Food waste and net zero ambitions

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Abstract

This chapter discusses the significance of food, its climate impacts, the scale of food waste in hospitality businesses, its causes and barriers to action. It concludes that net zero claims will be difficult to fulfil without addressing the issue of food and specifically food waste prevention in the industry. Technological solutions are unlikely to emerge in the short term and effective action will require changes in behaviours among all of those who are involved in the procurement, processing, service, consumption and disposal of food to deliver against these commitments. The information presented in this chapter is derived from learnings that have emerged from multiple research studies and practical consultancy projects commissioned by a range of clients from foodservice and hotel sectors, which focussed on the topic of food and food waste prevention. These have collectively utilised a combination of waste audits, reviews of service standards, observation, interviews with managers, corporate head office staff and individual employees in hotels and hospitality businesses located predominantly in the UK and Europe.

Keywords: Food waste, Pro-environmental Behaviours, Climate change; Carbon Reporting; Hospitality, Behaviour change

1. Introduction

Surveys of public opinion demonstrate a consistently high level of concern about environmental degradation worldwide. European Commission (2019), for example, report that nine out of ten Europeans consider protection of the environment to be very important to them and a growing proportion want more action to be taken to ensure the environment is protected. Research undertaken by the Pew Research Centre states that more than 70% of Chinese nationals rank themselves as moderately or very concerned about air and water pollution or food safety. Concerns about environmental protection in the USA lag behind those in Europe (especially when it comes to the issue of climate change). Nevertheless, Pew Research Centre reported in 2020 that:

"Given a choice, the majority of Americans think protecting the environment should take precedence over developing more energy supplies, even at the risk of limiting the amount of traditional supplies the U.S. produces."

(Pew Research Centre, 2020)

When it comes to reducing the environmental impact of humans, consideration of the way in which food is produced, processed, distributed, served and disposed of will be essential. According to the UN Food and Agricultural Organisation (UNFAO), food is responsible for 34% of carbon emissions globally (UN Food and Argicultural Organisation (UNFAO), 2021). Moreover, global agricultural systems are responsible for almost half of global water pollution and around 72% of fresh water consumption (UN Food and Agricultural Organisation (UNFAO), 2021). Over-and-above these impacts, the global food system is contributes towards a range of other environmental issues, many of which interface with climate change, including soil degradation, biodiversity loss, desertification and deforestation. Whilst carbon emissions associated with food have declined against a 1990 baseline relative to the contribution of other sectors, total emissions have increased.

"Spanning from land-use change and agricultural production to packaging and waste management, food system emissions were estimated at 18 billion tonnes of carbon dioxide equivalent in 2015. That's 34 percent of the total, a share that is gradually declining - it was 44 percent in 1990 - even as food systems emissions kept increasing in absolute amounts."

(UN Food and Argicultural Organisation (UNFAO), 2021)

Hospitality is often overlooked in reports that are focussed on the environmental impacts of food, but the sector is a significant consumer of food products. In the USA, for example, the average consumer unit (similar to a household) spent nearly half of its food dollars on food away from home in 2018 (US Bureau of Labor Statistics, 2018). In Spain, the comparable figure was 34% (World Health Organisation, 2021).

Despite the scale of impacts associated with food production and the relationship between these and climate change, a high proportion of food that is produced continues to be wasted. UNEP estimate that as much as one-third of all food produced worldwide is wasted (UNEP, 2021) and research by WRAP (2013) indicates that hospitality businesses across the UK are responsible for around 0.92 million tonnes of food waste per year. In the UK, the hotel industry is directly responsible for 79,000 tonnes of food waste (WRAP, 2013). In total, it is estimated that the hospitality sector in the UK creates 12% of all food waste arisings, significantly more than the 3% that are attributed to the retail sector (Dray, 2021).

"Much attention will rightly be paid to energy generation and transport at COP26, but we ignore the food system at our peril ... There is little talk about the contribution that strategies around food and drink can have to climate action, and it is vital we raise awareness and drive action among policymakers and businesses at COP26."

(Michael Gover, CEO of WRAP as quoted in Food Service Footprint, October 2021)

There is a growing recognition that a failure to address food consumption and food waste in sectors including hospitality will undermine efforts to achieve targets for broader environmental issues, including those related to reducing carbon emissions. Food waste is becoming more significant as an issue in hospitality businesses (see for example, the quote below from Aramark) and there are a range of Government initiatives that have been set up to help businesses reduce their impacts, including the Courtauld Commitment (managed by WRAP in England and Wales), Scotland's Zero Waste initiatives and the US Department of Agriculture Food Loss and Waste champion programme.

"*We work to continuously minimize our footprint through our waste reduction efforts. Reducing waste is a core commitment for Aramark and as a U.S. Department of Agriculture Food Loss and Waste 2030 Champion, we are committed to reducing food waste in the U.S. by 50% by 2030 from our 2015 baseline*"

(Aramark, 2021)

Nevertheless, food waste within the sector has a lower profile than the associated issues of energy and water consumption. At a time in which the interlinked issues of climate change and food security are topping the political agenda and global hunger is on the rise for the first time in a decade (9.9 percent of people globally are thought to go hungry (Nguyen, 2020)), there are moral as well as environmental dimensions to this debate. There are also very practical issues at a time at which food procurement costs are rising and there are obvious opportunities for reducing these by tackling waste. This has specific significance as hospitality organisations emerge from Covid with depleted capital reserves because food is one of the most significant costs associated with running a hospitality business. These make addressing the issue of food in general and food waste in hospitality of critical significance for the future.

2. Key concepts in the climate narrative, food and waste narrative

There is consensus among the scientific community that climate change is an existential threat to the future of the human race. Scientists estimate that as at 2022, there are 12 years in which to stop the planet from warming above 1.5 degrees centigrade. 1.5 degrees is the point at which 70 to 90% of coral reefs are likely to die off worldwide (this may sound bad but it is better than the 99% that are predicted to be lost at a warming of 2 degrees C). It is also the point at which weather events that are even now extremely rare become more common and at which popular tourist destinations may begin to feel the pressure from sea level rise, popular ski resorts may fail to have reliable snow and many of the species on which ecotourism depends are likely to come under more pressure. To put it bluntly, climate change is no longer something that can be discussed in the future tense. It is happening and now and is already impacting on the global tourism system.

2.1 Climate change and greenhouse gas emission reporting

Under international regulatory frameworks, most very large companies report on their contribution towards climate change by measuring their emissions of Greenhouse Gases (GHGs). These emissions are typically reported in tonnes of carbon equivalent ($TCO2_e$) or millions of tonnes of carbon equivalent ($MTCo2_e$). Within most reporting frameworks, companies are able to choose whether they report on scope 1, 2 or 3 emissions. Scope 1 emissions come from sources that are owned or controlled by the company (for example, energy produced by generators on site and/or company owned vehicles). Scope 2 emissions include energy generated off site but consumed by the company when creating its core products or services (for example, electricity purchased by a company from an energy supplier). Scope 3 emissions include all other indirect emissions that occur in a company's value chain (for example, emissions created by agricultural businesses who supply food to a company) (Carbon Trust, 2022). In hospitality businesses, food production and food waste disposal often fall into scope 3 emissions and are set out of scope for reporting.

Examples from businesses that have reported on the footprint of scope 1, 2 and 3 emissions indicate that the discourse around climate change is often divorced from the narrative around

the associated issue of food consumption and food waste in tourism and especially hospitality. Accor, for example, reported in 2016 that much of its water footprint comes from the agricultural supply chain rather than the food preparation activities etc. that are associated with the business itself. In the same report, they identify 11% of their carbon footprint is food and drink related:

"… of the 544 million m3 of water consumed by the Group, 86% is used for agriculture and 10% is directly consumed in hotels"
(Accor Hotel Group, 2016, p8)

WTTC estimate that Scope 1 and 2 emissions associated with the accommodation sector totalled 324 million $TCo2_e$ in 2019 (World Travel & Tourism Council, 2021). When scope 3 emissions are included, they estimate that agriculture accounts for 8% of total travel and tourism related carbon emissions and food and beverage activities around 9%.

It is the case that many hospitality businesses have made efforts that go over-and-above regulatory requirements to reduce their carbon footprint (primarily Scope 1 & 2 emissions), in some instances reporting impressive results. IHG, for example, reported energy consumption reductions of up to 25 percent between 2013 and 2017 as a result of its 'Green Engage' sustainability programme. Commitments to reducing emissions are generally very specific, focussed around reducing energy consumption and enabled by technology. Initiatives to tackle food and food waste related emissions are, however, often less specific. Hilton, for example, state in their 2021 Environment and Social Governance Report to have "established global food waste reduction program and collaborated with WWF and the hotel industry to develop a standardized waste measurement methodology" (Hilton, 2021, p. 17). Targets on the issue of food waste are less specific, reporting less consistent and the process of change typically depends on adapting the behaviours of employees rather than technology.

2.2 Defining food and food waste

Food is the term used to describe any substance that was produced with the intention that it would be consumed by humans. Food waste is the term that is used to describe any substance that was at some point intended for human consumption and that is disposed of regardless of the choice of disposal route (i.e. foods that are composted and sent to landfill are both considered waste). It is important to acknowledge that some waste is inevitable and WRAP (2013) divide food waste into two categories, of which, hospitality businesses are usually referring to the latter when they speak of food waste:

- Unavoidable wastes, comprised of items that arise from food or drink preparation and that are not, and have not been, edible in normal circumstances. These items include meat bones, egg shells, pineapple skin, vegetable peelings and tea bags.
- Avoidable wastes, comprised of food and drink items that were once suitable for human consumption but thrown away (e.g. slices of bread, apples, meat).

Essential to the narrative about food and food waste is the concept of waste prevention. Waste prevention is typically presented as the most favourable environmental option within the waste hierarchy as indicated in Figure 1. Waste prevention focuses on taking measures to ensure that food does not become waste by, for example, better matching the quantity of items purchased to those that are likely to be used; finding ways to extend the life of items or taking steps to

find new uses for those items beyond their initial and intended use. Only once waste prevention options have been exhausted should sustainable waste disposal options be considered.

Figure 1 – The Food and drink material hierarchy

In an industry that has as its core premise the concept of plenty and in which the regulatory environment to protect human health from food contamination is rigid, the concept of prevention is not always easy to progress and much reporting in the sector is based on food waste disposal, rather than food consumption *per se*.

2.3 Food and food waste and the concept of value

There is a disconnect at the core of the narrative around food and food waste in hospitality environments and the way in which value is ascribed. Food in its fresh state is ascribed a value that significantly exceeds its nutritional qualities or financial cost. It is the key element of the selling proposition, often used as a way to differentiate between competitor businesses and the recipes that are used to produce it can be the subject of costly intellectual property disputes (see, for example, the controversy that arose in Austria over the recipe for and right to produce the sachertorte). For some hospitality businesses, food also provides an expression of the culture of the place in which the business is located or is a source of pride that is associated with the origin of the business owners. For others, food is an art form, created by professional chefs who command annual salaries that are many multiples of the average annual wage in a hospitality environment.

Food waste on the other hand, is perceived as something that lacks any value. It is often managed by kitchen porters who are among the lowest paid hospitality employees. It is considered as something that is dirty, potentially hazardous and needs to be disposed of as cheaply and quickly as possible.

Given the relative dissonance between perceptions of the value of food as a commodity and a waste, it is surprising just how quickly the former transitions into the latter. Figure 2 describes the stages through which food passes in a typical hospitality business as it transitions from an item that has value (food) to one that does not (waste).

Figure 2 – the food process in hospitality businesses

Source: RHP Ltd combined with WRAP, 2011

As is evident in Figure 2, food can transition into waste at multiple stages. The point at which the transition happens largely depends upon a number of factors, most notably:

- *The way menus are planned.* A business that has multiple units, each of which serve a standardised menu will have a different food waste profile to a single business that procures as much of its produce as possible from highly localised sources.
- *Food procurement choices.* Organisations that have multiple units and for which all food is purchased by a centralised procurement team that sources most products in large volumes and from a global supply chain months in advance of actual consumption will have a different waste profile to those that have an in-house team that makes all of the buying decisions based on their perception of likely need in the days or weeks before it is consumed.

- *The processes that are in place for receiving food deliveries and moving food stuffs from the point of delivery and into fridges, freezers and store cupboards.* Some businesses have highly routinised food ordering and delivery processes whereas others have more flexible arrangements. The number of deliveries and nature of these arrangements will influence the amount of food that is wasted within the business.
- *The way in which food is prepared and cooked.* The use of fresh versus frozen or pre-prepared ingredients and the skill levels of food preparation teams will all have an impact on the food waste profile of the business. Processes such as pre-preparation and bulk cooking in advance of actual orders being received can ensure that customer wait times are minimised but can create food waste in those instances in which customer volumes do not match predictions. Cooking from fresh upon receipt of orders, conversely can support the achievement of food waste reduction ambitions but increase the amount of time customers need to wait to receive those orders with potential negative implications for perceptions of service quality.
- *The style of food service will play a critical role in how much food is wasted.* Businesses with buffet style operations will have a different (and often higher) food waste profile to those that provide an at table service.
- *The food waste disposal mechanism*. Research by Chawla (2019) indicated that the end destination of food once it becomes waste could influence the extent to which employees in hospitality contexts seek to implement prevention measures. Food waste disposal to non-landfill sources (such as composting) can be perceived by some staff as of equivalent value to waste prevention initiatives and – as a result – they reduce the efforts they make to prevent waste from occurring.

All hospitality businesses can take steps to reduce food waste at each of these stages as indicated in table 1.

	Waste prevention options available
Menu planning & Food procurement	Many businesses will make menu-planning decisions significantly in advance of the date on which food is actually served to customers. Large businesses, for example will plan menus that rotate for each season some six months to a year in advance of the menu being visible to customers. Smaller businesses will plan menus on a more *ad hoc* basis. Whichever approach is taken, good quality information is critical to match menu choices to customer demand and prevent waste. Information which can help menu planners reduce waste includes information about: menu choices that are popular with customers; menu items that have been particularly unpopular with customers; the number of ingredients (or Stock Keeping Units – SKUs) required to create menus; items that create waste because they are complicated to cook or the kitchen team lack the skills, use a large number of highly perishable ingredients; weather conditions that are typical over the period for which the menu will be current; the costs of producing each menu choice (ideally including the costs of energy and water consumption, the ingredients and the staff time taken to prepare the item). Streamlined menu planning processes feed into food procurement decisions. They enable food procurement teams to buy ingredients in the right quantities and at the right time (informed by knowledge about what is in stock); order pack sizes that are appropriate for each business

	unit; and trade-off decisions about whether it is better to buy fresh ingredients or to source those that are pre-prepared.
Food deliveries	Food deliveries are generally made on a regular basis and need to follow routine processes such as those that require chilled foods to be stored in a fridge within a specific timeline. Many businesses have effective systems that ensure that: new food deliveries are placed behind older stock on shelves (known as *first in first out* or FIFO); damaged goods are returned to the supplier; and deliveries are streamlined to ensure staff have enough time to store new products.
Food preparation and cooking	Food preparation and cooking systems will be dictated by whether food items are cooked from scratch, in batches or from pre-prepared products. In any instance, food waste can arise if: the kitchen team do not have the skills to cook the items on the menu; the volume of food that is pre-prepared does not match customer demand; staff are not provided with sufficient time for food preparation; and/or equipment fails to perform adequately.
Food service	Food service can significantly influence the food waste profile of a business. Table service can help prevent food waste, especially in environments in which staff are able to adjust the food offer to meet specific client needs (e.g. small portion offers). Plate size can play a role in buffet environments and there are a range of studies that indicate that the volume of food taken by consumers can be reduced by changing plate sizes and/or providing guidance on what constitutes a portion (see for example, (Matzembacher, Brancoli, Maia, & Erikkson, Vol 114, 2020). Apparently simple choices like the type of garnish provided can influence food waste as can Brand Standards and/or standard operating procedures that dictate portion size, fill level for buffets and so on.
Food disposal	Research by Chawla (2019) demonstrates that staff are often not able to trade off the relative environmental benefits of food waste prevention and non-landfill food disposal options. In a study in UK and German hotels, it was evident that instances in which compost or waste to energy solutions are installed to ensure that food waste is not sent to landfill employees perceive that environmental issues are already being managed and thus they do not need to act.

It is clear that there is a great deal of knowledge about waste prevention options at each of these stages. There are, however, a significant number of barriers to their implementation as explored below.

3. Barriers to preventing food waste

Barriers can be categorised into five broad areas. Although described separately, these barriers can combine in hospitality businesses to create an operating culture in which waste is considered a cost of doing business, rather than the loss of a valued resource which has implications for climate change.

3.1 Structural barriers.

These largely relate to issues that lie outwith the direct control of the hospitality business itself, but that influence its waste profile. They include:

- Regulatory frameworks that have unintended consequence (for example those that make donation of edible but unpackaged food from hospitality businesses to charities illegal or place the duty of care for food donated through these systems on the hospitality businesses that provide the food rather than the charity that redistributes it).
- Mechanisms that do not include the environmental costs of food production in the price charged at point of sale. These can incentivise procurement of food from production systems that produce food cheaply because they treat the environment as a free resource. There is a long running debate about this issue (see for example Pieper et al.,2020).
- Food systems designed to stimulate growth in demand, for example, by providing multiple variations of the same product (for example mayonnaise flavoured with garlic, chilli, etc.), thus encouraging purchases of multiple items that may perish before being used to service customers.
- A system in which it is common for ingredients that are purchased in bulk to be charged at a lower unit price than those that are purchased in smaller quantities. Thus, a small volume of a product can cost more than a larger volume of the same product.

These structural factors combine with the very low cost of waste disposal in many countries to hasten the transition of food from something that is perceived as of great value to a waste product.

3.2 Infrastructural barriers.

These relate to the range, age and adequacy of equipment essential for maintaining food quality. It includes within its scope:

- The efficiency of equipment, including investment in items that can extend the shelf life of foods (e.g. blast chillers, which can quickly and efficiently reduce the temperature of hot and warm food),
- The use of equipment that can reduce the life span for foods (for example, buffet systems in which the lighting creates heat close to the food shortening the length of time for which it can be displayed).
- Technologies such as food composting. As reported above these were found by Chawla (2019) to have the unintended consequence of undermining staff enthusiasm for individual behaviours that prevent food waste from occurring in hotels, despite the environmental and cost benefits from food waste prevention.

3.3 Organisational barriers.

Organisational barriers relate to practices that have been introduced into hospitality businesses and that are embedded into written brand standards and/or written or informal operating procedures. Typically, the aim of these is to ensure that service quality is maintained, but they can include provisions that are contrary to food waste prevention measures. In buffet service systems they may, for example, state that a pre-specified minimum fill rate will be maintained throughout the entire period of food service regardless of the flow of customers. They can also

specify the length of time that customers should wait for food to be served (thus encouraging excessive pre-preparation of foods), standardised portion sizes that exceed customer expectations, dictats that all items on the menu must be available for customers to choose from at all times and/or specify that a large range of items should be available on the menu at all times (thus encouraging the purchase of ingredients to service those items even if they are rarely ordered).

3.4 Cost barriers.

Like other businesses, hospitality organisations often trade-off between cost, environment and service quality factors on an ongoing basis. Buffet style food service systems are perceived to be cheaper to operate because staffing is perceived to be more expensive than food waste.

3.5 Behavioural barriers.

These relate to practices that become embedded into hospitality organisations and shape routinized behaviours. Critical among the behavioural barriers and reported by numerous research papers (e.g. Chawla *et al*, 2021) is a perception among employees in hospitality businesses that food waste is inevitable and thus, despite their individual beliefs that food should not be wasted, they are not empowered to prevent it. Moreover, division of responsibility for mandating and implementing behaviour change around food waste in hospitality workplaces presents a situation in which employees are asked by managers to engage in tasks that may match their personal values but are unpleasant, for example sorting of waste for recycling (Ones et al.2010). These behaviours are often reinforced by a culture in which there are conflicts between messages concerning food waste prevention and customer satisfaction.

It is widely acknowledged, that the timeline to address regulatory and infrastructural barriers is likely to exceed the 12 years that remain in which the human race needs to take substantive action to reduce climate change. In 2011, for example, Morris stated that it took an average of 17 years to implement a UN Resolution. There is a growing recognition, therefore, that the best hope lies in changing human behaviours (Stern & Dietz, 1994) (Steg, 2007) and in the case of hospitality this means addressing the organisational and behavioural and cost barriers listed above as a priority.

4. The art of changing human behaviours

Over the last 20 years a significant body of literature has emerged into the art of changing human behaviours, led by the ground breaking research of (Stern *et al.*, 1999). The term Pro Environmental Behaviours (PEBs) is used below, defined as 'Behaviour that is taken with the intention to change (normally, to benefit) the environment' (Stern *et al.*, 1999).

Much of what is known about PEB comes from domestic and public environments. Studies by Young *et al. (2015)* and Staddon *et al.* (2016) among others recognise that workplaces have different characteristics to households and interventions to change behaviours in these environments will differ from those in the domestic sphere. Knowledge about the implementation of PEBs in hospitality environments is nascent. The general literature provides some insights into factors (some contradictory) that may be important when seeking to stimulate PEBs in the workplace. These include:

- Positive personal pro-environmental values, and congruence between these values and those of the organisation (Steg *et al.*, 2014; Yoon et al., 2016);
- Strong environmental underpinnings to the organisational culture that engage employees in enacting PEBs (Chan & Hawkins, 2012; Zhang et al., 2013);
- Positive leadership attitudes towards the environment, which influence employees propensity to take action (Wesselink et el., 2017);
- A set of formal and informal rules of behaviour that are consistent, accepted as legitimate by all members of the organisation (Haire, 1962) and that govern employees' behaviours (Tudor et al., 2008);
- Social or financial sanctions for those who fail to comply with the stated behaviours (Owens & Steinhoff, 1989); and
- Shared meanings that recognise the various perspectives of stakeholders who are being asked to act, regard different perspectives as legitimate and explore options to create a desired future (Afsar & Umrani, 2020).

Within the context of changing behaviours to favour waste prevention in the workplace, it seems likely that hospitality businesses have some of these elements in place, most notably corporate statements of environmental values that are important to the organisation. However, their effectiveness when it comes to food waste prevention is largely under-explored and the way in which these statement interface with operational and cost barriers requires more evaluation to provide a framework for change.

5. In conclusion

Many tourism and hospitality businesses have introduced programmes to deliver reductions in carbon emissions, many making claims to achieve net zero within the next decade or so. Most of the action to deliver on net zero ambitions to date has focussed on reducing energy consumption, mainly relying on technological interventions that, for example, switch equipment off when not in use.

The contribution that food production makes to climate change is significant and hospitality is a significant consumer of food. At the current time, however, too few hospitality companies recognise the scale of carbon impacts associated with food consumption and food waste or take steps to account for this in carbon reporting. Indeed, many continue to accept the carbon footprint of food procurement and food waste as an inevitable consequence of operations. The high visibility of food waste in particular presents a significant reputational risk that those companies that continue to perpetuate the status quo vis-à-vis food waste whilst also laying claim to net zero. As the data provided in this paper demonstrates, consumers are increasingly aware of the climate crisis and willing to take direct action against those companies that they perceive to make misleading green claims.

To answer the question posed at the start of this text, therefore, it is clear that a re-evaluation of attitudes towards food will be necessary to deliver on net-zero claims. Even in the current climate, in which public concern about the environment and food costs are at an all-time high, however, the scale of the challenge should not be under-estimated. The root causes of food waste in the sector are complex and multifaceted. Delivering change will require determination and a genuine commitment that extends significantly beyond the boundaries of business as usual and engages hospitality companies in rethinking all aspects of their product offer.

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Rebecca has worked in the travel industry for the last 25 years. She started her career working in hotels and landscape management before joining the World Travel & Tourism Council. She has worked with some of the largest travel companies in the world helping them to create their responses to the sustainability challenges raised (initially) by the Rio de Janeiro Earth Summit. She has subsequently made input into policies and programme that have shaped the sustainable tourism movement. She still works regularly for large companies as well as international conservation organisations, destinations, travel trade associations and charities, advising on a wide range of issues from reducing plastic pollution, conserving water, enhancing the local contribution of tourism and destination management. Recently, she has been on projects that bring creative and tourism professionals together to develop experiences that reflect the essence of place. Rebecca delivers much of this work within her own business (RHP Ltd). She is also a part time lecturer at Oxford Brookes University.

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