



Briefing Report

Food & Agriculture



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As the *Innovation Zero* team continues to conduct research into our newly-introduced forums, reading online and speaking with our esteemed Advisory Board, we are pleased to bring to you our latest Industry Briefing Report. This seeks to provide background and context into the content we will deliver in our programme, with sneak peeks into the stimulating panel discussions and presentations featured onsite.

There was no question that Food & Agriculture needed to be featured at this year's event. [According to the UN](#), food system emissions were estimated at **18 billion tonnes of carbon dioxide** equivalent in 2015, or **34 per cent** of total global emissions. And following the response we've received from our [Oceans and Water Report](#) and its associated forum, it's time we turned our attention to land...



What comprises food GHG emissions?

- Production processes, including inputs such as fertilisers
- Land use
- Distribution
- Methane from livestock raising and rice cultivation
- Refrigeration
- Packaging

As with all of our forums across *Innovation Zero*, we are taking a whole-system approach to the climate crisis; tackling **finance, policy, and business**, and how **innovation** serves as the critical mechanism which underpins the necessary transformation of each towards net zero. As this report will demonstrate, we have conducted our research with this in mind, and developed thought-provoking content reflecting our ambition to **inspire you as an audience**.

Who have we been speaking to?

- Saasha Celestial-One, Co-Founder, OLIO
- Kathryn Miller, Innovation Lead – Food and Nutrition, Innovate UK
- Dr Tom Jenkins, Deputy Director: ISCF Transforming Food Production, Innovate UK
- Nicola Mackay, Community Food Programmes Manager, Tesco
- Paul Crewe, Chief Sustainability Officer & Executive Director, Anthesis
- Anna Taylor, Executive Director, Food Foundation
- Glenn Woodcock, Director, Exeter City Futures and Founder, Oxygen House

Turning our attention first to the policy and financial sphere: in order to encourage funding and investment towards the conservation and regeneration of our land, it's imperative that we communicate the economic opportunities both to government and the investment community. How does land, our natural environment, and the nature-based solutions which it offers, create growth opportunities to companies and communities alike?



Understanding Natural Capital

As mentioned, it is crucial to develop a framework of policy and investment around this food and agriculture sector, demonstrating how land and nature is the very bedrock of not only this industry, but several other industries represented in our event; the beating heart of our economy and the financial imperative driving investors towards conservationism and net zero who might otherwise be indifferent. We therefore need to talk about natural capital.

What is Natural Capital?

- The world's stocks of natural assets which include geology, soil, air, water, and all living things.
- It is from this Natural Capital that humans derive a wide range of services, often called ecosystem services, which make human life possible. The most obvious ecosystem services include food, the water, plant materials used for fuel, building materials and medicines.
- It even includes the climate regulation and natural flood defences provided by forests, the billions of tonnes of carbon stored by peatlands, or the pollination of crops by insects.

(Source: The [Convention on Biological Diversity](#))

As the [UK Infrastructure Bank's "Our Role in Natural Capital Markets" Report](#) explains:

Society and the economy depend on natural capital assets and services to function – including the carbon locked up by ecosystems, the provision of clean and reliable water supplies, and the biodiversity that underpins our food security. Our natural capital is a form of infrastructure, comparable to engineered solutions to problems such as flood risk and greenhouse gas removals. Often underpinning economic growth, it can protect other infrastructure assets, and deliver wider co-benefits, such as jobs. However, our base of natural capital assets has been rapidly eroded over recent decades and urgent investment is needed if the UK is to meet its net zero targets, adapt to an already changing climate, and secure future economic prosperity.

The unique challenge we face is that the UK is one of the most nature depleted countries in the world, having had **lost more wildlife than any other G7 country**. To address these issues, the government has launched a series of responses:

- The piloting of a [Natural Capital and Ecosystem Assessment](#)
- The introduction of a [mandatory biodiversity net gain requirement](#) in the Environment Act from January 2024
- Working with the [Taskforce on Nature-related Financial Disclosures](#) to develop metrics for companies and financial institutions to embed into their investment decision making.



However, much is yet to be done, as [Environmental Audit Committee](#) Chairman, Rt Hon Philip Dunne MP, argues: “Nature and biodiversity are declining at an alarming rate in the UK, and **adequate safeguards must be embedded to avoid any further loss**. The **financial sector will have a significant role to play** in promoting the development and enhancement of the nation’s natural capital – from air to water, soil to forests – as the UK economy begins to embrace the economics of biodiversity.”

Innovation Zero will therefore be opening our Food & Agriculture Forum with a scene-setting discussion to lay the regulatory and financial backdrop upon which the following panel discussions will take place.

Adapted & Regenerative Agriculture

Turning our attention specifically to agriculture, there is a plethora of challenges and opportunities which permeate this sector. In the UK, [GHG emissions between 1990 and 2020 are said to have decreased](#) (around 16%) – noting that this does not just include carbon dioxide, but nitrous oxide and methane also, coming from livestock, agricultural soils, stationary combustion sources and off-road machinery. Since 2000, however, **emissions have remained at a similar level.**

As our understanding around climate science – both in terms of **mitigation and adaptation** – increases, and as technological innovation increases exponentially, there are evermore discussions around how we can advance the sector towards **net neutrality** and indeed **net positivity**.

What is Regenerative Agriculture?

- Coined by the [Rodale Institute](#) in the 1980s, it defines the conservation and rehabilitation of food and farming systems
- It focuses on:
 - [Topsoil](#) regeneration
 - Increasing biodiversity
 - Improving the water cycle
 - Supporting [biosequestration](#)
- It encompasses practices such as [permaculture](#), [agroecology](#), and [agroforestry](#)

This is a great step forward in the sector from the mere practice of mitigating emissions through engineered solutions, and by encouraging biodiversity, it can in fact accelerate the net zero transformation in turn. For example, by improving soil health through regenerative practices – making sure not to over-till the land and **optimising crop rotations** – it can sequester enormous amounts of CO₂. Recent studies have shown that replenishing and protecting the world's soil carbon stores could help to offset up to [5.5bn tonnes of greenhouse gases every year](#).

Moreover, agroforestry, landscape diversification and **urban agriculture** – the integration of vegetation into city spaces – has the benefit of helping us adapt to the consequences of climate change. This includes mitigating drought, flooding,

and halting the devastating impacts of [climate-induced species migration](#). Installed tree canopies can even [cool our cities](#) – a practice now being studied and adopted in cities from [Madrid](#) to [Adelaide](#).

Meanwhile, innovations in vertical farming continue to sprout skyward and receive huge amounts of investment, including the [world's largest from the Jones Food Company in the UK](#). With geopolitically-induced supply chain shortages and food security now a tangential point of concern alongside conversations around climate, the notion of being able to grow vast amounts of crops with little land is extremely promising. Not only this, but vertical farming uses up to **98% less water**; no chemicals or pesticides; **extends shelf life** by between 14-21 days, and uses **5-10x less packaging**, at a cost comparable or even lower than traditional methods.



Source: Shutterstock

As 2023 and returning 2024 speaker [Peter Bachmann](#), Managing Director at Gresham House shared in an [interview with Innovation Zero](#), “If we could use all of the land inside of the M25 – even 75% of it – **we could feed the whole world.**”

We will therefore be featuring sessions on soil health and sequestration, adapted and regenerative agriculture, and hope to bring back the most exciting showcases on vertical farming and related innovations.

Zeroing in on the Food Industry

As our research moves from farming practices further down the supply chain, and as morning turns to afternoon in the Food & Agriculture Forum, we will now take a look at food as it travels **from farm to fork**. In terms of how we reach net zero, there are many ways we can work to achieve this – certainly through distribution, where transport accounts for [19% of total food system emissions](#), though this is primarily covered in our Transport & Mobility and [Aviation & Shipping](#) forums. And, as mentioned at the top of this report, there are also key factors including refrigeration and packaging.

One member of our board, however, drew our attention to a rather **controversial yet captivating debate**, one we naively assumed was settled, and headed in the same direction as drinking straws. For while **plastic packaging** undeniably poses a huge threat to our environment and wildlife, it ultimately greatly [extends shelf life](#), is recyclable, break-resistant, reduces dependency on chilled cabinet and chilled supply chain, and is [lighter than glass alternatives](#), thus maintaining a lower transportation carbon impact and rate of fuel consumption by comparison. With this in mind, there are deeper considerations to be explored when digesting net zero food strategies.

Packaging innovations are grabbing international, and even royal attention, such as **Earthshot Prize winners** [Notpla](#), as well as other seaweed innovators such as [Kelpi](#), [FlexSea](#) and [Sway](#). But how else can we reduce food waste, in a way that frees us entirely from this sticky plastic quagmire?

Eating for Net Zero

In consultation with our Advisory Board, and following a powerful [interview](#) between Innovation Zero and Nesta CEO [Ravi Gurumurthy](#), as well as his [fireside chat](#) at our 2023 event alongside [Sarah Hunter](#), the concept of shifting diets has registered a stronger presence on the industry's radar as well as our own.

In its Sixth Carbon Budget advice, The Climate Change Committee (CCC) said we need to reduce our meat consumption by [at least 20% by 2030](#). The question is whether this is achievable and if so, what strategies could be deployed? Does a meat tax punish the public against its will à la *“Let them eat tofu”* while the debate

on its health benefits still rages online? Can this movement – despite leaning in favour of *“This House Would Move Beyond Meat”* at the 2022 Oxford Union Debate – overcome the powerhouse that is the Meat Industry lobby, or is the impact of ever-increasing vegetarianism and veganism on meat and dairy industry profitability an urban myth? Bear in mind, of course, that if said industry were to invest in new innovations such as [alternative proteins](#) and [biomimicry](#) – its cost and return profiles could turn massively in their favour.



Source: [Hexagro Urban Farming](#)

Such innovations gained traction and attention at *Innovation Zero 2023* in our “Future Food Production” Working Group, hosted by Innovate UK and featuring speakers from DEFRA, the Food Standards Agency, The Good Food Institute, Nando’s and Morrisons. It raised awareness about the role alternative proteins can play not only in the food we eat, but what we feed our livestock: you can see our 2023 interview with Entocycle Founder [Keiran Whitaker](#) for reference [here](#).

The main barriers which stand in the way of the acceleration of this industry are **policy and regulation**, particularly with regards to bio-engineered foods for human consumption, with many products stalled by years of waiting for regulatory market approval. There is also a significant amount of funding which needs pouring into these businesses in order to bring down their **R&D and laboratory costs**, and thus cheapen the overall price of these products in line with traditional food. As the Great Attractor of policymakers, regulators, financiers and innovators, *Innovation Zero*, through its content, aims to **catalyse us towards the necessary tipping points**, scale these industries, bring the food sector closer to net zero and consumers closer to healthy living.

It's not just meat, of course, that dominates the conversation – at least, it shouldn't be. For example, **modern agricultural fat production** requires massive amounts of water and farmland, and releases billions of tons of greenhouse gases into the atmosphere every year, while the **\$61 billion palm oil industry** similarly has drastic environmental and societal costs. Exciting innovators from [Savor](#) to [C16 Biosciences](#) are on their way to address these problems, but they similarly need international platforming and investment, and more research and development is needed to advance more competitors who can further disrupt the environmentally harmful status quo.

Food Waste

We've looked out what the consumer could do; now to the producers, and the ecosystem which surrounds them. There is a [severe lack of food waste laws and reporting regulation](#), and an urgent need to incentivise change here. Moreover, as members of our Advisory Board have argued, food waste is being used to encourage corporate [greenwashing](#), with big companies in fact doing the bare minimum to resolve their contributions to food waste. We have increasing amounts of data on how much is thrown away from supermarket shelves and homes, but less so at a farm level, and successful case studies are limited.

Fortunately, food waste campaigners like [Tristram Stuart](#) are gaining celebrity status and pushing the needle, and this global scandal is starting to gain attention. Farmers, manufacturers and retailers are beginning to work with innovators to reduce waste throughout supply chain, and major supermarkets are now [axing unnecessary 'best before' dates](#) from their packaging. Innovations are employing **Artificial Intelligence (AI)** – a technology showcased across our programme – which is being utilised in predictive forecasting in supermarket purchasing decisions. The Internet of Things (IoT) really has the chance to revolutionise “agtech” and food supply chain – see our interview with Wiliot's VP of Climate & Circularity [Antony Yousefian here as a prime example](#).

In bringing together campaigners, innovators, policymakers and supermarkets championing sustainability, our dedicated panel discussion on streamlining the food supply chain – tackling **the convergent issues of food security and sustainability** – will be the final session of our Food & Agriculture Forum, drawing our twinned forums of Land and Oceans to a close.

Conclusions

The Food & Agriculture sector covers a whole host of disparate yet inextricably intertwined industries: farming, manufacturing, logistics, transport & distribution, restaurants & hospitality, supermarkets, and grocery chains. Moreover, it is here that the consumer plays a more direct behavioural role than perhaps any other; ultimately, we choose our food from the menu and from the shelf; we are not passive end users of an industry over which we have little or no control.

That being said, the companies which dominate the value chain are juggernauts, and there is a titanic challenge ahead if we are to radically overhaul this industry in the name of climate mitigation and adaptation.

However, with our aforementioned Advisory Board featured on the programme, as well as the following early confirmed speakers on board – the challenge is being accepted. Speakers include:

- Rich Stockdale, Managing Director & Founder, **Oxygen Conservation**
- Hamish Trench, Chief Executive, **Scottish Land Commission**
- Helen Browning OBE, Chief Executive, **Soil Association**
- Jack Bobo, Director, **Food Systems Institute**, and CEO, **Futurity**
- Caroline Lewis, Sustainable Agriculture Analyst, **BloombergNEF**
- Matt Homewood, CCO, **Throw No More**

Despite some extremely exciting speakers soon to be announced, [there is still space left on the programme](#), so we encourage you to reach out if you have an innovation or story to share with our audience of 12,000+ sustainability champions. We look forward to seeing you there.