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Technical Report · March 2022

DOI: 10.13140/RG.2.2.17319.62881

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A tool in the toolkit: Can true cost accounting remove siloed thinking about food loss and waste?



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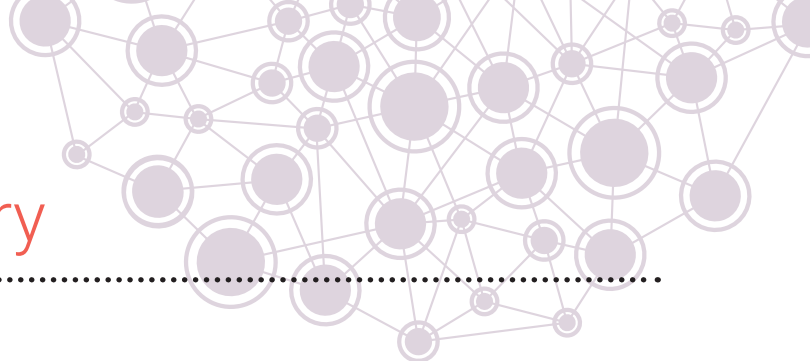
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This report should be cited as:

Bonfert B., Burke M., Caffrey A., Maderson S., Molotoks A., Pearce J. and Tak M. (2021) A tool in the toolkit: can true cost accounting remove siloed thinking about food loss and waste? Report produced for the Global Food Security Programme. November 2021. Available online at www.foodsecurity.ac.uk/publications

The findings of this report originate from a Global Food Security Policy Lab, and do not necessarily reflect the policy positions or views of GFS or its individual partners.

Executive summary



Food loss and waste (FLW) is a global economic, environmental, and ethical problem which has been specifically targeted within the United Nations Sustainable Development Goals (SDGs); goal 12.3 aims to “halve per capita global food waste at the retail and consumer level, and reduce food losses along production and supply chains by 2030”. While most efforts to decrease FLW focus on the individual consumer or householder, FLW is generated at all points throughout the food system, including production, processing, distribution and consumption. Since FLW is exacerbated by long and complex supply chains with many different stakeholders throughout the food system, efforts to decrease it must engage with all stakeholders and all of their impacts on FLW, rather than simply focussing on individual stakeholders or processes.

In this think-piece, True Cost Accounting (TCA), a method for measuring and quantifying the true social, economic, and environmental impacts of different food production systems, was explored to assess how it could help to overcome siloed thinking and support collaborative efforts to reduce FLW throughout the whole food system. To do this, a literature review was conducted, followed by a series of focus groups leading to the formation of 6 policy recommendations that could support stakeholder collaboration across the food system to reduce FLW.



Key findings

Barriers to reducing food waste at the household level include a lack of time, knowledge and skills for purchasing and preparing food. Use-by dates on packaging and large portion sizes exacerbated this issue. Almost unlimited accessibility to inexpensive, globally produced food disconnects consumers from the true value and impact of their food, and the value lost when wasting it. The barriers to food loss from producers and suppliers, include large, complex supply chains resulting in overproduction and overstocking. Unavoidable waste, as well as spoiled or damaged food is usually sent to landfill, due to current regulations on repurposing FLW.

Collaboration across the food system was demonstrated to be a vital solution in reducing FLW as responsibility for food waste is frequently passed between stakeholders and no single actor is held responsible for FLW, although FLW is most

frequently measured at the end of the supply chain. To encourage a collaborative approach, changes to supplier-retailer contracts, shorter, localised supply chains, closed-loop systems and communal storage facilities within food systems are discussed.

Benefits and opportunities of TCA included providing a wider system-level and collaborative perspective for decision makers and using TCA as a tool within a toolkit of other initiatives to reduce FLW. TCA could aid the co-production of policies between policy-makers and other stakeholders, making them more widely accepted and effective.

Challenges of TCA included the complexity and impracticality of applying TCA to the complex food system and how TCA metrics would be accurately measured, collated, and analysed across the many processes involved within the food system.

Report recommendations

Policy recommendations:

- Ensure supplier-retailer contracts address FLW at all points of the supply chain and mandate stakeholders to measure, state and reduce FLW in their contracts.
- Hospitality, supermarkets and local authorities should be required to disclose all FLW and set mandatory annual targets to decrease FLW.
- Review current rules and regulations regarding use and processing of FLW, and consider options for repurposing FLW, for example, as animal feed.
- Address supply chain inefficiency: supporting public procurement directly from suppliers could decrease FLW, while simultaneously strengthening local economies.
- Incentivise suppliers, retailers, and hospitality to address social, economic and environmental food system externalities, potentially offering incentives and rewards to do so via lower business rates.
- Clear definitions of terminology including: food loss, food waste, surplus, inedible parts and destinations of food loss and waste. Development of government recognised language for system-wide standardisation of data recording.

Further research and development:

There are several areas that we feel need further development and research to support our policy recommendations. We have emphasised the need for effective measures of data reporting, especially in FLW. Currently, there is more focus on recording and reporting food waste, which has led to an underrepresentation of food loss. To support our policy recommendations surrounding data reporting, we suggest that data on FLW should be measured across the whole food chain to represent a balanced and more accurate view of the FLW issue.

The infrastructure for FLW can be strengthened and supply chains supplemented through support for centralised FLW distribution hubs within local areas, allowing surplus food and food not fit for sale, to be stored, managed, and distributed appropriately within local food systems.

The simplification of information could be addressed with the creation of a central database that contains sustainability, health and environmental schemes and metrics. This would help provide consistency and inform consumers, for example; the creation of a simple labelling system encompassing metrics within the SDGs to incentivise positive change throughout the food system.

Further research is needed to explore if food pricing could reflect external social and environmental costs and what the implications on food poverty and affordability would be. There should be further work employing TCA to investigate if healthy food produced with low environmental impact is ultimately more economical overall, compared to foods that have negative public and environmental health impacts.






The challenge of food loss and waste

Globally, nearly 40% of all food produced for human consumption is lost or wasted¹. According to the Food and Agriculture Organization of the United Nations (FAO), food loss is *“the decrease in the quantity or quality of food resulting from decisions and actions by food suppliers in the chain, excluding retailers, food service providers and consumers”*, and food waste refers to *“the decrease in the quantity or quality of food resulting from decisions and actions by retailers, food service providers and consumers”*². Therefore, food loss includes estimates from post-harvest up to, but not including, the retail stage, whereas food waste includes estimates at the retail and consumption level.

According to the FAO’s food loss index, globally, 14% of all food produced is lost from the post-harvest stage before reaching retail level³. However food waste is most commonly addressed at the individual level⁴.

An estimated 931 million tonnes of food waste is generated from retail, food service and households annually, this is 17% of all food produced globally. 11% of all food waste, or 570 million tonnes is from the household level⁵. Solutions typically focus on the household, as this is where the majority of food waste is typically recorded. As awareness around the impacts of food waste increases, and other parts of the food chain begin to be measured, food loss on farms is now emerging as a significant cause of food wastage¹.



Current solutions to reducing FLW include recycling, recovery and disposal, however, to more effectively address the issue of FLW, a greater focus on preventative measures and reducing FLW at all points of the food system is required. This necessitates all stakeholders recognising that the current, siloed approach to reducing FLW at individual stages of the food system is a barrier that must be overcome, and emphasises the need to work collaboratively across the supply chain.

FLW is an ethical, economic and environmental issue.



On the 25th September 2015, the 193 Member States of the United Nations adopted the 17 Sustainable Development Goals (SDG) of the 2030 Agenda for Sustainable Development, global objectives with major outcomes including the Paris Climate Agreement (a global treaty to limit climate change). However, it is estimated that if FLW were a country, it would be the third largest source of greenhouse gases⁵.

The commitment to the Sustainable Development Goal included target 12.3; to halve per capita global food waste at the retailer and consumer levels and reduce food losses along production and supply chains, including post-harvest losses by 2030. Furthermore, reducing FLW is critical to creating a Zero Hunger world (SDG 2), and ensuring responsible consumption and production (SDG 12). The positive impacts could also extend to sustainable water management (SDG 6), climate action (SDG 13), life below water (SDG 14) and life on land (SDG 15) (Figure 1). Understanding, therefore, how to implement policy action to efficiently reduce FLW across supply chains is intrinsically important not only for reducing production costs and improving efficiency, but for contributing towards social and environmental sustainability.

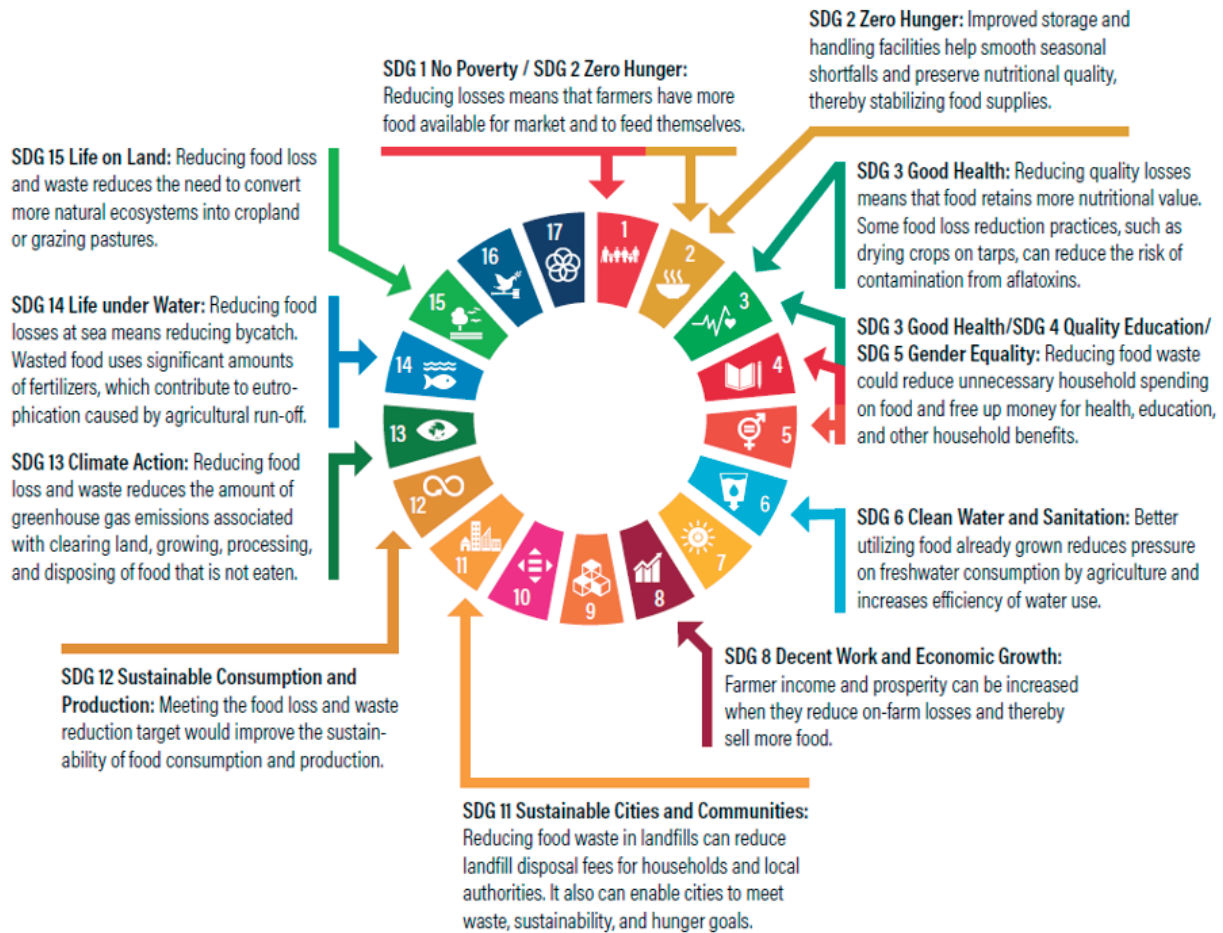


Figure 1: Food loss and waste is an important issue for the Sustainable Development Goals (SDG) as reducing food loss and waste can help achieve multiple SDGs (Source: WRI, 2019⁶)

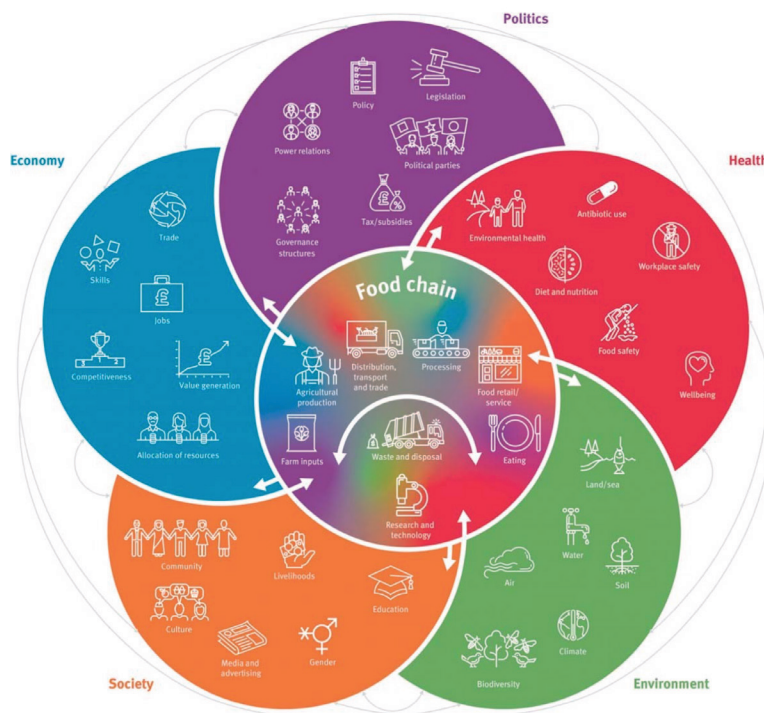


Figure 2: The food system. The food supply chain at the core of the food system, has interdependencies with politics, health, environment, society and economy. Source: Centre for Food Policy, City, University of London 2019¹⁰

Definitions

True Cost Accounting (TCA): TCA is a systemic approach to assess, measure, and value all externalities involved in the production and consumption of a product or service. In this report, TCA is used in context of, but is not limited to, the UK food-system. This can take the form of effective data recording and reporting. The use of TCA as a tool and its associated metrics, provide a holistic understanding of the relationships that form the food system, including: agriculture, food, the environment, and human well-being. The application of TCA principles by stakeholders within the food system provides transparency and being accountable for externalities⁷.

Externality: An external cost or benefit that is not financially incurred by the producer or consumer, but has an impact on a third party that has not consented to the cost. Externalities are normally environmental costs, societal or costs to public health⁹. Examples include water pollution from agricultural practices, low wages to food system workers, and the public health costs resulting from dietary illnesses, such as diabetes and cardiovascular disease.

True Price: The true price consists of the market value of a product, in addition to the social and environmental externalities or 'hidden' costs that make up the true price gap. The true price gap is defined to remediate the harm caused by the externalities of production and consumption, and so now included in the price of the product. The extra money must be used to repair the damages for it to be considered a 'true price'⁸.

True Pricing: True pricing is the application of the true price to products within the consumer market. This application must additionally

include providing transparency about the associated true costs and prices, preventing external costs through the transformation of products, and remediating external costs through transaction or taxation which creates a sustainable economy⁸.

Food System: A complex system of actors and activities that contribute to, or are directly or indirectly involved in feeding a population. This can include, but is not limited to the; growing, harvesting, processing, packaging, transporting, marketing, consumption, distribution and disposal of food and food-related items. There are further economic, political, environmental, health and social interactions with the food supply chain which influence and are influenced by it, that are considered parts of the food system, see Figure 2¹⁰.

Food Loss: Food Loss is the decrease in the quantity or quality of food resulting from decisions and actions by food suppliers in the chain, excluding retailers, food service providers and consumers. Empirically, it refers to any food, including spoiled or deteriorated food, that is discarded, incinerated or otherwise disposed of along the food supply chain from harvest/slaughter/catch up to, but excluding, the retail level, and does not re-enter in any other productive utilisation, such as feed or seed².

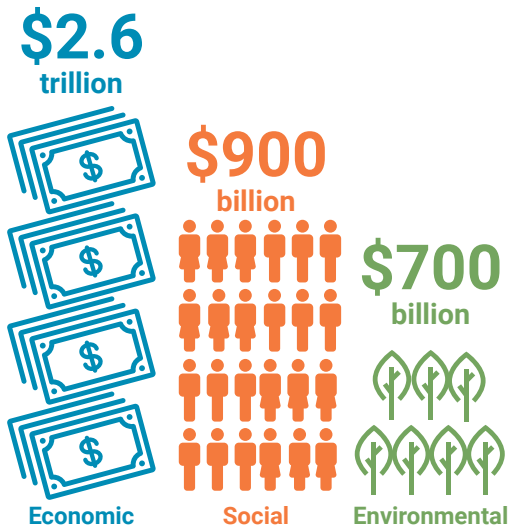
Food Waste: Food Waste refers to the decrease in the quantity or quality of food resulting from decisions and actions by retailers, food service providers and consumers. This refers to any food, including spoiled or deteriorated food, that is discarded, incinerated or otherwise disposed of by retailers, food service providers or consumers that is not otherwise repurposed².

True cost accounting (TCA) – What is it?

One of the tools available for helping to address detrimental practices, and support healthy, resilient, equitable and sustainable food systems is True Cost Accounting (TCA). TCA aims to acknowledge and assess the economic, environmental, and social impacts of food production and food waste. TCA can inform decision-makers (i.e. producers, governments, institutions, businesses) to make better decisions which reflect the full range of impacts of the food system⁷. It is important to note that TCA includes multiple assessments and metrics for assessing value, and is not a solely monetary analysis¹¹. Societal impacts, local contexts and full supply chain analyses are addressed via TCA.

Significant work has been done on developing and collating such metrics including; ‘The Economics of Ecosystems & Biodiversity for Agriculture and Food programme’ (TEEBAgriFood)^{8, 12}. The United Nations Food and Agriculture Organisation (FAO), has estimated the true cost of FLW as that of economic costs (US\$ 2.6 trillion/year), environmental costs (US\$ 700 billion/year), and social costs (US\$ 900 billion/year)¹³. These TCA figures include the carbon impact (3.5 gigatons CO₂e or US\$ 294 billion/year), water impact (250 Km³ or US\$ 164 billion/year), and biodiversity impacts (e.g. pesticides, nitrate & phosphorus eutrophication, pollinator loss etc.), at US\$ 32 billion/year.

The true costs of global food loss and waste in real money terms (per year)



Some environmental costs of food loss and waste in real money terms (per year)

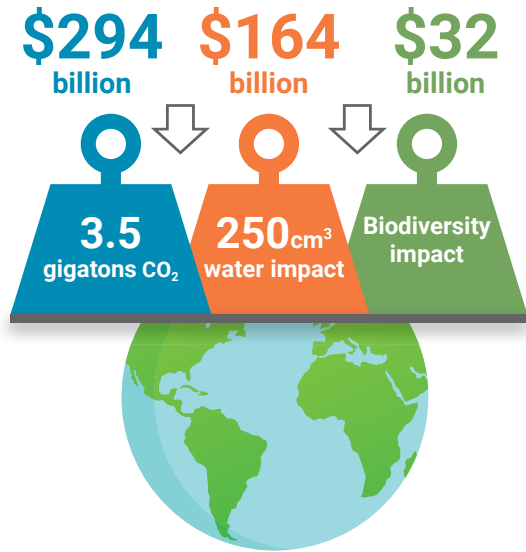


Figure 3: The true costs of global food loss and waste in real money terms

Sustainable diets that ensure healthy nutrition have been proposed as drivers for food system transformation. In the UK, the National Food Strategy set out ambitious proposals based on the current food system and its true cost on human and planetary health¹⁵. The EAT-Lancet Planetary Health Diet report reviewed global targets for healthy diets and proposed that a diet rich in plant-based foods and with fewer animal source foods confers both improved health

and environmental impacts¹⁶. The Commission developed a sustainable diet that would provide adequate adult reference intakes of energy, macro- and micronutrients; compared to typical UK diets, the EAT-Lancet diet contains more fruit and vegetables, more wholegrain starchy foods and more plant based proteins, but less meat and dairy, starchy tubers, sugars and processed foods, a diet that is supported by the British Dietetic Association¹⁷.

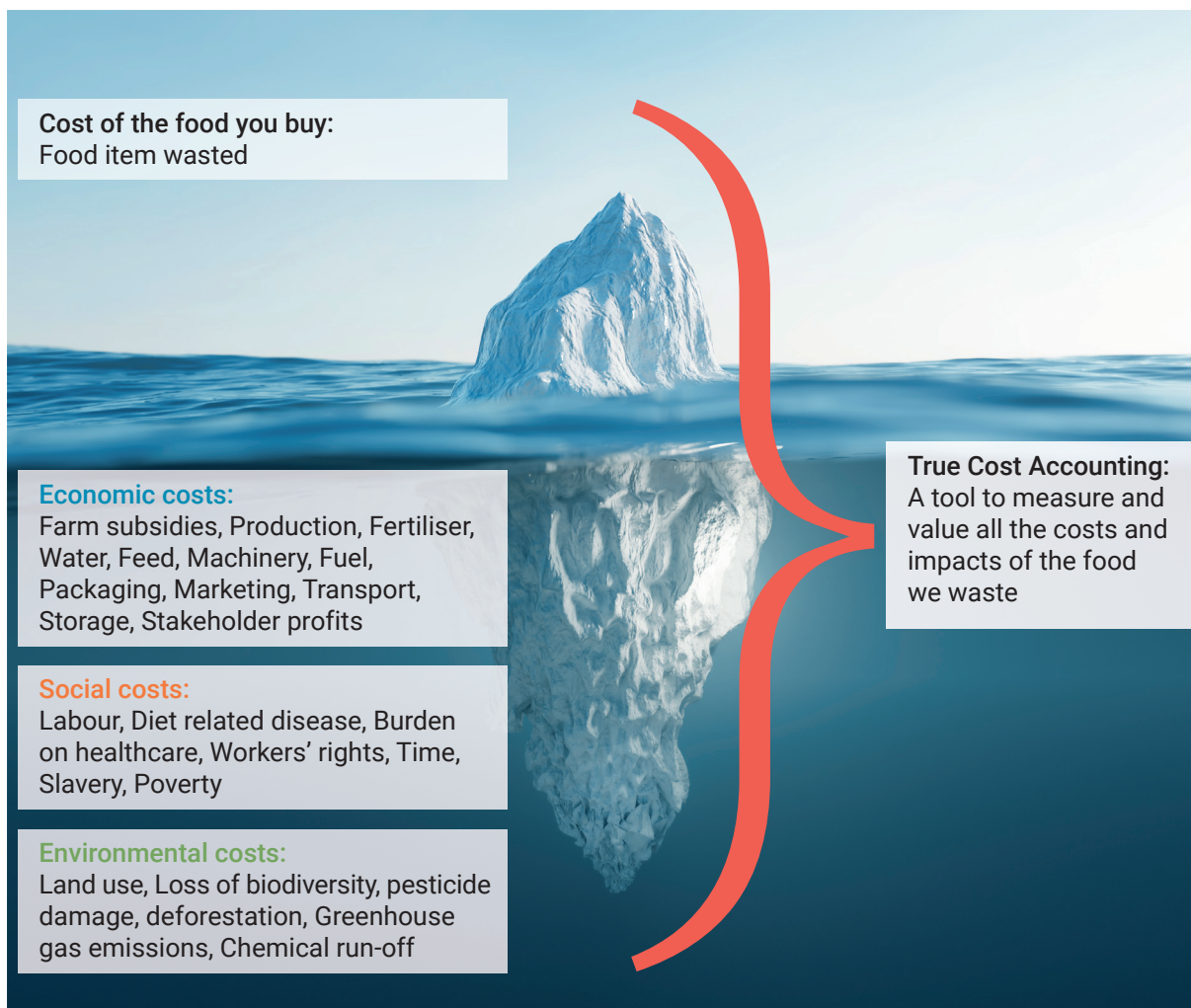


Figure 4: What we really waste when we waste food and how True Cost Accounting can measure this

Case study: True cost of food waste from the UK hospitality and food service sector, WRAP, UK

The Waste Resources Action Programme (WRAP) has explored the true cost of food waste within the UK's hospitality and food service sector¹⁴, identifying the true cost of food waste from a financial perspective and estimating the costs associated with food purchase, waste management, energy, water, labour, administration and transport. Whilst these sectors serve over 8 billion UK meals, they also produce over 2.87 million tonnes

of food and associated packaging waste. Of total food purchased by the UK's hospitality and food service sector industry by weight 17.8% is wasted, of which 13.2% is avoidable and the remaining 4.6% is unavoidable. The true cost of food waste generated within this UK sector was estimated at £2.5 billion/year, and a true cost figure that is double the costs of the food purchased.

Case study: Subsidising healthy school meals, food policy for public and economic health, USA

Healthy diets with a high level of fresh fruit and vegetables are commonly seen as prohibitively expensive. At the same time, there is a public health crisis, with poor diet linked to 18-25% of all deaths. Diet-related chronic diseases such as obesity, cardiovascular disease and diabetes, devastate communities, particularly people of colour and/or those experiencing poverty. Healthy eating needs to be affordable and accessible to all.

The Supplemental Nutrition Assistance Programme (SNAP) subsidises increased fruit and vegetable purchases amongst low income consumers. The Good Food Purchasing Program promotes public procurement directly from farms, and has increased the amount of organic and fair-trade foods included in school meals. Direct procurement has multiple True Cost benefits, and is also associated with lower levels of food waste¹⁸.

True cost accounting does not mean true pricing

Two concepts that are often conflated are: 'TCA' and 'true pricing'. TCA is a tool using a universal currency for valuing externalities without the application in real monetary terms. True pricing is the application of the true price to real product pricing. True pricing has been proposed as a possible method of reconciling the true costs for products and services⁸. True pricing would internalise the externalities into product prices to support a sustainable food system. A similar concept of taxing market activity to include externalities: 'Pigovian Taxes' was first suggested by Pigou, Sigdwick and Marshall in 1920 but has always been considered an impossibility¹⁹.

To consider the implementation of a systemic price realignment for all food products with a range of externalities would be complex, particularly when accurately measuring the precise value of true prices. In the last decade, the development of sophisticated data collection and reporting could make true pricing a legitimate possibility for the future⁸. The True Price Foundation (2012) have now

created frameworks for true pricing using a rights-based approach that takes the market value of the product, and fills the 'true price gap', reconciling the external social and environmental costs resulting from production and consumption that breach basic rights²⁰. These recuperated funds are then used to remediate these externalities.

In theory, true pricing in the food system could influence consumer behaviour into considering the types of diets they have, based on environmental impact, health or at least financial choices. It has been noted that true pricing may be too expensive and exclusionary to some consumers. Alleviation of this could be through subsidisation, however, there is significant risk that this would not be implemented fairly and the financial burden would inevitably fall to the consumer⁸. There is much debate surrounding the efficacy of true pricing, but it is important to note that true pricing is not the aim of TCA and they should be considered separate concepts.

Exploring the potential of TCA in reducing FLW with food system stakeholders

To explore the potential of using TCA in reducing FLW across the whole food system and reducing siloed approaches, a series of stakeholder focus groups were held. Stakeholders from across the food system were invited to participate in a series of 5 focus groups, which were held in July-August 2021. The 25 participants included food producers, wholesalers, retailers, researchers, restaurant owners, policy-makers, civil society organisations (CSOs) and consumers. Participants were encouraged to consider their multiple roles and identities within the food

system – e.g., retailer and consumer - as well as engage with the reality of climate change impacting everyone, and reaching net zero emissions being a challenge for all of us. These multi-stakeholder dialogues provided a breadth of insights, generating a clear picture of TCA's potential to support effective stakeholder collaboration for the reduction of FLW and thus ensuring the proposed policy recommendations had the best chance of being accepted by all stakeholders. The results of these focus groups are summarised below:

What are the personal and professional barriers to reducing FLW?

Stakeholders acknowledged that there is often a conflict between their professional knowledge about food waste issues and their personal capacity to act, both domestically and professionally. Personal barriers to reducing FLW included a lack of time, knowledge and skills for purchasing and preparing food effectively, which is often exacerbated

by misleading use-by dates on packaging, advertising schemes and large portion sizes in supermarkets and restaurants. The importance of household food provisioning routines e.g. shopping, reuse of leftovers, etc., have been highlighted as major drivers of food waste²¹. Recent research notes how COVID-19 lockdowns increased time at home which supported better food management and planning of meals, resulting in a decrease in food waste²². Many stakeholders also emphasised that difficulties in agreeing on meals due to changing schedules and accommodating different dietary restrictions or preferences contributes to the amount of food wasted.



“ People want consistent supply – even of waste. Transport costs are also an important factor. In order to collect everyone’s waste, and do something with it, we need to know what’s coming, and what can be done with it. ”
Wholesaler



Age and cultural backgrounds were also mentioned as factors influencing attitudes and behaviours surrounding FLW, with those who have experienced food scarcity being less prone to wasting food. This has also been shown in recent research with 18-34 year olds being consistently more likely to report higher levels of food waste, as well as those under higher time pressure on a daily basis²².

Beyond barriers in their personal lives, all focus group participants noted systemic barriers affecting them on both a personal and professional level, challenging their capacity to reduce FLW in their organisations. Stakeholders across all status groups agreed that the large, complex supply chains throughout the food system made it difficult to disrupt the status quo of business-as-usual. These supply chains are often focused on industrial production and distribution methods that require stakeholders to overproduce or overstock in order to guarantee they meet demand and avoid financial risks²³. Producers face extremely tight profit margins and need to fulfil contracts with narrow product specifications that retailers can unilaterally opt out of. This leads to high levels of overproduction and food waste, as not being able to meet demands currently poses a much more serious financial risk than wasting food²⁴. In order to stay profitable and competitive, retailers are also pressured to overstock and use certain packaging and aesthetic standards to cater for consumer tastes and demand. Retailers and restaurant

owners perceived that consumers had negative views of their businesses when not offering bountiful portions or full shelves, thus driving overstocking and food waste in hospitality and retail. Some literature sources suggest responding to this problem by encouraging customers to adjust portions based on how hungry they are or charging lower prices for smaller portions²⁵. There was also a suggestion that over or excessive consumption of food should be classed as food waste.

Results from the focus groups corroborated findings in the wider literature, noting that targeting consumer behaviour alone is unlikely to significantly reduce FLW²⁶, and that increasing all stakeholders' understanding of the significance of FLW was a key factor driving any potential reductions²⁷. The requirements for fresh produce (producing and direct sales) are narrow and can fluctuate suddenly e.g. in response to changes in the weather. This is exacerbated by a lack of adequate storage facilities, short windows for shipping certain harvests and little funding for scaling up innovations for repurposing or redistributing surplus food to avoid waste. There are also often hidden costs and logistical challenges for the third sector and those involved in initiatives for reducing and redistributing food waste. More resources and stakeholder support are needed for these initiatives, as well as enhanced shelf life, and better storage and distribution technologies. Food waste from spoiled or damaged foods, or inedible portions



of foods, is usually sent to landfill; in the past, it was repurposed as animal feed²⁴. Policy-makers and CSO representatives also noted a lack of regulation around repurposing and distribution of excess food, particularly for larger supply chains, and an inflexibility among public procurers,

as well as a hesitancy from the government to restrict consumer choice. Conversely, they felt constrained in their ability to repurpose FLW as animal feed, due to legal restrictions enacted in 2001 in response to an outbreak of Foot and Mouth Disease.

Opportunities for stakeholder collaboration to reduce FLW across the food system

Identifying and managing the ultimate responsibility for FLW between multiple stakeholders is difficult. Positive interventions that a siloed-working stakeholder might make to reduce their personal or organisational levels of FLW may inadvertently and unknowingly move the problem to another point in the food system, negating efforts to achieve an overall waste reduction. One example of this is poorly managed stock in a retail organisation. Overstocking followed by extreme reduction in price to the consumer at the end of the product shelf life can cause a shift of food waste to the consumer²⁴. Therefore focus group participants widely agreed that no single actor could be blamed for food waste or loss. As there are many factors and reasons for waste creation throughout the food system, including differences between food products, it is important to increase cross-system collaboration through improved communication about shared responsibilities²⁸. Thus, more collaborative action is necessary to reduce FLW in the food system for which TCA can be a useful tool to eliminate harmful practices²⁹.

Multiple stakeholders (policy-makers, CSOs, researchers) noted that small-scale innovative efforts, such as direct sales from farmers are useful and effective, but lack means to scale up³⁰. As such, local collaboration for community initiatives working to decrease FLW and engage directly with consumers have great potential but are resource-intensive. In part, this is because grassroots organisations that reduce FLW are often unaware of each other. This can lead to some efforts being replicated, while others are not addressed. Various civil society organisations serve as FLW redistribution centres, but these are often disconnected and lack the infrastructure

to receive, process, store and distribute variable quantities and content of FLW. The example was given of organisations being informed by a wholesaler that 500 kg of tomatoes were available for collection by the charity, and if not, they would go to landfill. These are large, awkward and potentially expensive quantities for small voluntary organisations to manage without infrastructural support.

“ That’s the only way that we’re going to be able to effectively decrease food waste. Working with the grower, seeing what they have and then following that all the way through into retail and into the household. ”
Retailer



Agro-ecological producers suggest that direct sales and shorter supply chains, as well as using communal storage, can be part of the solution to reduce FLW³¹. Yet, they often see such efforts sidelined by a more dominant research and policy focus on lowering production costs and using high-tech solutions to automate farming, neither of which are feasible options for small-scale producers, who tend to waste less food than larger producers. Planning for cropping and transport is highly complex, and difficult to manage on a small, local level. Hence the need for collaboration across the system.

Furthermore, CSOs highlighted that shortening supply chains requires institutional support from the existing retailers.

The role of managing demand in reducing FLW was also discussed. In its current form, the food system is focused on “meeting demand”, a phrase that is vague and ill defined. Stakeholders agreed that this demand-driven, productionist paradigm needs to be challenged, by questioning vested interests of organisations and businesses that profit from the current system.

Challenges and shortcomings of TCA as a tool to reduce FLW

Stakeholders noted that the main challenges of TCA related to the logistics of implementation and adaptation across all food system processes. As an example, one wholesaler described the extreme difficulties of a decade’s work on trying to assess and apply carbon footprinting. These sentiments were echoed by an academic researcher who had studied the carbon footprint of tomatoes, and highlighted the inconsistency in values due to producers residing in different countries and using different production systems. Similarly, one retailer was concerned that the complexity of TCA was a shortcoming of the initiative, stating their own lack of capacity and expertise for incorporating TCA:

This lack of consensus about TCA and what it should account for across the food system, was another challenge that stakeholders identified. Many stakeholders saw shortcomings with creating valid and reliable TCA metrics, which could be consistently measured, collated and analysed¹¹. Researchers suggest that TCA metrics and policies need to be co-produced with stakeholders to garner collective agreement. There is concern about how governments and other stakeholders will act upon receiving TCA data, since it does not suggest specific interventions:

“ I think it is an interesting concept, but I can’t see it yet on the retail side, how we would make it work. ”
Retailer

“ I struggle to see how TCA could be communicated to the people who make decisions about food waste. I don’t think it will change behaviours or practices. How we communicate the true cost to decision-makers is too complex. ”
Researcher





“ It’s a tool and method being used by some organisations, for various goals – but its potential depends on who is using it, for what purpose. Some stakeholders will lose out as they are just a part of the process.

Researcher

One potential unintended outcome of TCA could be public ‘naming and shaming’ based on the data surrounding FLW. Researchers and wholesalers were sceptical about whether this would positively impact consumer behaviour, as they considered regulation a more effective method for driving decreases in FLW. Agro-ecological producers were especially concerned about whether TCA can successfully address the power imbalances within the food system that underpin wasteful behaviours³², or merely reproduce dominant paradigms. Another unintended outcome could be that some stakeholders (particularly international farmers) may lose out if there is an increased emphasis on localising food systems and shortening supply chains due to TCA. Our current system is driven by the lowest cost of production. Cheap food comes at the cost of exploitation of workers, land-use and resources²². Furthermore, of the $\frac{1}{3}$ of global GHG from the food system, the largest contribution (71%) is from agriculture and

land-use³². TCA has the potential to capture these external costs. However, farming communities, including internationally, should not be expected to absorb the cost of negative externalities; it is imperative that international policy is carefully negotiated to protect vulnerable suppliers¹⁸.

In relation to true pricing, there should be a focus on ensuring consumers are not also expected to absorb extra costs associated with TCA. Regardless of feasibility, most stakeholders emphasised that TCA must not be used to change food pricing as this is considered a potential risk to healthy diets, particularly for low-income consumers. Food prices have already been on the rise over the past year³⁴ and the surge in food insecurity caused by the pandemic has only partially receded³⁵. Those consumers facing food poverty and injustice – local, national and global – risk being negatively impacted by true pricing. However, one researcher suggested that this is not the aim of TCA:

“ ...this is not supposed to, in principle, trickle down to the consumers [...] I don’t think by any means it should really be the price that people start to pay, because I think it will only decrease the interest of people in [making] better food choices.

Researcher

However, understanding the value of food and its associated costs and externalities (costs, benefits, risks, opportunities) could influence attitudes towards waste throughout the food system by, in part, informing consumers. There have been several examples in recent years displaying responses to 'sin taxes'. In 2015, the UK government implemented a £0.05 charge for plastic bags to reduce single use plastic which caused an overwhelming change to consumer behaviour with an 86% decrease in plastic bag use³⁶. Conversely, consumer buying behaviour did not significantly change immediately after the UK introduced the Soft Drinks Industry Levy (SDIL) in 2016. However, manufacturers diversified the range of low-sugar alternatives, and adjusted the sugar levels to fall below the threshold for the levy which in turn created a consumer shift

toward low-sugar and sugar-free alternatives, potentially exposing consumers to less sugars and associated health risks³⁷. These are examples of very simple taxes or levies associated with one specific externality.

Finally, it was suggested in focus groups that TCA is not actually a true account of associated costs. It is difficult or almost impossible to precisely and accurately quantify the many factors TCA claims to address and apply them to a wide range of stakeholders across the food system. Nonetheless, providing an approximate numerical value for social impacts, global inequalities, nutrition, toxicity, etc., to report on FLW from the food system may be a good starting place to make stakeholders accountable.

The benefits of using TCA to reduce FLW and opportunities for stakeholder collaboration

Given these challenges and limitations, there was widespread agreement in the focus groups that TCA could not reduce FLW alone, but that it could be used to inform further interventions. **TCA was perceived as 'one tool in the toolbox' that could help encourage greater understanding and appreciation of food, as well as raise awareness of the various negative impacts of FLW.** While various hidden costs are already being reported throughout the supply chain, TCA could provide a more holistic perspective to account for a wider range of impacts. For instance, some retailers measure the financial burden of their waste, and other businesses apply life-cycle assessments and extended input-output analyses to measure some of their externalities³⁸. However all businesses would benefit from having access to more nuanced and accurate data, in particular with regard to social and ecological impacts²⁶. TCA could provide that data, not only for individual stakeholders but at a systemic level by highlighting externalities that are produced and transmitted across the whole supply chain. TCA both requires and encourages stakeholders to adopt a wider system-level perspective and engage in collaboration, first to generate the necessary wealth of data and then to reduce FLW collectively.

Participants suggested that TCA could help inform a more holistic government approach to re-valuing the food system³⁹. Through its integrated engagement with the economic, social, environmental and health impacts of FLW⁴⁰, TCA could encourage waste reduction across government ministries. Additionally, TCA could aid policy-makers in implementing more precise sustainability measures, including sanctioning FLW, subsidising reduction initiatives, creating fairer producer-retailer relations, and rebalancing disposal costs. It could also encourage public-private partnerships and other forms of stakeholder collaboration, especially in the form of waste and surplus distribution, public procurement, planning new waste reduction measures, and introducing novel food certification. Stakeholders noted the confusion generated by disparity in clear definitions when describing FLW. Recognised definitions and a common language would support collaborative efforts to reduce FLW.



Policy recommendations that employ TCA principles to reduce FLW

Based on current literature and stakeholder input, we make the following policy recommendations. Overall, we advise that the underlying principles of TCA should be used to guide all stakeholders in the food system, as well as policy-makers, to acknowledge and assess the multiple impacts of the food system on society, the environment, and public health. When taken together as a suite of policy changes, our recommendations combine to create a culture shift towards stakeholder cooperation and shared responsibility in reducing FLW, whilst simultaneously ensuring our food system maximises environmental and wider benefits. Diverse metrics assessing the underlying socio-ecological and economic principles of TCA, combined with regulation, incentives, and education, can support efforts to decrease FLW throughout the food system. These recommendations focus on creating culture change for efficient and transparent data reporting, opening opportunities for a collaborative workforce towards significantly reducing FLW and the application of TCA principles throughout the food system.



1. Ensure supplier-retailer contracts address FLW at all points, and make it mandatory for all stakeholders to measure and state FLW in contracts

A significant share of FLW occurs during production, as suppliers are pressured to overproduce in order to guarantee fulfilling their contracts with retailers. To prevent this, contracts need to ensure a level playing field between stakeholders. They should include requirements for suppliers and retailers to measure and limit the FLW created through their transactions, as well as narrowly limit the option for retailers to opt out of contracts. This would also encourage better communication and collaboration between stakeholders by requiring them to more closely align their supply and demand to each other.

2. Require transparency in hospitality, supermarkets and local authorities to disclose all FLW and set mandatory reduction targets annually

Currently, reporting and publishing of FLW data is completed on a voluntary basis. We propose that this should be mandatory for all stakeholders; comprehensive FLW data is to be reported and published with additional encouragement for full disclosure of non-financial data reporting (NFR). NFR includes environmental and social impact data which is in line with the principles of TCA. The UK government wants to keep *"the UK at the leading edge of international developments in sustainability reporting"*⁴¹. Mandatory reporting of FLW data could help stakeholders to become aware of their FLW, whilst enabling the identification of parts of the food system that generate a lot of food loss and waste and increasing the focus on these. We recommend



support for those organisations that require it, both financially and by providing the tools to inform and encourage the value of data reporting for developing, improving and re-risking⁴¹.

3. Review current rules and regulations and consider options for repurposing of FLW (e.g. as animal feed)

Opportunities for a more efficient food system are currently being missed. An example of this is through historic legislation enacted in 2001 in response to the outbreak of Foot and Mouth Disease, which prohibits the recycling of catering waste to pigs. A review of legislation such as this, should be undertaken to enable safe recycling of food waste and reduction of the primary production and importation of feed that has large-scale impacts environmentally.

4. Support public procurement directly from suppliers: this will decrease FLW, while simultaneously strengthening local economies

There needs to be more support for public procurement through interventions and innovation to shorten supply chains. We recommend interventions for creating circular, closed-loop networks, incorporating redistribution, reuse, and recycling. Creating a regenerative system will aid in the reduction of FLW throughout the food system, and help to reduce externalities. We recommend that special attention should be paid to using locally based resources and organisations. There should be tighter regulation around food recovery and distribution. There should also

be investment into the way food is reused and recycled, improving flexibility, with a focus on the local setting, needs and infrastructure and upscaling to a national level. There should be a focus amongst hospitality stakeholders to encourage consumers to adjust their portion sizes to avoid food waste.

5. Incentivise suppliers, retailers, and hospitality to use TCA's emphasis on food system externalities (social / economic / environmental): reward with potential lower business rates

'Sin Taxes' have a propensity for penalising the consumer, especially affecting the most vulnerable in society if not properly implemented. Instead, we recommend focusing on rewarding stakeholders throughout the food system including suppliers, retailers and hospitality for embedding TCA principles within their business model and practices. A suggested incentive scheme could offer the reward of lower business rates for participants who report TCA data and show clear evidence of incorporating social and environmental metrics into business practice.

6. Clear definitions of food loss, food waste, surplus, inedible parts and destinations of food loss and waste, and development of government recognised language for system-wide standardisation of data recording

There is a clear disparity in the use of food-system-associated terminology which creates distortion of data, confusion in protocol, and provides a method for passing FLW to another stakeholder. Clear, government recognised definitions should be established to form a 'common language' for continuity and collective action towards reducing FLW. Having this common language would enable the creation of standardised FLW measurements and the accurate quantification of sustainability data, thus building a foundation for the future widespread implementation of TCA.



Further research and development

Current FLW data predominantly focuses on food waste due to the increased availability of this data. Current food loss data needs to be updated to present a balanced view between food loss and food waste. The recommendations of mandatory measuring and reporting of food loss will support this need for updated data.

There is a need for further development of infrastructure support for FLW distribution hubs. This includes a database and network of relevant schemes and metrics that can be used to generate and encourage TCA principles and practise. Metrics could include, but not be exclusive to carbon footprinting, socio-economic values and animal welfare parameters that could be linked to current animal welfare assurance schemes. Metrics and schemes for sustainable development should be recognised in one place. Research and development to combine these metrics to create a simple, holistic labelling system encompassing the 17 UN SDGs would be beneficial and could also be used to incentivise behavioural change across all stakeholders. Using the SDGs within labelling for food products acts as a standardised key for buyer choice. Additionally

it becomes recognised in the public forum for the progression of sustainability both within, and outside the context of food. Foundation Earth are currently trialling environmental rating labelling for food packaging in collaboration with several major UK retail organisations⁴³. This type of labelling could provide consumers a method for making environmental and ethical choices. Our recommendations will support these areas through stronger measuring of data, and the defining of FLW.

Further research is required to determine whether food pricing can not only reflect market activity, but whether prices can also reflect the external costs and what implications these price changes might have on socio-economic groups. Lastly, further investigation into whether healthy food with low environmental costs is more economically viable compared to ultra-processed, 'unhealthy' foods that are bad for the environment when all external costs are accounted for. This could support the introduction of dynamic costs into the food system, however 'unhealthy' would need to be strictly and consistently defined.



Conclusions

Systemic change is a difficult problem to address. According to the focus groups we conducted, opinion is divided on whether a whole system shake-up is necessary, as opposed to small incremental changes. True Cost Accounting can be perceived, and is described in many formats, ranging from; entirely repurposing the food system and using externalities to inform real-time product pricing (true pricing). Other stakeholders suggested that TCA should only be used as an informative tool without price changes, and small incremental changes should be made to implement TCA principles. After discussing with stakeholders and based on literature, we suggest that TCA should not be disregarded; but to implement TCA may require a simplified supply-system. We have made our recommendations to provide a pathway to a functioning True Cost Accounted, sustainable food system.

TCA's principles and frameworks are useful tools for increasing understanding and engagement with the social, economic and environmental aspects of sustainability, and of how the food system impacts these. By emphasising the diverse, and often overlooked externalities of the food system, TCA can be informative to all stakeholder groups: It should be used to influence and positively change culture through all points of the food system. We propose that collaboration is key to making a systemic impact. These changes should be approached by all organisations within the food system, and could be supported by the government in educational support and financial aid, using policy to incorporate the principles of TCA and the UN sustainability goals.



“ *I think at policy level [TCA] will help bring different ministries and authorities together around a common shared vision – that we are producing this much waste, let's not point fingers at each other, we are all in this together, we are all responsible.* **”**

Policy Campaigner

Acknowledgements

This work was funded by the Global Food Security (GFS) as part of the Policy Lab programme, in which doctoral and post-doctoral researchers compete to write an annual policy-facing think-piece. This report was edited on behalf of the GFS programme by Dr Lottie Chapman, Jude Powell and Dr Riaz Bhunnoo). A particular note of gratitude for the participants of the Focus Groups (stakeholders across the food system), without whom this work would not have been possible. Namely:

Dr Aisyah Faruk
Royal Botanic Gardens: Kew

Martine van Weelden
Capitals Coalition

Dr Annabel De Frece
*Centre for Development, Environment and Policy,
SOAS*

Maryam Rezaei
Food and Agriculture Organization

Ben Lake MP
Ceredigion, Member of Parliament

Pete Belk
Business in the Community

Prof Bill Davies
Lancaster University

Dr Saher Hasnain
University of Oxford

Prof Carol Wagstaff
University of Reading

Prof Tim Hess
Cranfield University

Dr Caspar Chater
Royal Botanic Gardens: Kew

Vera Zakharov
Sustain

Dr Christian Reynolds
University of London

Veryan Bliss
Suncrop Ltd

Dr John Ingram
University of Oxford

Some participants who participated in the Focus Groups decided to remain anonymous and are not listed.


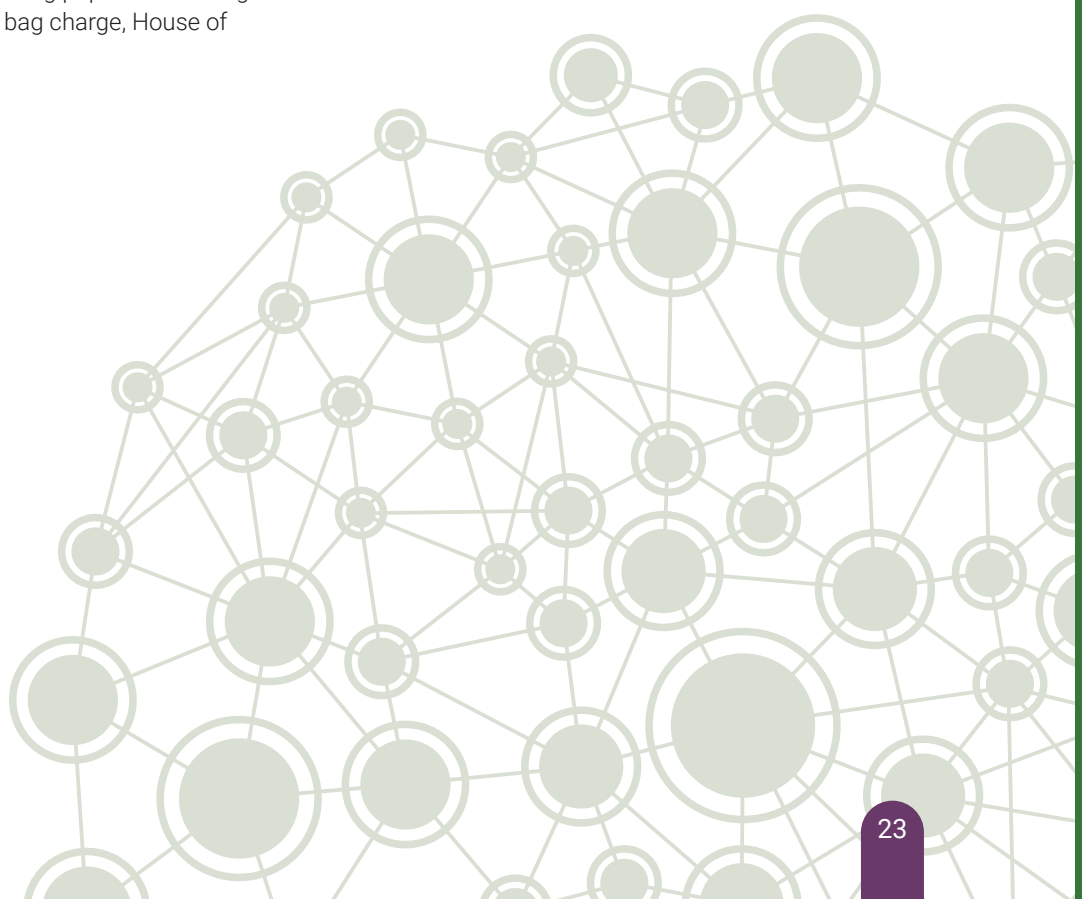
Katie Powell
Resource Futures

The authors would also like to acknowledge the UKRI projects that supported their funding (ES/S012435/1 (BB); BB/S020330/1 (AC); BB/P028225/1 (AC); BB/P028241/1 (AC); ES/S008160/1 (AM); BB/J014567/1 (JP); BB/T508883/1 (MB); ES/V011723/1 (SM)).

The authors are grateful to their respective host organisations during the development of this work; Aberystwyth University, Cardiff University, Lancaster University, Royal Veterinary College, Stockholm Environment Institute York-University of York and Ulster University.

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