling environment for increased private investment in this space (FAO, UNDP and UNEP 2021).

Private financial institutions will also be central in increasing the financial incentives for a sustainable transition among businesses, both through increased R&D in net-positive food system innovation and through more stringent sustainability-based criteria for investment. To encourage greater innovation and ambition in line with a sustainable transition, private investors with a commitment to responsible investment will need to adjust their risk-return assessments to take into account the lag between the adoption of net-positive practices and the realization of their benefits, as well as the long-term risk mitigation effects of a transition to more sustainable farming practices (Sustainable Markets Initiative Agribusiness Task Force 2022). They will also need to move towards a more systems-based appraisal of a company's commitment to a sustainable transition, assessing not only a company's existing operations and targets but also its readiness to help drive – and thrive in the wake of – an industry-wide transition to net-positive farming and more sustainable food value chains (Preston and Jain 2020).

3.2.2 Accounting for nature

For both public and private stakeholders, the embedding of true cost accounting in decision-making processes will be a crucial tool in ensuring that financial incentives – whether public support or private investments – are directed towards businesses and practices that minimize and mitigate value chain externalities. Important work has already begun to establish actionable frameworks for business leaders, policymakers, financial institutions and others to implement true cost accounting, including the True Cost Accounting Agrifood Handbook developed by the True Cost Initiative (2022); the TEEBAgriFood Evaluation Framework developed by UNEP; the TEEBAgriFood Draft Operational Guidelines for Business (Capitals Coalition 2020); and the Principles of Integrated Capitals Assessments developed by the Capitals Coalition (2021). The UN has also made significant progress in supporting more comprehensive natural capital accounting through tools including the System of Environmental Economic Accounting (SEEA) and the ARIES for SEEA Explorer (a digital tool using artificial intelligence to undertake rapid and standardized natural capital accounting) (UNEP 2021b). More work must nevertheless be done by governments, intergovernmental organizations and industry associations to collate, harmonize and improve access to the range of environmental outcome metrics and true cost frameworks that currently exist (Aspenson 2020) such that true cost accounting becomes a usable tool for risk-based decisions on policy and business investments.

The 2021 adoption of the SEEA Ecosystem Accounting framework represented a landmark international agreement among governments to measure nature in a coordinated and consistent manner and to integrate natural capital accounting into policymaking. Further work, however, needs to be done to align business accounting and reporting with the SEEA. While business accounts are generally consistent with the System of National Accounts, improving alignment between environmental data and corporate accounting will allow national statistical offices to collect high-quality corporate data on the environment as well as providing businesses access to high-quality and coherent data on the environment that is fit-for-purpose.

Accounting systems enhanced in this way would enable agribusinesses to better and more credibly report their environmental impact and dependencies. It would also result in better quality data fed into the accounts which would allow governments to track environmental trends and developments. The demand from the private sector appears to be

there, given that many companies already compile voluntary and statutory sustainability reports, integrating environmental information alongside financial information.

3.2.3. Strengthening regulatory options beyond finance

Beyond financial incentives, governments will need to implement policy reforms to create a more enabling policy and regulatory environment for sustainable value chains. As a first step, governments should commit to integrating environmental outcomes into trade policy to stimulate international markets for sustainably produced goods, as well as to ensure that domestic policy targets are not undermined by the import and sale of goods produced to lower standards (Deere Birkbeck 2021). Interventions to strengthen the regulation of food environments will also be needed to stimulate consumption of healthy and sustainable foods (Bailey and Harper 2015; Vermeulen *et al.* 2020; Popkin *et al.* 2021), including:

- public procurement standards to ensure that food offered in public institutions, such as schools and hospitals, is health-enhancing and sustainably sourced;
- public planning regulations to prohibit unhealthy food outlets within walking distance of schools and public universities;
- stipulations on the placement of healthy foods in retail outlets;
- stipulations on the content and design of front-of-pack labelling to heighten consumer awareness of the health and environmental impacts of their food choices.

Governments should also look to adopt policies that de-risk transition for market actors, including those that offer regulatory support to farmers and early-stage businesses. Regulatory support in the form of "sandboxes" – whereby businesses are permitted to trial innovative business models with regulatory oversight but with stripped-back regulatory requirements – and real-world trials of alternative production methods or products, can help considerably in reducing the financial and regulatory risks associated with disruptive innovation. This should form a part of governments' R&D investments in the sustainable transition of food value chains. Creating new policy environments to drive innovation in agrifood practices and products will also be critical. For example, in the realm of intellectual property, restrictive and longstanding patents impede the transfer and diffusion of sustainable innovations. They also reduce the scope for competition among non-incumbent businesses in developing and scaling practices and products to support net-positive agriculture. Given the urgency of food system challenges and the need to drive transition at scale and at pace, governments will need to explore policy avenues to incentivize the early sharing or licensing of sustainable innovations and to accelerate their diffusion and adoption among the wider industry.

3.2.4. Raising the costs of business as usual

Strengthening the business case for a sustainable transition will depend as much on increasing the costs of current unsustainable food systems practices as on creating positive financial incentives for change. Increasing those costs first requires clear laws and regulations that prohibit environmentally harmful practices, including, but not limited to, the conversion of native ecosystems or forests to farmland, the mismanagement or dumping of agricultural waste or the use of toxic substances. Those laws and regulations should place responsibility for paying the costs of non-compliance on the perpetrator.

Calibration of the amount and type of financial incentives and disincentives such as taxes, subsidies or payments for ecosystem services would be enhanced by national natural capital accounts and business accounting that are consistent with international standards, such as the SEEA. The existence of harmonized, transparent and credible data sources, through the accounts, would aid policymakers to be more targeted in implementing measures designed to promote or discourage particular practices. Holistic measurement approaches, such as true cost accounting, also facilitate a deeper understanding of the environmental and socio-economic trade-offs implicit in policy design.

Taxation of environmentally harmful practices and products provides another important lever through which to do so. Negative environmental externalities of food production should either be taxed directly, through levies on GHG emissions from on-farm activities or pollution of local water

sources, for example, or indirectly, through levies on unsustainable and polluting inputs such as chemical fertilizers and pesticides or fossil fuels. Both incentivize the substitution of those inputs with more sustainable alternatives where they exist, and investment in the development of new alternatives where they do not (OECD 2023). Both also offer a means of applying the "polluter pays" principle to food production by redirecting some of the true cost of production from society to farmers, and there are a number of examples where revenue from such taxes has been ringfenced for spending on remedial environmental management (Sustainable Food Trust 2019).

Tighter regulation is also needed of bad faith practices on the part of businesses that seek to slow sustainable food system transformation, for example through "green killer acquisitions", whereby large incumbent agribusinesses acquire smaller firms driving sustainable innovation with the intention of controlling and constraining the disruptive potential and limiting competitive pressure to adopt more sustainable practices or products (OECD 2021). Recent analysis suggests a strong tendency among competition authorities towards under-regulation and under-enforcement in monitoring and managing takeovers and mergers that risk stifling innovation (OECD 2020), and new provisions are being made for tighter governance of such non-mega-mergers in certain jurisdictions to address this situation (see, for example, Bertuzzi 2022; Zampa *et al.* 2022).

Governments should therefore pursue the introduction of rules that require large companies in highly concentrated markets, such as those discussed in this report, to demonstrate how they will preserve and grow innovations owned by firms they wish to acquire. Stronger regulation of corporate influence over political processes will also be needed to protect against powerful industry interests slowing or watering down public policy and regulation (OECD 2022b). A recent study of 17 countries in the OECD found that greater regulatory coverage was needed in the majority of those 17 to protect against "revolving door" practices, by which government officials or those holding public office are subsequently employed as industry lobbyists, or vice versa. That regulatory coverage should mandate disclosure of lobbying activity among industry associations


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(as opposed to individual businesses alone), and require mandatory approval of lobbying activities by company shareholders (OECD 2022b).

Beyond government interventions, penalties in cases of dereliction of duty of environmental obligations can also be leveraged by intergovernmental organizations and civil society through the use of public interest litigation. In line with recent developments in international environmental law and international human rights law, prominent public interest litigation cases have been playing an essential role in clarifying the obligations of governments in relation to the environment (see, for example, UNEP 2021c; United Nations, Office of the High Commissioner for Human Rights 2022; Vanuatu ICF Initiative 2023).

This trend is also relevant for the largest agribusinesses; important global standards and guidelines, such as the UN Guiding Principles on Business and Human Rights (HR/PUB/11/04) and the OECD Due Diligence Guidance for Responsible Business Conduct (OECD 2018), recognize that businesses should respect human rights and take adequate measures to ensure that adverse human rights impacts are prevented, mitigated and remediated (HR/PUB/11/04).

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04 Conclusion

The past few years have been marked by a series of global challenges that have revealed both the fragility of global food markets and the resilience of the overall system. The COVID-19 pandemic has demonstrated how quickly disruptions can occur, highlighting the vulnerability of interconnected economies. The global cost-of-living crisis has exposed the strain that global events can put on individuals and households, with rising expenses outpacing income growth, and growing concerns over the affordability of basic commodities such as food and energy.

The worsening global food crisis has been driven to a large degree by climate change and climate extremes. But, it has been exacerbated by pandemic-related supply chain disruptions, by interruptions to the global grain supply following the Russian Federation's invasion of Ukraine, and by the wave of protectionist trade measures that drove up global food prices. This underscores the limitations of the existing system, as issues such as acute food insecurity and unequal access to nutritious food have come to the fore, and will increasingly do so. The case for food system transformation is strong (Benton *et al.* 2021b).

Despite mounting evidence that the current system is failing to address these issues effectively, governments have often resorted to familiar rhetoric and strategies, indicating a reliance on entrenched ideologies and policies. Social protection measures of an unprecedented scale in many countries have largely been replaced with macroeconomic policies to stimulate growth, and with fiscal support to food producers – often in the form of increased production-based and input subsidies – to shore up national food supplies. This demonstrates the strength of system lock-ins, where deeply ingrained structures and practices hinder transformative change.

Addressing these interconnected crises necessitates a critical reassessment of prevailing paradigms and a concerted effort to identify and unlock the existing system's limitations. A recent analysis of major reports on food system transformation found that few address the important political economy dimensions of system change, circumventing or overlooking discussion of the role of power and knowledge asymmetries in today's system and holding back from challenging current political and economic structures that inhibit transformation (Leeuwis, Boogaard and Atta-Krah 2021; Slater, Baker and Lawrence 2022). But only by challenging the status quo and embracing innovative approaches can we hope to create a more resilient, equitable and sustainable future.

There are signs that we are approaching a turning point in efforts to drive transformation. The UNFSS offered food systems a global, multistakeholder platform like none before it, and the GBF marks the most comprehensive global agreement to address systemic drivers of environmental degradation and biodiversity loss to date. Food systems are now at the centre of multilateral environmental commitments, and multilateral efforts (UNFSS, Convention on Biological Diversity and UNFCCC) have provided the conceptual and legal frameworks for ambitious, disruptive action on the part of both governments and businesses.

Other promising developments are driving important but incremental improvements to the system. Civil society and investor scrutiny of policy, regulatory and corporate barriers to system change is heightening. Investor interest in sustainable businesses is growing. Metrics for the measurement and valuation of food system externalities are improving. Civil society-led pressure on the largest agribusinesses to engage meaningfully in the transformation agenda is growing through platforms such as Regen10, the Capitals Coalition and the Food Action Alliance.

Agribusinesses, particularly large ones operating internationally and across multiple commodity supply chains, hold significant potential to act as catalysers of system transformation, but will not do so in the absence of deep reform of policy norms and market structures. The changes to business models and practices which are required by any meaningful commitment to a sustainable transition among these businesses are such that the business case for doing so must be compelling, and this needs changes in the structure of the markets. The rewards of sustainably transitioning and the costs of business as usual must increase, and there must be a clear and long-term commitment to system-wide change from governments.

It falls primarily to governments to change the rules of the game for agribusiness and create a compelling business case for transition. Only with a rewriting of those rules will agribusinesses be enabled and incentivized to accelerate progress towards a transformed food system that can better meet the needs of present and future generations.

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