

Investment Trends

Supplement to the publication "Investment Update"
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How would you
like your steak?

"Downtown,
where all the lights
are bright"

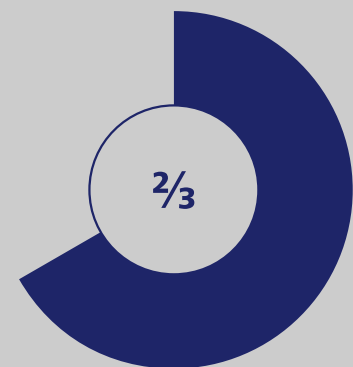


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A chicken produces only one calorie of meat from nine calories of feed.

In our special series on investment trends, we focus on sustainable development goals of the United Nations (UN), where no major progress has been achieved so far.



Half

of the of the earth's habitable surface is used for used for agriculture.

By 2050, two thirds of the world's population will live in live in cities.



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MSCI ESG rating of selected investment opportunities

2 Zero hunger

How would you like your steak?

Producing more and more food for a growing world population while conserving resources presents global agriculture with seemingly insurmountable tasks. We take a look at innovations in the fields of agriculture and nutrition that promise to solve this dilemma.

From food gap to biodiversity loss or: The country needs new solutions

That humanity is running out of food is not a new concern. Already in the 18th century, British economist Thomas Robert Malthus worried that exponential population growth would meet a linearly growing food supply and predicted an insufficient food supply for the future. His fear did not come true. Due to the intensification of agriculture in the last 50 years, grain production grew faster than the world's population.

Today, we seem to be at that point again. According to UN estimates, the world's population will rise to almost 10 billion people by 2050, and the World Resources Institute estimates that the food shortage then will be 60% of today's supply. In fact, today's situation is different because current agriculture is very resource-intensive and is considered the main driver of the rapid loss of biodiversity. For example, about half of the Earth's habitable surface is now used for agriculture. Six out of nine planetary boundaries, compliance with which ensures the livelihood of human civilisation, are now transgressed.¹ Our food preferences and the way we farm globally have a large part to play in this. The challenge we face today there-

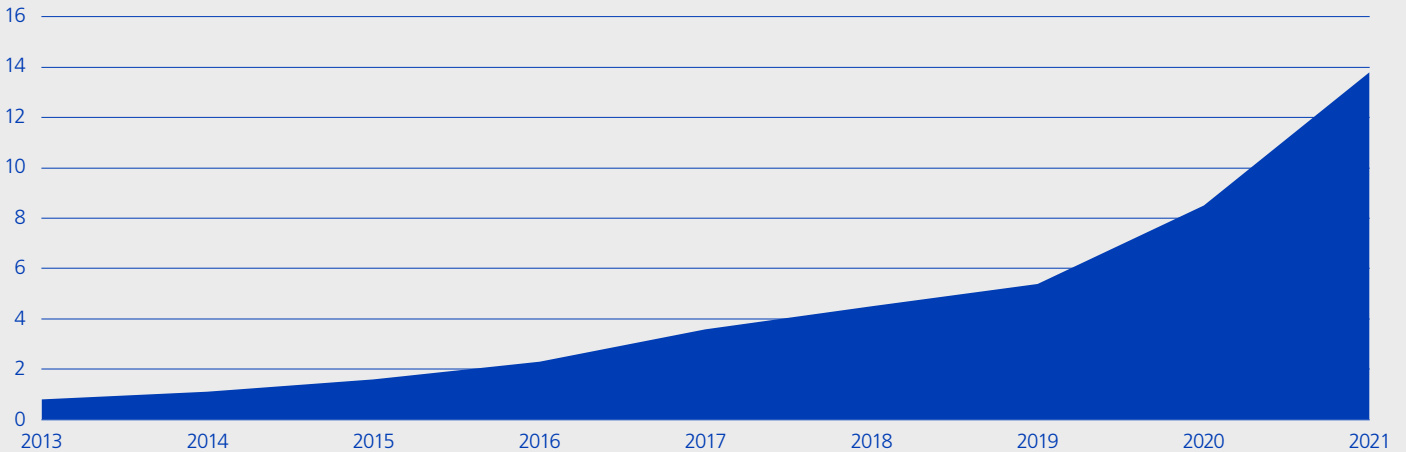
fore contains an additional condition: How do we feed 10 billion people in the future without further damaging our livelihoods?

Sustainable intensification or: Same same but different

One of the magic words in agriculture so far has been intensification. Cereal yields per area cultivated are three times higher today than in the 1960s, but it has also left its mark. More than 90% of the pesticides sprayed do not reach the target plant and unnecessarily poison other crops and animals. Future intensification must therefore ensure the preservation of biodiversity. Selective single-plant treatment can reduce the use of pesticides by up to 95% through cameras, imaging techniques and precision spraying. Another option for low-impact intensification is vertical farming with high-tech facilities built into the heights. Besides the obvious advantage of less land use, different crop species can be grown side by side as they do not share the same soil. That mechanisation increases yields is clearly shown by the example of Holland. Despite a smaller area than Switzerland, the Netherlands are the world champion exporter of agricultural products after the USA. Chart 1 shows that investors are interested in new technologies in agriculture.

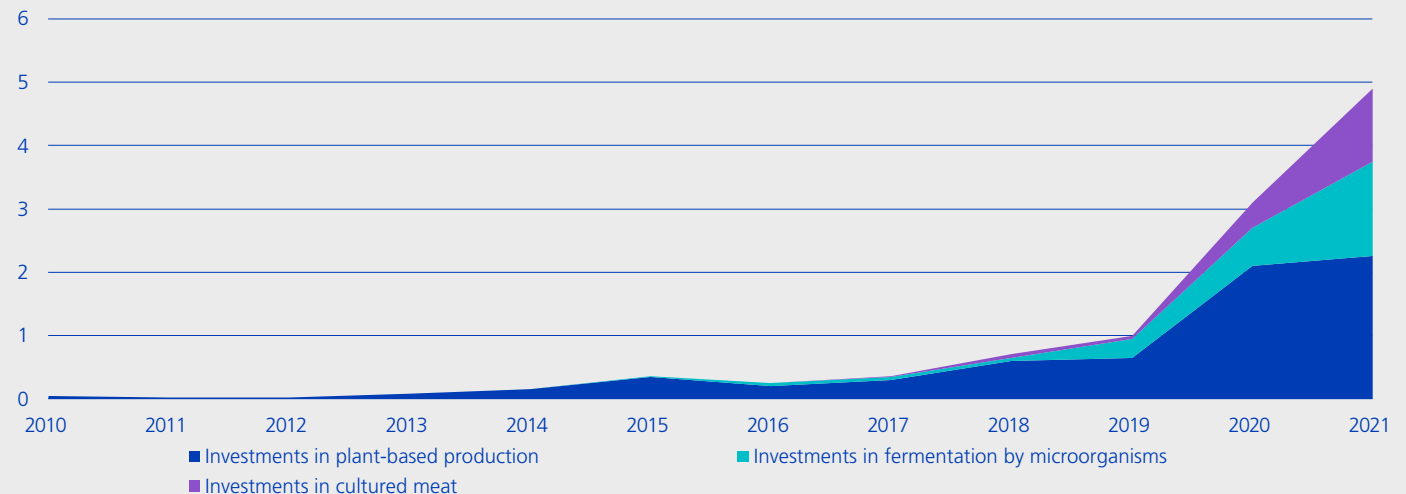


Chart 1: High tech in the field – Technology investments in agriculture in billion USD



Source: Zürcher Kantonalbank

Chart 2: Meat without slaughterhouse – Investments in production methods for proteins without animal farming in billion USD



Source: FAIRR, Zürcher Kantonalbank

New production methods or: proteins beyond the mainstream

Another development in the food sector has probably been seen by everyone who shops in supermarkets from time to time: The shelves for dairy and meat substitutes are getting bigger and bigger. Interest has also been aroused among investors (chart 2). However, they are not only interested in making the small number of vegetarians (about 5% in Switzerland) happy. If you look at food from an economic point of view, it is obvious that the effi-

ciency of animal calories is extremely low. A chicken needs nine calories of feed to produce one calorie of meat. The president of the Good Food Institute says: "It's like cooking nine portions of pasta and then throwing eight away.²" We could improve calorie efficiency by going vegan. We would then only need a quarter of the land currently used for agriculture³. Since meat consumption is rising sharply globally – it has almost doubled since the 1960s – this is probably not a realistic option. Therefore, much research is being done on alternative proteins, i.e. meat or dairy

Chart 3: Alternative proteins: proteins without animal farming



Source: Zürcher Kantonalbank

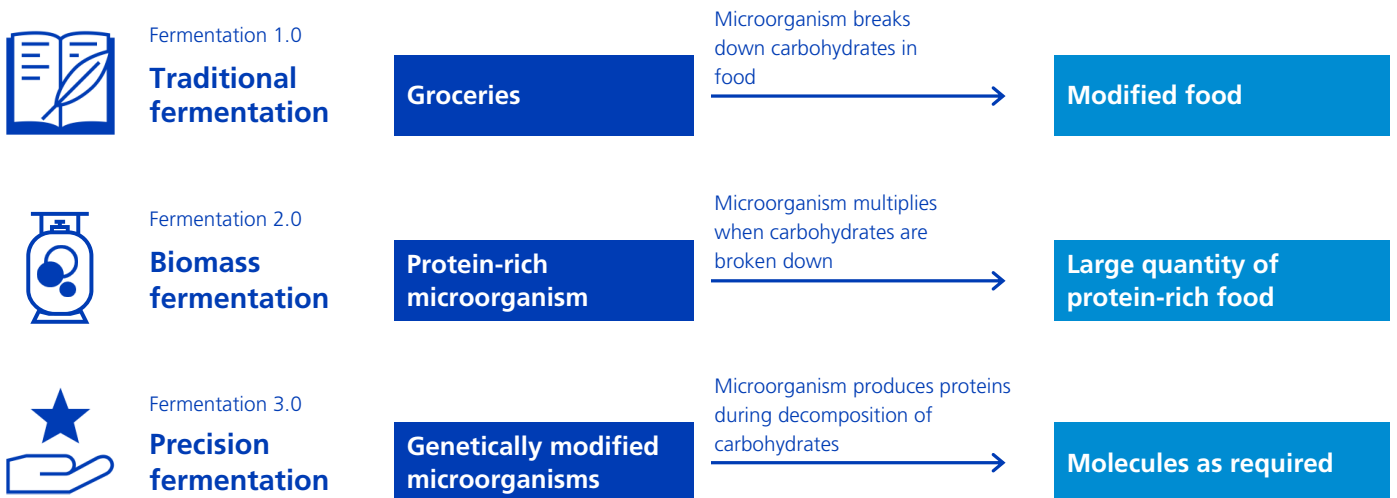
products that do not require animal farming (chart 3). Such new products could potentially be cheaper and less environmentally damaging due to their higher efficiency in protein production – not to mention the animal suffering in industrial factory farming. In addition to the established plant-based dairy and meat alternatives, products based on microorganisms or cell-based variants are emerging, which are explained below.

Fermentation or the art of dosed rotting

Fermentation has been used for thousands of years (chart 4). In this process, microorganisms break down the carbohydrates contained in the food and add a new taste and a longer

shelf life to the food. Bread, wine, beer, yoghurt, cheese or sauerkraut – we often consume foods that have been through the process of fermentation. Fermentation can also perform true masterpieces in creating protein-rich products. The key here is protein-rich fungi that multiply during fermentation. Some products are already on the market, many are still in development. Established breweries such as Bitburger or Anheuser-Busch Inbev have recently entered into collaborations with fermentation start-ups. Precision fermentation is even more special: here, microorganisms are genetically modified and used as a factory, so to speak, so that they produce very specific molecules during fermentation. The process of precision fermentation is not new: insulin

Chart 4: Fermentation – long known, but far from exhausted



Source: Zürcher Kantonalbank

or rennet are substances that used to be taken from animals and can now be produced artificially using this process.

Meat from the laboratory or: The appetite comes while you are eating

Another option to replace animal farming is meat from the laboratory. Winston Churchill already said that it was absurd to raise a whole chicken when all you really want to eat is the meat. He postulated that in future meat would be bred in a special environment. His idea became reality. Although we do not yet eat cultured meat on a large scale, it is already available in restaurants in Singapore. In the USA, approval was granted in July; in Switzerland, an approval procedure is currently underway. The main difficulty is still the cost-intensive production, but the cost curve provides an optimistic outlook. While the first burger patty cost USD \$300,000 in 2013, prices are currently below USD \$50.

What next? Or: what the farmer does not know, he does not eat

Alternative proteins still have a very small market share. Milk has the highest market share at 15%, but the growth rates are high: about 20% for plant-based milk and 45% for plant-based meat⁴. What market share alternative proteins will have in the future is nevertheless difficult to say. Some analysts predict the collapse of animal agriculture, while others see the market share of alternative proteins at around 20% in 2050⁵.

Why is the range of estimates so wide? The cost curve clearly suggests a future cost parity between alternative proteins and farmed proteins – for fermentation in 2025 and for cultured meat in 2032⁶. The taste of new products is also becoming more similar to what consumers already

know. The big unknown variable in the estimates is consumer behaviour. To solve the initial problem, however, the situation is clear: due to the efficiency in production, alternative proteins enable the production of more food with lower resource input. A life cycle analysis has shown that alternative proteins require up to 90% less land, 80% less drinking water and 90% less greenhouse gases compared to beef from animal farming, provided that renewable energies are used^{7,8}. A model calculation by the Potsdam Institute for Climate Impact Research shows that 50% fewer forests will be clear-cut by 2050 if we replace only 20% of meat from animal farming with microbial meat⁹. One thing is clear: the choice in dairy and meat products will include even more non-animal products in the future. So the question "How would you like your steak?" will take on a whole new meaning in the future.

Sustainability view (ESG)

(E) Environmental

- + Companies with potentially positive environmental ambition towards natural resources

(S) Social

- + Companies with potentially positive social ambition in the food sector
- Potential exposure to arms producers



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The QR code will take you to our video on this topic (available in German only).

For additional information on specific investment topics, please contact your client advisor.

1 Richardson, K. et al. (2023). Earth beyond six of nine planetary boundaries. Science Advances. Earth beyond six of nine planetary boundaries | Science Advances.
2 Friedrich, Bruce (2020). Meat Without Animals: The Future Of Food | Bruce Friedrich | TEDxGateway - YouTube.
3 Ritchie, H. (2021). Our World in Data. If the world adopted a plant-based diet we would reduce global agricultural land use from 4 to 1 billion hectares - Our World in Data.
4 FAIRR (2021). Appetite for the future.

5 FAIRR (2021). Climate Transition Proteins: Flavour of the Future.
6 Boston Consulting Group (2021). Food for Thought.
7 Sinke, P. (2022). Ex-ante life cycle assessment of commercial-scale cultivated meat production in 2030. International Journal of Life Cycle Assessment.
8 Good Food Institute. Environmental benefits of alt proteins - The Good Food Institute (gfi.org).
9 Humpenöder, F. (2022). Projected environmental benefits of replacing beef with microbial protein. Nature.



MSCI ESG rating of selected investment opportunities

11 Sustainable cities and communities

“Downtown, where all the lights are bright”

Cities have always exerted a great attraction. For some years now, more people live in cities than in the countryside. What challenges does this mean for the infrastructure in cities and how can this be remedied?

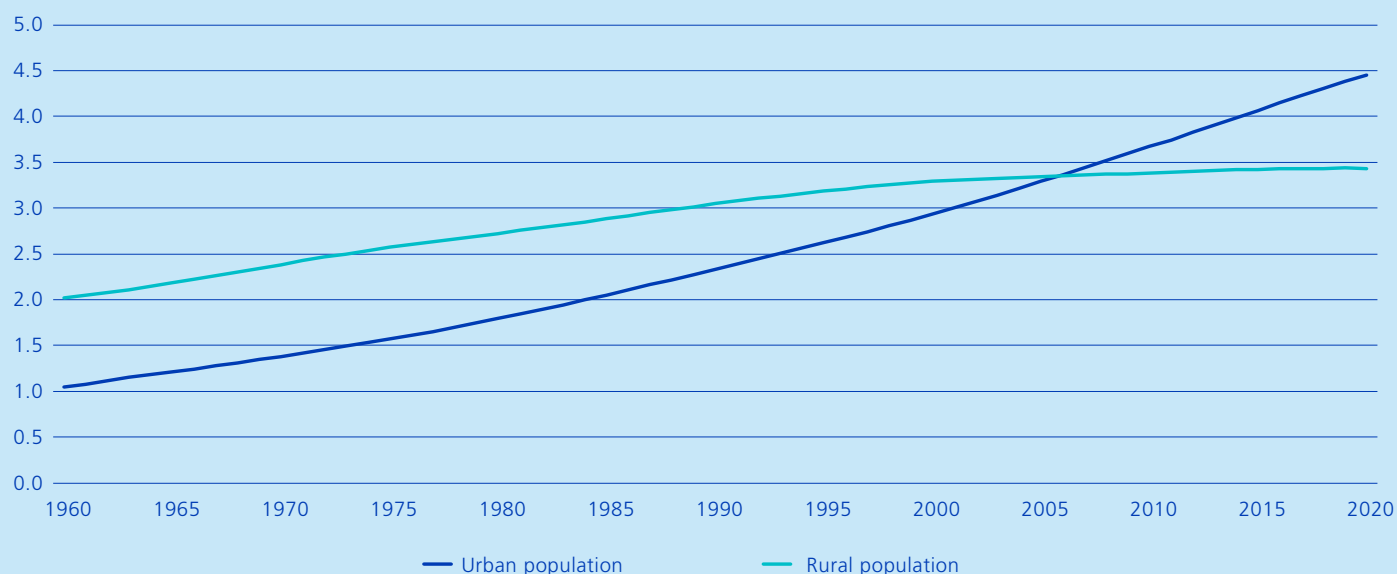
Forget all your troubles, forget all your cares

Petula Clark sang about it in the 1960s: "Downtown, where all the lights are bright" – the magical promise that seems to be in the air, especially in big cities. If you're having a bad time, all you have to do is find your way downtown and your worries are forgotten. 60 years later, the influx into the cities continues unabated. Whereas in the early 1990s almost half of the world's population worked in agriculture, now only about a quarter do. Most newcomers therefore do not come to the cities because they are looking for a bar that is still open late at night, but because they are looking for jobs and training opportunities.

From Tokyo to Dhaka – city beats countryside

At the beginning of the 19th century, less than 10% of the global population lived in cities. Since then, cities have experienced high growth rates worldwide. Since 2007, more people live in cities than in the countryside (chart 1), and the trend is rising. Perhaps the image of the merging communities on Lake Zurich now arises in your mind's eye and you conclude that with population growth everyone will inevitably become city dwellers? That is not the case. Globally, only about 1% of the land surface counts as a region built on by people.

Chart 1: Soon only urbanites? Development of urban and rural population in billion inhabitants



This trend hides two developments that seem contradictory at first glance. On the one hand, the higher a country's income, the more people live in large cities. In the very high-income Western countries, 80% of the population live in cities, and in low-income countries only just under 35%. On the other hand, most megacities with more than ten million inhabitants are precisely not to be found in the high-income West. Of the ten largest cities, eight are in low-income countries, such as Delhi (33 million inhabitants) in India or Dhaka (23 million inhabitants) in Bangladesh. The UN predicts that the trend in chart 1 will continue and that about two-thirds of the world's population will live in urban regions by 2050.

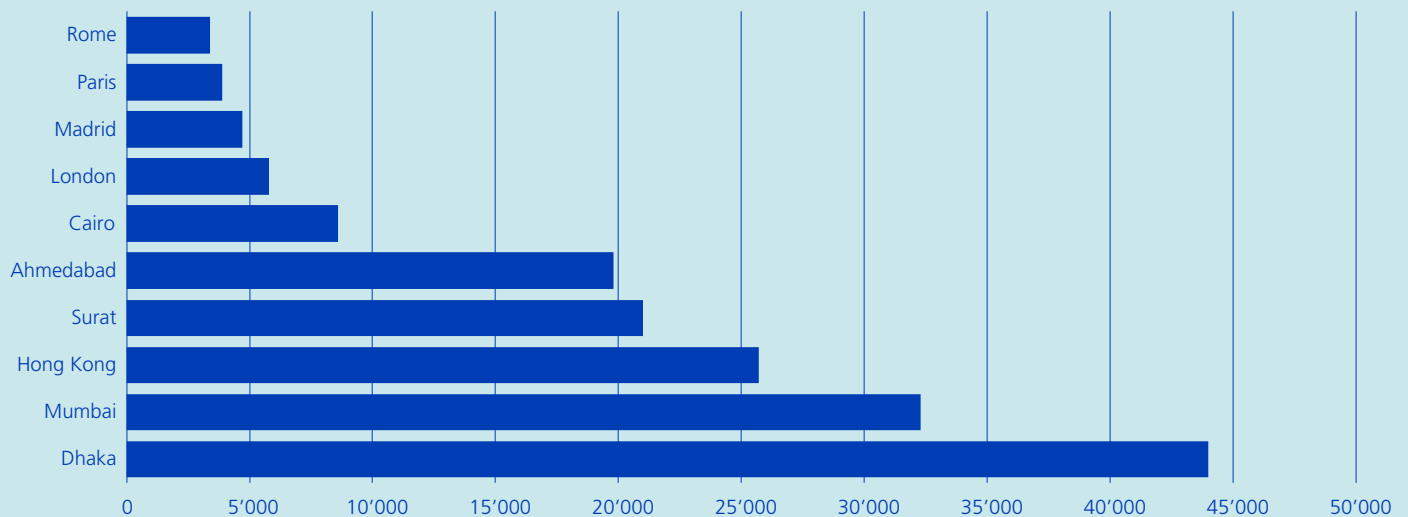
matter is another challenge of large cities. Although the establishment of industry creates new jobs, the use of fossil fuels and vehicles with internal combustion engines often results in very poor air quality in large cities. And with consequences, because poor air quality is the third largest risk factor for many of the most widespread causes of death.

Decentralised instead of centralised – solutions for troubled cities

There are various approaches to reducing traffic and the associated negative consequences such as air pollution. One spatial planning approach is to keep distances short so that transport can be dispensed with as far as possible. Paris aims to become a 15-minute city, where all relevant destina-

Chart 2: Density stress at another level – population density in large cities (as of 2014)

Number of people per km²



Source: Our World in Data, Zürcher Kantonalbank

Density stress on another level

In a fast-growing city, the expansion of infrastructure is almost constantly in competition with population growth. With a high population density, the challenges become even greater: when many people live together in a small space, there is a high degree of synchronisation in demand. Be it in energy, when everyone turns on the lights at the same time early in the morning, or in mobility, when very many people drive to work or school at the same time at 8 o'clock in the morning. The increasing density stress we experience in the Western world pales in comparison to that experienced by the population in Dhaka or Mumbai (chart 2). Intelligent load management is called for here. Air pollution from particulate

tions such as school, shopping, work, the doctor and leisure spots take a maximum commuting time of 15 minutes to be reached. Helsinki, on the other hand, relies on a digital solution with an app that integrates all means of transport to further reduce the use of private vehicles. The app is used to plan itineraries, and both private transport and public transport can be booked. Norway has opted for a different approach: The country is banning the sale of petrol and diesel vehicles from 2025. The energy transition can also provide relief for plagued cities by switching from fossil fuels to renewable energies. But the energy transition is not limited to simply replacing coal-fired power plants with solar power plants. It turns existing parameters of the energy system,

such as centralised, large and unidirectional, upside down. Future energy systems will be decentralised, small-scale and can be used bidirectionally. Whereas the role of the end consumer was long limited to that of a buyer, today, thanks to small, decentralised renewable generation plants, he is no longer just a consumer, but also a producer. Thanks to intelligent control systems, load control can be carried out and the infrastructure can be better utilised. Every electrically powered vehicle then represents, in principle, a battery on wheels, which can also feed stored energy back into the grid as needed. Fluctuations in the generation of renewable energies can thus be balanced out and the energy system becomes more resilient – so that the neon lights of the city can continue to shine and the promise of the big city can be fulfilled.

Sustainability view (ESG)

(E) Environmental

- + Companies with potentially positive environmental ambition
- + High share of companies with low CO₂e intensity

(S) Social

- + Companies with a potentially positive social ambition in the field of housing

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