World Sustainable Hospitality Alliance

Decarbonizing Hotel Food Systems

December 2024

In collaboration with

IBEROSTAR HOTELS & RESORTS

FERRA CARTA

Sustainable Markets Initiative

NetPositiveHospitality

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At Iberostar, sustainability is not just a part of our business; it's central to our strategic vision and embedded into every facet of our operations. We are committed to creating a hospitality model that fosters positive relationships with both people and the planet, ensuring a regenerative future.

Addressing the environmental impact of food in the hospitality sector presents unique complexities, especially for hotel chains operating across borders with diverse concepts. This involves managing a broad network of suppliers, navigating regional variations, finding tailored solutions, and accurately measuring both our inputs and outputs.

However, these challenges also present valuable opportunities for growth. Hotels are in a unique position to reshape food supply chains and drive innovation from within. At the same time, we have the potential to inspire and engage our guests on this journey.

We've seen firsthand how our guests have embraced our sustainability initiatives, discovering new flavors and concepts, as a result. Importantly, we've seen that high-quality food and sustainability go hand in hand—enhancing the guest experience, and lowering our footprint without compromising on excellence.

This paper provides a clear roadmap for the industry, highlighting the need for collaborative action and sparking the conversation on how we can collectively support the shift towards a more sustainable food future.

The hospitality industry holds a crucial position in shaping our global food system, driven by an ever-increasing demand for food. Yet, the prevailing model of food procurement and consumption in hotels often relies on emissions-intensive ingredients and generates significant waste, resulting in an unacceptably high carbon footprint.

While many hotels are leading the way in implementing solutions to reduce their environmental impact, navigating the complexities of this challenge can be daunting. To support our members on this journey, we are excited to introduce a groundbreaking paper that offers the first comprehensive analysis of our industry's food sustainability challenges, paired with actionable solutions.

We envision this paper as a vital resource, guiding hotels in their sustainable food initiatives and shaping our shared agenda at the Alliance.

Together, let us foster meaningful discussions and collaborations that will empower us to tackle this challenge and pave the way for a more sustainable future in hospitality.

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About this report

This paper was produced by Systemiq in partnership with Iberostar Hotels & Resorts, the World Sustainable Hospitality Alliance and the Sustainable Markets Initiative (SMI). The paper was undertaken in consultation with members of the hospitality industry to explore how hotels can shift to more sustainable food systems, with particular attention on how to reduce food-related emissions. The work received invaluable inputs from Alliance members, other hospitality players, and sustainability experts, allowing Systemiq to develop a clearer picture of the environmental impacts that today's hotel food systems have, and identify the key solutions that will have the biggest impact. The paper builds on the rich research and landscape of initiatives that already exist in the space, including the One Planet Sustainable Tourism Programme, a UN Tourism and UNEP initiative.

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Acknowledgments

The report team is grateful to Alexandre Musso (Accor); Niki Walsh (Hilton); Alicia Alonso, Rafael Carmona, Katherine Danby, Fran Díaz, Erika Harms, Nicholas Komisarjevsky, Alvaro Sanchez, Salvador Serra (Iberostar Hotels & Resorts); Denise Chen (Melco); Tony Adams (&Beyond); WRAP; Vojtech Vegh (Surplus Food Studio); Edwina Hughes, Cam Petersen (WRI); Rosalyn Marshall, Nanne van Doorn, Jose de la Fuente, Julia Koskella, Hannah Audino, Jane Leung (Systemiq).

Particular thanks to Winnow for the food waste analysis provided for this report.

Contributors and their respective organizations do not necessarily endorse all findings or recommendations of the report.

The authors would like to thank Gina Campbell for editing the paper and Lauren Bloom for designing and producing the report. All remaining errors and omissions are the responsibility of the authors.

About Iberostar Hotels & Resorts

Iberostar Hotels & Resorts is a 100% family-owned Spanish multinational company that aims to deliver a responsible tourism model focused on caring for its guests, people, communities and the environment. It has more than 100 4- and 5-star hotels in 14 countries.

The company has earned recognition for its efforts in promoting a responsible tourism model that prioritizes the well-being of both people and the environment. With quality and sustainability embedded throughout the business, the company positions the circular economy as the cornerstone of its strategy. Pursuing its own 2030 Agenda, goals include becoming waste-free by 2025, attaining carbon neutrality by 2030, ensuring complete responsibility in its seafood supply chain by 2025, and enhancing the health of the ecosystems that surround its hotels, among other objectives.

Iberostar Hotels & Resorts has a global team of over 35,000 people from 95 different nationalities. Their unwavering commitment to quality serves as a key differentiator, driving continuous improvement, innovative products, and exceptional customer service.

About the World Sustainable Hospitality Alliance

The World Sustainable Hospitality Alliance brings together the hospitality industry and strategic partners to address key challenges affecting the planet and its people, local destinations and communities. They develop practical free resources and programmes to create a prosperous and responsible hospitality sector that gives back more than it takes. Their members represent over 55,000 hotels – totalling more than 7 million rooms – and include world-leading companies including Choice Hotels International, Marriott International, Hilton Hotels & Resorts, IHG Hotels & Resorts, Hyatt Hotels Corporation, BWH Hotel Group and Radisson Hotel Group, as well as regional brands. Their network also includes other parts of the hospitality value chain, including owners, investors and suppliers, to further drive joined up action on sustainability, and accelerate the industry on the path to net positive hospitality.
For more information, please visit:
www.sustainablehospitalityalliance.org

About the Sustainable Markets Initiative

The Sustainable Markets Initiative was launched by His Majesty King Charles III, then The Prince of Wales, in 2020 at the World Economic Forum's Annual Meeting in Davos. As the 'go-to' global private sector organisation on sustainable transition, the Sustainable Markets Initiative's power to convene top organisations from industry and the financial services, alongside governments, is key to innovating, accelerating and delivering on a just, sustainable and prosperous future.

The Sustainable Markets Initiative's mandate, better known as the Terra Carta, has a mission to build a coordinated global effort to enable the private sector to accelerate the achievement of global climate, biodiversity and Sustainable Development Goal targets. The Terra Carta was launched in 2021 at the One Planet Summit and reflects a set of guiding principles and bold actions to 2030 - putting Nature, People and Planet at the heart of global value creation.

About Systemiq

Systemiq, the system-change company, was founded in 2016 to drive the achievement of the Sustainable Development Goals and the Paris Agreement. It does this by supporting the transformation of markets and business models in five key systems: nature and food, materials and circularity, energy, urban areas, and sustainable finance. A certified B Corp, Systemiq combines strategic advisory with high-impact, on-the-ground work, and partners with business, finance, policy-makers and civil society to deliver system change. Systemiq has offices in Brazil, France, Germany, Indonesia, the Netherlands and the UK.

Executive Summary

Food is central to the hotel experience and can be pivotal to a hotel's success. Yet managing food well is a complex operation. Many hotels provide three meals a day, prepared on site and covering a much wider range of guest needs and expectations than most other food service operations.

Mounting external pressures, such as risks to supply and rising costs, are adding even greater complexity to hotel food operations and posing risks to business continuity. Hotels can be particularly exposed to these risks compared to other food system actors.

At the same time, sustainability is a growing challenge to hotel food systems and to the world's food systems in general. Today's food systems are responsible for one quarter of all global greenhouse gas (GHG) emissions and are also depleting biodiversity – crucial for producing food – at an alarming rate.[1, 2] Much of this damage arises from growing demand for resource- and emissions-intensive foods, particularly meat, unsustainable farming techniques, and high levels of food loss and waste. Letting these trends and practices continue makes climate change worse and food systems increasingly fragile and unreliable.

While these issues are not specific to hotel food systems, hotels have a disproportionate impact on the global food system relative to the number of meals they serve. Although hotel meals account for less than 0.5% of all meals consumed worldwide, they contribute 1% of global food-related emissions and 3% of global food waste.

This is largely because of the higher emissions intensity of typical hotel meals, high rates of food waste in hotels and their inefficient use of resources overall. Analysis for this paper found that hotel food systems today generate 185 million tons of CO_2e emissions a year. That means if hotel food was a country, it would be in the top 25% of nations ranked by their emissions. Food sourcing accounts for by far the largest share of hotel food system emissions at over 60% of the total. Other sources are food waste, plastic packaging for food, and energy used in kitchens.

These combined challenges are straining the viability of current hotel food systems. But they also present significant and exciting opportunities for improvement. Reshaping food offerings in hotels will not only reduce emissions but also boost hotels' business resilience and broader environmental sustainability. Decisions about sourcing, menus, and food preparation can have far-reaching effects on nature (including saving water), reduce costs, improve guest satisfaction, and enhance the reputation of brands.

Implementing solutions can help hotels continue to serve plentiful, high-quality meals and avoid unnecessary costs. There are many readily available solutions that hotels can put in place today, several with attractive business cases. A majority of actions are operational changes rather than technological, achievable through behaviour shifts in teams. Some solutions pay for themselves through efficiency gains, while others have longer-term sustainability payoffs.

1 Joseph Poore and Thomas Nemecek. 2018
2 Biodiversity is the variety and variability of animals, plants and micro-organisms at the genetic, species and ecosystem levels that sustain the ecosystem structures, functions and processes in and around production systems, and that provide food and non-food agricultural products

Making food systems sustainable helps foster connections with guests. It also makes a hotel business more resilient, as well as helping companies meet their climate and nature goals.

This report sets out a pathway to reduce aggregate GHG emissions from hotel food by 30% by 2030, cutting nearly 70 million tons a year from the sector's footprint as well as delivering benefits for nature and communities.

Over half these potential emissions reductions come from food sourcing. Action on sustainable sourcing is by far the most urgent, as it could yield more than half of the total potential reduction in emissions. The actions are not necessarily technologically complex, but do require behaviour changes for teams. Training will play an important role here.

EXHIBIT 1

Summary of key levers and impacts

Lever	Impact			Solutions
	Emissions	Nature	Communities	
Waste and source less food	10-14 Mt reduction	Reduced land use change and deforestation Reduced water use	Support local communities through food donations	Let data drive procurement Make optimal use of ingredients Help guests to avoid wasting food Give away surplus food still fit for consumption Find uses for surplus food unit for consumption
Source more sustainably	27-35 Mt reduction	Reduced land use change and deforestation Protected biodiversity Better soil health Reduced water use and pollution	Support local producers Protect community environments	Offer more plant-rich options Source sustainably produced ingredients
Use less plastic packaging	0.8-1.2 Mt reduction potential	Reduced pollution of land and oceans	Protect community environments Promote local circularity solutions	Conduct a plastic audit Eliminate single use plastic used by guests Reduce use of B2B plastic packaging
Optimize kitchen energy use	8-17 Mt reduction potential	-	Support development of sustainable and affordable energy systems	Improve kitchen practices Switch to energy efficient appliances Switch to renewable energy sources
Total emissions mitigation potential	**46-67 Mt reduction**			

Rethinking food in hotels can also inspire wider change in global food systems. Hotels can use their combined significant procurement muscle to bring solutions to a larger scale. Encouraging more sustainable eating habits among their guests can inspire more environmentally friendly choices that continue well beyond each hotel stay, and even extend to choices beyond food.

Hotels have an opportunity to position their industry as a pioneer driving positive systemic change toward a sustainable future. This report sets out the tools hotels need to succeed.

3 Systemiq analysis – see Technical Annex for more information

01 Introduction

Delivering fresh, delicious food is crucial to the success of a hotel. It involves interacting with a wide variety of businesses and individuals to feed guests at the standard that they expect: farmers, fisheries, aggregators, manufacturers, packagers, caterers, waiting staff, transport providers, waste managers and, of course, the guests themselves: all are involved in a complex food system unique to each hotel, depending on its size, ownership, location and its offer to guests.[4]

This makes hotels different from other hospitality settings such as restaurants or cafés. Hotels, particularly larger properties, typically operate on a much larger scale, serving guests multiple meals a day, often around the clock. Hotel food is also an important contributor to brand value: most hotel guests expect regular meals of consistent quality and for some, what's on the menu swings their choice of where to stay.

However, the ways in which hotels are currently sourcing and preparing food are unsustainable. External pressures like supply chain disruptions, rising costs and regulations are further challenging the status quo. It is clear that change is needed, but it can be difficult for hotels to know where to start.

4 See Chapter 2 'Defining hotel food systems' for an explanation of food systems

Myth

"Cutting fossil fuels is the only way to fight climate change"

Reality

Global food systems must be reshaped as well because they produce up to a third of global greenhouse gas emissions today. Farming animals, overusing fertilizer and expanding the area of farmed land are the main culprits.

Source: Joseph Poore and Thomas Nemecek. 2018; Crippa et al. 2021.

This paper is intended to set out a pathway towards a more sustainable food future for hotels. It begins by defining hotel food systems and how they operate today. Next it sets out the case for change, exploring the risks arising from current hotel food practices, from carbon emissions to negative impacts on ecosystems and communities, as well as external pressures that hotels face. It then outlines the steps hotels can take to transform their food systems and reduce their environmental impact. Overall, it encourages hotel leaders to critically assess the food they serve and explore new pathways to build more sustainable and resilient food systems across the industry.

The paper is based on research carried out by Systemiq and extensive consultation with hotels and sustainability experts.

It focuses on hotel food systems, including any food that is sourced and/or produced by hotels. It does not explicitly cover broader hospitality settings such as non-hotel restaurants, cafes and bars, although some of the challenges and solutions will also apply in these contexts.

While comprehensive, this paper is not intended to exhaust all challenges and solutions relating to hotel food systems. Instead, it focuses on the biggest problems and on the most impactful solutions. Explanations of the climate impact of hotel food systems have been provided where relevant to introduce the reader to key concepts. For readers seeking more in-depth information, sources have been suggested.

02 Defining hotel food systems

Hotels deliver food to their guests in many different formats. These range from multiple restaurants and buffets in all-inclusive resorts and Michelin-starred dining rooms in luxury hotels to the simpler offerings in bed and breakfast establishments. In some settings, for example hostels, guests might use the kitchens to prepare their own food. In many hotels, guests have several eating options to choose from, possibly including a breakfast buffet, an à la carte restaurant, room service and a minibar. To serve food in their chosen formats, each hotel develops its own unique food system, sometimes working within the framework of a larger food system run by the hotel group it belongs to.

The term 'food systems', sometimes referred to as 'food and land use systems', covers every factor in the ways land is used and food is produced, stored, packed, processed, traded, distributed, marketed, consumed and disposed of. It embraces the social, political, economic and environmental systems that influence and are influenced by those activities.

Food from aquatic systems, both marine and freshwater, is also included.[5] In this paper we talk about food systems thus broadly defined as well as hotel-specific food systems. They are related because hotels operate within global food systems and are subject to macro challenges and trends. At the same time, hotel food systems have some unique characteristics and challenges which are relevant to efforts to make them sustainable.

To develop and manage their food systems, hotels and hotel groups have to engage with a wide variety of different businesses and individuals, both directly and indirectly. All these players and their interactions make up the typical hospitality food system shown in Exhibit 3. The links and feedback loops in the exhibit show that this is a highly complex system, made up of many interacting value chains, some of which are complex in their own right (see Exhibit 2 'What makes a cup of coffee?').

Hotels deliver food to their guests in many different formats. These range from multiple restaurants and buffets in all-inclusive resorts and Michelin-starred dining rooms in luxury hotels to the simpler offerings in bed and breakfast establishments.

5 As defined by the Food and Land Use Coalition

EXHIBIT 2

What makes a cup of coffee?

It can be hard to imagine all the steps that have taken place before a single type of food or drink reaches our plate or cup. Consider a cup of coffee. The exhibit below shows everything that must happen to produce one cup of coffee for a guest, and the impact of this one value chain along with the impact on the environment.

EXHIBIT 3

Mapping a typical hotel food system and key factors

How a hotel engages with other actors in its system will vary by the type of hotel business and its country or region. There is no one-size-fits-all system.

For instance, hotels in a group may have much of their food procured for them by a central procurement function. Local, individually run hotels may buy all the food they use themselves.

Whatever the structure of a hotel business, its menu and food purchasing decisions have enormous influence over the other actors in its food system, whether it buys from farmers directly or from traders. Hotel businesses can use that influence to shape supplier behaviour, their own operations and the choices made by guests.

03 The case for change

3.1 Risks facing hotel food systems

Hotels need well-functioning food systems to continue producing what their guests want. Yet current food sourcing practices are threatening the viability of that system. The pressures are exacerbated by supply chain disruptions, inconsistent regulation, and climate change itself.

In recent history, food systems have been very resilient at the macro level, but have serious vulnerabilities at the local level. Hotels are more exposed to sudden breaks in supply chains than other sectors.

Making hotel food systems sustainable is therefore an urgent priority for hotel businesses around the world.

There is much more at stake than projecting a green image: failing to secure and future-proof its food supply could threaten a hotel business's continuity. Responsible practices are also key to protecting the destinations where hotels operate .

Climate change and extreme weather, degradation of nature and geopolitical conflicts are all increasing the risk of supply chain disruptions and higher costs. Major new regulation, much of which is in response to climate change, may also translate into higher costs as well as reputational risks for those who do not comply. The table below explains what is driving these risks.

TABLE 1

Risks facing hotel systems

Risk drivers	Explanation	Nature of risk		
		Disrupted supply	Increased costs	Reputational risks
Climate change and extreme weather	Climate change is putting further strain on food production. Specialty crops like coffee and cocoa, for example, are particularly vulnerable to climate change. Coffee is grown in mountain ecosystems and climates that are changing rapidly, making the crop unviable in many places. Erratic rainfall and higher temperatures, caused by climate change and El Nino, led to a significant drop in cocoa production last year, quadrupling prices in April 2024 compared to the previous year.[6] Food production itself is also contributing to climate change: conversion of land for agriculture, often leading to deforestation, is generating significant carbon emissions. Climate change is also disrupting supply chains. In 2023, many cargo ships were forced to take roundabout routes avoiding the Panama Canal because drought had reduced the canal's capacity by more than a third.[7]	✓	✓	
Degradation of nature	Current patterns of food production worldwide are having a large negative impact on the environments we depend on for food. Intensive farming techniques are depleting nature, especially biodiversity and water sources. Fertilizer run-off, waste from animals and large volumes of wastewater from farms, often containing agrochemicals, organic matter and sediment, are all contaminating habitats, rivers, lakes, seas and oceans. The plastic packaging used to transport and store food also often ends up polluting nature. All of this is degrading ecosystems which in turn are less able to produce healthy, delicious food.	✓	✓	
Geopolitical conflicts	Geopolitical shocks are also causing disruptions: for example, cargo ships have been avoiding the Suez Canal because of drone attacks. The highest risk in the short run is to fresh produce which will rot if it doesn't get to market quickly. Longer term, all goods on those ships become more expensive.	✓	✓	
Regulation	Regulations on the production and imports/exports of certain food products and ingredients are becoming more stringent to combat climate change and rising geopolitical risks, Many regulations will require more detailed reporting on sourcing practices and demonstration of efforts to prevent or mitigate the impacts of business activities. Consider, for example, the EU Deforestation Regulation (EUDR), the Corporate Sustainability Due Diligence Directive (CSDDD) and EU Corporate Social Responsibility Directive (CSRD). In the short run compliance may increase costs, but failure to comply will represent higher costs in the long run.		✓	✓
Increased scrutiny on tourism	Multiple countries are seeing a backlash against tourism where it pushes up prices and puts local resources like water under strain.[10] This is increasing pressure on hotels to act in a way that is responsible to the destinations where they operate.			✓
Changing consumer expectations	Linked to the increasing scrutiny of tourism, consumers are asking more of the brands they buy. 75% of global travelers have said that they wanted to travel more sustainably.[11] These trends are particularly strong among younger consumers: research by the Harvard Business Review found that when Gen Z and Millennial customers believe a brand cares about its impact on people and the planet, they are 27% more likely to purchase it than are older generations.[12]			✓

6 International Food Policy and Research Institute. 2024. 'Soaring cocoa prices: Diverse impacts and implications for key West African producers'
7 Associated Press (2024). 'Panama canal traffic cut by more than a third because of drought'
8 Biodiversity is the variety and variability of animals, plants and micro-organisms at the genetic, species and ecosystem levels that sustain the ecosystem structures, functions and processes in and around production systems, and that provide food and non-food agricultural products
9 Reuters (2023). 'Red Sea attacks force rerouting of vessels, disrupting supply chains'
10 See for example 'Protests over mass tourism could spread beyond Spain, says Unesco official', The Guardian 2024; 'Water emergency becomes part of Mediterranean summer ritual', The Financial Times 2024
11 Booking.com. 2024. Sustainable Travel Report 2024
12 Harvard Business Review. 2021. 'Research: Consumers' Sustainability Demands Are Rising'

These risks are not unique to hotels. But hotels are more exposed to the supply chain shocks that climate change, degradation of nature and geopolitical conflicts are triggering. This is because shocks to food systems have had devastating impacts at local levels even though food systems have historically been resilient at the macro level.[13]

Hotels are arguably more vulnerable to such supply chain disruptions because they face more pressure to continue to deliver fresh, locally sourced food and are less able to fall back on pre-packaged or frozen food. They may also be in remote locations with restricted access to alternative supplies.

3.2 The impact of current hotel food systems

As well as being exposed to all the risks described above, hotels are also making an outsized contribution to the negative impacts of today's food production on climate and nature. Hotels are responsible for 3% of global food waste and 1% of all food sourcing despite providing less than 0.5% of all meals eaten each year worldwide (Exhibit 4).

This outsized contribution is driven by a business model that requires hotels to offer a wide range of food for up to three meals a day and minimize the risk of running out of options at any meal. It is a model bound to lead to overordering and overpreparing.

EXHIBIT 4

Hotels have an outsized impact on food consumption and waste

Hotel food systems today are responsible for an estimated 185 million tons of GHG emissions each year, equivalent to the annual emissions of 40 million petrol-powered cars.[14] This volume places hotel food systems in the quartile of countries with the highest GHG emissions, between the Netherlands and the United Arab Emirates (Exhibit 5). The high emissions are driven by hotels' relatively high consumption of emissions-intensive ingredients like meat, and also high rates of food waste.

The rapid growth of the hospitality industry over the next decade (projected to be faster than global GDP) and the rising number of trips made each year make improving the impact of hotel food systems on climate, nature and communities a pressing issue.[15]

13 See for example the sudden ban on the import of synthetic fertilizers and pesticides in Sri Lanka in 2021 which, by being implemented very abruptly and without sufficient support to farmers, led to reductions in crop yields, poor food security and increased food imports. See also the effects of El Niño and La Niña: in 2011, for example, parts of east Africa including Kenya experienced their driest periods in 60 years

14 Based on an average of 4.6 tons GHG emissions per car per year. United States Environmental Protection Agency. 2023. 'Tailpipe greenhouse gas emissions from a typical passenger vehicle'

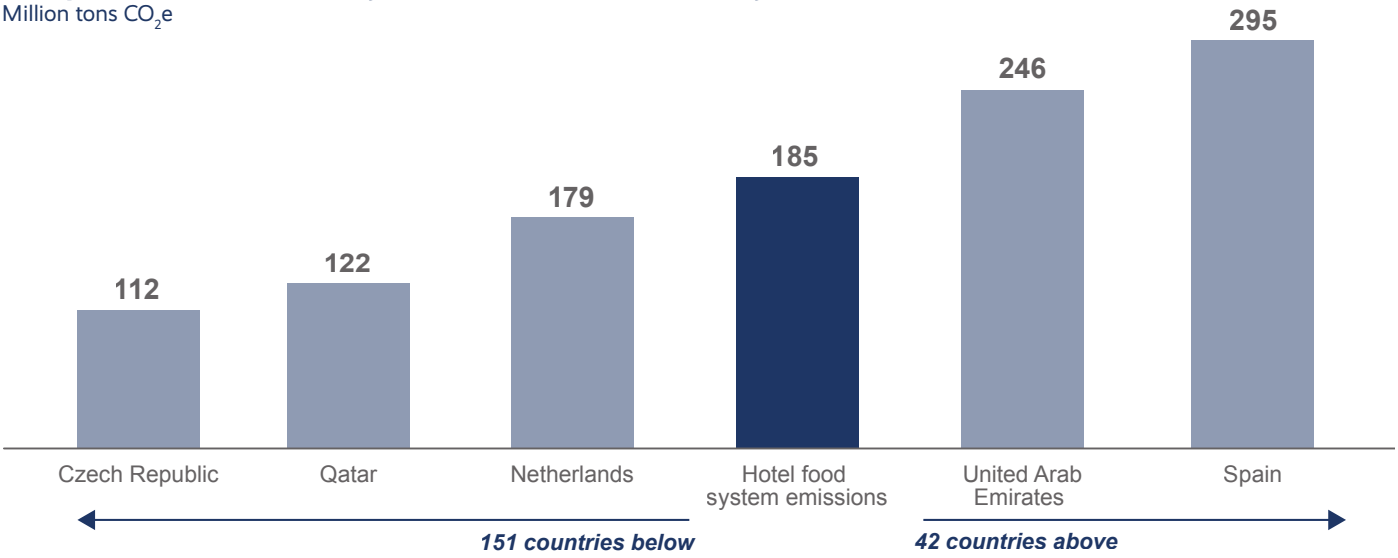
15 Travel and Tourism GDP contribution is projected to grow at a CAGR of 3.7% to 2024, compared to 2.4% for the wider economy. International arrivals are projected to grow from 1.4 billion in 2024 to 2.4 billion in in 2034. World Travel & Tourism Council, 2024. Travel & Tourism Economic Impact 2024

EXHIBIT 5

If hotel food was a country, it would be in the top 25% of nations ranked by their emissions

Comparison of hotel food system emissions with country emissions

Million tons CO_2e



Sources Systemiq analysis based on FAO data; WRI, Climate Watch emissions data

Tackling this issue effectively requires a detailed understanding of the dimensions of the problem. Quantifying the impact of hotel food systems on climate, nature and communities is challenging because of the lack of consistent data. However, where data can be found it is invaluable for setting priorities.

This paper therefore focuses predominantly on the impact of hotel food systems on climate, which it is possible to estimate from their greenhouse gas emissions, while taking into account the harder-to-quantify impacts on nature and communities where relevant. In many cases, actions that reduce emissions also deliver benefits for nature and people.

Hotel food system emissions stem mainly from four emission-intensive features

3.2.1 Current patterns of food sourcing

- 3.2.1.1 Emissions intensive menus
- 3.2.1.2 Farming methods
- 3.2.1.3 Food loss during production

3.2.2 Food waste in hotels

- 3.2.2.1 Kitchen waste
- 3.2.2.2 Plate waste

3.2.3 Plastic food packaging

- 3.2.3.1 Guest-facing single-use plastic
- 3.2.3.2 "Behind the scenes" plastic

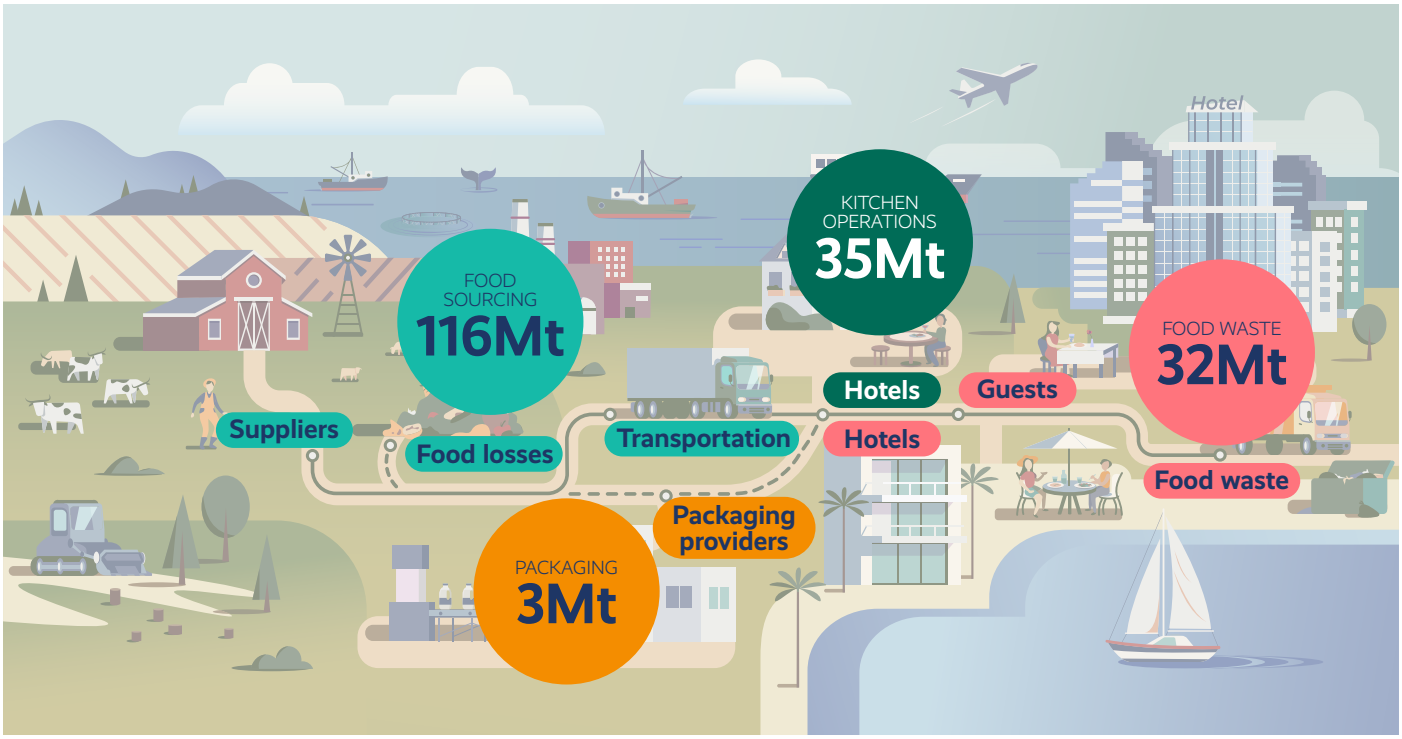
3.2.4 Kitchen operations

- 3.2.4.1 Energy intensive appliances
- 3.2.4.2 Wasteful practices

The rest of this chapter provides a deeper dive into each of these four emissions drivers.

EXHIBIT 6

Today's hospitality food system generates over 185 million tons of GHG emissions - nearly two thirds of this (62%) is from food sourcing



3.2.1 Current patterns of food sourcing

116Mt → **62%**

Total hotel related emissions

of total hotel food emissions

Some 159 million tons of GHG emissions are generated from producing food sourced by hotels. The key drivers of these emissions are choices concerning what we are eating, how it is produced, and how much food is lost along the value chain before reaching hotels. Tackling these upstream emissions in hotel food systems is critical to reducing hotels' scope 3 emissions.[16]

Sources of upstream emissions from hotel food systems also include the energy required for producing, processing and transporting food products.

However, emissions from these sources are rarely significant components of total food product emissions except for foods that are air freighted.[17] Hotels in locations that are highly dependent on imports, like islands or remote lodges, will buy more air-freighted food.

These emissions do not not include emissions from food that is sourced but ends up as waste. Emissions from wasted food are covered in section 3.2.2.

16 The Greenhouse Gas protocol defines each scope of emissions as follows: Scope 1 emissions are direct emissions from owned or controlled sources. Scope 2 emissions are indirect emissions from the generation of purchased energy. Scope 3 emissions are all indirect emissions (not included in scope 2) that occur in the company's value chain, including both upstream and downstream emissions.

17 For most food products, transport accounts for less than 10% of total emissions and an even smaller share of emissions intensive products. In beef from beef herds, for example, transport is on average less than 0.5% of the overall footprint. Our World in Data.

What is driving the emissions?

3.2.1.1 Emissions intensive menus

Some foods and diets are more emissions-intensive than others because of their need for land, which drives deforestation, and also prevailing farming and food transport methods. Analysis for this paper estimates the emissions from a typical hotel meal to be three times higher than the global average, driven by higher overall consumption of emissions-intensive foods such as meat.[18] Producing beef emits around 20 times more GHGs per unit of protein than plant-based alternatives.[19]

Demand for land to satisfy consumer demand for meat and dairy foods is the main reason for the continuing deforestation and conversion of wild spaces into farmland worldwide.[20] Around 45 million hectares of forest – roughly the size of Sweden – was converted to pastureland for cattle between 2001 and 2015.[21] The expansion of farmland is releasing significant amounts of carbon dioxide stored in trees and soil. It puts pressure on ecosystems critical to sustaining human and other life forms including tropical rainforests and carbon-rich peatlands.

Livestock also generate emissions through the methane produced by their stomachs and manure and the feed they consume. There is no 'emission free' way to raise cattle: cattle fed more grains need less land for grazing, but this land saving is offset by the extra land needed to grow their feed. However, adopting lower-meat and dairy diets can reduce emissions from this source.

3.2.1.2 Farming Methods

Agricultural yields of staple crops increased remarkably in the second half of the 20th century thanks to innovations in seeds, fertilizers and irrigation.[22] However, these innovations have enabled intensive farming practices that generate high emissions and costs to nature. For example, fertilizers have several serious environmental and social costs: fertilizer production is energy-intensive; once spread on fields, fertilizers produce nitrous oxide, an air pollutant; if overused, they deplete soil health; and excess fertilizer that washes off farmland ends up polluting water systems.[23] Practices such as monoculture farming have also significantly degraded soil quality, making land more susceptible to flood damage and pests and less resilient to drought and disease, reducing yields overall.[24]

18 Systemiq analysis, based on datapoints around increased consumption both in terms of volume and emissions-intensive products when eating in hospitality settings compared to at home. See Technical Annex for more information.
19 Searchinger et al. 2019.Creating a Sustainable Food Future.
20 Food and Agricultural Organisation (FAO). 2020. The State of the World's Forests 2020 https://openknowledge.fao.org/server/api/core/bitstreams/dfb12960-44ee-4ddc-95f7-bec93fbb141e/content
21 World Resources Institute (WRI) Global Forest Watch
22 Based on FAO data from the early 1960s to 1989-1991.
23 Soil health is the continued capacity of soil to function as a vital living ecosystem that sustains plants, animals, and humans. Soil health includes physical, chemical and biological status.
24 Monoculture farming is when a single crop species is grown over a large area for consecutive seasons. It often requires higher inputs of synthetic fertilizers, pesticides and water.

3.2.1.3 Food loss during production

Some food sourced by hotels never reaches them but is lost before and during harvest, transportation and storage. Such losses are particularly common in frontier markets where cold chain infrastructure is scarce and pest damage more frequent. Choosing low-waste suppliers reduces this source of emissions. (Large volumes of food are also wasted after reaching hotels, left uneaten either in serving dishes or on guests' plates. In-hotel food waste is covered in section 3.2.2)

Impact on Nature

Current agricultural practices are linked to destruction of natural habitats, pollution and depletion of natural resources. These are all factors currently reducing biodiversity, which is crucial to maintaining the health and stability of ecosystems. Biodiverse ecosystems themselves produce the clean air, pure water, healthy soil, carbon sequestration and pollination that they need to flourish. By the same token, the loss of biodiversity compromises the resilience of agricultural systems, making them more vulnerable to pests, drought and extreme weather.

Impact on Communities

The encroachment of agriculture on formerly uncultivated land is damaging vital ecosystems around the world and putting communities that rely on them under pressure. For instance, today the livelihoods of one billion people depend directly on tropical rainforests. These are increasingly threatened by expanding agriculture.

Impact of fishing on Nature and Communities

Fish need less food than farm animals to produce 1 kg of flesh, so they also cost less in emissions than farmed meat. However, many species of fish are being overfished and their numbers are falling. See for example the Greenpeace Red List Fish, a scientifically compiled list of marine species at risk. It includes Atlantic Cod, the stocks of which drastically decreased in the 1990s due to overfishing and which have not yet fully recovered.

The number of overfished stocks globally has tripled in half a century and one-third of the world's assessed fisheries are currently pushed beyond their biological limits. This is disrupting marine ecosystems and the livelihoods of the more than 800 million people who depend on fish for food and income.

These problems mean wild fish are not necessarily a good substitute for meat on sustainable menus.

In the future, aquaculture will play a critical in sustainably producing more food from the sea. If done in the right way, the High Level Panel for a Sustainable Ocean Economy predicts that the ocean could meet two thirds of the world's protein needs by 2050. However, realizing this potential in a sustainable way calls for tackling key environmental challenges including ensuring sustainable feeding regimes to reduce pressures on wild fish; sourcing juveniles sustainably; managing the impact of waste on water quality; and adhering to best practice for antibiotic use. It is also key that aquaculture sites are planned and constructed in ways that do not lead to nature loss such as mangrove degradation.

Sources: *FAO; World Wildlife Fund (WWF). 2021. Seafood and People; Costello, C., L. Cao, S. Gelcich et al. 2019. The Future of Food from the Sea. World Resources Institute*

3.2.2 Food waste in hotels

32Mt → **17%**

Total hotel related emissions

of total hotel food emissions

Today, hotels source more food than they need. More than 20% of the food that is bought by hotels is thrown away uneaten - some in the kitchen, some after being served to guests.[25] This waste is additional to food losses further upstream, described above.

Hotels can source less food in total if they manage to reduce food waste, reducing overall food costs or freeing up budget for higher quality ingredients.

What is driving the emissions?

3.2.2.1 Kitchen Waste

Due to variable demand from guests that is often difficult to anticipate, hotels purchase and prepare more food that is necessary to avoid impacting customer satisfaction. When this ends up uneaten and/or spoiled, this generates waste. Another source of food waste is 'trimmings' – the parts of ingredients considered unusable, such as peels and leaves. Rates of food waste tend to be highest in hotels with several restaurants that offer all-inclusive packages and/or buffets. Hotels typically continuously replenish dishes in all of them so that no dish runs out. On average, kitchen waste represents 60% of the food wasted in hotels.[26]

3.2.2.2 Plate Waste

Plate waste represents 40% of food wasted in hotels.[27] This can be a result of over-large portions or ordering too much food.

25 Systemiq analysis, based on data from Winnow and UN Tourism. See Technical Annex for more information.
26 Based on Winnow data.
27 Based on Winnow data.

3.2.3 Plastic food packaging

3Mt Total hotel related emissions → **2%** of total hotel food emissions

Food packaging protects food when it is transported and helps it to meet food safety standards. However, a large share of food packaging is made from plastic, with its well-documented negative impacts on the environment.[28] Extracting the fossil fuels from which plastics are derived and converting them into plastics produces large amounts of greenhouse gases. There are different types of plastic packaging, and some are more circular than others: plastic bottles made from polyethylene terephthalate (PET) are generally recyclable, while flexible wrappers, like those used for confectionary, are typically not. Some types of plastic are also more suited to reuse. However, half of all plastic produced is designed for single-use purposes.[29]

This paper focuses on single-use plastic packaging rather than other packaging materials given its prevalence in hotel food-related waste and its relatively high pollution risks compared to other packing materials. An estimated 11 million metric tons of plastic waste enter the ocean every year. Without immediate and sustained action, that amount will nearly triple by 2040, to 29 million metric tons per year. This is equivalent to 110 pounds (50 kilograms) of plastic on every meter of coastline around the world every year.[30]

What is driving the emissions?

3.2.3.1 Guest-facing single-use plastic packaging

This includes packaging such as water bottles, yoghurt pots and confectionery wrappers. Some of it may be recyclable. However, wherever waste management infrastructure is scarce, even plastic that is technically recyclable may end up going to landfill, polluting nature or being burned, thus generating further emissions.

3.2.3.2 'Behind the scenes' plastic

Hotels use and receive a large amount of plastic 'behind the scenes' in the form of packaging used by suppliers and manufacturers to contain and transport hotel food, or by the kitchen team during food preparation and storage. Single-use, non-recyclable flexible plastic, such as plastic wrap (also known as cling film) is likely to end up in landfill, leak into nature or be burned. Packaging is often designed for retail contexts rather than large-scale catering, meaning hotels end up with a large number of small packages instead of more efficiently packed bulk deliveries.

28 See United Nations Environment Programmme's (UNEP) annual Global Waste Management Outlook for more detail on the impacts of plastic
29 UNEP
30 Pew Charitable Trusts & Systemiq. 2019. Breaking the Plastic Wave

Impact on communities

Plastic pollution can harm tourism, threatening the viability of certain destinations where plastic pollution is particularly severe and where proper waste management systems do not exist. In these places, plastic often ends up being burned, polluting the air and damaging health of local communities.

There is also emerging evidence of the negative impacts of exposure to plastic, particularly microplastics – for example through the water supply, on human health.

Sources: United Nations Development Programme (UNDP); World Health Organization (WHO)

3.2.4 Kitchen operations

35Mt → **19%**

Total hotel related emissions

of total hotel food emissions

Once food has reached a hotel, its kitchen operations generate more emissions because of the energy used to store and prepare food and to keep kitchens cool. Different types of meal or food will have different impacts on energy consumption in kitchens – dishes that need to be cooked on an open flame, for example, will generate higher emissions than those that can be prepared using electricity.

Introducing more energy-efficient practices and equipment can reduce these emissions substantially.

Total emissions from hotel kitchens are an estimated 35Mt a year. Energy used in hotel kitchens generally accounts for 15-25% of a hotel's overall energy use.[31]

What is driving the emissions?

3.2.4.1 Energy intensive applications

Running commercial appliances uses significant energy, which generates emissions unless that energy is renewable. Cold chambers (walk-in fridges) and ovens are particularly energy intensive. Using inefficient or outdated machines will produce even more emissions.

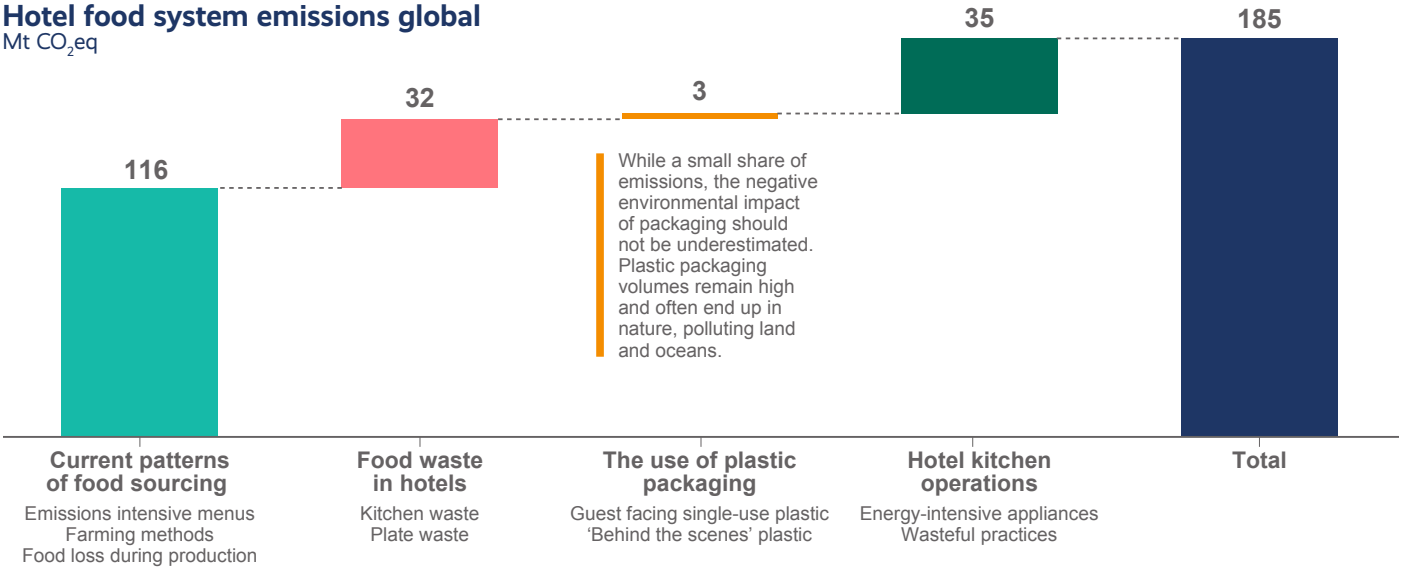
31 Based on interviews with hotels conducted for this paper. Reliable industry wide data is not currently available

3.2.4.2 Wasteful practices

Wasteful kitchen habits, such as leaving equipment switched on when it's not being used, add to emissions from this source.

EXHIBIT 7

Today's hotel food system generates 185 Mt of GHG emissions, of which over 60% is driven by what food is sourced and how it is grown



3.3 Regional Variation

The hidden costs to climate and nature of current hotel food systems shown above are global estimates. These global figures conceal wide variations in their causes and extent between regions and countries. The same ingredient produced in two different places will have two different carbon footprints.[32] Factors such as climate, soil, and farming practices all affect the emissions generated, as do water, land and fertilizer use.

Diets also vary by country, leading to regional differences in total emissions.

For example, beef consumption per head in the US is 2.5 times higher than in the EU, and more than 5 times higher than in China.[33]

Such local variations will affect the options for reshaping their food systems that hotel businesses choose to prioritize in their different locations. For this reason, it is important that hotels understand their particular footprints in order to identify solutions that will have the highest impact on the sustainability of their particular food system.

32 See Our World in Data 'How does the carbon footprint of protein-rich foods compare?' for examples
33 OECD-FAO Agricultural Outlook 2023-2032, via Our World in Data

04 Key actions for resilient and sustainable hotel food systems

What actions can hotels take to tackle the risks facing hotel food systems and grow their business at the same time? There are many actions for hotels to choose from, and several are set out below under four headings: waste and source less food; source sustainably; use less plastic packaging; and optimize kitchen operations. Hotels can choose the actions under these headings most appropriate to their footprint, type of business and location and implement them to shape food systems that are circular, regenerative and with much lower emissions.

We estimate that as a result of these actions, carbon emissions from hospitality food systems could be 30% lower than currently projected by 2030, avoiding 67 million tons CO_2e.[34] Achieving this reduction will help individual hotel businesses get closer to their net-zero goals. Action on sustainable sourcing is by far the most urgent, as it could yield more than half of the total potential reduction in emissions.

As well as reducing GHG emissions, these solutions can also have positive effects on nature and communities (see Exhibit 8).

34 Systemiq analysis – see Technical Annex for more explanation

EXHIBIT 8

Summary of key levers and impacts

Lever	Impact			Solutions
	Emissions	Nature	Communities	
Waste and source less food	 10-14 Mt reduction	 Reduced land use change and deforestation Reduced water use	 Support local communities through food donations	Let data drive procurement Make optimal use of ingredients Help guests to avoid wasting food Give away surplus food still fit for consumption Find uses for surplus food unit for consumption
Source more sustainably	 27-35 Mt reduction	 Reduced land use change and deforestation Protected biodiversity Better soil health Reduced water use and pollution	 Support local producers Protect community environments	Offer more plant-rich options Source sustainably produced ingredients
Use less plastic packaging	 0.8-1.2 Mt reduction potential	 Reduced pollution of land and oceans	 Protect community environments Promote local circularity solutions	Conduct a plastic audit Eliminate single use plastic used by guests Reduce use of B2B plastic packaging
Optimize kitchen energy use	 8-17 Mt reduction potential	 -	 Support development of sustainable and affordable energy systems	Improve kitchen practices Switch to energy efficient appliances Switch to renewable energy sources
Total emissions mitigation potential	**46-67 Mt reduction**			

Many of the solutions have attractive business cases and these are helping to speed their spread. But both the pace of change in the industry and its level of ambition must ramp up fast for hotels to avoid the risks set out in Chapter 3 and reap the commercial rewards of following a coherent and transparent plan to green their food systems.

This chapter breaks down the reductions in carbon emissions the hospitality industry can realistically hope to achieve by adopting these solutions. The figures are based on pathways to net zero identified for the industry, the progress made by hotels already taking action and the gathering pace of eco-innovation across the industry.

4.1 Financing Action

Many hotels struggle to prioritise the actions set out in this paper because they appear to need substantial additional investment but have an uncertain financial upside. While some of these solutions do indeed require sizeable upfront investment, hotels may be underestimating the scale and reliability of their returns. A majority of actions are operational changes rather than technological, achievable through behaviour shifts in teams. Many can deliver considerable cost savings by lowering spending on food, energy and other resources. Some help to meet rising demand from guests for hotels taking ambitious and credible action on sustainability, and providing unique, sustainable food experiences.

Taking action today also helps hotels to prepare for the future and stay ahead of the upcoming regulatory, climate and geopolitical risks set out in Chapter 3. By the same token, failing to prepare now is likely to add significant costs later.

Exhibit 9 provides a broad overview of the likely cost and return on each solution (an in-depth cost-benefit analysis would need research beyond the scope of this paper). All require a degree of operational changes, for which training will play a key role in implementation.

4.2.1. Waste and source less food >	Food waste can quickly be reduced, and less waste lowers food costs. Implementing food waste measurement tools can deliver a 2-10x return on investment. See Winnow case study library for specific hotel examples of cost savings.
4.2.2. Source more sustainably >	This requires more long-term effort to shift procurement practices. Costs are likely to outweigh additional revenue in the short term.[35] However, new regulation like the CSRD means that hotels will need to understand their supply chain and address unsustainable sourcing to comply. So it makes sense to reshape procurement practices in a way that is sustainable and resilient at the earlies opportunity.
4.2.3. Use less plastic packaging >	Many solutions are readily implementable and low cost. Others will require more investment and work with suppliers over the longer term.
4.2.4. Optimize kitchen energy use >	Using less energy use will translate into lower costs almost immediately. However, it will take time to break even against initial investment made in new equipment.

35 Certified sustainable products tend to be more expensive, Rainforest Alliance certified bananas, for example, are around 35% more expensive than non-certified. There is limited data on cost differences between certified and non-certified sustainable products in food service. This example is based on Systemiq analysis, using 2024 United Kingdom supermarket banana prices.

EXHIBIT 9

Overview of key financial implications per lever

Lever	Type of intervention	Costs	Return on investmnet	Payback
Waste less food	• Operational	**Low** • Invest in initial audit, storage and staff upskilling. • Ongoing costs for inventory management and /or data/ AI tools to continuously monitor sourcing/ inventory and food waste.	**Medium** • Reduction in food procurement costs.	**Short term** • Majority is opex (SaaS solutions exist) but small initial capex investment may be needed for storage/ technology. Costs savings are material and immediate (2-10x return on investment and cash positive within 2-4 months).
Source more sustainably	• Operational	**Medium** • Operational changes to shift procurement practices. • Menu development. • Higher cost of sustainable ingredients.	**Low** • Subject to harnessing premium pricing through effective marketing of sustainable and/ or locally-sourced dishes	**Long term** • Mostly opex. • Shifting to sustainable procurement will be a long-term and ongoing effort. • Costs likely to outweigh additional revenue in the short term.
Use less plastic packaging	• Operational • Technological	**Low** • Changes in procurement practices. • Implementation of new delivery models e.g. reuse. • Investment in new packaging solutions.	Low • Reduction in packaging costs.	**Medium term** • Some swaps can be made immediately, others will require working with suppliers or packaging providers over the longer term. Cost savings may be small and require time to outweigh initial investment.
Optimize kitchen energy use	• Operational • Technological	**Medium** • New equipment requires capex. • Training and operational changes to improve kitchen practices (marginal).	**Medium** • Lower energy bill thanks to reduced energy use through more efficient equipment and practices.	**Long term** • Whilst savings happen immediately, the capex nature of the investment may take long to break even.

4.2 Priority actions

4.2.1 Waste and source less food

10-14Mt
Emissions reduction potential

The Opportunity

Making sure no food is wasted is a crucial step in cutting emissions from hotel food systems given the extent of food waste in hospitality today and its cost in emissions.

Cutting food waste can also reduce the amount of food hotels need to buy, saving costs or freeing up budget for higher quality ingredients.

For example, Hilton hotels in 24 countries are saving more than $2M a year by reducing waste using Winnow solutions (see case study 1 for more information). Buying less food also reduces the amount of plastic packaging that ends up at hotels.

Six of the many opportunities for hotels to waste less food are listed below. Some can be introduced immediately; others may take more time.

A combination of clear communication of goals, staff training, and incentives are all key to the success of the solutions. Around 60% of possible actions to reduce food waste take place in the kitchen.

This guidance is in line with the UNWTO's Global Roadmap for Food Waste Reduction in the Tourism Sector, similarly rooted in the principles of the food waste hierarchy.

Key Actions

4.2.1.1 Let data drive procurement and meal planning

That means collecting guest and food waste data to understand different preferences and consumption patterns, and then using that data to inform decisions on what foods to buy and in what quantities. As a result, the amount of food bought matches actual guest needs. A Cornell study found that kitchens that started measuring food waste generated 29% lower food waste after three months. Upgrading to a system that used AI computer vision to automate the process led to a further 30% reduction in food waste.[36] Automating food waste measurement programs can help staff to keep them in place, which is essential for making continual progress.

4.2.1.2 Better data on guest habits

Understanding flows of guests into restaurants can help anticipate the amount of food required, particularly at the end of the service. Better data on guest habits can also help hotels reduce unnecessary use of buffets. It can be used to show when an a la carte service would be more suitable and help manage the flow of guests, allowing hotels to introduce more efficient food service practices. Better use of data enables hotels to avoid overproduction and prevent food waste before it happens. It is important to keep food waste measurement programs in place to avoid rowing back on progress.

36 Nu, Yu and Belavina, Elena and Girotra, Karan. 2024. Using Artificial Intelligence To Reduce Food Waste.

Case study 1: Tracking food waste to target interventions

Winnow's AI technology uses computer vision to identify, track and provide detailed data on food waste. This includes identifying the specific types of food being wasted most frequently – whether it's unused ingredients from the fridge or unserved food from the buffet. This data equips staff with an accurate view of the problem, enabling them to implement targeted strategies.

Winnow has worked with a range of hotels around the world. Their tool shows that hotels can reduce food waste by 40-70%, translating into major emissions savings as well as efficiency gains for the hotels. Chefs around the world are collectively saving $70 million a year using Winnow tools.

"Analyzing our trash was eye-opening. We realized that by rethinking how we handle our produce, from peeling more efficiently to repurposing overstocked items, we could significantly reduce our waste. It's surprising to see how much good food can be saved from being thrown away"
– Chef Rauzer Garcia, Executive Sous Chef of Swissotel Clark

Case study 2: Using AI to estimate the number of covers needed

It can be difficult for hotels to know how many guests will come through the doors each day and eat in the restaurant. This can be particularly challenging in hotels with multiple restaurants and all-inclusive resorts. To avoid the risk of running out, kitchens often end up overpreparing. The hotel industry could look to aviation for a potential solution: the airline KLM is using AI to better predict how many passengers who have booked will actually board a flight. The AI model was specifically developed for KLM and uses historical data to predict how much food will be needed, influencing decisions all the way from purchasing to loading. This allows the exact number of required meals to be calculated, leading to up to 63% less food waste. Annually, this amounts to a saving of more than 100 tons of food.

4.2.1.3 Make optimal use of ingredients

As well as being sustainable by design (see next opportunity), hotel menus can also be designed to minimize food waste. For example, they can favor dishes that use low waste ingredients or ingredients that can be used in many different meals or dishes and therefore bought in bulk. Some food waste is widely considered unavoidable, for example, some parts of fruits and vegetables like carrot tops and orange peel. But even these forms of waste can be reduced through creative meal planning (see Case Study 3 on Surplus Food Studio). Overall, more staff training and awareness can cut out a significant portion of pre-guest waste by introducing new behaviours, from extra care in the preparation of food to better food storage practices.

Case study 3: Reducing pre-consumer waste

Surplus Food Studio helps food service providers to reduce pre-consumer waste by showing all of the different ways to use every part of an ingredient. We have included a selection of examples here (tomato; orange; onion; potato):




Photo credit: Vojtech Vegh, Surplus Food Studio www.surplusfoodstudio.com

4.2.1.4 Help guests to avoid wasting food

Shrinking unnecessarily large portions, plate sizes and buffet serving dishes are easy ways to do this.

Case study 4: Minimizing waste during religious and social festivities

With reports from UNEP West Asia showing that food waste increases by 25% - 50% in the region during religious and social festivities, Hilton introduced measures to minimize waste during the holy month of Ramadan and drive awareness around food waste. In 2023, Hilton launched a Green Ramadan initiative across hotels in Qatar, the United Arab Emirates, and Saudi Arabia.

The campaign took an educational and interactive approach, using a range of interventions including guest messaging, smaller portions, artfully reduced food displays and switching to à la carte menus.

It led to a 61% reduction in food waste – equating to serving over 8,600 meals and preventing almost 4.8 tons of waste and over 14 tons of CO_2 emissions.

4.2.1.5 Give away surplus food still fit for consumption

In places where regulation allows it, hotels can donate any leftover food that still meets food safety standards to a food recovery partner, who makes sure the food goes to people who need it. This way hotels can demonstrate their social responsibility as well as avoid food waste. In places where donation is difficult or expensive, hotels can advocate for policies that would make it easier to donate.

4.2.1.6 Find uses for surplus food unfit for consumption

Hotels should always prioritize avoiding creating waste in the first place. Where hotels do end up with wasted food that is unfit for human consumption, there are alternatives to landfill. It can be used for composting, as feed for an onsite digester or local community anaerobic digesters or given to local farmers to use as animal feed or fertilizer, which returns nutrients to the soil. Some hotels may be able to use their reduced streams of waste food on site. Others with less space and resources may need to enter partnerships with local providers of circular food waste management services.

Case study 5: A circular solution for food waste and sourcing in city hotels

To tackle residual food waste and create a more local, circular food system, Melco has set up on-site composting.

At City of Dreams Manila, food waste is processed on site into compost using a large-scale composter. The weight of food waste reduces by roughly 86% through the composting process and the rich nutrients can be used as fertilizer. Over 21 tons of compost was harvested in 2023 at the hotel, a 30% increase compared to the previous year.

Some compost is used to support the landscaping across the property, but the majority of the compost produced is donated to local vegetable farms. The hotel also works closely with local hydroponic farms to purchase lettuce, tomatoes and kale.

A portion of the food waste is processed into vermicompost and vermitea through a vermicast system (using earthworms), which is used to directly to support a rooftop herb garden. A variety of herbs and calamansi are grown on site and used directly by the restaurants for a full closed loop food system. Over 6,600 tons of vermicompost and 5,300 liters of vermitea were produced in 2023, enabling 185kg of herbs to be harvested from the rooftop garden.

4.2.2 Source more sustainably

27-35Mt
Emissions reduction potential

The opportunity

Hotels can significantly reduce food emissions by designing sustainable menus. These are menus made up of dishes rich in low emission, sustainably produced ingredients that guests enjoy eating. They are likely to offer fewer meat-heavy dishes than today's menus, but this does not mean going completely meat-free. The key solutions are to a) reduce meat dishes and offer more plant-rich options and b) ensure that all ingredients sourced have been produced in a sustainable, low-emission way.

Unlocking the potential impact of sustainable menus depends on hotels enabling guests to make more sustainable choices. It will also be key to work with kitchen teams when designing new dishes, particularly where data on consumption history is available and can help to inform the way forward.

Key actions

4.2.2.1 Offer more plant-rich options

As shown in Chapter 3, meat and dairy products have a particularly high cost for climate and nature because they need large areas of land for grazing animals and for growing feed crops.[37] Farming vegetables and grains usually needs less land than raising livestock as well as less water and fertilizer per kilogram or calorie produced.

TABLE 2
Comparison of the environmental impacts of key food categories[38]

Food Group	Volume	GHG Emissions (kg CO_2eq)	Land Use (m^2)	Water Use (L)
Red Meat	1kg	43	205	1211
Pork	1kg	7	10	1073
Saturated Oils	1kg	7	9	738
Poultry	1kg	6	7	402
Other Crops	1kg	5	11	353
Eggs	1kg	5	6	583
Unsaturated Plant Oils	1 liter	4	12	502
Rice	1kg	4	2	1962
Dairy	1 liter	3	14	550
Fish	1kg	3	1	436
Added sugars	1kg	3	2	443
Legumes	1kg	2	6	328
Whole grains	1kg	1	3	463
Starchy Vegetables	1kg	1	1	26
Fruits	1kg	1	1	129
Vegetables	1kg	0	0	82
Nuts	1kg	0	5	1914

37 Food and Land Use Coalition. 2019. Growing better.
38 Poore and Nemechek. Update to 2018 paper.

Myth

"Grass-fed beef is good for the climate"

Reality

False, emissions are often higher than conventionally produced beef as more land is required at the fattening stage. However, grass-fed beef may have other benefits such as contributing to protecting or restoring high-biodiversity grasslands.

Source: Garnett and Godde. 2017. *Grazed and Confused?* Food Climate Research Network.

Certain types of seafood can offer more sustainable protein options. Putting more certified farmed fish on the menu or exploring alternatives to the traditional retail species will be a good option for hotels in many countries. Alternative options may also be cheaper. Additionally, oysters and mussels, long considered luxury food items, and other shellfish are highly sustainable when managed responsibly because they require very few inputs. This is because they are filter feeders, feeding by extracting nutrients and plankton from water while mitigating their assimilation of harmful toxins and pathogens. They are bioremediating, which means they improve water quality by accumulating nutrients.

Hotels might hesitate to change traditional menus in case guests don't want to change their eating habits. But pioneering chefs are showing that plant-rich options can be exciting and enticing to guests. The new fine dining restaurant at Raffles OWO puts plants at the center of the story, describing itself as hyper-seasonal. The chef is a UNESCO Goodwill Ambassador for Biodiversity. This example shows how innovative plant-rich dining can be packaged as an exciting dining experience for guests.

In other cases, the changes do not even need to be apparent to guests or packaged as plant-based options. They can involve replacing a small portion of meat in a dish with other ingredients. When the early adopters of the Coolfood Pledge reduced the share of beef and lamb from 9% to 8% of total food purchases, the group's per-plate GHG emissions fell by 21%.[39]

More people are seeking healthier and more sustainable options.

39 WRI. 2022. 2021 *Coolfood Pledge Collective Climate Impact Report.*

Last year the Hilton Trends Report found that 41% of travelers will be looking for healthier options to eat and drink as they travel and that an increasing number of diners are identifying as “reductarians” — those who reduce their meat consumption, particularly in the Europe, Middle East and Africa region.[40] In many cases healthy, nutrient rich food complements sustainability. Hotels can position their sustainable menus as an introduction to healthier, planet-friendly ways of eating. They can offer sustainable sourcing and cookery classes to guests and give them recipes to take home.

Moreover, a sustainable menu does not mean a restricted choice of boring or unappetizing foods. On the contrary, sustainable menus will still include regional dishes and reflect cultural differences, satisfying the many travelers for whom trying unfamiliar local food is a major reason for travelling.

Myth

“Eating sustainably means cutting out all meat, so it won’t happen”

Reality

Scientists recommend reducing, not eliminating, meat. Meat in limited quantities is an important part of a balanced diet, so scientists advise that regions with higher meat consumption must reduce it, whereas poorer regions must be supported to diversify and improve their protein sources.

Source: Willett, W., Rockström, J., Loken, B., Springmann, M., Lang, T., Vermeulen, S., Garnett, T., et al. 2019. “Food in the Anthropocene: The EAT–Lancet Commission on Healthy Diets from Sustainable Food Systems.” The Lancet 393, no. 10170: 447–92

Myth

"Eating soy and other meat substitutes destroys the rainforest"

Reality

Most soy is fed is fed to animals, which need to eat between 1kg and 20kg of feed for each kg of meat they produce, and require additional land for grazing. As a result the overall land and emissions footprint of meat and dairy products is significantly higher than for plant proteins like soy.

Source: Food Climate Resource Network, University of Oxford

Myth

"Plant-based diets offer limited variety and are unappealing to customers"

Reality

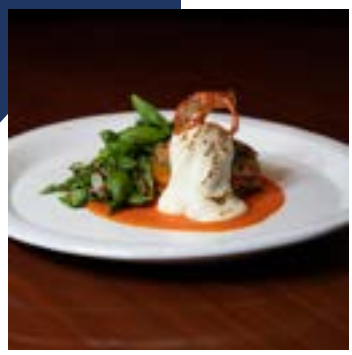
Plant-based diets allows for significant diversity of exciting and tasty food. Many traditional regional diets such as Cantonese, Mediterranean, South Indian are primarily plant-based and also cater to the growing number of people who are vegan, vegetarian and flexitarian.

Case study 6: Introducing guests to low-carbon dishes

During COP 28 in the United Arab Emirates, Accor piloted an initiative to encourage guests to make more sustainable food choices. The initiative had two main elements: the addition of carbon labels to menus to educate guests on the carbon footprint of each option, and the creation of special low-carbon dishes.

Carbon labels certainly had an impact on guest choices: 63% of those surveyed said the information prompted them to choose a less carbon-intensive option.

The new chef-designed dishes included a vegetable lasagna with a carbon footprint of 0.4 kg CO_2e, which is less than a tenth of the emissions of the beef version. It also included the "Planet Burger," which with a carbon footprint of less than 1kg CO_2e – similarly generating just a tenth of the emissions of a typical beef burger. This represents potential for major emissions savings through more plant-rich meals. However, hotels reported relatively few orders of these special dishes, signalling a need to find effective ways to nudge guests towards sustainable choices (see case study on Coolfood).



Case study 7: Enabling guests to make sustainable food choices

Hotels may be grappling with the challenge of how to serve more sustainable food options, get guests to actually make those choices, and still meet guest expectations for quality and taste. The Coolfood Food Service Playbook for Promoting Sustainable Food Choices was developed precisely to address this challenge, offering a practical approach focused on how to create an enabling environment that naturally guides guests toward more sustainable choices. Many of these actions require very small shifts, some of which guests may not even notice.

The Playbook recognizes that while many guests express a desire to make eco-friendly choices, there's often a gap between their intentions and their actual decisions. Rather than trying to change guest preferences directly, the Playbook suggests that hotels can subtly adjust the choice environment to make sustainable options more appealing and accessible. The Playbook provides an extensive list of behavioral changes to support this shift. A selection is included here:

- **Presentation:** the language used in menus and the placement of plant-rich dishes can significantly influence guest selections. Hotels can use indulgent language to enhance the appeal of certain dishes, as well as promote them as 'chef's special' or 'dish of the day'. Conversely, they have found that specifically labelling these dishes as 'vegetarian' or 'meat-free' and placing them in a separate section on the menu, can actually reduce the appeal.
- **Placement:** Strategically placing plant-rich foods can also be effective, particularly in buffet settings. This might include integrating plant-based meat alternatives into meat displays (clearly labelled), or setting out a dedicated plant-rich section.
- **Product:** Hotels need to ensure that the lower carbon, plant-rich options are delicious and appealing. This might require work to improve the flavor and texture of dishes, as well as improving the presentation for example through vibrant plating and creative garnishes. It will probably also mean increasing the ratio of plant-rich to meat-based dishes available. However, this does not mean cutting out meat completely. Significant emissions reductions can be unlocked simply by replacing a share of meat in a dish with plant-based ingredients. This is particularly applicable to dishes using ground or minced meat.

The success of these strategies demonstrates that significant reductions in diet-driven food emissions can be achieved without radically altering or restricting the guest experience. By creating an enabling environment that encourages sustainable choices, hotels can maintain their commitment to quality while also meeting their climate goals. The Coolfood Playbook provides a roadmap for how hotels can make these changes effectively, ensuring that sustainability and guest satisfaction go hand in hand.

Coolfood's playbook is one of the resources the Coolfood platform offers. Its initiatives also include the Coolfood pledge and a meal certification scheme, among others. Coolfood is an initiative of the World Resources Institute (WRI) that provides food service industry with the tools and expertise to reduce emissions by 25% by 2030.

4.2.2.2 Source sustainably produced ingredients

This requires sourcing ingredients produced using low-carbon sustainable practices, such as regenerative agriculture or from deforestation free supply chains.[41] Hotels need to define their particular sustainable sourcing goals because 'sustainable sourcing' covers several potential priorities under the umbrella aim of having positive impacts on nature, communities or climate. In this paper we focus on the goal of lowering adverse climate impact by avoiding or reducing emissions.

Hotels can identify these ingredients through certification schemes like the Rainforest Alliance, or through close engagement with suppliers. Independent hotels can partner with others in their locality to collaborate on sustainable purchasing – for example, through the Hogast platform in Austria, or the Privathoteliers platform in Munich; the latter has worked with its members to procure sustainable coffee and thus achieve higher volumes at better value than hotels acting individually would be able to.

While more sustainably produced ingredients can be more expensive, more than 80% of consumers surveyed in 2024 said they are willing to pay more for sustainably produced goods. In terms of a price premium, they are willing to spend an average of 10% more on sustainably produced or sourced goods, even in the current context of high cost of living.[42]

The tools set out by Coolfood for nudging guest behaviors could also be applied here. Furthermore, savings from reducing food waste and so reducing the amount of food bought overall can help to offset the potential higher costs of sustainable sourcing.

Myth

"Local sourcing is always the more sustainable option"

Reality

Unless it's air freighted, transport accounts for less than 10% of the typical food system emissions; the majority comes from production. Local sourcing of food out of season may drive up emissions even more than transport, for example if it is grown in greenhouses. However, local sourcing may have other benefits such as supporting local farmers and communities.

Source: Poore and Nemecek. 2018.

41 Regenerative agriculture is a holistic, systems-based approach to farming that seeks to restore, regenerate and enhance the health and vitality of soils, ecosystems, and communities
42 PwC 2024. Voice of the Consumer Survey 2024

Case study 8: Building oversight over the supply chain

The Rainforest Alliance Certification is one example of a scheme to enable better traceability. A product with the Rainforest Alliance Certification contains one or more ingredients produced with social, economic and environmental sustainability.

A key criteria for products is the prevention of deforestation. The Alliance's training and certification program requires best practices for protecting forests and fighting deforestation. Cutting down trees to expand farmland is not allowed. The Rainforest Alliance Certification program promotes responsible land management methods that increase and conserve the number of trees. In addition, the farming practices embedded in the training programs help farmers face climate-related disasters like droughts and flooding.

Standing forests are excellent at storing carbon and keeping it out of the atmosphere – protecting them is a critical solution for limiting climate change.

4.2.3 Use less plastic packaging

0.8 -1.2Mt
Emissions reduction potential

The opportunity

Much of the plastic packaging currently used for food in hotels could be reduced by eliminating the need for packaging entirely, or replacing it with reusable or refillable alternatives.

At the moment, the scale and nature of the challenge is not sufficiently understood. Here are 3 ways for hotel managers to get a grip on the problem.

Key actions

4.2.3.1 Conduct a plastic audit

Hotels are increasingly conscious of how much single-use plastic is involved in their guest experience and taking steps to switch to more circular and lower emission alternatives. But few hotels are yet measuring how much B2B plastic packaging they receive. An essential precursor to reducing this stream of plastic is to find out how much plastic packaging is coming in, what materials it's made of and where it's coming from.

4.2.3.2 Eliminate single use plastic used by guests

A number of hotels have proved this is possible. All hotels should carry on cutting single-use plastics from the guest food experience until they are eliminated. In the first instance, hotels should consider whether the use of packaging can be eliminated entirely. If it is needed, reuse models should be considered next (see Case study: Econesia). It is crucial that the full life-cycle impact of any alternatives is considered, and that single-use plastic is not simply replaced with other single-use materials which may have a higher carbon footprint overall.

Case study 9: Switching to reuse models for water

Econesia, based in Indonesia, offers reuse solutions to help hotels ditch single use plastic. This includes a full-service drinking water solution for hotels: Instead of using single-use plastic water bottles, Econesia provides hotels with a water filtration system to offer fresh water in refillable glass bottles. As well as resonating with increasingly eco-conscious guests, it also saves costs spent on disposable plastic products with a return of investment within 2-3 months.

4.2.3.3 Reduce use of B2B plastic packaging

Hotels can work with their suppliers to reduce the packaging they receive. There are a number of options including buying more in bulk and switching to reusable crates, baskets and tubs, which are returned to suppliers after use. Hotels can also consider switching to nature-friendly alternatives like biobased and biodegradable packaging materials, where these are shown to have fewer environmental impacts – bamboo and bagasse are two options to explore. Hotels choosing this last option will help to scale these relatively new subsectors of the packaging industry. Hotels that favour biodegradable or recyclable alternatives need to consider the waste infrastructure of the destination the hotel is operating and make sure it has circular end of life solutions for these materials available. In many cases it is the supplier who makes the packaging choice, so switching to better options may entail close engagement suppliers to signal a hotel's demand for, for example, bulk purchases that need less packaging for the same amount of product.

Case study 10: Eliminating guest facing single-use plastic

Iberostar Hotels & Resorts embarked on an ambitious journey to go beyond plastics, committing to eliminate all single-use plastics by 2020. Rapid implementation of this goal allowed Iberostar to bring a single-use plastic free experience to employees and customers in just eighteen months. Supply chain changes played a crucial role.

Iberostar now purchases **692 fewer tons of plastic per year** than it did in 2018, representing **over 1,000 items that were evaluated,** removed, altered and reimagined. In terms of food-related packaging, this included changes to mini bars: plastic bottles were changed to aluminum or glass, the snacks moved from plastic packaging to glass containers sealed with paper labels to address plastics in packaging.

Iberostar also reimagined how guests receive water during their stay. In lieu of replacing all plastic bottles with glass, **1,368 water fountains were installed** to replace single-use bottles altogether.

Key lessons learned were that:

1. Operative action can happen incredibly quickly around largely visible levers; it becomes a question of motivation, empowerment and enlightened leadership.
2. Most single-use plastic items do not play a fundamental role in luxury hospitality settings.
3. Empowered, value-driven and effective procurement teams can transform supply chains by bringing existing providers along with them.
4. A narrow focus on plastics started to risk other sustainability levers such as carbon footprint and waste production, particularly in food waste.

4.2.4 Optimize kitchen energy use

8-17Mt
Emissions reduction potential

The opportunity

Hotel kitchens can cut down their need for energy by adopting more energy-efficient practices and equipment and switching to electricity as a power source. Of course, hotels can reduce more emissions by taking an energy-saving eye to how they use energy as a whole - where they get it from, how they use it and where there are opportunities to switch to different sources (for instance, local solar and wind power) and uses (for example, heat pumps instead of gas boilers for heating).

But they can make a significant impact on their energy use through actions that focus on using less energy in kitchen operations.

Key actions

4.2.4.1 Improve kitchen practices

Energy can be saved by, for example, doing more batch cooking to reduce the time appliances need to be running and turning off equipment when it's not being used, particularly overnight.

4.2.4.2 Switch to energy efficient appliances

For example, replacing gas stoves with induction hobs and ovens. Induction cooking is more energy-efficient because it heats cookware directly, reducing wasted heat and also preventing kitchens from getting too hot. Switching to electric ovens and LED lighting may also reduce emissions considerably. However, hotels will need to weigh the relative impact on their emissions and material waste of buying new energy-efficient appliances versus allowing the old appliances to reach the end of their working lives before replacing them.

4.2.4.3 Switch to renewable energy sources

This is a decision for the whole hotel, not just the kitchens, and can save money as well as cut carbon costs. Options include buying green energy generated offsite or generating electricity on-site, usually from rooftop solar panels and in some locations from wind or hydro-turbines. Energy from biomass, although technically a renewable source, performs poorly on most sustainability dimensions for hotels.

4.3 Summary of actions and areas of collaboration

This table summarizes all the opportunities for cutting emissions from hotel food systems described above. Some are within the power of hotel managers to introduce in their hotels.

Others depend on collaboration between hotel managers and other actors in their food systems, depending on their hotel's decision-making structure and the complexity of the supply chains involved.

EXHIBIT 10

Some actions can be taken at the hotel level; others require interventions by the hotel group

Lever	Action	Where action is taken	In collaboration with
Waste less food	Let data drive procurement and meal planning	Hotel group level	Hotel general managers who run data collection process
	Make optimal use of ingredients	Hotel level	Hotel group who set group wide targets
	Help guests to avoid wasting food	Hotel level	Hotel group who set group wide targets
	Give away surplus food still fit for consumption	Hotel level	Hotel group who set group wide targets; local organisations
	Find uses for surplus food unfit for consumption	Hotel level	Hotel group who set group wide targets; local waste management providers
Source more sustainably	Offer more plant-rich options	Hotel group level	Hotel general managers / chefs depending on menu variation across hotels
	Source sustainably produced ingredients	Hotel group level or hotel level depending on decision making structure	Hotel general managers where local sourcing strategies are needed; local producers
Use less plastic packaging	Conduct a plastic audit	Hotel group level	Hotel general managers who run data collection process
	Eliminate single use plastic used by guests	Hotel group level	Hotel general managers who implement changes
	Reduce use of B2B plastic packaging	Hotel level	Hotel group who may make procurement decisions; suppliers who make packaging decisions
Optimize kitchen energy use	Improve kitchen practices	Hotel level	Hotel group who set group wide targets
	Switch to energy efficient appliances	Hotel level	Hotel group who set group wide targets
	Switch to renewable energy sources	Hotel level	Hotel group who set group wide targets

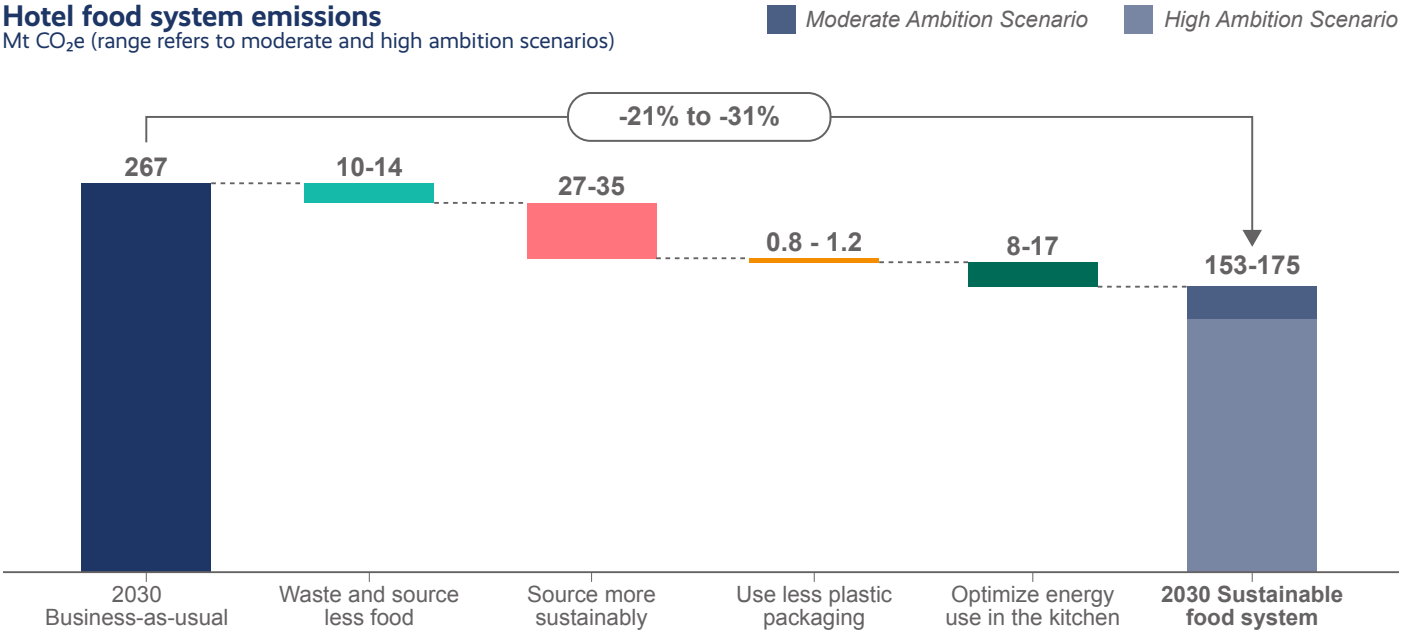
If all hotels set themselves high ambitions, hotels could reduce their aggregate food system emissions by 30% in 2030 compared to a business-as-usual scenario. Sourcing more sustainably, by offering more plant-rich options and sourcing sustainably produced ingredients, is the most powerful lever and critical to tackling scope 3 emissions.

At the same time, action across all areas is crucial for hotels to reach net zero goals. Hotels can chose the best tools from all those described above to make that happen in their particular context.

EXHIBIT 11

Hospitality food system emissions could be reduced by 30% by 2030 – the biggest lever by far is sourcing more sustainably

Hotel food system emissions
Mt CO_2e (range refers to moderate and high ambition scenarios)



4.4 Implications for different regions and types of hotels

There are many different hotel models in operation around the world, differing in the way that decisions are made, food is sourced, which food is served and many other factors. What does this mean for how solutions should be implemented across geographies and hotel models? While the specifics of challenges and solutions vary from place to place, research for this report has found that, overall, the headlines are the same. Food sourcing is the largest source of emissions, requiring ambitious action around procurement practices and menu composition.

Some regions will be able to move faster than others. For example, certain countries have far more sophisticated waste infrastructure or better access to sustainable packaging solutions than others. It will also be easier to source sustainably and nudge guests to make more sustainable choices around food in the places where consumer trends are already heading in the right direction. Hotels in these places should harness this momentum and act as pioneering businesses. In some places it may be harder to source sustainably, but tackling the challenge may bring even greater payoffs for not only climate but local nature and communities.

05 Conclusion

The hotel industry can succeed in reshaping its food systems in ways that reduce emissions, protect nature and build resilience, a win-win outcome for business and planet. Hotels have all the tools they needs at their disposal. As major purchasers of food and providers of meals to large numbers of consumers, hotels also have the power to alter patterns of food production and consumption worldwide if they understand and change hotel food systems.

Today's hotel food systems are designed to provide guests with sufficient and diverse food to meet their expectations. But they impose substantial hidden costs on the environment and communities in the form of greenhouse gas emissions, food waste, and adverse effects on nature and human health.

Cutting these costs is a business necessity. Disruption to supply, greater scrutiny from regulatory bodies and eco-conscious guests means unsustainable practices are no longer an option. Hotels that fail to adapt risk falling behind. Conversely, those that embrace sustainable food systems can benefit from significant cost savings, a more positive, attractive brand, more guests and enhanced guest loyalty.

EXHIBIT 12

Hotels have the tools at their disposal to shift to a more circular, regenerative food system

2030 hotel food system

There's no one-size-fits-all way to make hotel food systems sustainable. Hotel managers can tailor strategies to fit their local context, using this paper as inspiration. And different hotels can work together for maximum impact, for instance, forming a collective to purchase sustainably produced ingredients at scale. By customizing their approaches and collaborating where it makes sense, hotels can make their food systems sustainable, improve the bottom line and bring lasting benefits to their communities and the environment.

This paper has set out a vision for a better hotel food system and the actions needed to get there. As an industry, it is now time to rally around that shared goal and work together to pave the way for a prosperous future for our industry and a healthier planet for generations to come.

World Sustainable Hospitality Alliance

In collaboration with

IBEROSTAR HOTELS & RESORTS

Sustainable Markets Initiative

Decarbonizing Hotel Food Systems

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