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The Agri-Foodtech 2023 Whitepaper

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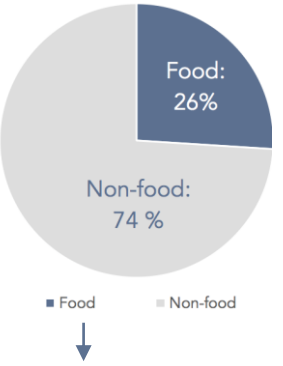
AGRI-FOODTECH 2023

Agri-FoodTech refers to the innovative use of technology for the production, transformation, distribution, and consumption of food. The Agri-FoodTech sector is leveraging the latest technologies to combat the rising food demand and the environmental challenges of this industry to disrupt the way we produce and consume food in a healthier and more sustainable way. In short, the challenge of this industry lies in the transition from an industrial approach, where crops and livestock production are kept separate, to a regenerative agricultural approach, where processes are connected through a circular ecosystem. Not only is the latter significantly better for the environment, but it has proven to be 78% more profitable[1]. The global food market is expected to reach $12 trillion (tn) by 2027[2].

Key impact takeaways

- Global food supply chains are responsible for 26% of the global greenhouse gas (GHG) emissions[3].
- Agriculture alone is accountable for 21% of global GHG emissions. It is the largest producer of methane emissions in the world, which is a GHG that is 265 times more harmful than CO_2.
- Agriculture uses 70% of the world´s water supply[4].
- Today's food supply chains create 13.7 billion (bn) metric tons of carbon dioxide[5].
- Globally, 30% of food produced is wasted[6].

Sources of global GHG emissions



Key problem areas

Rising demand for food, increased cost of living, scarce resources, and decreasing fertile ground capacity

By 2050, the food demand will have increased 60% since 2016, according to the World Economic Forum[7]. By 2050, the UN estimates that there will be a global population of 9.7 bn people[8]. With more people to feed and less available resources like water and land, the food industry is quickly moving towards processes and technologies that focus on the efficient use of resources. In addition, the rising cost of energy and food strongly impact food security. This term refers to low access to adequate food that meets average nutritional needs due to financial or other types of constraints. For example, the percentage of households with children experiencing food insecurity in the UK rose from 9.6% in January 2021 to 25.8% in September 2022[9].

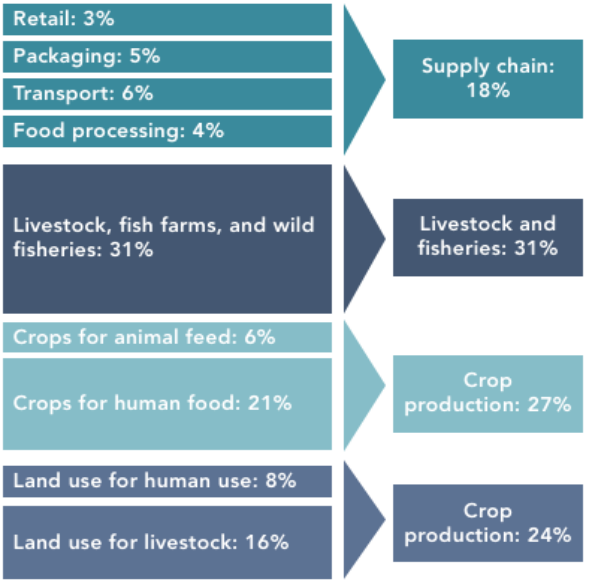
Traditional and unsustainable agricultural practices

Traditional agricultural practices such as the use of environmentally harmful pesticides, fertilisers, and heavy machinery have caused more than half of the Earth´s land to be degraded and inadequate for agriculture[10]. Not only does this limit the production capacity for an increasing global population, but it also leads to productivity losses of $400 bn per year, according to the World Economic Forum[11]. Thus, AgriFoodTech innovations have a central role to play in the transformation of the food industry.

Changing customer behaviour

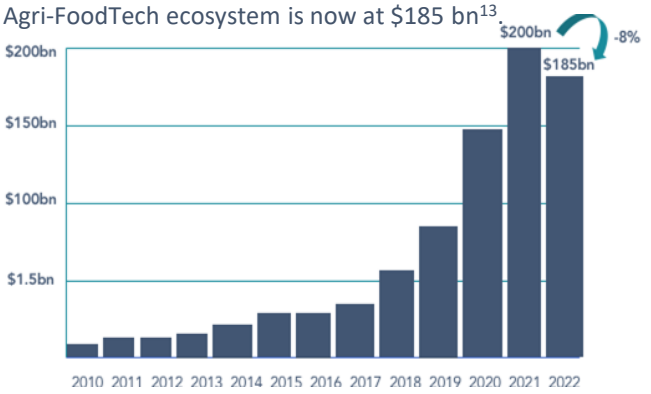
Key stakeholders dealing directly with the consumer such as retailers, restaurants, and D2C food brands have to quickly adapt to the demands for healthier, personalised, faster, and more sustainable food alternatives[12]. To address this demand, which also translates into an innovation and investment opportunity, startups offer solutions that range from personalised meal plans to alternative protein products and innovative delivery services.

Distribution of the 26% of global emissions caused by food supply chains



The European Agri-FoodTech ecosystem

The combined enterprise value of the European Agri-FoodTech ecosystem is now at $185 bn[13].



Funding insights of the Agri-FoodTech sector in 2022

- In terms of European VC investment, the Agri-FoodTech sector was the second most resilient sector despite the economic conditions, following the Real Estate sector[13].
- The AgriFoodTech subsectors that saw the highest year on year growth were alternative proteins, B2B marketplaces, Agritech, and enterprise SaaS[13].
- Overall, the total Agri-FoodTech global funding was $29.6 bn, compared to $53.2 bn in 2021. This is mainly due to the impact of the macroeconomic crisis on public and private capital markets[14].

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Subsectors of Agri-FoodTech

The food supply chain can be categorised into four main stages: primary production, transformation, delivery, and consumption. Within primary production, Agri-FoodTech solutions are disrupting the way farmers grow, maintain, and harvest crops. Subsequently, transformation subsectors include food science and alternative proteins where new innovations are optimising the composition of food to yield more sustainable, healthy, and tasty products. Finally, the last stage refers to subsectors related to the distribution and consumption of food products, where consumers are expecting faster, personalised, and more convenient solutions. The following subsectors are present across each of these four main supply chain stages.

Sector	Short definition
Alternative Proteins	Alternative Proteins refer to food products that seek to fully or partially substitute the use of traditional animal proteins. An example are plant-based cheese solutions that use melon seeds as their main ingredient. This subsector is further analysed in the next page due to its high level of growth and VC investment.
Consumer FoodTech	Consumer FoodTech refers to technological solutions that have a direct contact with the consumer such as diet and lifestyle support apps, technologies leveraging biomarkers to offer personalised plans, food experiences, reservation platforms, and next-generation cookware.
Food Delivery	Food Delivery refers to services that deliver meals and/or groceries to customers. Some examples within this subsector include restaurant and supermarket delivery services, farm-to-home solutions, delivery robotics, and discovery boxes.
Food Science	Food Science refers to the interventions in the chemical and physical properties of food while preserving the quality and safety of food products. Through the use of biotechnology, new food alternatives have risen to make food systems more sustainable and scalable.
Food Waste Management	Food Waste Management refers to technological solutions that seek to minimise or eradicate food waste throughout the supply chain. These include innovations leveraging data to better manage the production and consumption of food. For example, waste sorting robots are among the most promising solutions in the subsector.
Kitchen and Restaurant Tech	Kitchen and Restaurant Tech refers to products and services that use technology to improve the productivity, sustainability, and efficiency of kitchen and restaurant-based processes. Examples include payment services, virtual menus and restaurants, cloud kitchens, and foodservice robotics.
Online Marketplaces and retailers	Online Marketplaces and Retailers refer to solutions that seek to improve the transactions, processes, and interaction between food-related stakeholders such as supply management apps and farm data analytics platforms.
Regenerative Agriculture	Regenerative Agriculture refers to the use of technology to make agricultural practices more efficient, scalable, and sustainable. Namely, it focuses on the conservation of soil health, protection of biodiversity, and the optimal use of natural resources such as water, energy, and land. This subsector is further analysed in the next page due to its high level of growth and VC investment.
Sustainable Food Packaging	Sustainable Food Packaging refers to solutions that leverage technology to minimise or eliminate the environmental harm of food packaging by, minimising the use of plastics or using circular products with long life cycles, among other solutions.

Deep Dive: Alternative Proteins

Definition

Alternative Proteins refer to food products made from plants and other bio-ingredients as an alternative to animal products such as meat and dairy. This market is expected to have a value of $290 bn by 2035, according to the UN´s Food and Agriculture Organisation[15]. The main use cases include food products made from plants, fungus, algae, bio-cells, and insects. Companies in this space are facing the challenge of offering solutions that are sustainable, tasty, affordable, and healthy at the same time. On the other hand, consumers´ willingness to pay for a price premium has decreased while the expectations for sustainable, healthy, and tasty products have remained. Given that the value that each alternative protein offers is a function of price, nutrition, affordability, and environmental footprint[16], margins and overall unit economics are becoming increasingly important to attract VC funding and demonstrate scalability. In 2022, funding in Alternative Proteins was at an all-time peak and its most funded category was insect-based proteins[12]. As seen below, this sector is expected to keep growing in the next years.

Impact context

Historically, the prevalent sources of protein have been animal products such as meat and dairy. However, those have proven to be significantly harmful to the environment. Meat and dairy products account for 14% of the total GHG emissions, where beef is the largest contributor of $C0_2$ emissions per product[17]. By leveraging the use of innovative processes such as cellular food engineering and incorporating new food ingredients, alternative protein companies are able to diminish the footprint of protein products. However, companies are also producing hybrid products since some consumer segments value animal-based ingredients due to their taste and texture contributions.

Investment opportunities

- Insect-based products – 24.1% CAGR
- Hybrid products – 7.5% CAGR
- Plant-based products – 24.9%

Various sources of alternative proteins[18]

Deep Dive: Regenerative Agriculture

Definition

Regenerative Agriculture refers to a food production approach that conserves the quality of the soil, protects biodiversity, and makes an efficient use of natural resources such as land, energy, and water. Regenerative agricultural practices can help capture and store $C0_2$ while optimising the production output in high-quality crops[19]. Innovative companies are disrupting the traditional agricultural practices and relationships between key stakeholders such as farmers, suppliers, and distributors. To do so, they leverage technologies such as AI, robotics, computer vision, biosensors, machine learning, space data, space imagery, and biotechnology.

Impact context

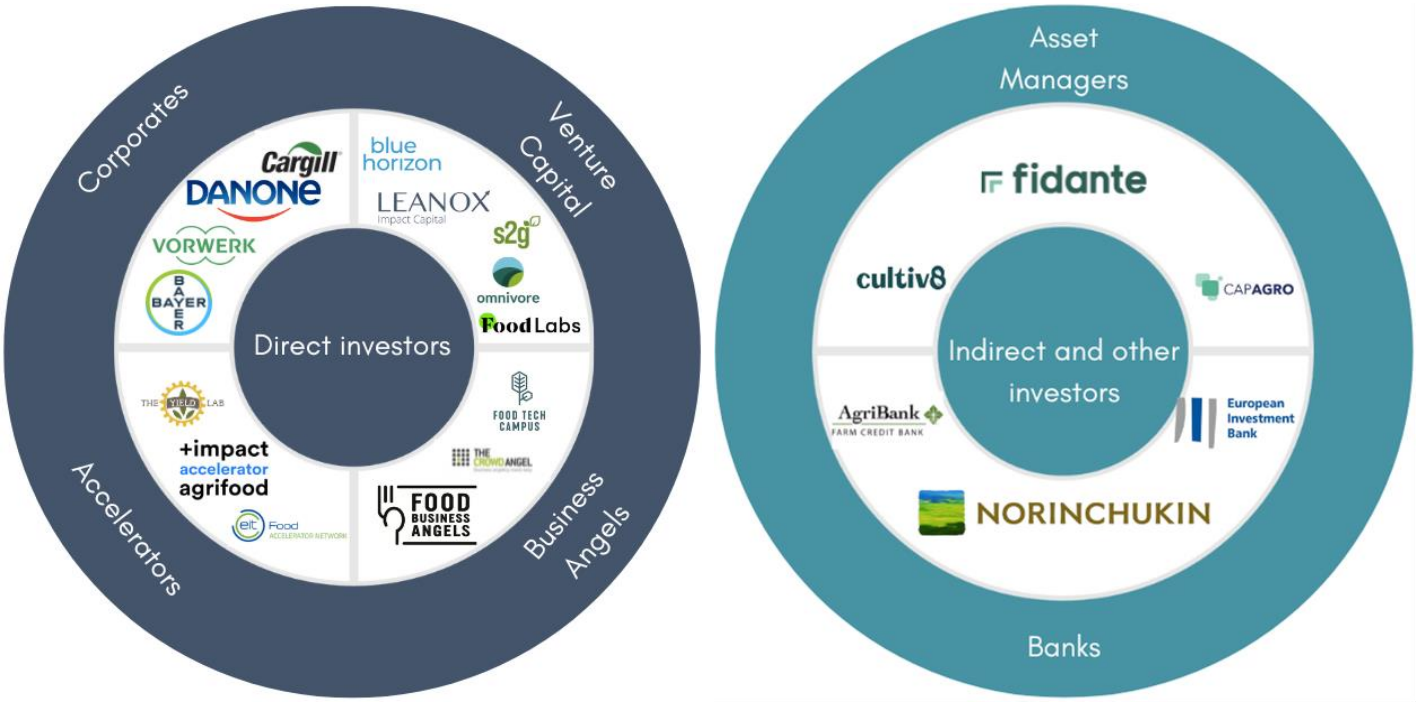
The agricultural industry has been characterised by the heavy use of chemicals, pesticides, and heavy machinery. The ratio between agricultural inputs and outputs has proven to be both inefficient and environmentally harmful. These problems, paired with the above-mentioned technologies and the rising demand for sustainable products, boost new innovative opportunities such as cellular agriculture, vertical or indoor farming, new crop production, innovative maintenance and crop feeding, field data aggregation, precision agriculture, marketplace platforms, food waste management software and hardware, and food logistics optimisation.

Investment opportunities

- Sustainable fertilisers – 12.9% CAGR
- Precision Agriculture – 14.9% CAGR
- Indoor Farming – 12.9% CAGR

Autonomous harvesting robots[20]

Key players in the industry



Challenges for the Agri-FoodTech industry

As new technologies disrupt the way we produce, deliver, and consume food, there are still significant challenges for the key stakeholders in this sector. Consumers and producers are directly affected by the impact that macroeconomic and geopolitical conditions have on commodity prices. Meanwhile, farmers need to continue adapting to innovative ways of leveraging technology to operate more sustainably and profitably[21]. For companies in their scale-up journey, the volatile accessibility to funding has presented a significant barrier. Those that combine differentiated, cost-effective, sustainable, and scalable value propositions will stand out in a rapidly-growing sector that needs to respond to urgent environmental pressures and high consumer demands. Among other important challenges, we can find:

Ecosystem gaps

Although Agri-FoodTech is among the most promising impact innovation sectors, its ecosystem still needs to address different gaps that are key for the regenerative transformation of food systems. From a public policy point of view, there is still an underdeveloped legal framework that caters the right financial and nonfinancial incentives to move from an industrial to a regenerative approach to agriculture[22]. Additionally, nascent innovations such as AgBiotech still need to prove a significant amount of success cases to attract more funding and to demonstrate scalable economics.

Urbanization and population growth

As the global population grows rapidly, there are significant challenges in setting up food systems that meet the high demand for sustainable food products and services. One of them is the availability of suitable land for agricultural practices, as urban expansion consumes 1.9 million acres of farmland per year[14]. As a result, farming processes are under pressure to make effective use of land to feed a growing population while maintaining or improving soil health.

The road ahead

The macroeconomic and geopolitical crisis is expected to continue to influence the Agri-FoodTech sector in a negative way. However, the future outlook is highly promising due to the positive impact caused by technology across the cost-effectiveness, profitability, and sustainability in this industry. As a result, investors are increasingly interested in this sector and the market infrastructure becomes more robust and resourceful. In the coming years, technology will continue to empower key stakeholders in an unprecedented way. Technology will provide a multitude of improved solutions to the way our food systems operate at scale and relate to the environmental pressures.

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