



# Upcycled Food and Ingredients

A collaborative effort  
to further strengthen the  
upcycling ecosystem

POSITION PAPER - EXECUTIVE SUMMARY

## Unlocking the Potential of Upcycled Foods: A Path to Sustainable Consumption

Upcycling food and ingredients is emerging as a promising solution to combat food losses while promoting sustainability. Innovative companies are introducing products like nutritional chips from vegetable scraps and protein-rich snacks from spent brewing grains, showcasing the potential of upcycling in food production. Upcycling minimizes food waste and contributes to a more resilient food system, enhancing food security.

However, upcycled food concepts are relatively new to food manufacturers, retailers, and food service organizations. This innovative market is encountering 'classical' challenges that hinder widespread adoption, such as scaling solutions, establishing recognized value, and finding the right fit within regulatory frameworks and policies.

Upcycling food losses represents a crucial step towards environmental sustainability within food production. We can minimize our ecological footprint and promote circularity by repurposing food and ingredients, whose value would otherwise fall to a lower level on the food hierarchy ladder. This reduces the strain on natural resources and aligns with global efforts to mitigate climate change and foster a more sustainable future.

### Join forces to overcome barriers

Cross-sector collaboration is crucial for unlocking the full potential of upcycling in the agri-food sector. From producers to regulators, stakeholders must join forces to overcome existing barriers and seamlessly integrate upcycling practices into established value chains. Furthermore, sectors must recognize the potential for mutual benefit, as side streams deemed worthless or waste in one sector can serve as valuable ingredients in others. By promoting collaboration, we can expedite these inter-sectoral partnerships and innovations in side-stream upcycling, streamline data on sourcing and processing technologies, and ensure that upcycled ingredients and foods become commonplace for manufacturers, food services, and retail shelves, rather than the exception.



In addition to reducing their carbon footprint by using upcycled ingredients and foods, these stakeholders also can benefit from prioritizing food security. Decreasing reliance on external, sometimes overseas, supply chains is increasingly crucial in an era of global challenges such as pandemics, climate change, and geopolitical instability.

## Envisioning the Future

As we approach the milestone year 2030, the Upcycling Community envisions a future where upcycled foods are integral to sustainable procurement and consumption patterns worldwide, and will also become serious business for owners of valuable side streams. Our collective efforts are directed towards three key objectives:

Firstly, we aim to catalyze the development of successful value propositions that facilitate the integration of upcycled ingredients into a diverse range of food and beverage products. By fostering connections across sectors and value chains, we seek to empower businesses to embrace upcycling as a viable and attractive option for enhancing their product portfolios.

Secondly, we endeavor to foster widespread awareness of the benefits of upcycled foods among authorities, consumers and businesses. By aligning our efforts with EU 2030 policies and United Nations SDG 12.3 goals to reduce food waste and losses, we aim to cultivate a culture of sustainability where upcycling becomes the norm rather than the exception.

Finally, we are committed to the development of supportive regulatory frameworks that provide companies with the necessary guidance and incentives to adopt upcycling practices responsibly. By establishing clear standards and guidelines, we can ensure that upcycled foods are marketed transparently and credibly, fostering consumer trust and confidence in these innovative products. Expanding upon the idea that consumers contribute to food conservation and reward farmers' efforts, they purchase products that utilize the entirety of the raw materials farmers diligently produce at the farm level.



# Get inspired by our position paper



We are excited to present our position paper “Upcycled Food and Ingredients”. This comprehensive document will explore the challenges, opportunities, and actionable strategies for integrating upcycled foods into mainstream consumption patterns.

This paper was conceived with one mission in mind: to take upcycled food from niche to the new normal. It is the result of collaboration between stakeholders across the industry – both public and private – and other experts in the field, who came together to form the Upcycling Community, led by Foodvalley. Their backgrounds are varied, but they share a belief that upcycling food is a key to unlocking significant value for both the industry and the planet. This paper aims to give the reader a better understanding of where the upcycling movement stands and make clear calls to action to guide those who want to get involved.

Upcycling food and ingredients is slowly gaining traction. Pioneering companies are ushering in a new era of innovation with products like nutritional chips made from vegetable scraps and protein-rich snacks produced using brewers’ spent grains. The steady growth in upcycled products shows industry leaders’ willingness to develop new technologies and strategies that can bring upcycling to the mass market. There are plenty of examples of how actors across the value chain are working together to make these foods more accessible and more appealing.

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## take upcycled food from niche to the new normal

But there are obstacles in the way that need a collective approach of those pioneering companies. The benefits of upcycled food and ingredients are often not well-known by manufacturers. This is even more true at the consumer level. The lack of cohesive standards around upcycling complicates the task of communicating the value of upcycled foods. Facets of the legislative and regulatory backdrop like national and EU-wide goals to reduce food waste are supportive, but a stronger endorsement would be better. Addressing these challenges would go a long way toward getting more companies to feel that it’s worth investing time and money into this nascent market.

The road to making upcycled foods a common item on store shelves is long and winding. By linking the right people together across the spheres of government, enterprise, advocacy and academia, we can make it a successful journey. Since the authors’ expertise lies primarily in Europe, the geographical scope of this paper will focus mainly on that region. But most of the insights are likely applicable worldwide when it comes to side streams in highly developed agrifood value chains.





The paper is based on three core premises:

## 1 Upcycling higher volumes of food losses towards food and ingredients is a “must-do” environmental goal.

By upcycling, the food industry can make optimal use of resources in a way that minimises the impact on the planet and promotes circularity.

## 2 Cross-sector collaboration is the key to unleashing the full potential of upcycling.

Limiting reliance on external supply chains has taken on more urgency, fuelled by events like the covid-19 pandemic, climate change, and geopolitical crises. In the EU, authorities are calling for member states to be more “food self-sufficient” and to combat food waste.

## 3 Upcycling food losses is also relevant for countries’ food security.

Actors throughout the value chain - from producers to regulators - must work together to overcome existing barriers and make upcycling side streams in the agrifood sector a common practice. With this in mind, the Upcycling Community has charted a course toward making upcycling accessible, attractive, and advantageous.

By 2030 – a milestone year for the global sustainability agenda – the Upcycling Community would like to facilitate progress in:

### The development of successful value propositions.

Connecting food –and beverage makers across sectors and value chains with suppliers and producers of side streams and upcycled ingredients. The aim? Getting more upcycled food/ingredients into companies’ product portfolios.

### Raising widespread awareness of upcycled food & ingredients.

Spreading awareness among authorities, consumers and B2C companies about the benefits of upcycled food. Central to this goal is aligning upcycling efforts with EU 2030 goals to lower food waste at both industry (-10%) and consumer (-30%) levels. \*

### The development of supportive regulatory frameworks.

Developing a regulatory foundation for upcycling practices that will help companies make credible claims about their products, and market them responsibly to consumers.

2030

These aims are ambitious but attainable. If we act now, we can start making them a reality. To set things in motion, the partners have committed to working on several fronts:

### Industry partnerships

Fostering collaboration among food manufacturers, retailers and upcycling startups is essential if we want to make upcycled food the “new normal”. This will help make upcycling side streams towards food cost-competitive relative to other avenues for side streams, like biofuels. This can be done by actively promoting new initiatives, making use of the growing network of the Upcycling Community. Such partnerships can also incentivise more businesses to incorporate upcycling into their procurement policies, develop new solutions, scale production, and solve logistical and distributional challenges.

### Public-private partnerships

Forming partnerships between the public and private sectors is important as well. Combining companies’ know-how with regulators’ policymaking expertise and research institutes’ academic rigor can generate actionable research that leads to progress within the industry. Other outcomes include the development of intellectual property, technologies to upcycle unusual side streams, and business models that break with traditional food production and are based on the demonstrable values of upcycled food.

**Guidelines and standards** Developing verifiable standards for upcycling that can be incorporated into existing private standards (B2B) or certifications (B2C) will be the cornerstone of a credible, traceable market for upcycled food and ingredients. This would involve the development of regulatory frameworks around certification, the integration of upcycling practices into existing quality standards like ISO and FSCC 22.000, and alignment on methods for lifecycle assessments.

### Consumer education

Identifying the right communication channels and key messages to raise awareness about the environmental, social and health benefits of upcycled products. The aim here is to both inform consumers and appeal more effectively to those willing to make more sustainable choices.

### Regulatory support

incentivising upcycling by incorporating it into government plans to cultivate a circular economy and meet climate targets. Having a clear mandate and incentives from authorities could ensure that the right side streams are used for food instead of being used in other end-markets. Regulators can also assist in the creation of so-called experimental spaces, which give companies the freedom to test out new upcycling ideas without being constricted by prohibitive production costs and legislative limitations.

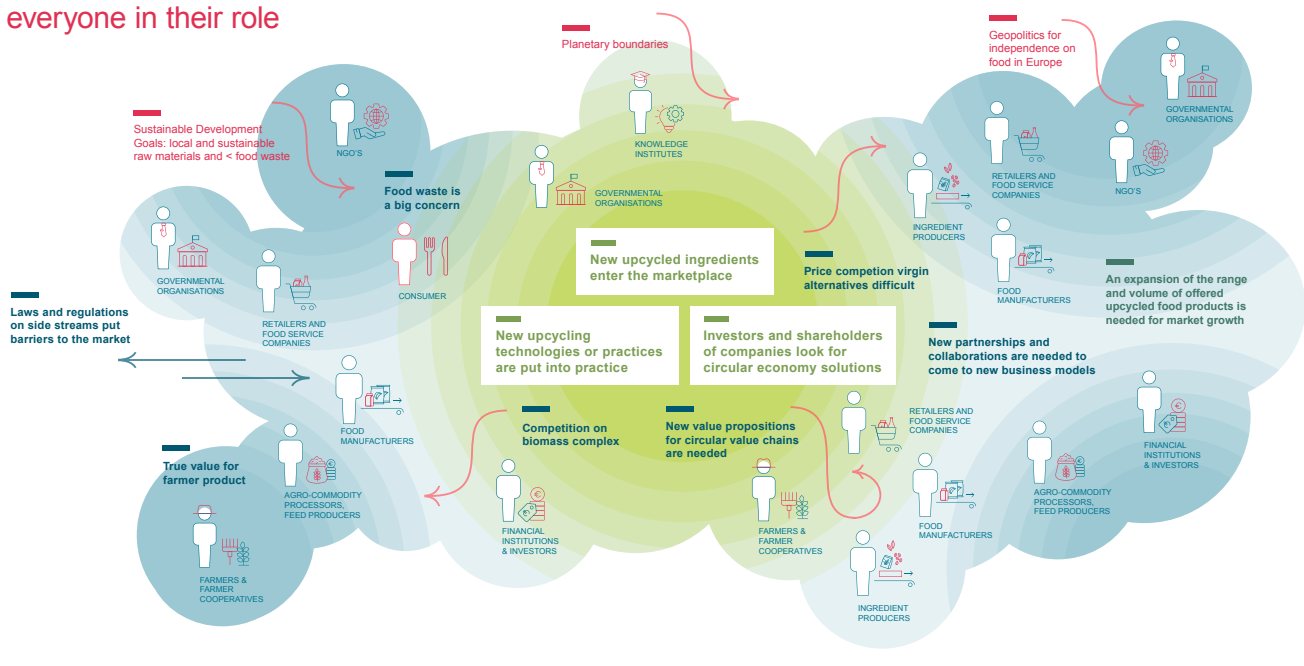


The Upcycling Community and Foodvalley want to inspire the key links in the agrifood value chain to get involved. We also want to show them how. On the next pages, we give a brief overview of **what each stakeholder can do to develop the market for upcycled food and ingredients** to the point where it can be instrumental in meeting sustainability goals, and become “good business”.

Discover your role, and benefit

## DRIVING FORCES UPCYCLED FOOD AND INGREDIENTS MARKET

Breaking down barriers: getting everyone in their role



# Food manufacturers

## OUR KEY TAKEAWAYS FOR YOU

Procuring food is a delicate process for manufacturers. When searching for alternatives to existing virgin ingredients, e.g. for clean label, environmental impact, or nutritional value arguments, you might encounter upcycled ingredients. At the same time, as a food manufacturer, you often require all conditions applicable for the virgin alternatives and upcycled ingredients, which is often unrealistic.



You may come across upcycled ingredients when looking for alternatives to virgin ingredients for your products for environmental or nutritional reasons. However, food manufacturers need to meet all conditions (e.g. texture, colour, taste, functional aspects, price, seasonality, etc.) to use upcycled ingredients, which is often challenging since ingredients made from side streams can have different characteristics that bring new values but can also imply concessions.

### Discover your role, and benefit

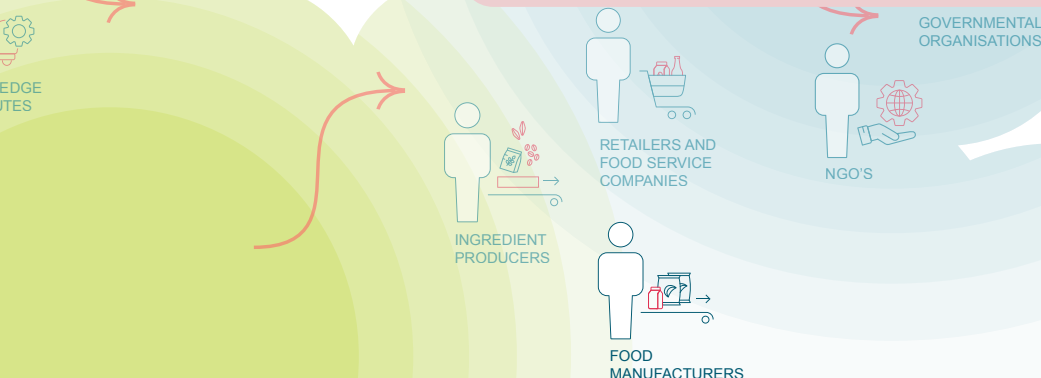
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For one, buying and using upcycled ingredients can contribute to a company's overall sustainability performance. That's particularly useful as EU regulators increasingly roll out sustainability directives like reducing greenhouse gas emissions as an impact category being part of the by the European Union required CSRD principles for reporting. Replacing conventional ingredients with upcycled alternatives gives you access to new materials with other values and benefits, while making supply chains more diversified, and more circular.

By adding upcycling as a decision criterium for your **procurement** and **product development** departments, the 'green actions' of food manufacturers can also be based on upcycled food and ingredients.

As a manufacturer, you can also join forces with technology providers or others who already have the tech and/or processing lines in place for upcycling in order to develop new products using food manufacturers' own side streams. New partnerships will foster the exchange of expertise, leading to fresh innovations.





# Ingredient producers & technology providers

## OUR KEY TAKEAWAYS FOR YOU

Ingredient producers have a crucial position in the value chain: you **bridge supply and demand**. You have the know-how and technology to make side streams stable and food-grade, and process them into the building blocks for upcycled products.

In this paper, as an ingredient producer, you will find fresh insights that can inspire you to identify new market opportunities and see how you could benefit more from your role in the value chain.



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As with other stakeholder groups, creating links with other actors in the industry is a vital step. This can be done by **activating new suppliers of side streams and food manufacturers** to work on existing solutions for upcycling side streams, or on untapped sources of side streams.

Another way ingredient producers like you can fuel the adoption of upcycling is to **communicate the ESG benefits of upcycled ingredients more clearly to their partners in the value chain**. This will require having the right primary data and fact-based analysis, such as LCA data, to back up any green benefit claims transparently and credibly.

The same goes for the personal health or societal benefits of upcycled food. Based on trustworthy claims, those benefits could be communicated more clearly in the value chain.

You should also consider what you can do to help suppliers and manufacturers develop **viable mass-market business models**. **Thanks to your experience in turning raw materials into ingredients, you can play a vital role** in R&D efforts, scaling, formulating and promoting upcycled ingredients.

Having a sound business model can help start-ups succeed in upcycling and become pioneers. Partnering with other companies, investors and financial experts is a smart first step to help pave the way.

High costs for investments in equipment pose a challenge for start-ups. Shared facilities where you can produce your products in a pilot- or scale phase are a game changer. One existing solution is the [Foodleap platform](#) and the [Shared Facilities finder](#).

By partnering with peers and investors/financial institutions that can offer the right expertise, start-ups can help ensure their efforts are focused on devising solutions that deliver true value for the circular economy.



INGREDIENT PRODUCERS



RETAILERS AND FOOD SERVICE COMPANIES



FOOD MANUFACTURERS



INGREDIENT PRODUCERS



FARMERS & FARMER COOPERATIVES

# Food retailers & service industries

## OUR KEY TAKEAWAYS FOR YOU

By reading this paper, food retailers and service providers can gain fresh perspectives on the market for upcycled food and ingredients and what opportunities lie ahead.



Upcycled food is a relatively new concept for the retail and service industry you're in. But businesses in this sector would do well to start becoming familiar with it. Having more upcycled products as part of the food you offer can bolster your companies' sustainability profile, helping you meet the targets set out under corporate responsibility directives like the CSRD and scope 3 emissions that potentially can be solved with the procurement of upcycled food. Putting upcycled food that has a measurable positive environmental impact on store shelves and restaurant plates also boosts your company's sustainability profile, giving you yet another incentive to explore this burgeoning market.

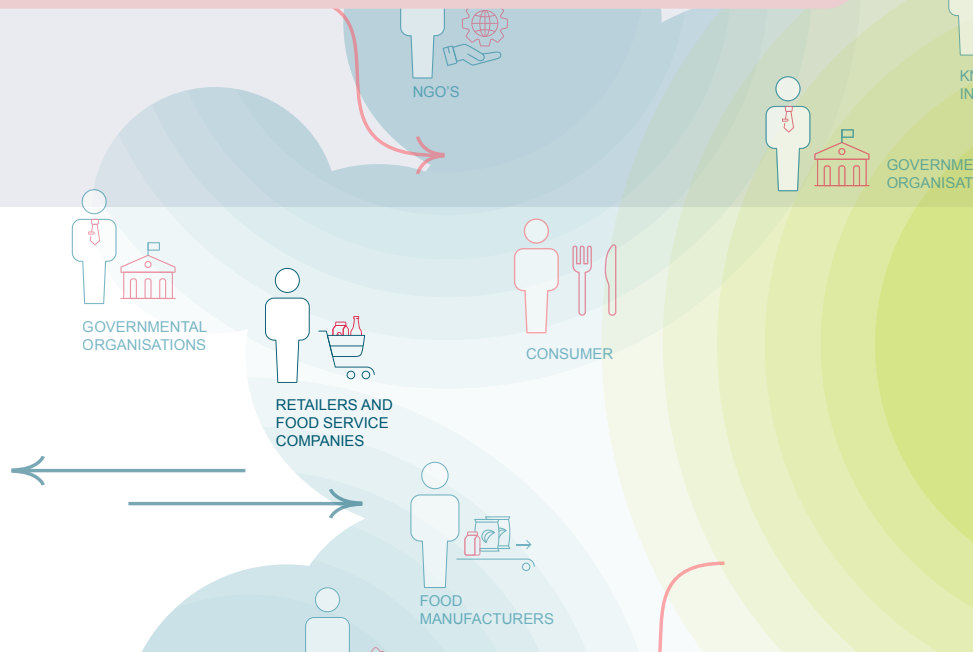
This is also an advantage from a branding point of view. As more consumers become more environmentally conscious, food retailers and service providers like you, who offer upcycled products, will have a clear edge in this growing sector.

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You can raise the profile of upcycled products via sales promotions and marketing. These should of course be based on transparent, traceable data provided by the producers. By showing manufacturers that upcycled products have a place in stores and supermarkets, as a retailer you can create a positive feedback loop that spurs more companies to get into upcycling.



# Agro-commodity processors, feed producers & traders

## OUR KEY TAKEAWAYS FOR YOU

Agricultural commodity processors, feed producers and suppliers have scope to play a starring role in the market for upcycled food and ingredients.

Repurposing side streams into food instead of other things like biofuels is the obvious choice from a sustainability point of view. But for suppliers of side streams, it's not so obvious. Many times, the price paid for side streams other markets is too attractive or the implementation of upcycled practices too complex or expensive according to their standpoint.

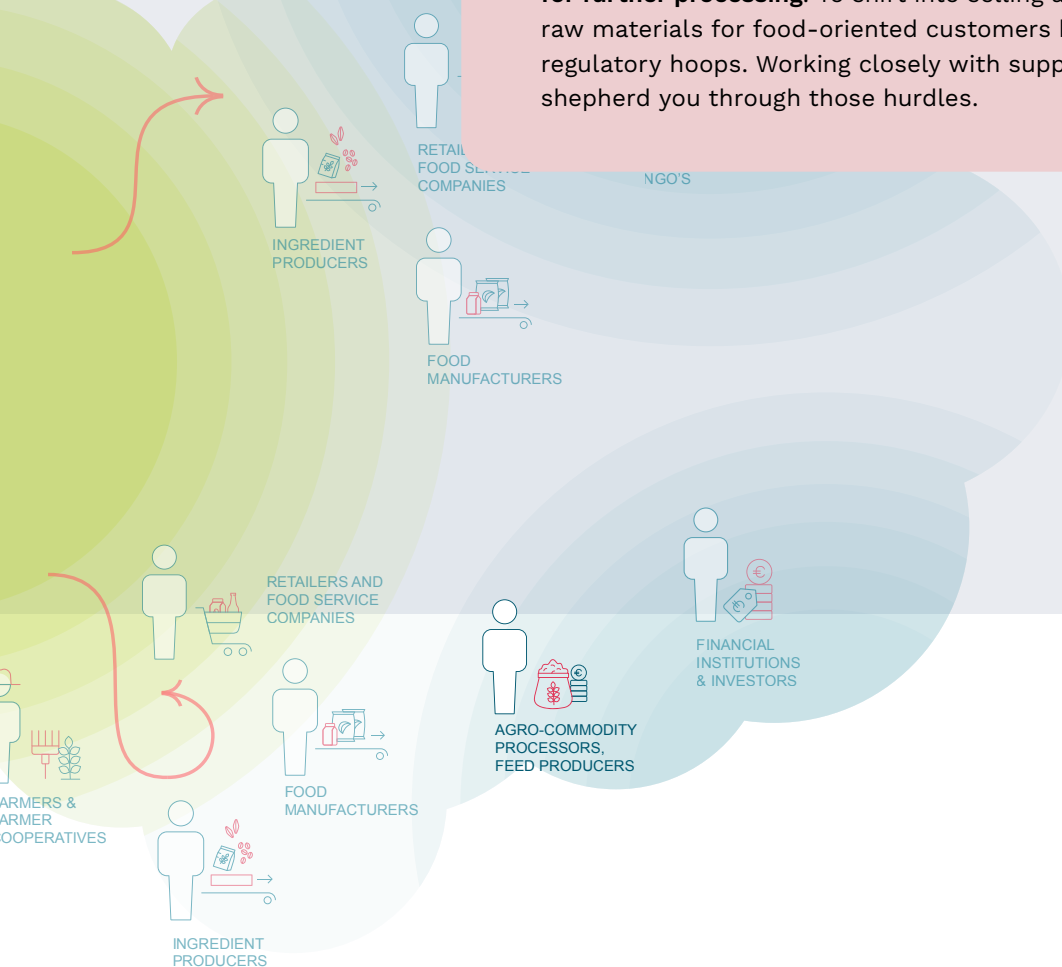


### Discover your role, and benefit

Besides the fact that you as a stakeholder can harness existing links with food manufacturers to **find new directions for side streams in the food space**, you can also play a potential role as innovator by **finding new ways to make side-streams safe, stable and applicable for further processing**. To shift into selling and potentially processing raw materials for food-oriented customers have to jump through many regulatory hoops. Working closely with suppliers and customers can shepherd you through those hurdles.

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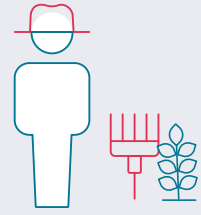
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# Farmers & farmer cooperatives

## OUR KEY TAKEAWAYS FOR YOU

Farmers and farming cooperatives stand at the forefront of the valorisation process for virgin raw materials. Your yielded output (crops, dairy, eggs, animals, manure etc.) is the first step in the valorisation journey for many raw materials for any type of end market. Varying from food, feed, building & construction, to pharma, biofuels and cosmetics, your products will be further valorised and cascaded through the value chain. Cascading starts at your farms, e.g. when crops are harvested and organic matter stays behind on the field to fertilize soil.

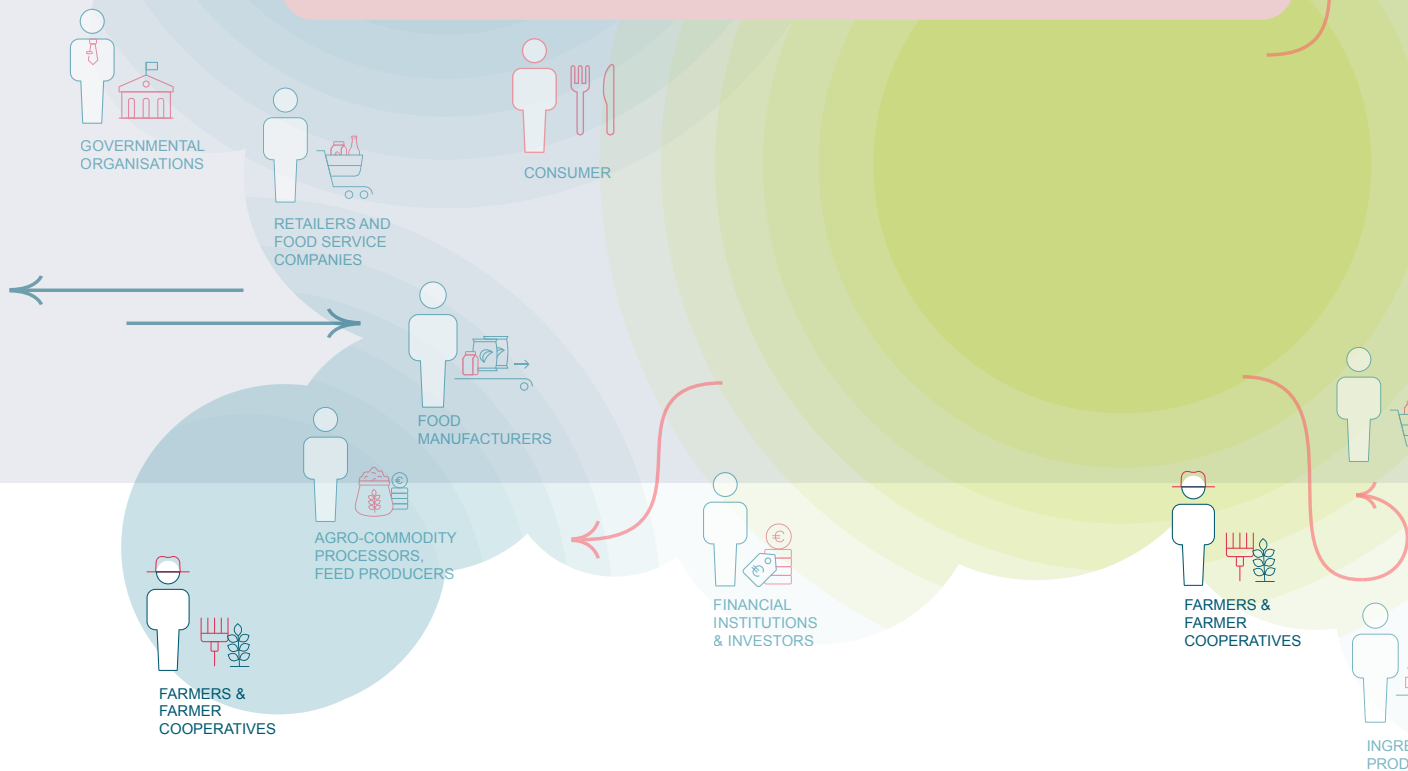


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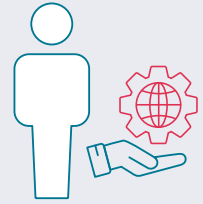
Food losses that arise at the point of origin on farms often have huge potential in term of nutritional value, containing fibres, proteins, micro nutrients and other elements that could be used for various purposes. If you as a farmer or farming cooperative get more involved in the process of optimizing those side streams, you will get more opportunities to valorise the biomass that you own.



# Non-governmental organisations

## OUR KEY TAKEAWAYS FOR YOU

NGOs like you, working in sustainable food production, are aware of the environmental and societal impact of food loss and waste, with some focussing specifically on how to prevent food waste as part of national or international programs. However, finding opportunities to repurpose unavoidable losses or waste is often not part of your organisations' agenda.

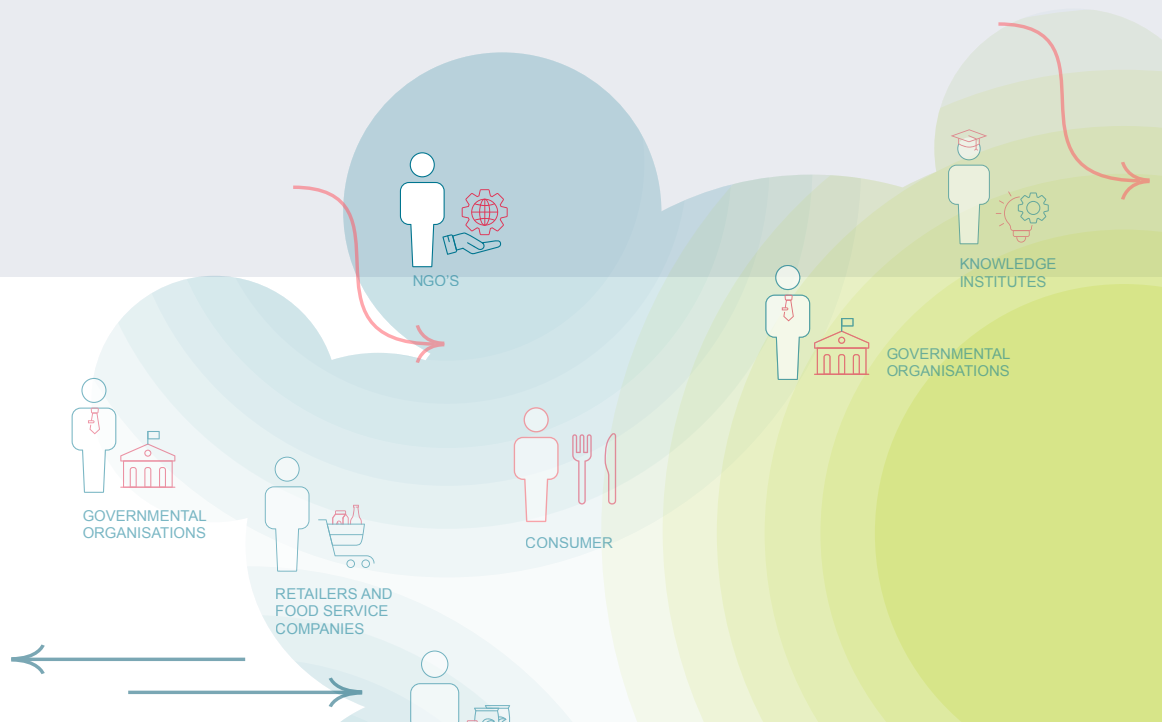


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As an NGO, you can play a huge part in raising awareness of the process and its benefits at a societal and governmental level by **promoting upcycling as a way to tackle sustainability** issues. If you want to take on that role you can use the insights given in this paper as a guide and connect with players in the upcycling ecosystem.

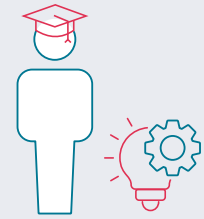




# Knowledge institutes

## OUR KEY TAKEAWAYS FOR YOU

This paper collects various academic insights developed by working groups of authors and backed by research. Presenting these insights, the authors aim to showcase key topics that have been researched so far and demonstrate why we the need to undertake more research into upcycling, and why it's so important.



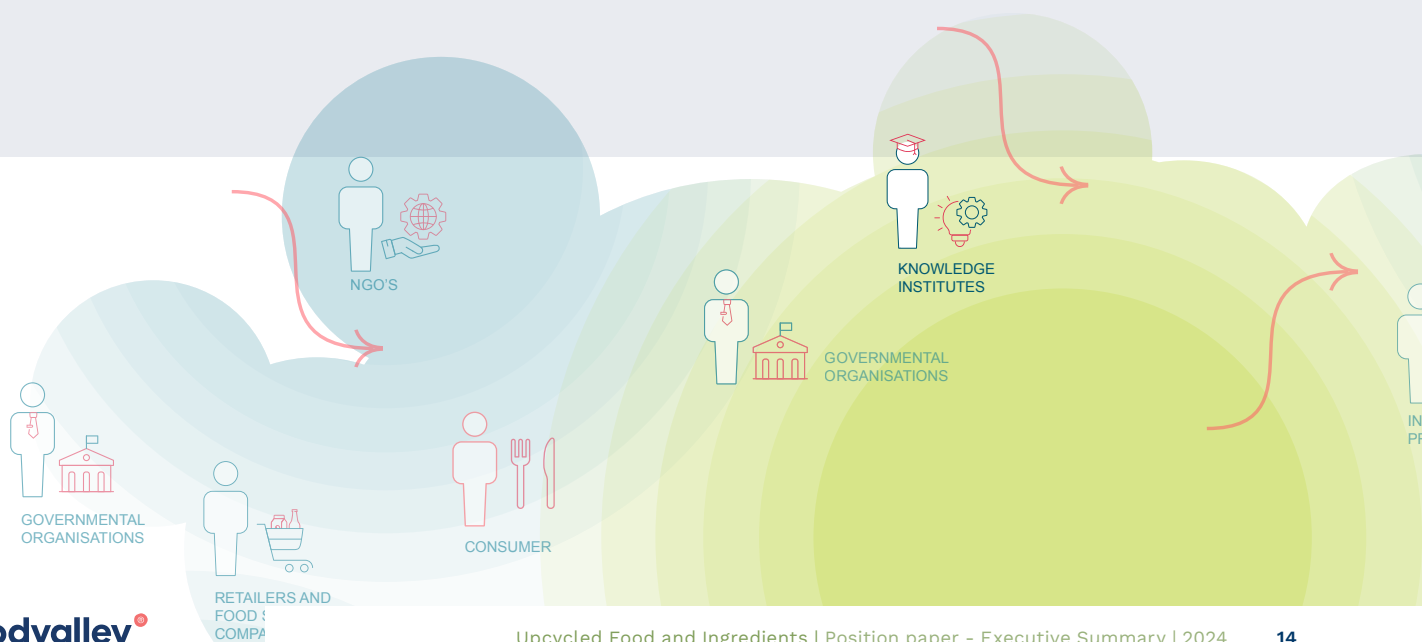
Developing a market for upcycled food and ingredients aligns with various public and private organisations' goals relating to food security, availability and the impact of food production and waste on the planet. It is a topic that is receiving more and more attention from researchers across the public-private spectrum.

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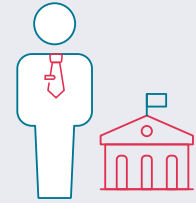
In the future, **more research should be done on technical barriers and opportunities to upcycling side streams into food-grade ingredients.** Moreover, knowledge institutes can do further research on side streams in the agrifood sector, looking into which streams can be defined as unavoidable, where significant unavoidable losses arise (in value chain and geographically) and how can they be optimally valorised. Measuring the consumer market's **response to upcycled food products that demonstrate positive values** is also a new topic that would be good to explore. Having this sort of data would help companies gauge consumer appetites for upcycled products, and better shape their strategies.



# Governmental organisations

## OUR KEY TAKEAWAYS FOR YOU

This paper gives an overview of how various laws and regulations present barriers -- but also opportunities -- for companies that want to bring innovative technologies for upcycling side streams to market and process new side streams into food.



It also provides insights from companies and policymakers on how the development of the upcycled food and ingredients can be better linked to existing sustainability initiatives.

### Discover your role, and benefit

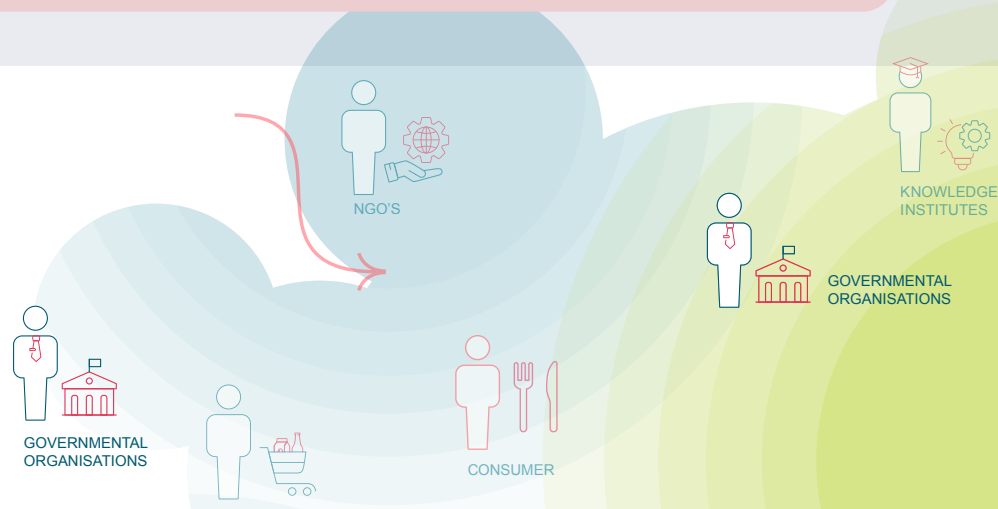
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Governments can incentivise upcycling by incorporating it into plans to cultivate a circular economy and meet climate targets. In Europe, this would ideally be done at both the European Union and national levels for maximum effectiveness. **Having a clear mandate** and incentives from authorities could **ensure that the right** side streams are used for food instead of being used in other end-markets. Setting targets for upcycled food in government-level procurement policies would provide significant impetus for the market.

Regulators can also assist in creating so-called experimental spaces. Companies need such spaces to test out new ideas without being constricted by prohibitive production costs and legislative limitations. **Having this sort of freedom to experiment will** promote innovation and encourage more businesses to adopt solutions for upcycling agrifood side streams in food and feed.

Regulators interested in making upcycling a policy objective should reach out to the companies and experts in the field to start discussing how to create the legal backdrop necessary to bring the market to maturity, including via linking existing policies and frameworks to the values of upcycled food and ingredients.



# Financial institutions & investors

## OUR KEY TAKEAWAYS FOR YOU

Investing in value propositions based on circular business models is very different and more complex than investments in linear business models in which the ingredient producer or manufacturer can simply source raw materials based on standardised conditions in the market. For upcycled ingredients and food, the quality, quantity and condition of the available side streams – plus the collaboration with the supplier -- determine the success of the value proposition. This is often new for investors and financial institutions, who need to learn more about investing in circular companies who play a crucial role in a future where resources will become scarce and the impact of food production on the planet is a serious threat. By showcasing what frontrunners are doing to advance the field of upcycling, this paper also hopes to help guide investors on the potential role such firms can have in the development of circular business models for the agrifood of the future – and the returns they can generate. Ideally, this paper can help link capital providers like you to the startups and businesses that need your investment.



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GOVERNMENTAL ORGANISATIONS

**As a financial institution, you can contribute to the upcycling market by using your expertise to substantiate the value of innovations and solutions.** This will help validate the economic, societal and environmental value of food or food ingredients generated by upcycling side streams, which at present is hard to quantify in a clear manner.

**Investors like you, looking for innovative, sustainable and societally relevant food technology startups** to invest in can use this paper to inform yourself of the challenges and opportunities companies face when trying to develop upcycled foods and bring them to market.



FINANCIAL INSTITUTIONS & INVESTORS



FARMERS & FARMER COOPERATIVES



RETAILERS AND FOOD SERVICE COMPANIES



FOOD MANUFACTURERS



INGREDIENT PRODUCERS



AGRO-COMMODITY PROCESSORS, FEED PRODUCERS

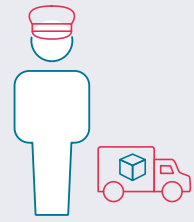


FINANCIAL INSTITUTIONS & INVESTORS

# Transport & distribution companies

## OUR KEY TAKEAWAYS FOR YOU

Stabilising and preserving side streams at food-grade quality is one of the major challenges suppliers and producers face when trying to upcycle new side streams. Recognising this challenge, transport and distribution companies like you can play a crucial role in this.



### Discover your role, and benefit

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As the pin between suppliers of a side stream and food processors, you can play a **coordinating role in bringing different suppliers together**.


Those who are already doing (cold) logistics and transporting wet food-grade ingredients can **play a role in developing systems for stabilising, preserving and transporting side streams that meet food-safety and quality standards**.

Thanks for reading this executive summary of our Position Paper. We hope we have inspired you.

Do you need more insights, recommendations, and practical steps to drive positive change in your spheres of influence?

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## Next steps to take action: Join the UPcycled4Food Initiative!



Based on the insights provided in the position paper, the next step is to scale and expand the success of front runners, transitioning from a niche market to widespread use and procurement of upcycled ingredients and products. Achieving this requires the involvement of multiple stakeholders who can shape new value propositions and how they fit with future market demands.

Foodvalley will spearhead the UPcycled4Food initiative, focusing on collaboration across the value chain and accelerating the adoption of upcycled products and ingredients, pushing the ambition to make upcycling the new normal mainstream choice for manufacturers, food service companies and retailers. By collaborating, partners can attribute to implement strategies to enhance the visibility and accessibility of upcycled products and ingredients in food products, supermarkets, and food service offerings, making upcycling products and ingredients the new normal in the market.

Additionally, this initiative will explore new product categories where upcycled ingredients have great but untapped potential like bakery, confectionary & pastry products, soups & sauces, savoury products, meat & dairy alternatives, beverages, and ready-to-eat meals.







Do you want to participate and join this groundbreaking initiative and be among the frontrunners?

**LET'S GET IN TOUCH**

Would you also like to visibly support this initiative by displaying your logo on our website?

Please send us your company logo in high resolution via the contact form. With this, we endorse our joint commitment and support for this initiative on the Foodvalley website.





### **This paper is supported by the Foodvalley Upcycling Community**

As we look ahead, the Upcycling Community aims to foster progress in value proposition development, raising awareness, and establishing supportive regulatory frameworks by 2030. The community is an international and closed group of partners collaborating on the upcycling of food losses towards food and feed.

Together, we can drive meaningful change and pave the way for a more sustainable future. The community setting creates a safe environment where organizations can share ideas, and get inspired by new developments and insights from the market and research. The Upcycling Community contains business partners who are ambitious about upcycling, come from various parts of the value chain, and vary from scale-up to SME and corporate organisation.

Join the Upcycling Community to be part of this inspiring journey. Let's collaborate, innovate, and make a difference. We look forward to collaborating with food manufacturers, food retailers, food service, agro commodity processors, and feed producers & suppliers, amongst others.

Read more about the [Upcycling Community](#)