HOSPITALITY SPOTLIGHT REPORT: Accelerating circular economy adoption

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Danielle Farrow, Peter Hopkinson,
Fiona Charnley, Markus Zils
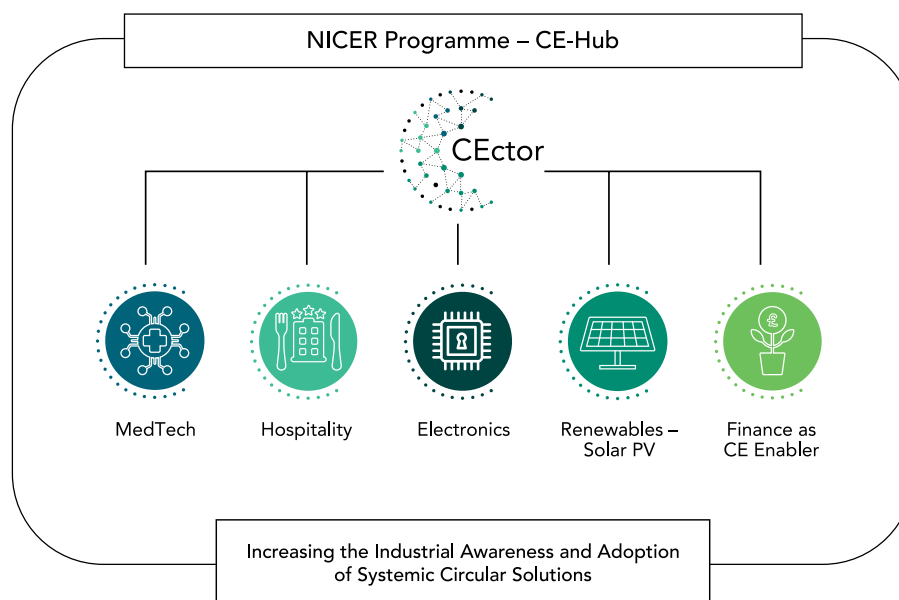
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CEctor

Purpose of the report

As part of the National Interdisciplinary Circular Economy Research programme (NICER), the CEctor project is a dedicated workstream within the CE Hub. The project has the scope to identify and explore five different UK industrial sectors, where significant opportunity exists to accelerate Circular Economy (CE) adoption. The five sectors are: 1. MedTech 2. Hospitality 3. Electronics 4. Renewables-Solar PV and 5. Finance as an enabler of the CE. The purpose of the project is to engage with stakeholders across each of the five sectors, building CE knowledge and understanding, and working collaboratively to identify key enabling mechanisms, then prioritising actions to deliver outcomes and impact, including research and innovation funding and scaling requirements. The ultimate goal is to assist in accelerating industrial awareness and the adoption of systemic CE solutions, including value creation opportunities. As an output of the CEctor project, this Spotlight Report draws together academic research and insight from a broad range of stakeholders, providing an evidence base for CE adoption within the Hospitality sector.

NICER Programme – CE-Hub

CEctor

MedTech · Hospitality · Electronics · Renewables – Solar PV · Finance as CE Enabler

Increasing the Industrial Awareness and Adoption of Systemic Circular Solutions

Authors & Acknowledgements

Authors: Danielle Farrow, Professor Peter Hopkinson, Professor Fiona Charnley, Professor Markus Zils

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Methodology

This report is an output of the work undertaken by the CE Hub CEctor project team from June 2023 to July 2024. The research involved i) a review of the academic and grey literature, including relevant media articles and industry publications ii) engagement with stakeholders from across the Hospitality value chain through informal conversations, interviews and interactive workshops (see Sections 2 and 3). Insights from these two outputs have informed an analysis of the action required across multiple stakeholder groups to support the sector's transition to a circular economy.

This report can be referenced as follows: Farrow, D., Hopkinson P., Charnley, F., Zils, M., (2024). Hospitality Spotlight Report: Accelerating circular economy adoption.

Executive Summary

The UK food and accommodation sector, also known as the Hospitality sector, had a turnover in 2023 of £103 billion (Bn) pounds, (Clark, Statista, 2023) and supports 2.74 million (M) jobs (Clark, Statista, 2024a), making it the UK's 6th largest industrial sector in employment terms. It faces many classic business pressures including tight profit margins, high employee turnover and cost-of-living impacts on procurement, pricing strategy and customer spending power.

Hotels, pubs, and restaurants construct and operate materially intensive assets (construction and refurbishment), have high throughput of diverse goods and services including textiles and laundry (soft furnishings, linens and uniforms), electricals, and energy consumption (catering and brewery equipment), packaging (incoming goods, takeaway packaging) and food and drink (DEFRA, 2023).

Excluding refurbishment activities, the sector generates 2.8M tonnes of waste (WRAP, 2013), with over 1.1M tonnes of food waste costing the sector around £3.2bn p.a. (WRAP, 2023a). The sector emitted 4203.9 thousand tonnes of territorial greenhouse gas emissions (GHGs) in 2022 approximately 1% of the UK total (ONS, 2024). Scope 3 emissions in the form of purchased goods and services and logistics account for a high percentage of emissions; from 61% for hotels to 97% for quick-service restaurants. Sectoral initiatives such as Zero Carbon Forum provide leadership, reports and guidance in carbon and net zero (NZ), and the difficulty that many businesses, notably SMEs face in reducing GHG emissions.

To date, the sector has little engagement with a circular economy (CE), or awareness of the potential opportunity to apply a CE to reduce GHG emissions, boost resource productivity and reduce costs. To build greater awareness and engagement, this Spotlight Report provides examples of current CE practice within hospitality and explores what a CE Hospitality sector might look like and some of the actions to support engagement and practical adoption of CE on the ground.

Consultation with stakeholders and a scan of the grey literature identified examples of CE in practice across three phases of the CE-value chain:

- **Reducing material inflows:** through restorative design principles (refurbishment) and product (mattress) redesign (lightweighting, modular design and mono-material selection).
- **Product life extension and asset utilisation:** through resale and exchange platforms and reducing laundry losses.
- **Increased valorisation of post-use products and waste:** through improved closed loop systems for textile waste and converting food waste into higher value products.
- **Cross-sectoral collaborations:** including ReLondon's circular food business guide 'Food that Doesn't Cost the Earth', the EMF Big Food Redesign, and WRAP's Courtauld Commitment 2030 programme.

A deeper dive case example based on St. Austell Brewery highlights ways in which this business has configured CE design, business model and reverse logistics building blocks across diverse activities and with suppliers: learnings then used to create a vision and longer-term circular strategy.

Two workshops involving 42 stakeholders from across the Hospitality sector and its supply chains explored challenges and opportunities for CE adoption and measures of success. Stakeholders identified a number of areas as key to a successful transition including, embedding CE principles within existing frameworks, developing CE pilots, shifting to collaborative rather than competitive working practices, developing CE leadership and creating CE-specific policy levers.

Combined analysis of existing CE activity and stakeholder input from the workshops highlighted six key levers for accelerating a CE transition. These are 1. Funding and incentives, 2. Data collection and transparency, 3. Collaboration and leadership, 4. Knowledge and awareness, 5. Policy and regulation and 6. Shared vision. Recommendations for action include:

- **Embedding CE principles** in procurement frameworks both within hospitality businesses and along supply chains.

- **Improving data systems** for key product and material flows (i.e. food, products with short replacement cycles) to create a baseline and measure success.

- Deploying and configuring **systemic CE solutions**, from design of space to products built for longevity, ease of repair and ease of removal.

- **Enhancing CE knowledge**, skills and capability training within existing programmes, and greater knowledge exchange upstream (along supply chains) and downstream (through customer communications).

In conclusion, this Phase 1 report underscores that a CE offers a tangible solution to the challenges faced by the Hospitality sector. Doing nothing, or focussing on NZ alone, misses the opportunity to realise financial savings through addressing wasteful practices, to increase resource and material security through value capture strategies, to increase supply chain resilience through simplification and increased collaboration and to increase profit margins through innovation.

To implement a CE Hospitality sector at a national scale requires systematic integration of a taxonomic approach, a common data framework and capability to connect initiatives and evidence via digital tools, dashboards and reporting systems as is emerging in other sectors and approaches globally.

Findings and successes from a second phase, with learnings from across a signature set of products and services, would provide the confidence and support to enlarge and set up policy-hospitality-supply chain collaboration to drive data and case study pooling, and the evidence for proof of value.

Learnings and experience from Phase 2 would identify and develop the dynamic capabilities required for total system integration into governmental, hospitality, and supply chain decision-making and collaboration.
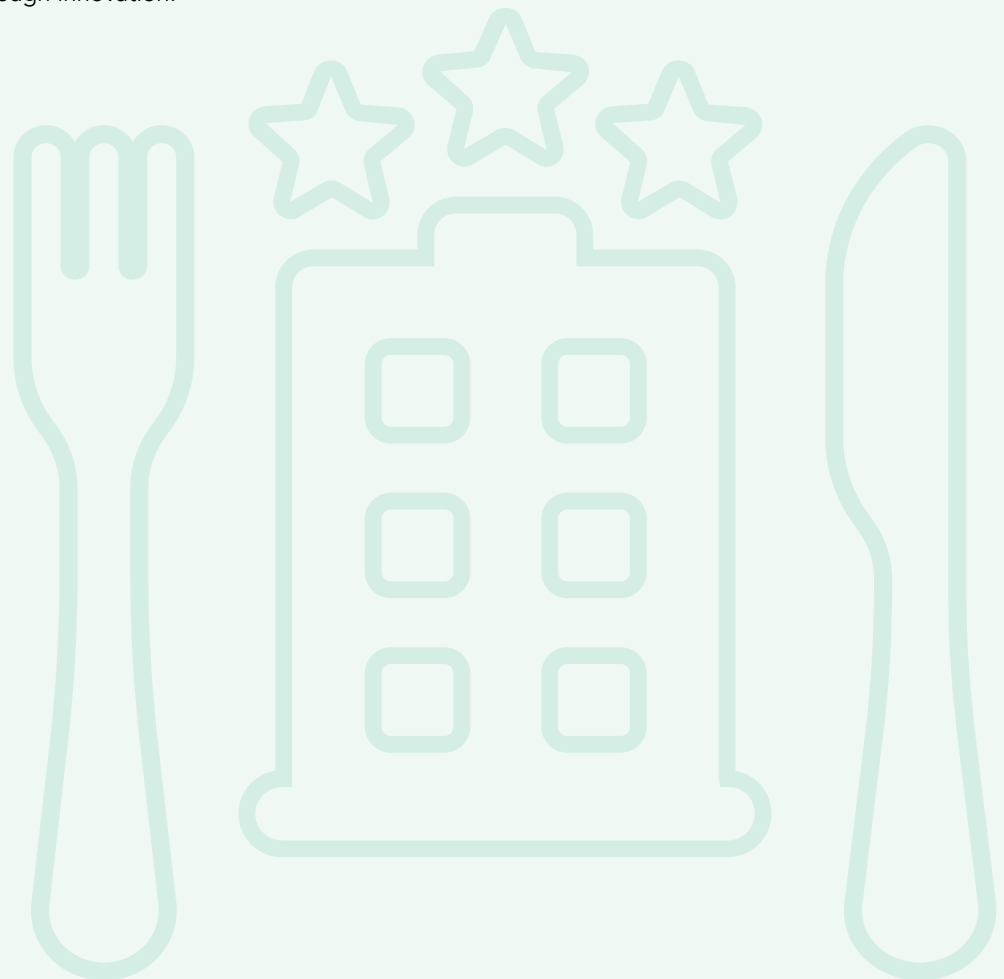
Introduction

What is the Hospitality sector?

The UK food and accommodation sector[1], also known as the Hospitality sector, includes hotels, pubs, breweries, restaurants, cafes and fast-food businesses, ranging from small independents through to multinational chains. It plays a significant role in the UK economy, providing 2.74 million jobs (Clark, Statista, 2024a) and generating £59.9 billion a year in GVA (Clark, Statista, 2024b).

Alongside this, the sector has significant social impact:

Hospitality, be it restaurants, pubs, bars, or cafes, lights up our high streets and is a lynchpin in local ecosystems of shops, offices and residential, creating places where people want to live, work, shop and visit. (Department for Business and Trade, 2023)

The Hospitality sector is supported directly through key organizations including UK Hospitality, the Sustainable Restaurants Association and the British Beer and Pub Association. Within government, the Hospitality Sector Council brings together trade representatives and industry and includes a focus on sustainability through waste reduction and NZ. To date however there has been little systematic engagement by the Hospitality sector with a CE. This report places a spotlight on the sector in the following three sections:

1) A snapshot of some of the business and environmental challenges facing the Hospitality sector including volatile supply chains, workforce pressures and material and waste impacts.

2) Examples of current CE practice across three stages of product or material lifecycles (inflow/in-use/outflow) and a deep dive into the experience of a case study business seeking to transition to circular practices in a refurbishment project.

3) What a CE might look like for the sector, and the actors and actions needed to support the transition.

The report concludes with a combined analysis, highlighting potential levers for change and recommendations.

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[1] Statistics for the sector vary depending on which industries have been included. For the purpose of this report we have used the Office for National Statistics SIC code data for the Food and Accommodation sector.

Section 1: A linear sector under stress

1.1: Hospitality sector challenges

Hospitality operates on a mainly linear economic model, and faces many day-to-day sectoral, organisational and operational challenges that affect its ability to transition to a CE and NZ. Key challenges include:

Global supply chain complexity and volatility

The Hospitality sector is reliant on numerous, complex supply chains for its food and product needs, each of which involve multiple tiers (Aigbedo, 2021; see Appendix 1 for detail). Factors such as long supply chains and lack of visibility in supply chains can impact on business performance (Aaditya, Shanker and Barve, 2021; Aigbedo, 2021). Events such as the Covid 19 pandemic highlighted supply chain risks affecting the availability of products such as catering equipment, spare parts, single-use takeaway items and key ingredients such as chicken and corn (Forbes, 2022). More recently, the war in Ukraine caused an increase in energy and food prices, impacting on hospitality business closures. Extended, complex, globalised supply chains can also disincentivise circular principles such as design for longevity, durability and end-of-life (see Section 1.3 for more detail on CE strategies).

Fragmented industry

Micro and small businesses make up 99% of the sector, with just over 50% of businesses having 0-4 employees (ONS, 2023; see Appendix 2). Many of these businesses are sole employees or family-owned businesses, which makes it difficult to form collective views, influence upstream and downstream value chains or lobby government. SMEs face tight financial margins, are time constrained and often lack the technical knowledge and expertise to discern the most effective solutions for their business (Rizos et al., 2016). Initiatives such as B Corp, or trade bodies such as the Federation of Small Businesses (FSB) are examples of mechanisms that can support co-ordination and direction-setting for SMEs. More support is needed however, as the latter part of this report explains.

Rising costs

Between 2021 and 2023, the Hospitality sector faced an increase of over 26.2% on the cost of food and in 2022 energy prices for the sector rose by 238% (The Access Group, 2024). In October 2022, inflation peaked at 11.1% (UK Parliament, 2024). High levels of inflation reduced disposable income, negatively impacting on Hospitality sector businesses. According to a survey published by market research company Statista, 64% of respondents had eaten out less than usual, 58% didn't eat takeaway and 72% travelled less (Statista, 2024).

Staff shortages

The Hospitality sector is estimated to have a job vacancy rate of 6.6% - higher than any other industrial sector (Department for Business and Trade, 2023), placing pressure on recruitment and training, and potentially reducing the resources available for CE innovation and implementation.

Resource and material footprint

The Hospitality sector has a large material and carbon footprint across its capital phase (construction), use (refurbishment and operations) and outflows (waste and decommissioning). Despite its significant environmental footprint, publicly reported data on material, resource and product stocks and flows is highly fragmented, often missing or out-of-date. Figure 1 illustrates some of the key resource and material inputs and outputs identified from the literature, and which highlight potential future CE value creation opportunities.

Figure 1: Hospitality sector value leakage and CE value opportunities

Inflow	Use	Outflow

Hotel Energy Use
Electricity
450 kwhe/m2 per year

Hotel accommodation
Furniture, fixtures, fittings, appliances
Refurbish: 5-10 years
Water use per room
1,500 litres per day
Linens & textiles
Service life: 200 washes

Restaurants & bars
Furniture, fixtures, fittings
Refurbish: 7-10 years
Water Use
13-31,000 litres per day

Kitchens
Catering equipment
Service life: 10-15 years
Staff Uniforms
Service life: 1-2 years

Total Solid Waste
2.87m tonnes per year
46% Recycled, anaerobic digested or composted

Packaging Waste
1.3m tonnes per year
62% Recycled

Food Waste
920,000 tonnes per year
75% of which is avoidable and edible

Refurbish Waste
Unknown
Typically sent for recycling or incineration.
*Due to service life and volume: potential to explore how a CE can reduce inflow, extend life and close the loop on **furniture, fixtures, fittings and appliances.***

Hospitality Sector Value Opportunities

Hotels have high electricity and water demands (Arup, 2022; World Sustainable Hospitality Alliance, n.d.; Castle Water, n.d.), including high frequency linen and textile service washes (TSA, n.d.) and refurbishment cycles of between 5-10 years for customer-facing areas (Arup, 2022; Suite Renovations, 2023). Restaurants and bars are also high users of water (Castle Water, n.d.) and have average refurbishment and replacement cycles of between 7-10 years (Build it, n.d.).

Backstage, commercial kitchens are high energy users, with 11% of UK service sector energy consumption estimated to come from catering activities (Mudie and Vadhati, 2017). They also hold substantial stocks of material and energy intensive equipment including commercial ovens, hobs, grills and other cooking equipment, food preparation equipment, warewashing equipment and refrigeration. The value of this market in the UK has been increasing year on year, rising from £740 million in 2013 to £870 million GBP in 2019 (Statista, 2020). Replacement of catering equipment is linked to service life, which varies by product but is estimated to be between 10-15 years (Industry Kitchens, 2023; Department for Business, Energy, Industrial Strategy, 2021). Both front and back of house staff need regular uniform replacements, approximately every 12-18 months (Xamax, n.d., Merchology, n.d.)[2]

As with other sectors, consumer trends are creating pressures for even more linearity, with higher rates of refurbishment and replacement to keep up with trends in technology and fashion.

The modern hospitality property is subject to ongoing change as a response to the ever-shorter life cycles of fashion, technology and product service content, as required for brand compliance in an ever-increasing competitive environment to acquire customers' discretionary spending. (Ransley, 2022)

Waste outflows

Food and packaging waste make up a significant proportion of recorded waste for the sector, which has been widely reported at a global level, and there is widespread interest in the potential for a CE to reduce waste in the first instance and increase the revalorisation in subsequent cascades (Ellen MacArthur Foundation, no date a, 2021a, 2019, 2021c). Despite this there is currently no national dataset or mandatory reporting on waste or food waste for the sector[3].

[2] These generic estimates were checked with St. Austell Brewery Group for a Hospitality-specific view on uniform lifespan.

[3] UK food waste statistics for the Hospitality and Food Service sector are modelled by WRAP using data collected between 2009-2011 (published in 2013) and based on the assumption food waste has remained static per site (WRAP, 2023b).

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Combined, restaurants, pubs and hotels in the UK produce over 2 million tonnes of solid waste per year, of which 800,000 tonnes (over 75%) is edible food waste (WRAP, 2013, 2023). Waste disposal creates an environmental and financial cost burden, with an estimated 1.1M tonnes food waste (edible and inedible) estimated to cost the sector £3.2 billion per year – an average of £10,000 per business (WRAP, 2023a). Mandatory waste segregation and recycling is already in place in Wales, Scotland and Northern Ireland, including food waste segregation for all businesses who produce more than 5kg food waste per week (LLywodraeth Cymru, 2023; Navitas Safety, 2023). It is expected that similar legislation will come into force in England in future (Navitas Safety, 2023).

Data on levels of construction and refurbishment waste are difficult to access, although a recent non-UK study indicated construction waste in hospitality is higher than in other sectors (Juvan, Grün and Dolnicar, 2023).

Carbon and Net Zero

Despite being hard-hit by the long-term impact of the COVID-19 pandemic, the sector surpassed pre-pandemic levels of growth in 2022 (Clark, 2023) – a trajectory which is set to continue (Statista, 2023). According to the Office for National Statistics (ONS), territorial emissions for the sector were 4203.9 thousand tonnes in 2022 (ONS, 2024). A significant proportion of emissions sit within Scope 3 - between 61% in the case of hotels to 97% for quick service restaurants (Figure 2). In all cases, emissions hotspots are dominated by purchased goods and logistics.

To tackle this, the non-profit organisation Zero Carbon Forum published its Roadmap to Net Zero for the Hospitality sector in 2021, in association with trade bodies UK Hospitality and the British Beer and Pub Association. The roadmap aims for a 90% reduction of scope 1 and 2 emissions by 2030 and between 60-78% scope 3 emissions by 2040 (Figure 2).

Figure 2: Breakdown of carbon emissions and emissions hotspots for the Hospitality sector
(Source: Zero Carbon Forum, n.d.)

Sub-sector	Scopes 1, 2 & 3 Intensity (market-based)	Scopes 1 & 2 Contribution	Scope 3 Contribution	Scope 1 & 2 modelled reduction	Scope 3 modelled reduction	Emission Hotspot
Pubs	363.9 tCO2e / £m	17%	83%	90%	78%	• Purchased goods & services • Logistics • Capital goods
Restaurants	376.9 tCO2e / £m	11%	89%	90%	69%	• Purchased goods & services (key categories include - dairy, beef, poultry, pork, seafood, drinks, and grains/cereals) • Logistics (note, that majority of logistics data came from CDP) • Capital goods (key categories include – facilities & equipment)
Quick Service Restaurants	570.7 tCO2e / £m	3%	97%	90%	67%	• Franchises • Purchased goods & services (key categories include - beef, dairy, frying oil, poultry) • Logistics
Hotels	579.1 tCO2e / £m	39%	61%	90%	70.5%	• Direct energy consumption (electricity) • Franchises • Purchased goods & services (key categories include – food & beverages, cleaning & chemical supplies & maintenance)
Breweries	832.9 tCO2e / £m	11%	89%	90%	60%	• Purchased goods & services • Use of sold products (e.g. downstream refrigeration of products by customers) • Logistics • Brewing process energy use

The roadmap outlines the actions required of Hospitality businesses to achieve the modelled emissions reductions across six categories:

- **Strategy and data:** gathering and reporting on baseline data across scopes 1, 2 and 3, switching to renewables, setting a decarbonisation strategy.
- **Buildings:** upgrading building fabric, installation of solar panels and heat pumps, replacing end-of-life appliances with electric induction, energy efficient appliances and low-GWP refrigerants.
- **Renewable energy:** source renewable energy via providers and explore other green energy options (i.e. hydrogen, biomass).
- **Sourcing:** develop supplier engagement programmes, support low carbon farming through sourcing and menu changes, design packaging for reusability and recyclability.
- **Transport:** Develop schemes to reduce guest travel emissions, switch to zero carbon incoming and outgoing deliveries, switch to electric fleet vehicles and increased fuel efficiency.

- **Carbon removals:** agree strategy and quality criteria for carbon removal, identify and secure suitable schemes.

The roadmap has a strong focus on renewable energy and increasing optimisation and efficiencies, with CE principles (reduce, redesign, reuse) applied to packaging decisions, rather than holistically across the roadmap.

As with many other sectors, climate change is a serious risk to hospitality in all its forms, affecting travel and tourism, quality of life and customer spending, reducing the overall profitability and viability of hospitality businesses. Moreover, extreme weather events affect crops and food security. In 2023, wine, olives, olive oil, rice and potato crops were most affected, causing shortages and price increases for these items (Chow, 2023). Climate change and a continued reliance on a linear economic model will compound all the challenges described above, including customer spending.

Figure 3: A summary of some of the key stresses affecting the Hospitality sector
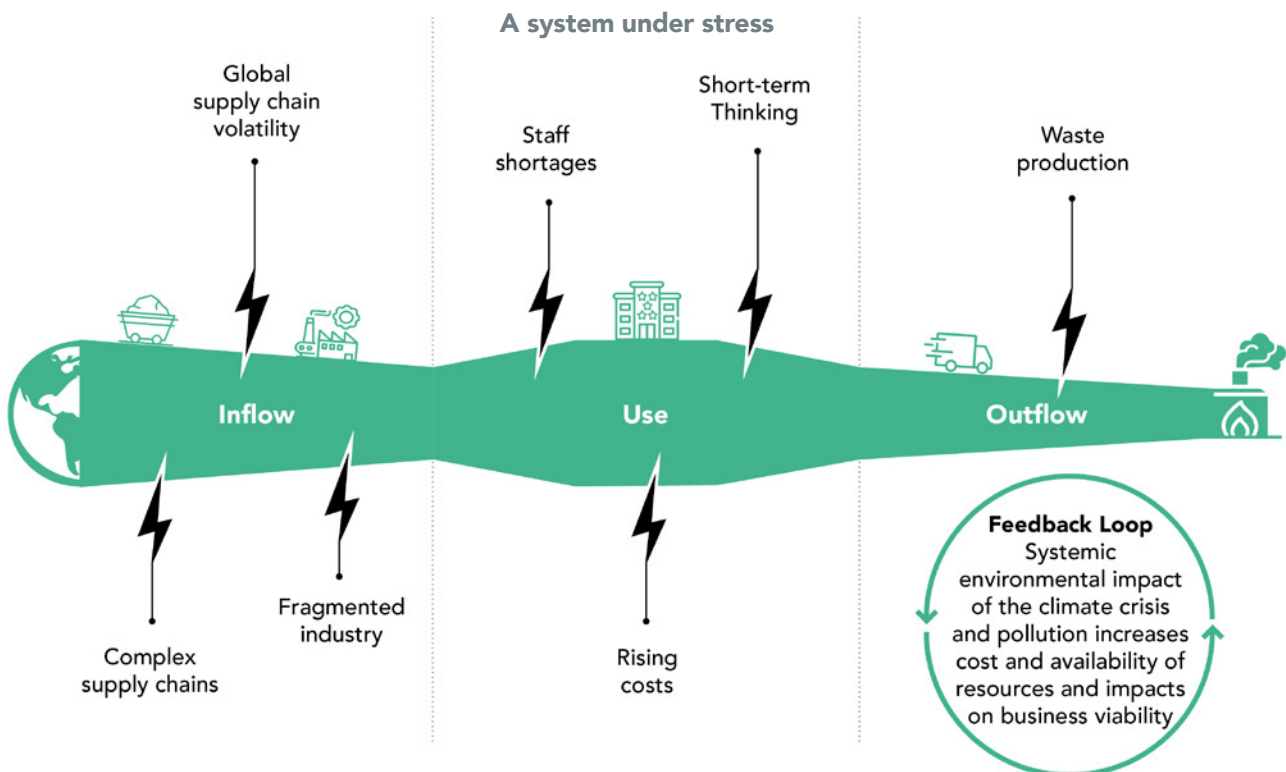
From Linear to Circular

In summary, the Hospitality sector largely operates as a carbon intensive, linear, take-make-dispose system, with many negative environmental impacts. It faces many direct business and sectoral challenges, and to make the shift from linear to circular will require evidence that

a) it can be done and b) that it is both practical, and a better decision in the short-, medium- and long-term for the business, the customer and the planet. How this might work up close is described in the following sections.

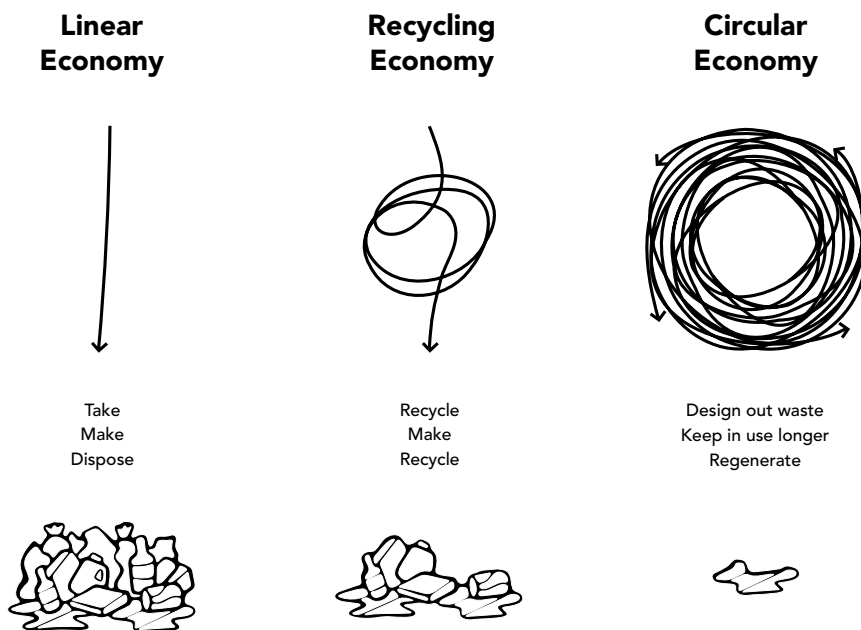## 1.2 The solution: A circular Hospitality sector

The foundation of a CE

Circular Economy has been defined in many ways, but most definitions are underpinned by a set of core principles set out by the Ellen MacArthur Foundation (EMF):

- **Eliminate** waste and pollution (through design),
- **Circulate** materials and products at their highest value for as long as possible,
- **Regenerate** natural capital,
- Powered by **renewable energy.**

However, there is still a misconception in some circles that a CE is primarily about recycling. As illustrated in Figure 4, a CE goes far beyond improved recycling, which only slows down the rate of resource consumption and should be considered a last resort. Rather, an effective circular economy rebuilds and maintains capital, promoting higher quality stocks and flows of materials, components and products for repeated lifecycles and cascades.

Figure 4: A linear, recycling and circular economy (adapted from Circular Flanders, 2017)
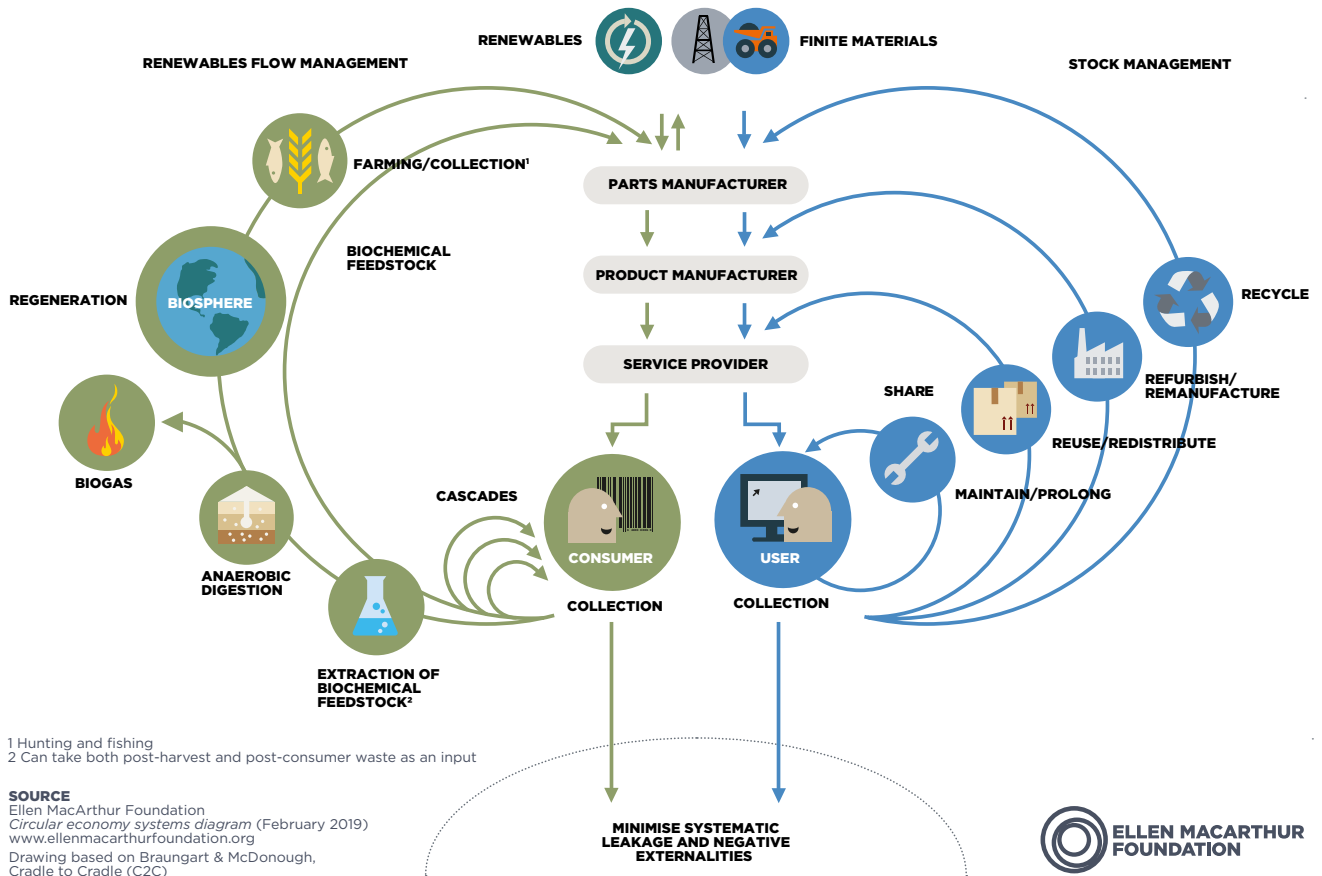

Linear Economy	Recycling Economy	Circular Economy
Take Make Dispose	Recycle Make Recycle	Design out waste Keep in use longer Regenerate

Developing a CE is therefore a system challenge, involving multiple organisations, sectors and supply chains. The well-known 'butterfly diagram', first produced by EMF, visualises the CE as a whole system framework (Figure 5). In this conception, the current linear take-make-dispose economic model is depicted as a vertical value chain, where materials and resources flow through the economy to disposal, often in a single use cycle. By contrast, in a CE the aim is to preserve, circulate and cascade materials and products productively back into the economy at various lifecycle stages.

The way this might be achieved differs depending on whether materials, components and products are designed for the biosphere (green cascades on the left) or the technosphere (blue cascades on the right). In the biosphere, materials are biodegradable and can be safely returned to the natural world. This could be through consumption and metabolisation, composting or creation of stocks (e.g. soils and fertilisers). The technosphere encompasses materials and products that are durable (e.g. electrical equipment) comprising materials such as steel, copper and plastics. Many forms of pollution and harm to life occur when technical, durable materials, such as plastics, end up in the biosphere (e.g. ocean plastic, air pollution), or biodegradable materials become mixed with technical materials making it hard to separate them and increasing the cost and feasibility of value capture.

Figure 5: Circular Economy System Diagram (Ellen MacArthur Foundation, 2019, b)

1 Hunting and fishing
2 Can take both post-harvest and post-consumer waste as an input

SOURCE
Ellen MacArthur Foundation
Circular economy systems diagram (February 2019)
www.ellenmacarthurfoundation.org
Drawing based on Braungart & McDonough,
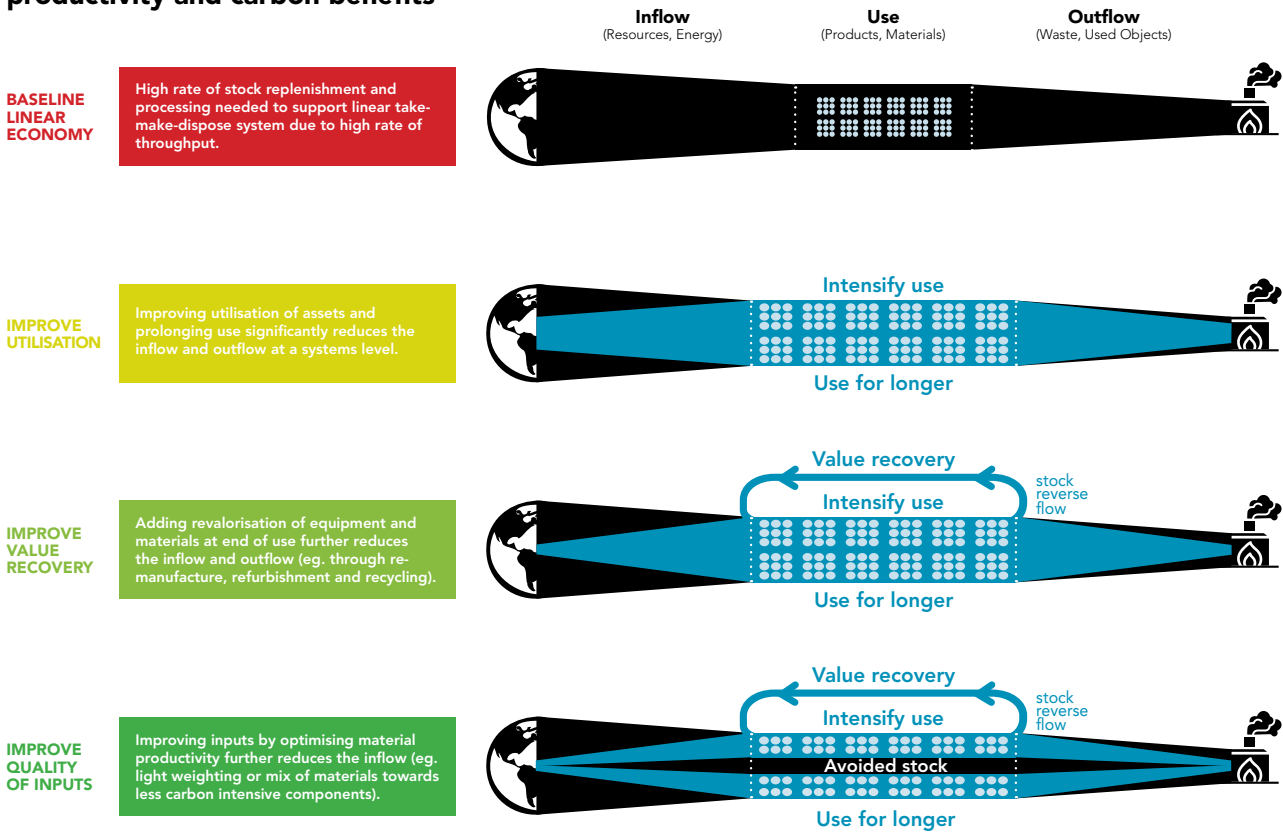Cradle to Cradle (C2C)

The power of CE value creation can be realised by designing interventions and innovations as a system across the value chain (Figure 6 below). Interventions include:

- Utilisation: prolonging and intensifying product lifespans (without compromising user safety or functionality), increasing asset utilisation and overall resource productivity and driving down carbon emissions. These actions reduce the overall rate and size of the outflows from the system (reducing externalities, waste disposal and costs).

- Value recovery: designing and managing the reverse flow of products and assets on circular principles, drives value retention and reduces demand for new product or materials at the inflow stage.

- Quality of inputs: designing products and components for circularity at the outset, reduces material complexity, toxicity and in some instances necessity, and forms a key value creation enabler in the use and outflow stages.

Figure 6: CE levers providing non-linear productivity increases and carbon reductions (adapted from Zils et al., 2022)
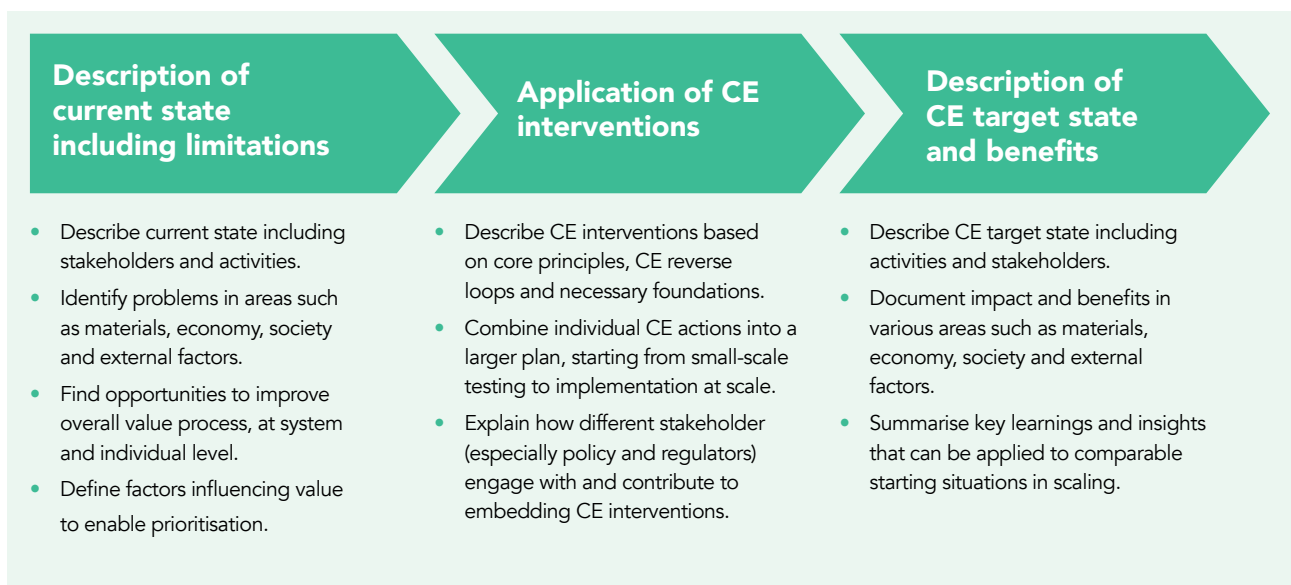
CE levers for improving material productivity and carbon benefits

BASELINE LINEAR ECONOMY — High rate of stock replenishment and processing needed to support linear take-make-dispose system due to high rate of throughput.

IMPROVE UTILISATION — Improving utilisation of assets and prolonging use significantly reduces the inflow and outflow at a systems level.

IMPROVE VALUE RECOVERY — Adding revalorisation of equipment and materials at end of use further reduces the inflow and outflow (eg. through re-manufacture, refurbishment and recycling).

IMPROVE QUALITY OF INPUTS — Improving inputs by optimising material productivity further reduces the inflow (eg. light weighting or mix of materials towards less carbon intensive components).

To make a system shift towards a new target state at the sectoral scale requires sequencing three steps (Figure 7):

- Description of the current state including limitations (Section 1 of this report),

- Application of CE interventions (Section 2),

- Description of CE target state and benefits (this section and Section 3).

Figure 7: Transformational steps to a CE target state (adapted from Zils et al., 2023)

Description of current state including limitations

- Describe current state including stakeholders and activities.
- Identify problems in areas such as materials, economy, society and external factors.
- Find opportunities to improve overall value process, at system and individual level.
- Define factors influencing value to enable prioritisation.

Application of CE interventions

- Describe CE interventions based on core principles, CE reverse loops and necessary foundations.
- Combine individual CE actions into a larger plan, starting from small-scale testing to implementation at scale.
- Explain how different stakeholder (especially policy and regulators) engage with and contribute to embedding CE interventions.

Description of CE target state and benefits

- Describe CE target state including activities and stakeholders.
- Document impact and benefits in various areas such as materials, economy, society and external factors.
- Summarise key learnings and insights that can be applied to comparable starting situations in scaling.

In practice, companies and organisations who are already benefitting from the CE typically succeed by harnessing four core intervention building blocks:

Design

Hospitality supply chains encompass products in both the biosphere and the technosphere. Within the biosphere, design means working with food producers that practice CE principles such as nature regeneration, reducing inputs and waste throughout the system and eliminating toxic chemicals. Internally, it means designing spaces to regenerate nature, menus based on provenance, seasonality and reduced waste, whilst putting systems in place to segregate and capture the value of unavoidable food waste.

Within the technosphere, design means working with the supply chains that design assets, products and services to reduce intake, reduce reliance on disposable containers and packaging, promote maintenance, product life extension and eliminate toxic materials that prevent re-use or recirculation (i.e. in furnishings and building materials). Secondly it means making internal design decisions which align with CE principles. For example, interiors which build in flexibility through modularity and timeless designs.
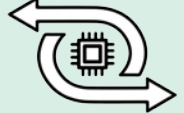
Enabling conditions

There are a wide range of enablers that can support the transition towards a CE, their deployment and exact influence being context-specific. Key enablers include procurement, new forms of collaboration, core service design, digital and software tools, financial and accounting tools. Future legislation and policy, such as Extended Producer Responsibility (EPR) or Ecodesign, will increasingly influence cost profiles and impact system and project design, material selection and future carbon and financial costs and revenue streams. Making the shift from linear to circular isn't easy or straightforward and will require the ability to both think in systems, design systems and be able to manage complexity and uncertainty, supported by new and diverse forms of collaboration across the value chain.

Business Models

This involves working towards business models that focus on the total cost of ownership and carbon impact, shift to performance-based models that incentivise greater utilisation with guaranteed performance and options to significantly extend product life, through upgrades, repair, refurbishment, remanufacture and cross value chain collaborations (e.g. industrial symbiosis).

Reverse Logistics

From the outset, design an adaptive through-lifecycle with reverse loops back to the producers and suppliers, third parties or adjacent value chains to ensure valuable products, components, materials and nutrients can be recirculated profitably.

In the next section, we turn to examples of how some businesses are beginning to make the shift.

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Section 2: How the CE works in practice within the Hospitality sector

2.1 Circular Economy in Action: case studies

The following case study vignettes provide a snapshot of existing CE initiatives and innovations across the inflow, in-use and outflow stages for several product categories, highlighting the enabling conditions and the challenges posed in each case[4].

Inflow phase: Reduce inflow

There are numerous ways that the Hospitality sector can reduce its demand for resources at the outset.

Circular refurbishment

Creative design agency Object.Space.Place (OSP) work with clients to embed circular principles into their refurbishment activities. Using their Restorative Design Framework (Appendix 3) to shape each project, OSP begin by carrying out a comprehensive audit of existing sites and materials. This data informs the design process as materials are retained and reused on-site wherever possible. New designs prioritise longevity by incorporating flexibility amongst design criteria alongside energy efficiency and use of low-impact materials. Consideration of material end-of-life is a core feature of the design process through principles such as design for disassembly, lease hire arrangements, manufacturer take-back schemes and reuse/resale options.

By incorporating these principles into their refurbishment, London-based restaurant Apricity achieved a 41% reduction in embodied carbon compared to a typical fitout of this type (OSP, no date, a). Several strategies were employed, including:

- **Retention of existing materials** such as the wooden staircase and architraves. These were reworked into wall cladding and the bar frontage. Leftover timber was used to make storage units.

- **Minimalist design** features such as exposed walls. Where this was not possible, natural, clay plaster was used.

- **Sourcing products made from waste materials** i.e. lampshades made from recycled oyster shells and coffee grounds.

- **Incorporation of energy and water efficient systems.** Electrolux Skyline premium combi-ovens integrate a Lambda sensor to produce steam only when needed. Thermaline cooking equipment, powered by geothermal heat exchange, reduces annual energy consumption and CO2 emissions by 92%. The choice of a hood type dishwasher reduces water use to just 2 litres freshwater per cycle, compared to 13 litres for a standard dishwasher (Nisbets, n.d.; OSP, no date, b).

- **Responsible procurement.** Collaboration with social enterprise Goldfinger to commission new furniture from local, sustainably sourced timber.

- **Social impact.** Staff washroom designed to the same quality as front-of-house spaces and fitted with a shower to encourage active travel. Retention of original windows to provide natural light in the kitchen.

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[4] The use of brand names and/or any mention or listing of specific products or services is solely for illustrative purposes and does not imply endorsement by the CE Hub, nor discrimination against other circular initiatives not mentioned.

CEctor

According to OSP they demonstrate some of the ways that a CE can be applied to reduce the carbon footprint of refit/refurbishment activities, both in the short-term and in the long-term as energy and water use is reduced in the operational phase and future updates are minimised through timeless design.

Challenges

- The need for **storage space** to enable collection of second-hand furniture as it became available. In this case, storage was enabled by a third party.

- **Convincing the contractor** and wider design team to do things differently (such as reworking the staircase into wall cladding).

- Concerns around the **uncertainty of the outcome** - knowing how long untested processes would take, impacting on pricing.

- Embedding **flexibility in the design process** – i.e. when the walls were revealed, OSP had to be fluid with their design and the other finishes in the space so that they all worked together.

Enabling conditions

- **Collaboration** and strong **supplier relationships.**

- Thorough **knowledge of CE**, embedded at the design stage.

- **Availability of products and services** which meet CE principles.

- Inclusion of **social impact** of design on employee welfare.

- Emphasis on **social value** through inclusive procurement strategies.

CEctor

Circular product design

Of the 6.4 million mattresses which reach end-of-life each year in the UK, only 24% are sent for recycling. Due to the complexity of the process and the variation in materials used, the real rate of recycling is significantly lower, at just 14% (National Bed Federation, 2022). A brand leader in the mattress industry, Silentnight are tackling low mattress recycling rates through strategic redesign of their products. In designing a mattress for hospitality client Premier Inn, Silentnight were challenged to combine guest comfort with their client's NZ commitments. They achieved this by combining lightweighting, modular design and the use of mono-materials.

Lightweighting

According to Silentnight, the type of spring is more important than the spring count in creating comfort (Silentnight, n.d.). They designed their pocket sprung mattress to use the minimum materials - 1000 springs, compared to up to 2,000 in a single layer (John Ryan by Design, 2023) for maximum comfort.

Modular design

Modular design allows for the separation and replacement of the top "comfort" layer following its six-year lifespan, without having to replace the entire mattress. An early-stage lifecycle analysis suggests that based on the 12-year lifespan of the spring unit, switching to a modular design would reduce the carbon footprint of the mattress by 23%, compared to a standard mattress made from the same materials (Oakdene Hollins, 2022).

Material choice

Working closely with recyclers and academic partners, Silentnight are exploring their material choices at the design stage and how these early choices impact on end-of-life value capture opportunities. An early assessment of the three main material choices used in the comfort layer paints a complex picture:

- Sheep's wool: although a natural material and technically compostable, the facilities to carry this out at scale are lacking. Wool is prone to settlement, potentially shortening the lifespan of the product and has high associated GHG emissions at 23.3 kg CO_2e kg.

- Polyester (PET): oil derived but suitable for existing mechanical and chemical recycling processes. Prone to settlement. Associated GHG emissions 5.43 kg CO_2e kg.

- PU foam: oil derived, limited recycling options due to flame retardants[5]. The material is resilient and durable with associated GHG emissions of 4.32 kg CO_2e kg[6].

Silentnight highlight that there is no perfect, circular material without a system in place which supports value retention and capture at end-of-life. Their current design uses polyester due to ease of recycling within the current infrastructure.

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[5] There is widespread industry reliance on brominated flame-retardant (BrFR) treated fabric (upholstered seating and headboards) to meet the current UK and Irish Crib-5 fire safety test (Europur, 2023). The use of these chemicals has resulted in environmental and human toxicity concerns (Shaw et al., 2010; McKenna et al., 2018) and prevents effective end-of-life value capture as treated materials must be incinerated or sent to landfill (Gov.UK, 2022).

[6] Data provided by Silentnight. GHG emissions associated with polyester and PU foam are taken from the EcoInvent database and assume 100% virgin fossil derived polymers.

Challenges

- Delay in expected Extended Producer Responsibility (EPR) legislation which would support the aims of Silentnight's redesign programme.

- End-of-life value capture for some materials limited by use of flame retardants, creating a potential conflict between the need to meet Crib-5 in the UK and IR markets and the forthcoming European Ecodesign for Sustainable Products Regulation (ESPR) guidance on substances of concern (European Commission, 2024).

- UK waste regulations require end-of-life mattresses to be collected by a licensed waste company, increasing the cost of value capture for long-life materials, such as pocket springs.

Enabling conditions

- Strong supplier relationships along multiple supply chains.

- Alignment of client NZ goals with CE principles.

- Long-term client contract enabled design and pilot of an innovative new product.

- Strong academic and researcher relationships fuel research into material composition and recycling opportunities.

- Engagement with the National Bed Federation enabled shared learning beyond their own sphere of influence.

- Collaboration with recycling partners influenced product design.

Use phase: Asset optimisation

Reuse and redistribution organisation Ramco, reports two thirds (67%) of businesses in the UK have working equipment they no longer use sitting idle. Catering equipment accounts for 10% of unused equipment by type. Furniture and electronics goods, although not specific to hospitality, account for 53% of unused items (Figure 8). Over half of businesses (59%) had disposed of working equipment by selling it for scrap or sending it to landfill in the last 5 years. Ramco (2022) estimate the value of unused equipment held by UK businesses to be worth over £59 billion.

Several of the equipment types shown in Figure 8 are relevant to the Hospitality sector, including furniture, electronic goods and catering equipment. The current second-hand market for catering equipment is primarily driven by third-party organisations who purchase products for repair and resale, rather than by the original product manufacturers. This is partly due to the complexity of supply chains within the sector, which result in little or no relationship between manufacturers and end-users.

Figure 8. Source: Ramco survey results (2022), obtained directly from Ramco.
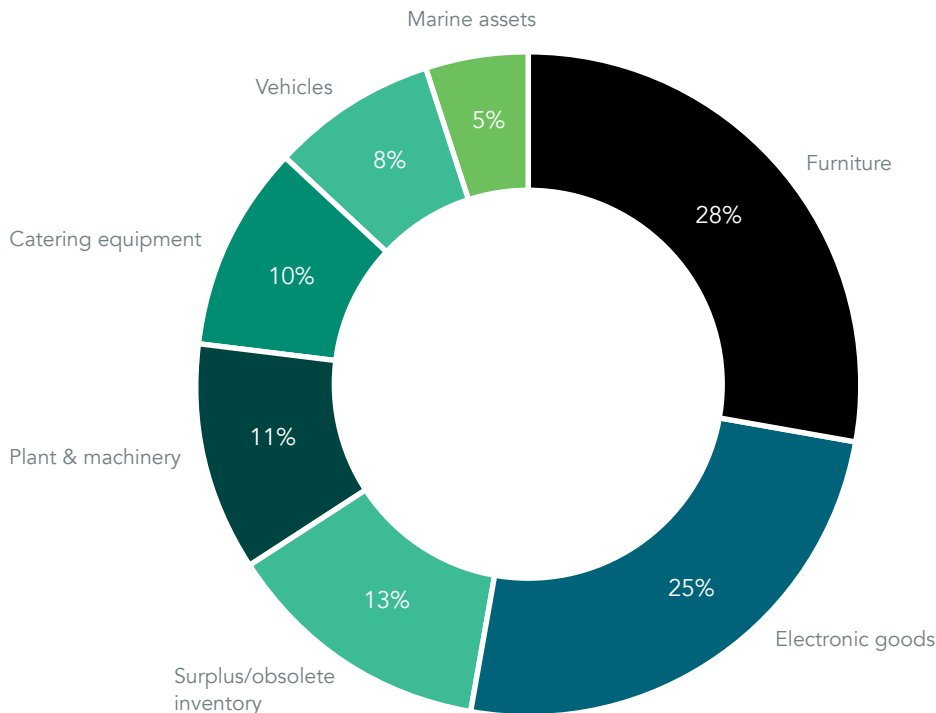
Public data and statistics on the size of the stocks and flows of commercial catering equipment placed on the market, their lifespan and eventual disposal pathways, is very limited, with commercial datasets being expensive to access. No examples could be found in which manufacturers sought to recover the value of the materials used in catering equipment past the point

of sale, although Electrolux Professional are currently exploring the potential to source high quality plastic recyclate created from end-of-life electrical goods, for use in new products (Waddilove, 2023). It was also suggested (see Section 3.1) that NZ and efficiency goals may encourage early retirement of older equipment.

Increase utilisation of catering equipment

To support value capture of materials used in catering equipment, Loopcycle (now part of ImpactLoop) developed a digital platform that helps trace, manage and recover physical products throughout their lifecycle. They connect different stakeholders in the supply chain including manufacturers and asset owners/operators, increasing supply chain transparency, resilience and circularity of products. Working with a fast-food restaurant chain in the UK, Loopcycle calculated the circular potential and end-of-life opportunities for two of their client's key products at a single estate. Their review highlighted seven unused products with a new purchase value of between £6000 - £7000. Based on a thorough review of these products by Loopcycle's CE partner, three were suitable for refurbishment, whilst the others contained serviceable parts suitable for reuse or resale. Loopcycle estimated cost savings of more than £17,700 to the business from refurbishing and retaining the existing units as an alternative to buying new replacements. In addition, parts harvested from the remaining products could either be retained within the business, representing over £9,000 in cost savings, or sold as spares, generating a potential income of £2,332. Replicated across multiple estates, this activity demonstrates the potential for significant cost savings through value capture opportunities.

Challenges

- Poor product maintenance can negatively affect value capture opportunities.

- Product repair, refurbishment and remanufacture opportunities and skills need further development.

Enabling conditions

- Strong relationships with manufacturers, distributors and end users.

- Collaboration with third parties who can capture the value of products and materials (i.e. refurbishers and remanufacturers).

- Alignment of client goals to capture the value of unused products with CE principles.

- Information sharing between manufacturers and end users (bill of materials, maintenance schedules, repairability, in-use lifespans and energy consumption).

- Effective communication with installers to ensure used products are treated with care and retained/delivered to the correct CE partner.

- Investment in digital systems which track assets throughout their lifecycle and collect in-use data on product and part lifecycles, maintenance schedules and energy use.
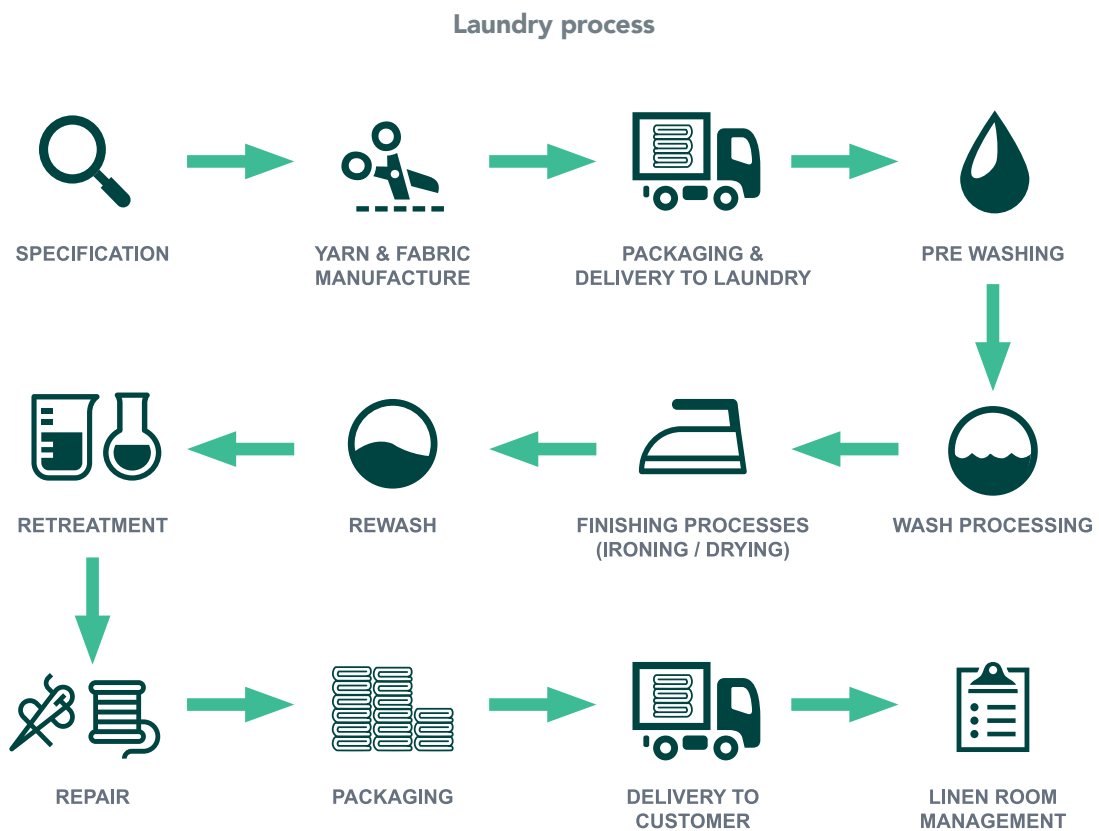
CEctor

Outflow phase: Post-use asset recovery

Closing the loop on textile waste

The majority of hotels in the UK outsource their laundry services to commercial businesses. These are supported by the Textile Services Association (TSA), who state that 95% of the UK's hotel towels and linens are processed by their members. Due to the need to withstand frequent wash cycles, hotel linens tend to be made from high-quality cotton with an expected lifespan of up to 200 washes (TSA, 2022). As a result of its quality, the end-of-life linen product is well-suited to recycling and can be made into a yarn suitable for use in garment production.
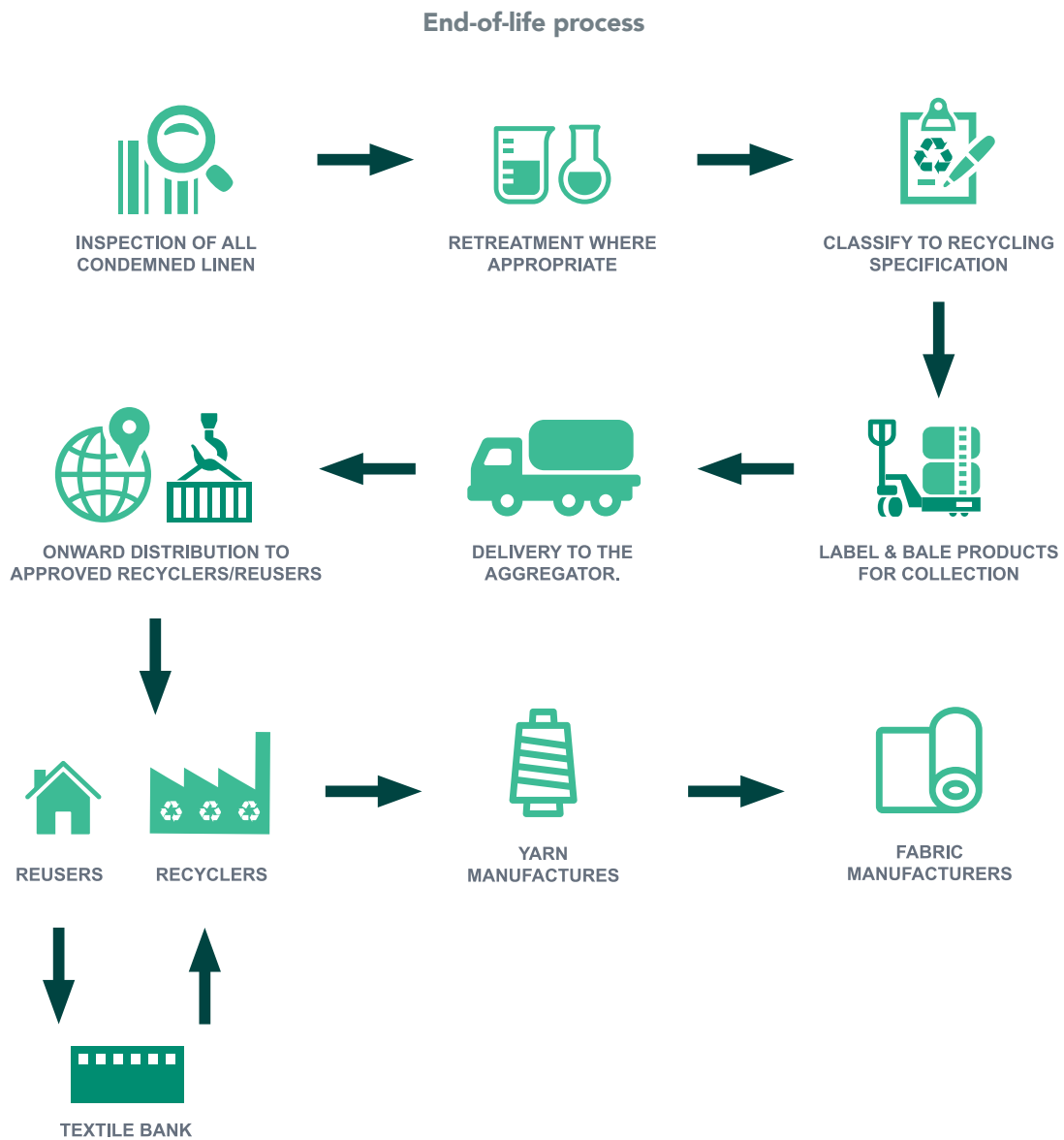
Figure 9. The typical laundry process (TSA, 2022)

Laundry process

SPECIFICATION → YARN & FABRIC MANUFACTURE → PACKAGING & DELIVERY TO LAUNDRY → PRE WASHING

RETREATMENT ← REWASH ← FINISHING PROCESSES (IRONING / DRYING) ← WASH PROCESSING

REPAIR → PACKAGING → DELIVERY TO CUSTOMER → LINEN ROOM MANAGEMENT

Cotton production has numerous environmental impacts, including pesticide use and run-off, high water use and greenhouse gas emissions (Zhang et al., 2023). The TSA estimate that 12.5 million items of linen are lost from hospitality businesses each year. This equates to 61% of linens and towels in circulation. Replacing these items generates 39,000 tonnes of carbon and requires 75 billion litres of water (MacDonald, TSA, 2024). To tackle this challenge, the TSA are developing a portfolio of resources designed to be integrated into existing training programmes, focussing on the impact of linen, how to care for it and extend its life.

A new recycling programme, designed to maintain the value of high-quality textiles through future use cycles is under development to address the 6,000 tonnes of textile waste generated each year by hotels (TSA, 2022). The main recycling route for these textiles is through short-term use as rags before their value is lost into landfill or incineration. Infinite TextilesTM is a whole systems accreditation programme that any business handling end-of-life textiles can work through to improve the total lifecycle of their products.

CEctor

Figure 10. Textiles-to-textiles process for used linens (TSA, 2022)

End-of-life process

INSPECTION OF ALL
CONDEMNED LINEN

RETREATMENT WHERE
APPROPRIATE

CLASSIFY TO RECYCLING
SPECIFICATION

ONWARD DISTRIBUTION TO
APPROVED RECYCLERS/REUSERS

DELIVERY TO THE
AGGREGATOR.

LABEL & BALE PRODUCTS
FOR COLLECTION

REUSERS   RECYCLERS

YARN
MANUFACTURES

FABRIC
MANUFACTURERS

TEXTILE BANK

As part of the programme, TSA have developed a collaboration with textile aggregators and recyclers to create a textiles-to-textiles recycling model to retain the value of materials at their highest value for the longest time, and which is easily accessible for UK businesses.

CEctor

Challenges

- Absence of existing recycling infrastructure in the UK increases the cost and environmental footprint of the scheme as items are shipped to France.

- Competition with the rag trade who are able to offer a higher price for used textiles. Items used as rags are often unsuitable for recycling due to chemical contamination (i.e. paints, solvents), meaning their residual value is lost.

Enabling conditions

- Leadership by a unifying body (the TSA) brings together a fragmented industry, enabling economies of scale and generating commercial value.

- Accreditation and the auditing process provides transparency and accountability, building trust in the scheme.

- Engagement through an existing network enables communication with the majority of the industry group (commercial laundries).

- Early engagement with both the commercial laundry and the hotel industry allowed the programme to be developed in line with industry needs.

- Collaboration with ports, recyclers, logistics and technology companies to create access to existing infrastructure and deliver social and environmental value.

- Long-term vision, as behaviour change requires time to become embedded.

- Support from other trade organisations, including UK Hospitality and the UK Housekeeping Association increases engagement and momentum.

Collaborative initiatives

Beyond individual firms, various collaborative CE initiatives offer support, guidance and aim to scale up and accelerate CE transitions in hospitality businesses.

- The 2020 ReLondon guide to creating a circular food business, 'Food that doesn't cost the earth' (ReLondon, 2020) outlines why a CE is necessary and provides practical examples of its application across seven key activities including food and drink, energy, water, packaging, facilities management, consumables and transportation.

- The Ellen MacArthur Foundation launched their Big Food ReDesign challenge in 2023 which works with food producers to apply CE principles at the product design stage to create food products with a positive environmental and human health impact (EMF, no date, c; 2021d).

- WRAP have carried out research on food and packaging waste in the Hospitality sector (WRAP, 2013, 2020 and 2023) and have developed a range of programmes and resources to support businesses to take a whole lifecycle approach to tackling food and packaging waste, including the Courtauld Commitment 2030 (WRAP, n.d.), Guardians of Grub (Guardians of Grub, n.d.) and the UK Plastics Pact (WRAP, 2023c).

- The Worldwide Fund for Nature (WWF), in partnership with Greenview, created a Hotel Waste Measurement Methodology to support the collection of robust and comparable waste data across the Hotel sector (Ricaurte et al., 2021).

In summary, these vignettes highlight different ways that CE building blocks and interventions can be applied across the inflow, use and outflow phases of the value chain. They illustrate that change is possible leading to positive outcomes. The examples also highlight the opportunity for scaling up CE interventions across the sector, whether it is unused or underutilised assets, revalorising waste streams or reducing demand and need for materials and products at source. Such initiatives bring environmental benefits and preserve the embedded carbon in the goods and services already in the sector.

In the next section, we examine in more detail how one business has taken a strategic approach to a CE for commercial benefit consistent with their core social and environmental values.

CEctor

2.2 Journey to circularity: learning from a business in transition

Established in 1851, St. Austell Brewery is responsible for two breweries, and over 180 owned and leased pubs, inns and hotels across the Southwest, UK. Following fire damage to one of their properties, the Pier House in Charlestown, St. Austell Brewery set themselves the challenge of completing their rebuild and refurbishment project taking CE principles into consideration at each stage of the process.

The Pier House Project

Located in the centre of a UNESCO World Heritage Site, the Pier House is a grade II listed building, in keeping with its position at the edge of an historic working harbour. Popular with both locals and tourists, the Pier House hosts a bar and restaurant, as well as 25 guest rooms. When a fire broke out in January 2023, temperatures reached well over 1000°C, resulting in significant damage to one third of the building fabric and half the roof.

Due for refurbishment, the timeline of the project was brought forward so that the Pier House could be up and running again as soon as possible. The scope and scale of the project was significant, with the potential to create a blueprint for future refurbishment and refit projects across the wider estate. St. Austell Brewery were keen to use the project as a testbed for embedding CE principles across their refurbishment activities, whilst delivering results on time and within budget and meeting their return-on-investment targets. With two major and five smaller property upgrade projects planned year-on-year, the Pier House project represents the first step in St. Austell Brewery's long-term plan to embed a CE across their business activities.

Approach

The first step for St. Austell Brewery was to gather data on their existing material use and purchasing principles, to identify good practices, easy wins and long-term opportunities. Working through each area (construction, mechanical and engineering, refurbishment, and food), St. Austell Brewery made a note of the materials they were using, along with quantities, lifespan and current end-of-life solutions. This provided them with a solid baseline from which they could evaluate circular alternatives. The data could also be used to calculate their carbon footprint and align with their NZ goals. Carrying out the audit highlighted some of the circular practices they were already following, such as reupholstering furniture and redistributing furniture and electrical appliances across the estate. Realising this provided strong motivation for the team and helped them visualise what a CE could look like in practice.

To support them as they undertook the Pier House project, St. Austell Brewery identified a set of guiding statements to set the direction and support decision-making:

- **Rethink, repair, reuse** and **refurbish** as much as possible from the original building.
- Build **local networks** and **develop strategies** for items which could be **redistributed**.
- Embed strong **skills** within project team and wider stakeholders.
- Take a **whole lifecycle** approach to materials and appliances.
- Design for **longevity** and **flexibility.**
- **Lean on suppliers and contractors** to align with these principles.

With reference to the four key building blocks of embedding a CE – Design, Business models, Reverse logistics and Enabling conditions – St. Austell Brewery succeeded in taking action across three of these, with the exception of reverse logistics. The next section describes the actions they took with regards to each building block and shares some of their learnings.

PIER HOUSE
CHARLESTOWN

CEctor

Design

The Pier House project presented St. Austell Brewery with the opportunity to redesign their internal systems to reduce the inflow of valuable materials and resources including energy and water. Low flow sensor taps were introduced, reducing water usage by 30% compared to the previous system and low flush toilets save over 1 litre of water per flush. Lighting motion sensors ensure lights are only on when needed and reduce reliance on individual guest behaviour change. The new kitchen design included the Cheetah Quintex system which automatically matches kitchen extract to energy demand, reducing energy consumption compared to the previous, manual system and again reducing reliance on individual behaviour change. Where new materials were required for construction and repair works, St. Austell Brewery prioritised the use of biomaterials, such as natural insulation and natural plaster, to reduce toxicity and eliminate associated pollution.

Enabling conditions

In the absence of manufacturer-led or producer-led reverse logistics, St. Austell Brewery engaged a third party, CollectEco, to enable the redistribution of fixtures, fittings and furniture which could not be retained on site or otherwise kept within the estate. As a result, 4,944kg of materials were diverted from landfill, incineration and end-of-life recycling, resulting in £19,297 value donated to community projects including YMCA, Harbour Housing, Start2furnish CIC and ARC Inspiring Lives.

St. Austell Brewery's initial data collection and audit phase created a baseline against which future activity can be measured. The action of undertaking the audit was as beneficial as the resulting data, in that it created a space in which the existing mindset and processes could be questioned and existing solutions identified and celebrated. To enable this process, St. Austell Brewery invested in staff training and internal knowledge sharing activities, engaging wider teams and the senior leadership team as the project progressed. Engaging internal colleagues can bring fresh, creative ideas and collaborations to the project as knowledge and experience are shared. St. Austell Brewery have also been instrumental in sharing their CE knowledge and experience with suppliers, contractors and designers, becoming a catalyst for change along their supply chain.

Business Models

CE business models include principles such as repair, reuse and redistribution of materials. Roof repairs reincorporated all undamaged slate and supplemented with 300 m² of reclaimed local Delabole slate. Furniture and catering equipment was repaired and refurbished where possible. The first priority was to retain materials onsite, failing this they were redistributed across the wider estate or collected by a third party (see below - Enabling conditions). To improve the efficiency and lifespan of catering equipment, St. Austell Brewery reviewed their maintenance and repair contracts to ensure timely servicing and product maintenance took place.

In terms of food waste, St. Austell Brewery became the first pub company to use Olio to redistribute uneaten food. During the summer pilot, 300 meals were shared with the local community. The impact of this was twofold, reducing waste internally whilst having a positive impact externally. Alongside this, in-person community engagement meetings were used to communicate St. Austell Brewery's plans for the pub renovation work and to understand community needs which could impact on the design and use of space. As the project progresses and St. Austell Brewery have concrete results to communicate, they plan to use social media as a platform to share their CE journey and activity, both in the redesign of the Pier House and for future projects. It is hoped that this engagement will lead to new links with local community projects, third parties and businesses, sharing CE knowledge and finding new ways to capture the value of used products and materials.

Challenges and enablers

Within each of the key building blocks of a CE, St. Austell Brewery encountered challenges and enabling factors, which are set out in the table below:

Table 1. Challenges and enablers for circular refurbishment

Design challenges
• The building's Grade II* listed status placed limitations on the design changes which could be implemented for this property – future blueprints need to be flexible to individual contexts. • The absence of available space to accommodate grey water tanks and associated equipment prevented the installation of greywater recycling systems. • Incoming electrical supply limitations prevented the installation of a full electric kitchen and a heat pump system. • Existing design principles prioritised aesthetics over longevity and the need to keep up-to-date with changing styles.

Design enablers
• Developing strong working relationships with the building conservation team and introducing the concept of a CE so that they could work together to find mutually beneficial solutions. • Challenging the design status quo and enabling cross-team collaboration to create new design protocols.

Business model challenges
• The CE was a new concept for many of St. Austell Brewery's suppliers and contractors, meaning they had to learn to communicate their new priorities clearly. • For the Pier House project, St. Austell Brewery was unable to embed CE principles into initial contracts as these were already underway before they made the decision to apply CE thinking. • The time-sensitive nature of the project meant it was often challenging to justify the extra time required to research new materials and CE business models, resulting in internal and external pressure to revert to existing, linear models.

Business model enablers
• For future projects, CE expectations (including value retention and capture opportunities) will be embedded from the outset in written contracts. • St. Austell Brewery are creating an internal catalogue of preferred CE suppliers and materials, enabling them to build in any increased costs from the project outset. • By developing strong relationships with contractors and suppliers, St. Austell Brewery were able to highlight mutual benefits. For example, one of St. Austell Brewery's suppliers was inspired to create a catalogue showcasing their more environmentally sustainable product offerings.

Enabling conditions challenges
• Building networks with third party organisations and local groups who can retain the value of products and materials takes time. • Sharing CE knowledge and training, whether internally with staff or externally along supply chains, is a long-term process that requires significant time investment.

Enabling conditions enablers
• Planning ahead to enable value retention of key materials. • Developing strong local networks and identify organisations who can help.

Conclusions

As a result of their experience on the Pier House project, St. Austell Brewery are well on their way to developing a vision and blueprint for their circular strategy. Although they came up against challenges as the project progressed, they found a range of products, materials and services already available which they could leverage to increase the circularity of their project. It is hoped that these options will increase as knowledge of and engagement with the CE increases. The learning from this process has been consolidated by the CE Hub into 'A guide to embedding CE in refurbishment activities' for use by other businesses carrying out circular refurbishment projects.

Figure 11. Key learnings from St. Austell Brewery's experience embedding CE in the Pier House project

Question the status quo

Embed CE from the outset

Build strong networks

Streamline processes

Engage the community

Increase CE skills

Prioritise

Prepare for push-back

Section 3: Envisaging a circular future

While conducting research for this report we were told by industry stakeholders that commercial pressures within the Hospitality sector lead to short-term thinking and business cycles. Given the unfamiliarity with CE as a term or a value proposition, an effective transition requires laying out how businesses can engage with and take initial steps towards the adoption of a CE, as shown in the vignettes section. This section presents a high-level, early-stage CE action plan based on input from stakeholders across the sector, its supply chains, and the policy world. It concludes with a series of recommendations, which draw on learnings from all three sections of this report.

Transformative change: a whole system approach

To enable us to map the challenges and opportunities across the hospitality ecosystem, we invited stakeholders with a wide range of backgrounds, expertise and experiences to take part in two workshops. The groups were attended by hospitality businesses, manufacturers, technology providers, policymakers and trade bodies (see Appendix 4). Altogether 42 stakeholders, representing 36 organisations, took part across the two workshops and their views, opinions and perceptions form the basis of the findings presented in this section.

Prior to attendance, stakeholders were categorised according to their business activity and relationship to the Hospitality sector, into one of six groups: hospitality, product design, policy and support, enabling technology, design and use of space and food. During the workshop, participants carried out the majority of the activities within these six groups, with the exception of the development of a final action plan (see below) which was carried out in mixed groups to facilitate cross-industry communication and learning.

The objectives of the workshops were to:

1) Establish a set of evaluation criteria against which the success of the sector could be measured (including both CE and general success criteria). Whole group activity.

2) Establish a baseline measurement against these criteria. Workshop groups (see Appendix 4, Table 3).

3) Identify the challenges and opportunities presented by the adoption of a CE. Workshop groups.

4) Come up with CE solutions which address these challenges and meet the specific needs and priorities of the sector. Workshop groups.

5) Assess the CE solutions against the evaluation criteria and create a high-level, early-stage CE action plan. Mixed groups.

The next section outlines the evaluation criteria selected by the stakeholders that was used throughout the workshop, followed by an overview of the challenges and opportunities presented by the adoption of a CE. The results from the future scenarios and action plan are presented in Appendix 4 of the report.

Measuring success in a CE: key factors for the Hospitality sector

Stakeholders were asked to create a set of evaluation criteria against which the success of the sector could be measured (including both CE and general success criteria). The selected evaluation criteria addressed the generic challenges facing the sector (outlined in Section 1 of this report). The first three criteria, which relate to the three founding principles of a CE (EMF, no date, d), were pre-populated but the subsequent 8 criteria were agreed by stakeholders to be suitable measures of success to reflect the overall health of the sector. The short-term success/long-term planning criteria were selected as a means of balancing the current short-term thinking which characterises the sector (see Section 1). The table below shows the criteria chosen, alongside the score reflecting the current, business as usual, performance against these indicators.

Table 2: Measures of success for the Hospitality sector

Measure	Business as usual: combined score for existing performance against measure of success (1 = poor 10 = excellent)
Elimination of waste & pollution	4.6
Circulation of materials	3.8
Regeneration of nature	3.2
Short-term business success	5.8
Long-term business planning	4.2
Financial viability	4.7
Reduction of carbon emissions	4.3
Customer experience	5.3
Job retention, creation & staff upskilling	4.7
Promotes & supports human health	3.9
Supports existing sustainability & NZ goals	4.7

Although business-as-usual scores varied significantly between workshop groups, the overall perception of the current state of the Hospitality sector was not encouraging. For example, some groups (i.e. Hospitality) scored the measurement criteria much more highly than others (i.e. Policy and support). This highlights the importance of ongoing communication and collaboration between groups to ensure that opportunities for system level change, such as policy levers or new product designs, are created and used effectively by those for whom they are intended.

The inclusion of multiple criteria to address CE and NZ targets separately reflects general confusion amongst stakeholders about how these two strategies complement each other, as well as concerns that they may conflict with each other. This highlights the need for greater clarity and understanding about a CE, how it contributes to NZ and addressing the risks inherent in applying a single solution to the multifaceted problem of climate change. This tendency to focus on one solution is the so-called "carbon tunnel vision" (Konietzko, 2022; Deivanayagam and Osborne, 2023), which, if not properly understood, can result in environmental harm and increased emissions (Savasta-Kennedy, 2014).

Accelerating a circular economy: challenges and opportunities identified

Stakeholders were asked their views on challenges and opportunities against three social and three technical spheres: goal/vision; people; infrastructure; policy and processes; technology and culture. Quotations have been attributed to the workshop group in which the business was categorised – hospitality, product design, design and use of space, enabling technology and food – rather than to individuals.

Goal/Vision

"Survival, profit for shareholders, I think that's the goal and vision for most hospitality businesses right now." (Design and use of space).

Stakeholders reported the prevalence of a "survival" mindset, due to pressures within the system. However, whether businesses aim for survival or growth, the main business driver was reported to be profit.

Stakeholders' views on environmental sustainability were that the sectoral focus was almost entirely on NZ, with

little knowledge or awareness of the CE. Concerns were raised that this focus was too narrow: *"It's 99% focussed on carbon and Net Zero [...] because it's a quantifiable tangible thing [...] I get why carbon's important, but carbon isn't everything, it's an oversimplified model."* (Design and use of space) In addition, there was a perception that the goals of NZ and the CE might conflict with each other, creating confusion and limiting progress: *"It almost takes away the incentive to be circular because it [carbon] is already measured."* (Enabling technology)

To resolve these issues, it was suggested that a more holistic vision is needed to replace the emphasis on NZ. Aligning NZ and CE goals with a stronger emphasis on biodiversity would help decrease risks resulting from restricted thinking: *"There's a risk of just shoehorning in solutions without really actually fully practising circular economy across the whole system."* (Enabling technology) This would require a shared language and development of a gold standard for businesses to work towards. In addition, stakeholders suggested that increasing the stability and reliability of supply chains and resolving the staffing issues found across the sector (see Section 1) would support adoption of CE principles.

People

"It's all very well implementing certain initiatives, but if the ones practicing it aren't fully aware of what they're doing and why they're doing it, there's a sort of lack of commitment." (Enabling technology)

Stakeholders agreed that knowledge of the CE, both within the Hospitality sector and along supply chains was limited, impacting on opportunities, innovation and data collection: there's a "lack of literal understanding of where to start." (Enabling technology) Where training does exist, it tends to be material-specific (food, textiles) rather than holistic, with the CE generally viewed as a niche topic.

To combat this, stakeholders suggested that accessible, bite-sized training should be made available, which could be embedded into existing programmes: *"I think you need to take it down to a more basic level. If we're talking about hospitality, we're talking a lot about very small companies and businesses [...] and this concept isn't even on their radar. [...] They don't understand the circular economy."* (Policy and support). It was felt that training should include *"the broader opportunity, not just economically, but also in things like guest loyalty and community and identity."* (Enabling technology). The Policy and support group emphasised that additional research was required into the barriers to uptake of the free resources already available (e.g. the Guardians of

Grub programme and NZ roadmap previously mentioned). On a positive note, stakeholders highlighted the passion and enthusiasm displayed by many working in the Hospitality sector; traits which, combined with the right messaging, could result in high levels of engagement.

Supply chains were viewed as complex, fragmented, and characterised by siloed working, lacking a cohesive approach to circularity. Skills gaps along the supply chain were impacting on efforts to increase both knowledge and implementation of a CE: *"Skills gaps in the trades is something we're seeing a lot of which can impact on a kind of approach to the circular economy."* (Design and use of space). These skills gaps included both a lack of trained professionals such as construction workers and electricians which put pressure on projects and a general unfamiliarity regarding CE combined with the perception that applying CE principles would make a job more difficult. Hospitality businesses currently rely heavily on third parties and the charity sector to capture the value of used products, with little to no involvement from original product manufacturers: *"I think third party in regards to circularity is almost the only way at the moment."* (Hospitality).

Stakeholders emphasised the need to significantly increase collaboration across sectors and organisations, engaging businesses, NGOs, academics, government departments and local councils to boost innovation and create a supportive environment incentivising CE adoption.

Infrastructure

"There is no easy infrastructure to replace the linear supply chain." (Design and use of space)

Under infrastructure, the main focus across all groups was logistics, including both deliveries and reverse logistics. The system was described as fragmented, with no consolidation or optimisation between organisations. Behaviour and infrastructure surrounding deliveries was perceived to fuel the use of excess packaging: *"There's so much waste coming from the construction industry just in packaging and delivery of materials."* (Design and use of space). Stakeholders agreed that this challenge was not limited to construction, but that it extended along the supply chain.

In terms of reverse logistics, it was felt that limited storage space was driving businesses to find quick, easy solutions, often resulting in products sent prematurely to landfill or incineration just to get them out of the way: *"they're missing the space to store the bottles and the empties. So usually they put them in the bin."* (Hospitality). From a hospitality perspective, CE opportunities were seen to be limited: *"[old equipment] never goes back to the actual origin or the company*

that we bought it from." (Hospitality). Participants from elsewhere in the supply chain commented that reverse logistics were time-consuming or costly: *"A lot of circularity ideas are not viable because of the cost of logistics."* (Enabling technology).

Regulations that require waste products to be handled by a registered waste carrier were cited to increase costs. Furthermore, the fragmented, siloed approach to logistics fails to maximise environmental benefits: *"It's the logistics that are a real problem. Carting around coffee grounds that are very heavy and voluminous and contain a lot of water offsets any benefit because of the carbon footprint of the logistics."* (Food). Participants from the Hospitality workshop group suggested that involving wholesalers would be key to creating a more cohesive logistics service, in that empties could be collected by delivery services: *"Getting the wholesalers on board is a really important part of it [...] reducing deliveries, getting all of your different kind of foods and non-foods on one vehicle."* (Hospitality).

In addition to the focus on logistics, manufacturers in the catering industry commented on the perceived pressure to move from gas to electric, which they saw as in conflict with CE principles: *"it's almost against the circular economy […] It's almost counterintuitive"* (Product design). Concerns raised included the loss of products and materials through early retirement (i.e. functioning gas or older electric appliances) and concerns about existing infrastructure being insufficient to meet the increased demand for electric (a challenge faced by St. Austell Brewery). In addition, stakeholders commented that electrical products have a shorter lifespan than gas, due in part to inbuilt complexity and in part to increased obsolescence and the need for regulatory compliance. The cost of replacing individual components in electrical catering equipment products can be high as they tend to be bought in rather than manufactured on site.

Policy and processes

"There are not enough policies in place – policies and incentives – to move that way [towards Net Zero] and I don't think there are any for the Circular Economy." (Product design)

Stakeholders from across the supply chain felt that there were no policy or financial incentives for CE design, innovation or adoption: *"There is no incentive for [products] that fit with recycling, the circular economy, or even energy saving."* (Product design) In fact, CE was not widely perceived to be high on the government agenda: *"I'm not sure I've heard a lot from leading ministers. I've heard lots about Net Zero. I don't think I've heard a lot about the Circular Economy."* (Product design). However, those with a policy background explained that CE was on the agenda, albeit still under development: *"Resource efficiency, such as circular economy policymaking is still quite in its infancy. There is a lot of work happening to set things in motion."* (Policy and support).

This misconception ties in with another topic of discussion, which is that of communication of the potential benefits of a CE along with a unified, coherent wider message from government, policy and supporting bodies. Stakeholders felt that the cost-benefits of transitioning to a CE were not well enough publicised: *"The messaging has to change [...] adopting a circular economy model is a more cost-effective way to run your business and will see your business survive longer into the future [...] it has to be a more holistic message."* (Policy and support). This consideration could be embedded in future training materials and programmes mentioned above. Stakeholders also reported receiving mixed messages from government and policymakers on CE-related legislation, with CE perceived to sit primarily with the Department for the Environment, Food and Rural Affairs (DEFRA) and CE-relevant policy such as Extended Producer Responsibility delayed.

There was common agreement that the relevant data was lacking to quantify circularity, identify potential policy levers and support a circular transition: *"There's a massive gap in the baseline data and there isn't a real, true benchmarking. There isn't a very simple way to look at the way something operates and identify the circular opportunity."* (Enabling technology). To enable change, stakeholders suggested a comprehensive programme of data-gathering from businesses across the value chain. This evidence-gathering should include learning from the experience of other countries. Such a programme could inform the development of suitable support packages to enable businesses (especially SMEs) access to CE initiatives. In addition, it would enable tools to be created, such as cost/time matrices to support business decision-making and make it easier to identify opportunities.

Technology

"The elephant in the room is cost [...] particularly in hospitality where they're still feeling a lot of business pressure, economic pressure." (Enabling technology)

The key message from stakeholders with regards to technology was that change was held back by the perceived higher cost of CE solutions. Manufacturers were concerned that they wouldn't see returns on

investment for circular innovations because the industry would continue to purchase cheaper, linear alternatives: *"You can have a product that will beat your competitors but if it's not the cheapest it's unlikely to be bought."* (Product design). The perception was that this mindset was driven by the current challenges facing the industry: *"I think the challenge is staying alive or doing your bit for the environment and understanding the imbalance potentially there that these businesses need to get over."* (Policy and support). This situation was exacerbated by the perceived absence of policy incentives discussed above.

In terms of existing solutions, there was a mix of opinions regarding the availability of suitable products and business models. The general consensus was that opportunities were increasing, and that new business models, such as product-as-a-service, were now open to discussion: *"there's a growing amount of products that you can access now almost daily I find. So in the last 18 months, 12 months or so, there are lots more opportunities to buy things that have been repurposed or use upcycled materials."* (Hospitality).

However, some felt that existing circular solutions were not being adopted, perhaps due to the current industry culture: *"we have the ability to deal with a lot of this […] but there's a link to the culture of adapting or adopting that technology, so sometimes it does exist, but people just don't use it"* (Design and use of space). Stakeholders also reported a wariness or risk aversion with regards to new technology. As a result, circular innovation is disincentivised. Underpinning this was a lack of knowledge and awareness of existing technology and its capability as an enabler of a CE. In spite of this, stakeholders felt that there was a perception of technology as a silver bullet, that a change in technology alone would be sufficient to meet environmental targets, without recognition of the other aspects (such as policy change or behaviour change) required for systemic change.

In addition, stakeholders suggested new solutions were needed to support the evidence and data gathering process discussed above and to support CE solutions such as design for disassembly: *"I think one of the challenges we have from a circular economy perspective for hospitality is the need for hygiene. [...] you want things to be as seamless as possible and that need for seamless means you can't design for disassembly."* (Design and use of space). For example, closed units provide smooth, seamless surfaces which are easy to clean, but they present a challenge when it comes to repair and remanufacture. Further difficulties are created by the use of powerful adhesives during fitouts, rendering fixtures and fittings difficult and time-consuming to remove without damage.

Culture

"I think the cultural problem is 'this is the way we do it, this is the way we've always done it' - there's a lot of aversion to change." (Design and use of space)

Many of the challenges facing the sector were believed to be as much cultural as operational. For example, stakeholders believed that siloed working and fragmentation were embedded in the industry's way of doing business, and that this was hampering a circular transition: *"If you look at the groups that are being set up to discuss it [CE] they don't involve suppliers. I personally don't think the industry as a whole is going about this in the right way. It's not integrated enough."* (Product design). Siloed working also meant that circular initiatives and opportunities were not well-publicised: *"There may be lots of companies out there all trying to do small bits [...] we just don't know about them. [...] Short-term success may be going on but it's not joined up."* (Food).

Stakeholders also described a resistance to change which was hampering the adoption of solutions, perhaps due to a belief that change would introduce unknown risks to an industry with limited financial resilience. Yet, it was widely agreed that change was necessary: *"There's a huge shift in mindset that's needed everywhere - not just in hospitality. You know, all of us are so wasteful."* (Food). The challenge created by the short-term financial cost of change was also considered to have become embedded within the culture of the industry: *"The hospitality industry kind of pushes towards the lowest cost and therefore the idea of what value is gets warped."* (Design and use of space). A short-sighted "get in, get out" approach to design and refurbishment activities meant that the long-term benefits of a CE were not being realised.

In terms of focus, stakeholders believed that most initiatives were geared towards energy efficiency and changes to food supply, rather than applying a circular perspective in a holistic way across organisations. In addition to this, where CE principles were considered, this was taking place at the end of product and material lifecycles, with an emphasis on recycling, rather than applying them throughout product lifecycles. Manufacturing stakeholders reported poor care or stewardship of kitchen products, making it difficult or impossible to recoup the value of materials: *"Hot [catering] equipment more or less gets vandalised on a daily basis."* (Product design).

Conclusions

For the successful adoption of a CE, stakeholders envisaged the development of more collaborative, cohesive working practices, featuring cross-sectoral and cross-organisational partnerships. A programme of support would enable access to circular initiatives for all businesses, exemplified by knowledge-sharing and co-development of opportunities. This would extend to wider stakeholders affected by the impact of changing business practices, such as farming communities.

Although the stakeholders differed in terms of background, experience and position in the hospitality supply chain, there was a common consensus on the required conditions for a CE to become embedded within the sector and across its supply chains:

- The need for a shared, cohesive vision combining the language of NZ targets and carbon accounting with CE principles and strategies to create a more holistic and transformational roadmap.

- The need for multistakeholder collaboration, robust and thorough data collection, data sharing and transparency.

- The opportunity for new businesses to lead the way in providing innovative solutions and offer new CE business models.

- The need for leadership and creativity to offer solutions which go beyond incremental change.

- The need for a policy landscape which proactively supports a CE transition, whilst disincentivising the continuation of the current, linear system.

Developing a CE action plan

Over the course of the two workshops, participants identified both broad and highly specific challenges, opportunities and short-, medium- and long-term actions to support a transition to a future CE Hospitality sector under six key themes: goals and vision; culture, people, policy/process, infrastructure and technology. These have been mapped onto an initial action plan set out below (Figure 12). These challenges and actions, together with the evidence reported in the earlier section of the report, have then been used to develop a series of recommendations to support the adoption and implementation of a CE within the sector, which we turn to in the final section.

Figure 12: Phase 1 action plan for accelerating CE adoption in the Hospitality sector

Category	Challenges	Actions: Short term	Mid term	Long term
Goal / Vision	Profit-driven business	Integrate cost-saving CE measures and value capture opportunities	Develop long-term vision	Build brand around CE
	Net Zero tunnel vision, NZ/CE conflict	Align goals of NZ & CE; Develop a shared language combining NZ & CE; Create gold standard exemplars of CE principles in practice		
	Survival mindset		Create stable, resilient supply chains to ease pressure.	
Culture	Poor stewardship of products/materials	Address culture, shifting towards product care & maintenance	Expectations & contractual obligations set out for product-as-a-service contracts	Shift from end user responsibility for value capture to manufacturer/contractor responsibility; Shift mindset from ownership to shared use
	Competitive, rather than collaborative, approach to data transparency and IP	Create collaborative, cohesive working practices		Develop cross-sectoral and cross-organisational partnerships
	Silo-working embedded in culture			Product-as-a-service models shift responsibility of value capture to manufacturers
	Over-reliance on recycling			Co-development of opportunities
	Resistance to change	Address and share risk in CE transitions; Knowledge sharing activities		Emotional, not just intellectual, approach to behaviour change
	Frugality embedded in mindset and processes			Increase acceptance of second-hand products
People	Lack of CE knowledge/awareness	Bite-sized training packages; Embed CE into existing programmes		Enable and resource effective leaders
	Skills gaps in supply chains		Identify and address current and future skills gaps	Increase collaboration across sectors and supply chains
	No cohesive approach to CE			Implement data collection and sharing to improve product quality, longevity and repairability
	Reliance on third parties for value capture		Recognise and create social and community value	Pilot centralised distribution centres
Policy / Process	CE legislation such as EPR slow to arrive			Support manufacturer-led solutions; Accelerate introduction of EPR; Review and update existing legislation
	Mixed messages with regards to CE benefits	Embed clear messaging and cost benefits into CE training	Use language to address culture-change - i.e. waste to resource	Communicate data and metrics to incentivise change
	Lack of CE policy and incentives		Finance & support for CE initiatives & innovation	Introduce mandatory reporting on food waste at all stages of value chain; Incentivise product life extension and value capture and disincentivise linear models
	Lack of data quantifying CE	Apply learning from other countries	Gather data across supply chains; Create tools to support business decision-making	
Infrastructure	Fragmented logistics – no consolidation			Pilot consolidated delivery and reverse logistics solutions with wholesalers
	Limited storage space for reverse logistics		Pilot materials hubs; Implement effective segregation of materials	
	Existing electric infrastructure insufficient for increased demand			Install local food cycling machines, reducing weight and cost of inedible food waste
	Cost of reverse logistics			
	Use of excess packaging		Switch to minimal eco-packaging	
	Lack of bioplastics composting infrastructure			Upscale anaerobic digestion facilities
	Waste regulations increase cost			Update regulations to enable and incentivise value capture
Technology	High cost of CE solutions		Utilise partnerships	Product-as-a-service models spread costs across contracts; Save costs through other CE approaches and reinvest
	Risk aversion to new technology		Create digital product passports	
	Over reliance on tech to provide whole solution	Develop scenario-modelling tools to enable effective decision-making	Create software solutions (i.e. marketplace apps) to enable client	Create digital platforms to support predictive maintenance
	Lack of CE solutions		Design for disassembly	Introduce sensors to detect faults
	Lack of CE adoption (existing solutions)			Collect data on individual waste streams to inform new tech opportunities
	Lack of knowledge and awareness of CE solutions			

Section 4: Recommendations to accelerate a Circular Hospitality sector

Building a future CE for the Hospitality sector will require action on many fronts by multiple stakeholder groups. Drawing on the full range of evidence from the literature, case studies, workshops and wider consultations, we propose six key action areas (Figure 13) are required to accelerate the shift from linear to circular. These action areas are differentiated and targeted towards five stakeholder groups (Figure 14).

Figure 13: Six action areas for achieving a CE.

Funding & incentives	Data collection & transparency	Collaboration & leadership
Policy & regulation	Knowledge, awareness & skills	Shared vision

Figure 14: Stakeholder groups

Regulators, policymakers & trade bodies	Manufacturers & supply chain	Hospitality sector & customers	Third party organisations & investors	Academics & research partners
Catalysts	Innovators	Pioneers	Accelerators	Investigators
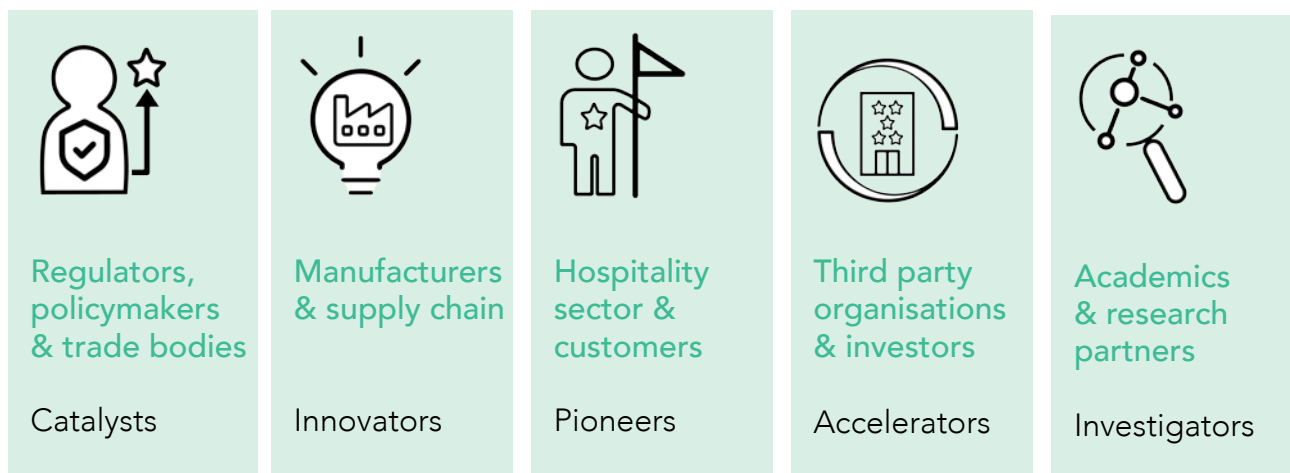
CEctor

Hospitality sector
Pioneers

While NZ targets have been established and are being progressed by a growing number of hospitality businesses, there is much more that can be done through procurement and logistics that account for the majority of carbon emissions. NZ can only be achieved by applying CE interventions to reduce overall demand for products, goods and services, increasing asset utilisation and rethinking end-of-life solutions, as described in Section 1.

Key actions include:

Funding and incentives

- **Structure procurement frameworks** to incentivise circularity and embed CE options into initial costings, rather than viewing them as an added or increased cost. Where costs are saved (i.e. through reduced need for trend updates), funnel these into other CE projects which require upfront costs or initial infrastructure investments.

Data collection and transparency

- Collect **data on key material flows**, product lifespans and current end-of-life solutions to identify short-term easy wins and long-term projects to reduce material inflow, use and outflow. This will provide a strong baseline against which to assess progress.

- Support mechanisms for **data sharing** across the value chain with continuous exchange of information. E.g. for kitchen equipment, real-time data gathered from products in use can help identify where there are gaps or inaccuracies in product performance information and can also be used to inform the market for spare parts. Data sharing can also facilitate proactive maintenance schedules which can improve the performance and extend the life of products.

- Engage in **cross-sectoral, collaborative initiatives** such as those highlighted in Section 2.

Collaboration and leadership

- **Engage early** with contractors and **embed expectations** for CE into contracts.

- Where feasible, **engage directly** with suppliers – i.e. direct relationships with farmers can help create a market for surplus or unappealing (i.e. 'wonky' vegetables) crops, reducing food waste.

- **Engage with product manufacturers** for the creation of user-centred circular product & service design especially within the kitchen environment. Involving

end users (i.e. chefs and kitchen staff) can avoid the design of products and smart systems which fail to meet the needs of end users.

- **Access existing CE infrastructure** (i.e. 3rd party reverse logistics opportunities, product reuse programmes) and signal demand for missing or inadequate CE infrastructure.

Policy and regulation

- **Demonstrate demand** for CE **policy, regulation and support** through cross-industry collaboration and lobbying for specific policy and funding mechanisms to support a CE transition.

Knowledge and awareness

- Create a **culture of care** for products and materials, increasing efficiency, extending product life and increasing opportunities for end-of-life circular strategies.

- Put in place robust and effective strategies for **reducing waste and retaining material value** across all aspects of the business (from refits to menu redesign).

- Support with **knowledge sharing and education** around CE implementation within staff teams across all areas of the business (management, design, kitchen, cleaning). Everyone has a role to play if systems change is to be effectively embedded across the organisation. Engagement with diverse groups of people will also bring to light new ideas, innovations and solutions which are truly matched to the challenges of end users.

- **Engage in CE pilots and research** programmes to support the generation of new knowledge.

Shared vision

- **Align CE goals with NZ,** using the principles of a CE to support, accelerate and enhance NZ planning. Proactively educate and communicate this across the supply chain.

- **Align CE goals along supply chains,** creating mutually beneficial relationships.

- Implement **long-term strategic planning** processes to assess cost-benefits of CE adoption over time.

- **Invest in existing CE solutions**, thereby signalling demand.

CEctor

Manufacturer
Innovators

Manufacturers can play a key role in CE through product and service design, business model innovation for repair, refurbishment and remanufacture and take-back schemes as well as material choices: each of these have a major impact on product life extension and value creation opportunity.

Key actions include:

Funding and incentives

- Continue to **invest in innovation** cycles with a CE focus, including exploring digital enablement.
- Make use of **small pilot projects** to test new CE products.

Data collection and transparency

- **Proactively gather data** on product performance in-use. Make use of tools such as product passports and digital bill of materials which can increase the effectiveness of end-of-life open-loop recycling.
- Carry out **robust cost-benefit analysis** to support applications for funding and investment.

Collaboration and leadership

- **Engage with product end users** to increase understanding on how products are used and experienced.
- **Engage with recyclers** to understand material valuation challenges and integrate this knowledge into product design.
- **Engage with upstream suppliers** to demonstrate demand for CE products, services and business models.
- Explore **value capture opportunities** and **new business models** to retain the value of materials post-sale and develop supporting infrastructure (i.e. reverse logistics to enable reuse/remanufacture).
- Carry out **skills gap analysis** for new business models and support with training programmes (i.e. for repair and maintenance of products.

Policy and regulation

- **Engage with policymakers** to identify enabling actions to accelerate circular business model adoption and identify commercial transition strategies to minimise first mover disadvantage.

Knowledge and awareness

- **Train design teams** in CE principles and **incentivise CE innovation**. Explore business model strategies such as reuse, repair, refurbishment and remanufacture and embed this thinking into product design.
- Explore the adoption of **digital innovations** such as sharing platforms, asset management systems and other tools to optimise utilisation of resources.

Shared vision

- **Align CE goals with NZ,** using the principles of a CE to support, accelerate and enhance NZ planning.
- **Align CE goals along supply chains**, creating mutually beneficial relationships.
- Implement **long-term strategic planning** to assess short-term costs vs long-term rewards (including the implications of climate change) and embed within the decision-making process.

Policymakers & Industry Groups
Catalysts

Policymakers and industry bodies are key enablers for CE transitions and have the capability to set clear leadership and direction, including incentives/advocacy for CE adoption and implementation.

Key actions include:

Funding and incentives

- Embed **funding mechanisms, incentives & tariffs** to support CE interventions and long-term value-based procurement, defining critical measures of success and prioritising key performance indicators.
- **Provide funding for CE** research across the whole system, exploring a range of CE solutions across the inflow, in-use and outflow stages and partnering with experts across academia and industry to create joined up solutions.

Data collection and transparency

- Use **feasibility studies** to identify need for reconfiguring operational infrastructure and new organisational systems to capture and valorise waste, supporting with the cost and feasibility of reverse logistics solutions.
- Explore data collection options to ensure **robust data collection** across key products and materials (i.e. food, refurbishment and refit activities), establishing a baseline against which to **measure progress.**

CEctor

Collaboration and leadership

- Demonstrate **leadership** by bringing together multi-stakeholder groups to explore CE solutions for the sector and develop action plans and roadmaps to support SMEs in the transition.

- Create a **clear language** and **set of goals** for the CE, in alignment with NZ, to overcome existing confusion and perceived conflict between these pathways.

Cohesive, holistic CE policy and regulation

- Use **policy and standards to support the full range of CE principles**, going beyond improving recycling to enabling **whole systems change.**

- Address challenges around **legacy policies** which create lock-in to the linear system, such as current waste and fire regulations

Knowledge and awareness

- Provide a **shared CE vision** for the Hospitality sector, supported by a common language and framework. Consider the development of gold standards or accreditation processes and highlight exemplar practices and share learning.

- Carry out comprehensive **skills gap analysis** for skills underpinning the CE (i.e. in repair and refurbishment) and create mechanisms to address any gaps.

Shared vision

- **Collaborate across government departments** to create a shared vision for a CE across multiple topics and sectors (i.e. food systems, electronics, the built environment). Taking such a joined-up, systems approach enables multi-faceted CE solutions to be developed, taking into account the implications for other sectors.

- Create a long-term **strategic roadmap** for the sector which clearly sets out the steps required by stakeholders to achieve this vision.

Academic, research and innovation partners
Investigators

Research, development, and innovation are essential to enable hospitality to make the shift from linear to circular. To date, research specific to the adoption of a CE within the Hospitality sector is limited, often focussed on individual cases or single materials, with a fragmented evidence base and lacking systems approaches and scalability.

Key actions include:

Funding and incentives

- Carry out research into **funding and incentive mechanisms** which could support the transition to a CE, being mindful of unintended consequences and potentially harmful effects. Learn from other countries who are pioneering work in this area.

Data collection and transparency

- Develop **viability assessments, cost-benefit analyses and case studies** for CE business models, such as product-as-a-service, helping to establish the risks and benefits of these activities.

- Support with the development of user-friendly **methodologies and frameworks** for data collection, supporting the development of robust, up-to-date data for key material flows.

- Support with the collection and analysis of **in-use product** data and its application to increase product longevity.

- Act as impartial third parties to support with navigating the complexities of **balancing data sharing with data protection.**

Collaboration and leadership

- Engage multi-stakeholder groups to develop modelled examples demonstrating the **business case for change,** identifying value creation opportunities and decision-making processes across the short, medium and long term.

Knowledge and awareness

- Define criteria and provide **agnostic frameworks** to demonstrate CE value creation.

- Use case examples to develop **CE intervention-specific roadmaps** identifying best practice to engage wider adoption.

- **Share cross-sectoral, interdisciplinary research** for application to the Hospitality sector, including digital enablement, data analysis and scenario modelling.

- Support the Hospitality sector with **knowledge sharing and education** around CE implementation.

- Conduct research into the **social impact** of a CE, including just transitions, unintended consequences and the behaviour change required for an effective transition.

- Conduct research into the **infrastructure and technological changes** and innovations required for an effective transition, supporting with whole lifecycle analyses and focusing on difficult materials (i.e. chemicals which do not align with CE goals).

Cohesive, holistic CE policy and regulation

- **Engage policymakers** in research and translate research findings into white papers and policy briefs to support the exchange of knowledge between policymakers and academics.

Shared vision

- Support in the creation of a **shared language** for CE, aligning with NZ goals.
- Engage in long-term **strategic planning** which enables the continuation of knowledge exchange and networks beyond short-term funding cycles.
- Create an **interdisciplinary CE vision** which brings together research from both social and technical spheres.

Enabling organisations
Accelerators

As demonstrated by the future scenarios envisaged by our working group stakeholders (see Appendix 4), there is a need for multiple organisations of all types including design agencies, the charity sector, NGOs, food and agriculture and finance and investment to support CE transition for the sector.

Key actions include:

Funding and incentives

- Review funding **and investment products** and processes and develop **funding packages** to support CE adoption and innovation which are accessible to businesses within this sector (high proportion of SMEs facing rising costs and cash flow issues [UKHospitality, 2024] - see Section 1)

Data collection and transparency

- **Identify gaps** in existing technology and develop services to support a CE transition (including data collection, reverse logistics and end-of-life value capture opportunities).

Collaboration and leadership

- Consider CE opportunities in **consolidation services** (i.e. deliveries, storage, valorising food waste) and **design services** which respond to these needs and support the CE transition.
- Foster a culture of **collaboration, transparency** and **data sharing**, at the organisation, supply chain and sector level.
- Explore CE **accreditation** and **auditing opportunities**, supporting the development of knowledge and programmes which are adapted to the specific needs of the sector.
- Embed CE into **upstream procurement processes,** ensuring CE principles are applied across all key business activities.

Knowledge and awareness

- Support in the development of **CE training programs,** designed specifically to address the needs of this sector.
- Address **CE skills gaps** through the provision of services (i.e. enabling reuse, repair, remanufacture and refurbishment).
- Engage in CE **discussions and stakeholder working groups** to understand opportunities and create services and products in response to these needs.

Cohesive, holistic CE policy and regulation

- **Engage with policymakers** to identify enabling actions to accelerate circular business model adoption and identify commercial transition strategies to minimise first mover disadvantage.

Shared vision

- **Embed CE thinking into vision, mission and values** at the organisational level, the supply chain level and the multi-sector level.
- **Align CE goals with NZ**, using the principles of a CE to support, accelerate and enhance NZ planning.
- Take a long-term **strategic planning** approach to envisage CE solutions for the sector.
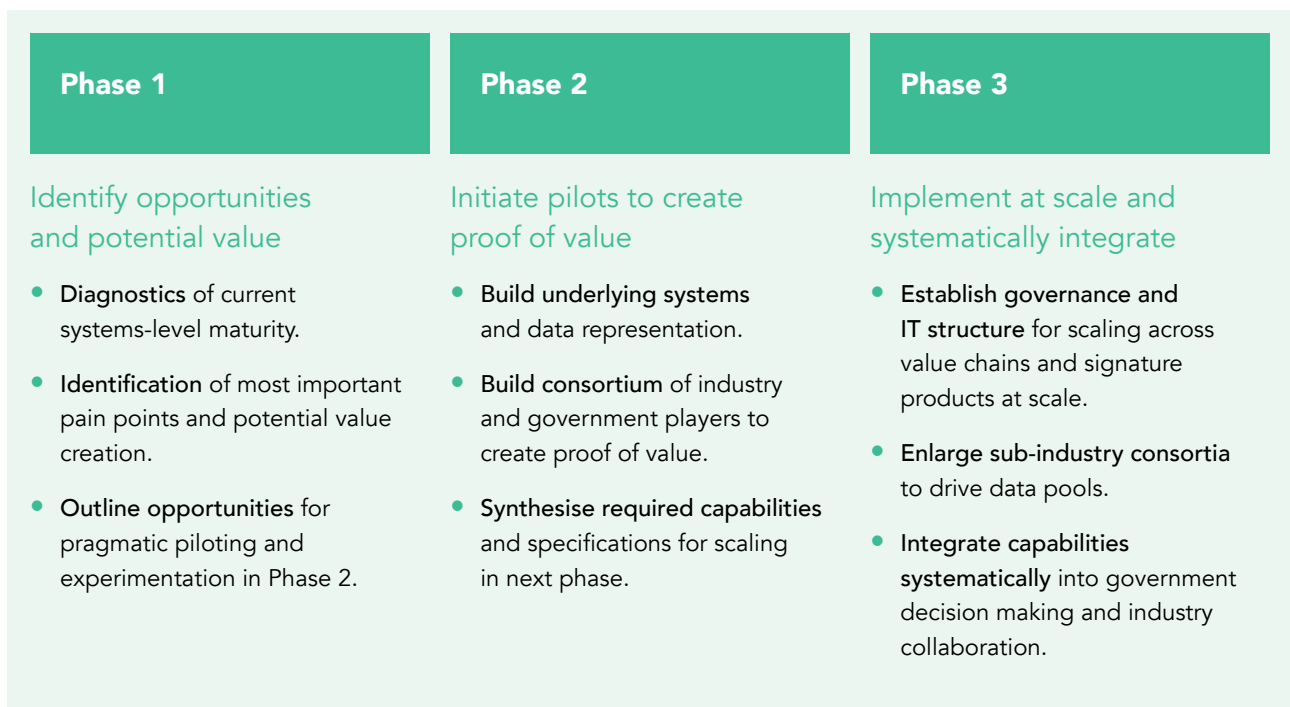
CEctor

Hospitality sector customers

Although beyond the scope of this project, the customer role in the transition to a CE represents a key area for future research. The Hospitality sector has the opportunity to engage directly with local communities as well as regional and international visitors, to showcase CE in practice, and disseminate knowledge and awareness. Local communities and visitors as customers equally have an opportunity to signal demand for businesses to apply pressure to adopt CE and take responsibility for their environmental impact. This may take a wide variety of forms, from paying a premium for CE-oriented products, services and experiences, to engaging with CE business initiatives or asking questions about material provenance or challenging the need for trend-based refurbishments.

Next steps for the Hospitality sector

The illustrative examples presented indicate that a CE has a positive business case with the potential to save businesses in the Hospitality sector money in the short term through procurement savings, deliver significant carbon savings, drive private sector innovation and future profitability, and fulfil government policy commitments for delivering NZ and reducing food waste. Achieving a circular Hospitality sector of the future within the UK is a priority that requires clear leadership and collaborative forward-looking actions from all stakeholders throughout the value chain.

As Phase 1, this report provides a diagnostic of current CE systems level maturity to identify key pain points, potential opportunities for value creation and future piloting and experimentation across a wider range of Hospitality sector applications in the next phase (Figure 15).

Figure 15. Adopting a circular Hospitality sector

Phase 1

Identify opportunities and potential value

- **Diagnostics** of current systems-level maturity.

- **Identification** of most important pain points and potential value creation.

- **Outline opportunities** for pragmatic piloting and experimentation in Phase 2.

Phase 2

Initiate pilots to create proof of value

- **Build underlying systems** and data representation.

- **Build consortium** of industry and government players to create proof of value.

- **Synthesise required capabilities** and specifications for scaling in next phase.

Phase 3

Implement at scale and systematically integrate

- **Establish governance and IT structure** for scaling across value chains and signature products at scale.

- **Enlarge sub-industry consortia** to drive data pools.

- **Integrate capabilities systematically** into government decision making and industry collaboration.

Phase 2 requires the initiation of a dedicated and co-ordinated programme of practical pilots to create further proof of value. To ensure consistency of approach, this requires building the underlying systems and data requirements by bringing together policymakers,

hospitality and key supply chain services against an agreed taxonomy. Figure 16 provides an illustrative taxonomic approach against a short list of criteria and signature products which have been explored in this report.

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Figure 16. Sample Classification of Hospitality Use Cases

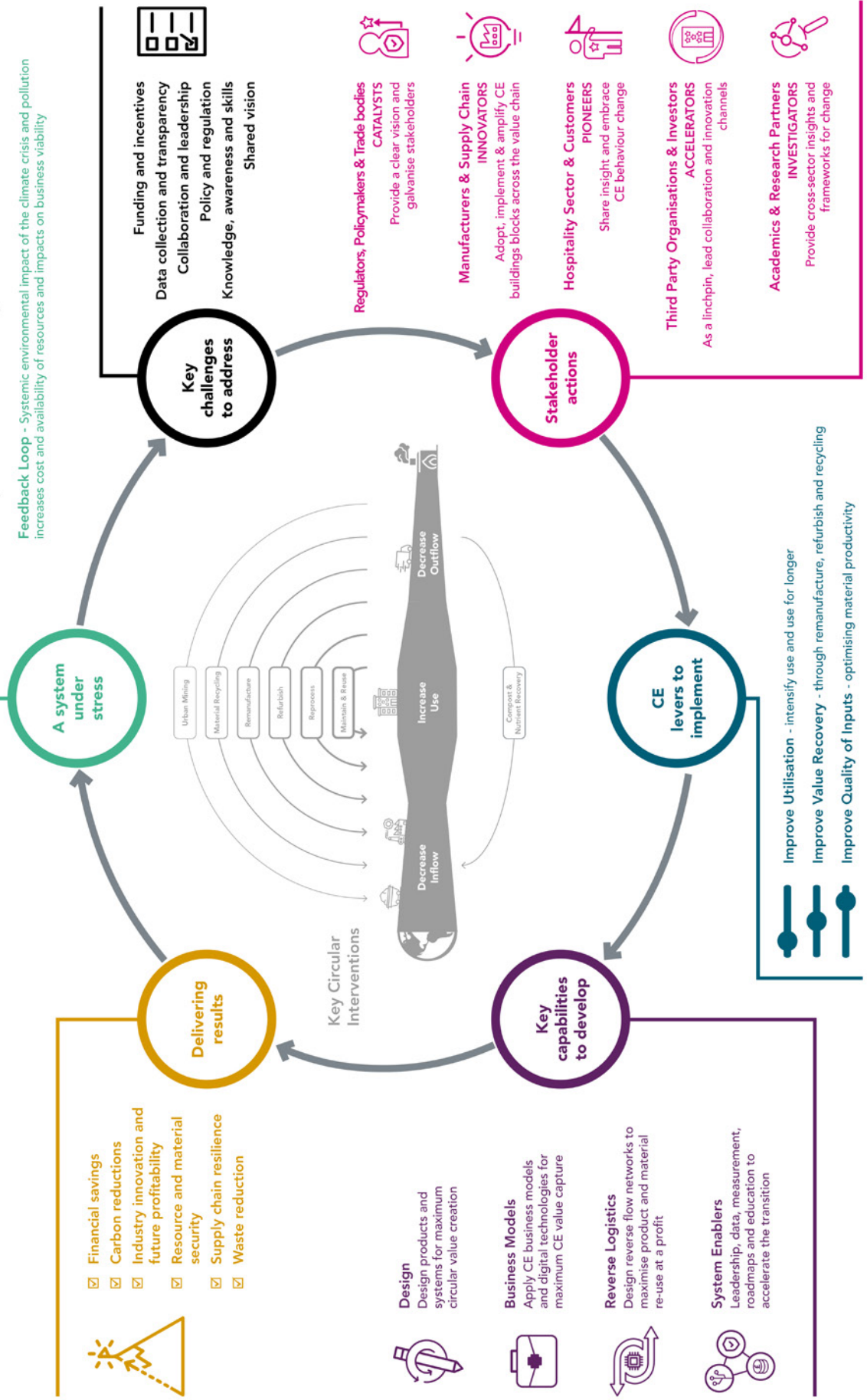Sample Classification of Hospitality Use Cases (Illustrative example)
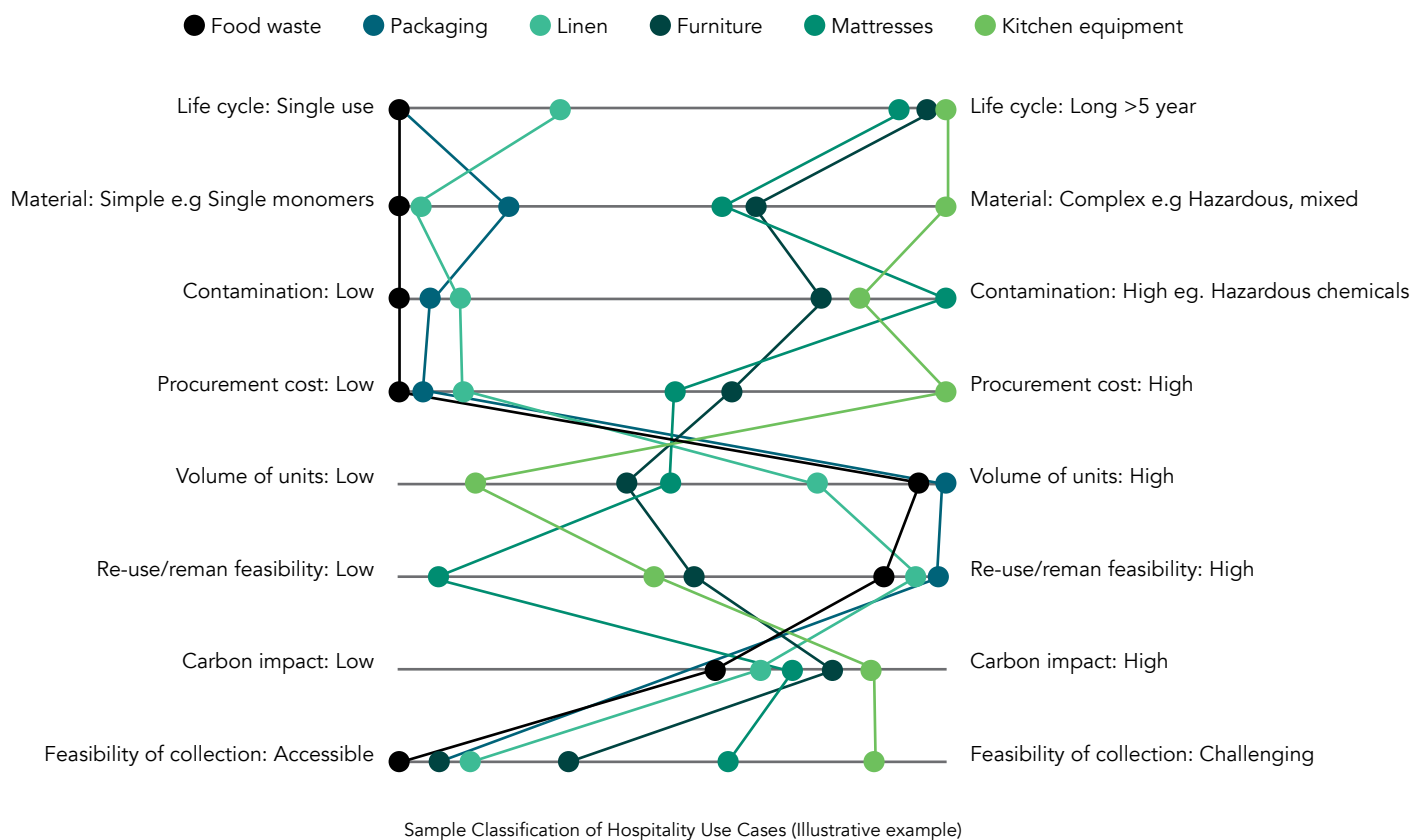
To implement a CE Hospitality sector at national scale requires systematic integration of a taxonomic approach, a common data framework and capability to connect initiatives and evidence via digital tools, dashboards and reporting systems as is emerging in other sectors and approaches globally. Findings and successes from a Phase 2, with learnings from across a signature set of products and services, would provide the confidence and support to enlarge and set up further policy-hospitality-supply chain collaboration to drive data and case study pooling and the evidence for proof of value. Learnings and experience from this stage will identify and develop the dynamic capabilities required for total system integration into governmental, hospitality, and supply chain decision-making and collaboration.

This report underscores that a circular economy offers a tangible solution to the systemic challenges faced by the UK Hospitality sector (Figure 17).
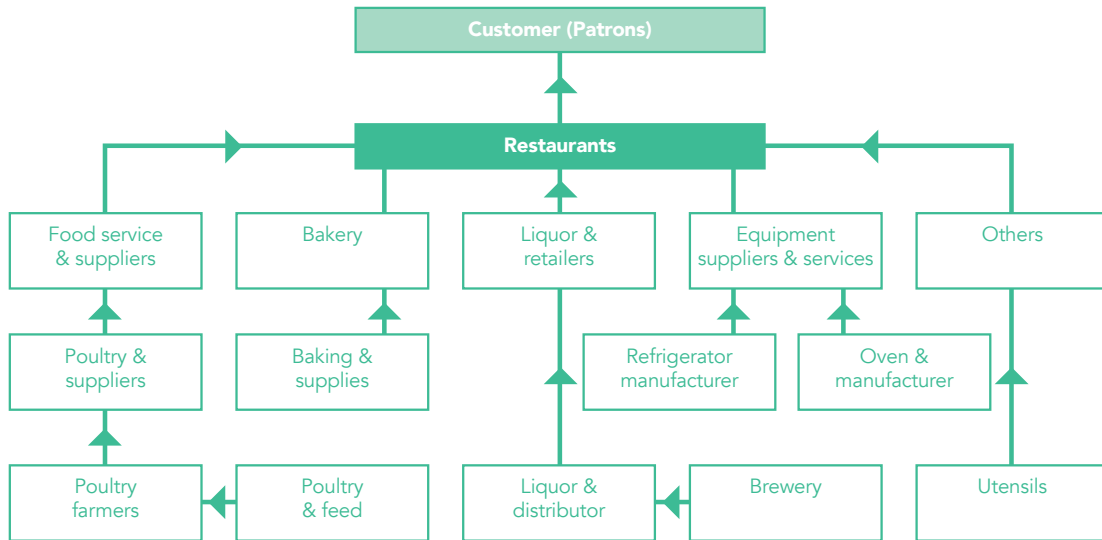
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Figure 17. Transitioning to a Circular Hospitality sector

Transitioning to a Circular Hospitality Sector

Feedback Loop - Systemic environmental impact of the climate crisis and pollution increases cost and availability of resources and impacts on business viability

Key challenges to address

- Funding and incentives
- Data collection and transparency
- Collaboration and leadership
- Policy and regulation
- Knowledge, awareness and skills
- Shared vision

Stakeholder actions

Regulators, Policymakers & Trade bodies
CATALYSTS
Provide a clear vision and galvanise stakeholders

Manufacturers & Supply Chain
INNOVATORS
Adopt, implement & amplify CE buildings blocks across the value chain

Hospitality Sector & Customers
PIONEERS
Share insight and embrace CE behaviour change

Third Party Organisations & Investors
ACCELERATORS
As a linchpin, lead collaboration and innovation channels

Academics & Research Partners
INVESTIGATORS
Provide cross-sector insights and frameworks for change

A system under stress

CE levers to implement

- **Improve Utilisation** - intensify use and use for longer
- **Improve Value Recovery** - through remanufacture, refurbish and recycling
- **Improve Quality of Inputs** - optimising material productivity

Key Circular Interventions

Decrease Outflow
Increase Use
Decrease Inflow

Urban Mining
Material Recycling
Remanufacture
Refurbish
Reprocess
Maintain & Reuse
Compost & Nutrient Recovery

Key capabilities to develop

Design
Design products and systems for maximum circular value creation

Business Models
Apply CE business models and digital technologies for maximum CE value capture

Reverse Logistics
Design reverse flow networks to maximise product and material re-use at a profit

System Enablers
Leadership, data, measurement, roadmaps and education to accelerate the transition

Delivering results

- Financial savings
- Carbon reductions
- Industry innovation and future profitability
- Resource and material security
- Supply chain resilience
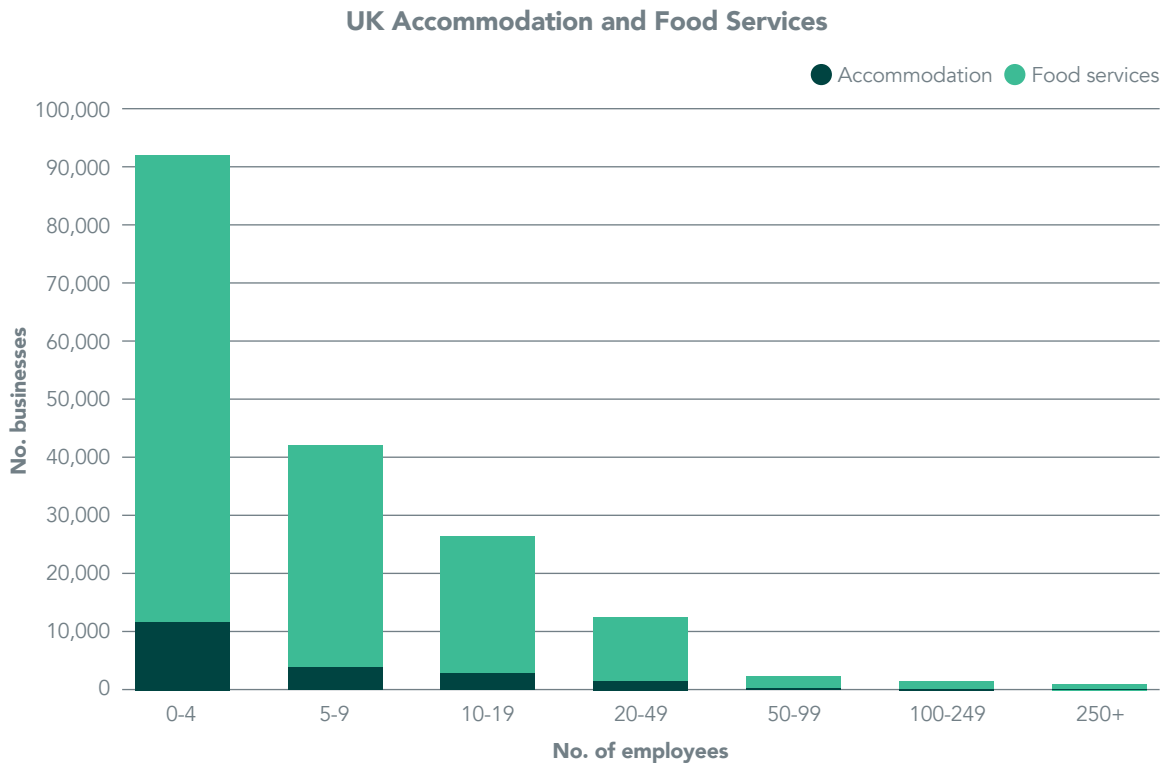- Waste reduction

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Appendices

Appendix 1: Hospitality Supply Chains

Source: Aigbedo (2021)

Appendix 2: Business size across the UK Accommodation and Food Sector

UK Accommodation and Food Services

Source: Office for National Statistics, Dataset, UK Business: Activity, Size and Location. Available at: https://www.ons.gov.uk/businessindustryandtrade/business/activitysizeandlocation/datasets/ukbusinessactivitysizeandlocation

(Data produced from a snapshot of the Inter-Departmental Business Register).

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Appendix 3: Restorative Design Framework

Created by Object.Space.Place, the Restorative Design Framework provides an heuristic for applying CE principles to refurbishment projects:

The Restorative Design Framework is a design approach based on the principles of a circular economy.

The aim is to remove the idea of 'waste' from new fitouts and ensure that designs are created so that all elements can be re-used again at the end of their life. Eventually, this will be measured in 'tonnes of lifecycle waste' produced - a bespoke assessment method we are developing.

The framework combines these principles with a number of existing sustainability assessment methods which allows it to flex across a wide variety of project types.

The Restorative Design Framework
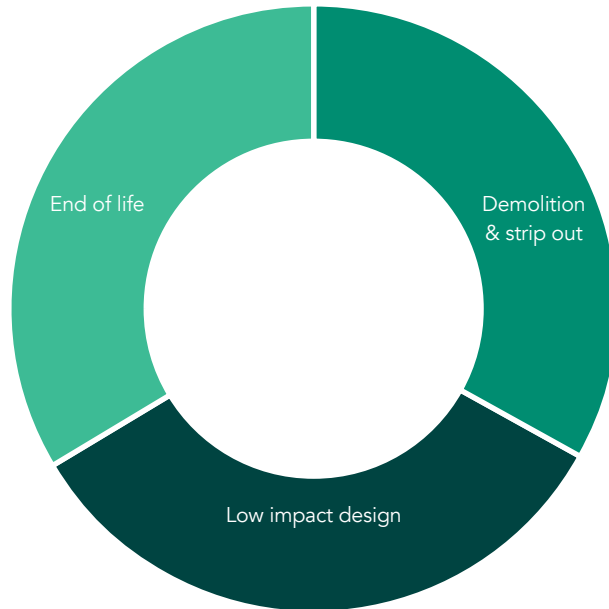
Source: Object.Space.Place, https://objectspaceplace.com/blog/the-restorative-design-framework/

Appendix 4: Workshop stakeholders, methodology and future scenarios

Figure 18. Spread of organisations represented at the workshops

Organisations represented

44

Figure 19. Stakeholder knowledge of CE, prior to the workshops

Knowledge of CE
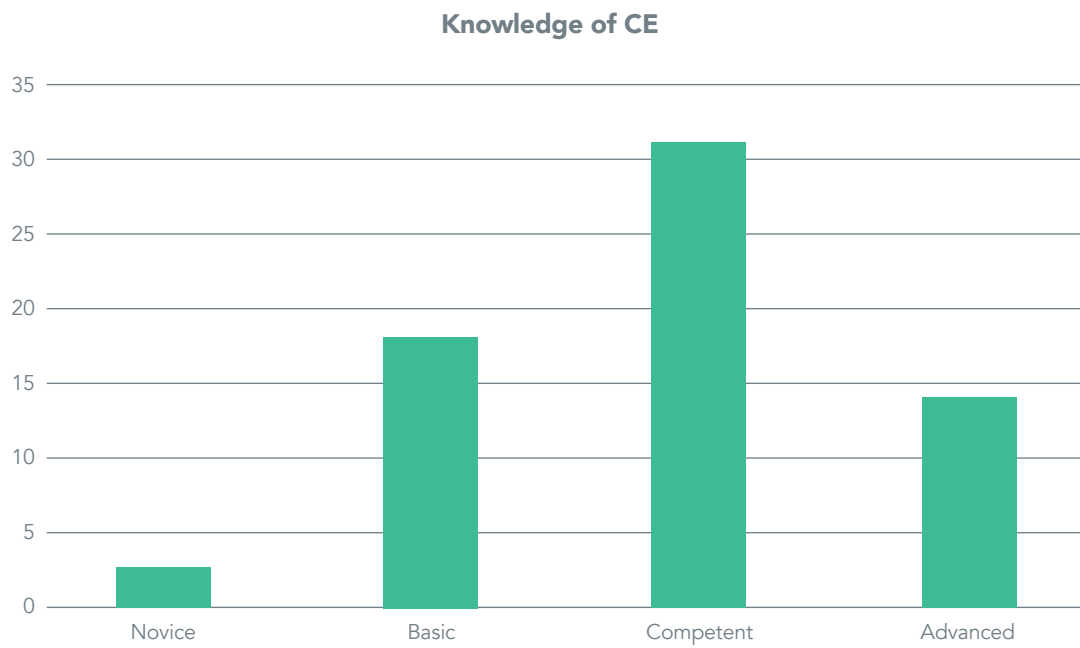
Table 3: Description of stakeholders by group

Group	Stakeholder description
Hospitality	Umbrella organisation offering Hospitality services
	Pub and bar operator
	Pub and bar operator
	Wine merchant
	Brewery and pub operator
	Restaurant
	Holiday park operator
	Academic with expertise in the Hospitality sector
Product Design	Trade body supporting businesses in the foodservice equipment industry
	Product assembly: mattresses
	Foodservice equipment manufacturer
	Refrigeration equipment manufacturer
	Circular product design start-up
	Water filter product manufacturer
Policy and support	Climate action NGO
	Consultancy with expertise in environmental impact and sustainability
	Government representative (local level)
	Non-profit organisation supporting Hospitality businesses to achieve Net Zero
	Government representative (national level)
	Trade body supporting businesses in the textiles industry
Enabling technology	Software engineering business focussed on CE solutions
	Organisation specialising in sustainable "last mile" logistics
	Software design company tracking reusable items in the Hospitality sector
	Polyester recycling facility
	Digital platform provider specialising in CE solutions
	Organisation providing software solutions for a CE
Design and use of space	Academic with expertise in engineering
	Design agency specialising in CE solutions
	Consultancy specialising in sustainable design principles
	Business consultancy with expertise in customer experience and the CE
	Consultancy for kitchen design and refurbishments
	Building project design and renovation specialists
Food	CIC providing food-focussed circular community projects
	Academic with expertise in food systems
	Academic with expertise in food systems
	Food and drink distributor
	Provider of CE solutions for used coffee grounds

Workshop Methodology

The workshops followed a socio-technical systems theory approach, an existing, peer-reviewed methodology that aims to identify challenges and opportunities within an organisational context (Clegg et al., 2017) and integrate systems change (Davis et al., 2022), including environmental sustainability initiatives (Davis et al., 2014). Businesses within the Hospitality sector can be viewed as individual systems (micro-level), nested within supply chains (meso-level), nested within industrial sectors (macro-level). As can be seen from the image below, these complex systems are affected by the financial, regulatory and wider stakeholder landscapes.

The sociotechnical systems theory approach recognises that each system is made up of social, cultural and technical aspects, all of which overlap and are inter-related. This means that a change made in one part of the system will only be effective if it is combined with change in other parts of the system. For example, within the Hospitality sector, smart systems implemented to reduce energy consumption will only be effective if they are combined with training and cultural or behavioural change to ensure successful adoption. By asking stakeholders to consider the activity and actions required within each of the six spheres shown in the image below, some of the complexity of change implementation is captured and the risk of unwittingly omitting key actions across both technical and socio-cultural spheres is reduced.

Figure 20. Socio-technical system, illustrating the interrelated nature of an organizational system, embedded within an external environment (Davis et al., 2014)
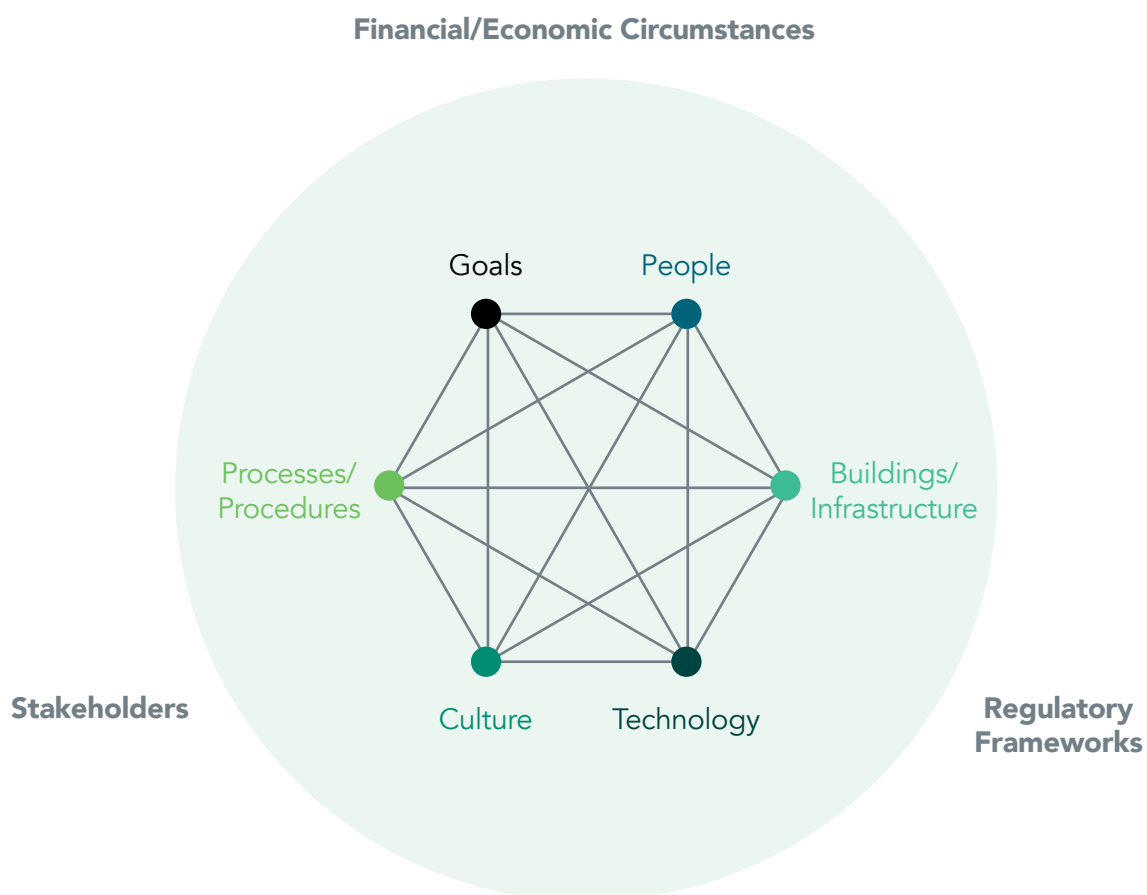
The design of the workshops was inspired by the System Scenarios Tool, developed by Hughes et al. (2017) to support businesses in the redesign of work systems. The tool has been adapted here to the redesign of wider, economic systems and to support with the development of a CE action plan (see Section 3). Adaptations included providing input on the CE, categorising participants by business activity and mixing groups to provide insight from across the sector in the development of action plans.

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CE Solutions

Product-as-a-service
(Developed by the Hospitality and Product Design groups)

Products are leased to the customer through a product-as-a-service model, looping back to the original manufacturer at end-of life. Product life is extended through repair, refurbishment and remanufacture. This extended producer responsibility and ownership incentivises CE principles such as modular design for ease of repair and design for longevity. Use of recycled and recyclable materials where possible.

Centralisation of resources
(Developed by the Design and use of space group)

CE service provided by a zero-waste contractor, offering holistic strip-out and fit-out services (sale or lease) to multiple businesses. Resources removed during strip-out activities can be retained in a central hub to be used again. By concentrating responsibility with a single contractor, complexity is reduced for clients who may not have the time to find solutions for individual items, or the storage space to retain items awaiting collection.

Maximising the value of food
(Developed by the Food group)

Segregation of food waste at source enables high-value streams to be valorised (i.e. coffee grounds, orange peel, egg shells). Solutions for each stream provided on a local level via shared access. For example, through locally installed food cycling machines, which create nutrient-rich powder from business food waste streams. Powered by solar power, the by-product of the process is water which is collected and diverted into the waste water system.

Centralisation of logistics
(Developed by the Enabling Technology group)

Development of third-party, centralised distribution centres which manage both outgoing and incoming deliveries for multiple business sites within congested areas. Dedicated eco-vehicles decrease environmental impacts resulting from vehicle use and congestion, whilst eco-packaging services reduce reliance on packaging materials. In addition, such consolidation enables systematic, cost-effective return logistics from all sites for multiple resource flows and the opportunity to streamline existing processes resulting in potential cost-savings.

Creation of a cohesive, holistic CE policy landscape, featuring funding and support
(Developed by the Policy and support group)

The policy group developed a three-strand strategy to transform the policy landscape into one which incentivises and enables a circular economy:

1. Measure: Creation of a holistic measurement framework and a robust cost-benefit analysis process for the circular economy to tackle challenges and inconsistencies in measurement and access to funding.

2. Incentivise: Implementation of incentives which reward circular economy decisions, such as tax cuts and rebates combined with drivers which more accurately reflect the true cost of the linear system (i.e. increasing landfill tax).

3. Fund: Provision of funding to support CE training packages, increased capital costs of transition and innovation in CE technologies and infrastructure.

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