EE4HORECA

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Deliverable 2. 1 Map the HORECA value chains

Co-funded by the European Union

Summary

INTRODUCTION

The present deliverable is the first step of the value chain analysis within the Life Energy Efficiency 4 HORECA project (Supporting the Clean Energy Transition of the HORECA value chain) sustained by the European Commission within the LIFE-2022-Clean Energy Transition call. The EE4HORECA project brings together 12 partners from 7 countries and focuses on the value chain approach to test and validate the economic viability of collaborative models in greening value chains and to propose benchmarks and standards inputting regulatory and policy improvements. All the activities are focused on supporting companies and staff in the implementation of energy efficiency measures, business models and benchmarks for greening the HORECA value chain.

The project focuses its activities in the following NACE sectors: accommodation and food service activities (NACE Code: I55 to I56.3.0)

The present work is part of the WP2 that will Map the value chain of the HORECA sector, gather best practices and identify the multiple benefits achievable from collaborative approaches between large and small companies operating in the same value chain.

The overall objectives of the present work aim to activate the collaborative approach that will perdure throughout the whole project between the actors involved in the project and external stakeholders to:

- map the actors connected with the HORECA value chain, identifying the point of high environmental impact (D2.1 and D2.2);
- identify and select the best transferable practices for energy efficiency across the value chain at European level (D2.2 and D2.3).

The present work explains the background and the methodology utilised in the WP2 Mapping study and WP3 Business Model and benchmarks.

The present work is Co-funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or CINEA. Neither the European Union nor the granting authority can be held responsible for them.

METHODOLOGY

VALUE CHAIN, HISTORY AND DEFINITION

The concept of the value chain, encompassing the entire spectrum of activities required to take a product or service from conception to its ultimate delivery and disposal after use, has evolved over time and is grounded in many theoretical frameworks and methodologies. The foundational elements of the value chain theory find their roots in two key concepts: the French notion of filière and the English concept of the commodity chain, as elucidated by Raikes et al. (2000). The filière concept emerged in the 1960s, originating from collaboration between the French National Institute for Agricultural Research and the French Agricultural Research Centre for International Development. Initially designed for monitoring crop production in France and its former colonies, this concept laid the groundwork for understanding the interconnected stages of agricultural activities.

In parallel, the English concept of the commodity chain gained prominence, with its roots traced back to the 1980s. The term "supply chain" management was first introduced by consultants Oliver and Webber in 1982, providing an early glimpse into the structured management of the flow of goods and services. The notion of the commodity chain extends beyond the mere supply chain and encompasses a broader perspective on global economic patterns, including the conception, transformation, design, and disposal after use of each product. Gereffi (1999) and Dougherty (2008) have explored and articulated this comprehensive understanding of commodity chains.

Building on the groundwork laid by the supply chain concept, Michel Porter, in the 1980s, further developed the term "value chain" applicable to firms' analysis. Porter emphasized a strategic perspective, delineating a set of activities—ranging from logistics and marketing to production, delivery, and design—that collectively contribute to the value-added by firms.

The value-chain concept, originally applied to individual firms, has evolved to encompass entire supply chains and distribution networks. This extension recognises that delivering a diverse mix of products, including goods and services, to end customers involves the coordination of various economic factors, each managing its own distinct value chain. The synchronised interactions of these local value chains within an industry give rise to an extended value chain, often spanning a global scale. Michael Porter terms this broader interconnected system of value chains the "value system." A value system incorporates not only the value chains of a firm but also those of its suppliers (and their suppliers), distribution channels, and buyers (including the buyers of the firm's products and beyond). This holistic perspective underscores the complex interdependencies and interactions that shape the broader economic landscape within which businesses operate.

Value chain analysis has been widely applied in various domains, including business strategy, supply chain management, development economics, and social responsibility. It has been used to identify opportunities for cost reduction, efficiency improvement, and innovation, as well as to assess the sustainability and ethical implications of value chains.

In recent years, value chain analysis has incorporated concepts such as sustainability, social responsibility, and ethical sourcing to address the social and environmental impacts of companies and their value chains. This evolving framework recognises the interconnectedness of economic activities with societal and environmental concerns and emphasises the need for responsible business practices such as those pursued by the EE4HORECA project.

The value chain map in the HORECA sector is interpreted through the perspective of the customer, focusing on the user experience from the booking to the activities taking place at the destination and including all actions, processes, and equipment that impact energy efficiency. This approach focuses on the mapping each service rather than a linear flow and emphasises the importance of interactions and relationships between different phases of the value chain. This model provides a holistic view, analysing how each individual element contributes to the overall customer experience, with a focus on the energy-related aspects that permeate the entire system.

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GHG PROTOCOL, HISTORY AND DEFINITION

The Greenhouse Gas Protocol (GHG Protocol) is an international recognised standard for measuring and managing GHG emissions. It was developed in 1998 by the World Resources Institute (WRI) and the World Business Council for Sustainable Development (WBCSD) in collaboration with the United Nations Framework Convention on Climate Change (UNFCCC). The GHG Protocol is nowadays one of the most widely adopted greenhouse gas accounting and reporting standard in the world.

The GHG Protocol emerged in response to growing concerns about climate change and the need for effective strategies to reduce greenhouse gas emissions. Initially focused on providing guidance for corporate greenhouse gas accounting and reporting, establishing standardised methods for quantifying and reporting emissions. It has expanded its scope to encompass a broader range of applications, including supporting the development of national strategies, calculation of project-based emissions, and the creation of emissions trading schemes. The GHG Protocol has gained widespread international recognition and adoption, becoming 'de facto' the most common standard for greenhouse gas accounting and reporting. It is widely used by companies, organisations, and governments: It is used by companies to report GHG emissions to investors, customers, and stakeholders and it is also used by organisations to develop climate change mitigation strategies and to measure their progress against their targets. The GHG Protocol is also used by governments around the world to develop national climate change mitigation strategies.

The GHG Protocol consists of a suite of standards and tools that address various aspects of greenhouse gas management, including:

- Direct and indirect Emissions (Scope 1, 2, and 3): The GHG Protocol defines three scopes of greenhouse gas emissions;
- GHG Accounting and Reporting: The GHG Protocol provides standards and guidelines for measuring, calculating, and reporting greenhouse gas emissions.
- Project-Based Emissions Reductions: The GHG Protocol provides standards for quantifying and verifying greenhouse gas emissions reductions from projects;
- Emissions Trading Schemes: The GHG Protocol provides standards for emissions trading schemes, which are market-based mechanisms for reducing greenhouse gas emissions.

The adoption of the GHG Protocol can bring several benefits such as:

- Improved transparency and accountability: The GHG Protocol provides a consistent and standardized approach to measuring and reporting GHG emissions.
- Increased efficiency and cost savings: By measuring GHG emissions, companies can identify and implement opportunities to reduce their emissions and improve their performance.

- Enhanced decision-making: GHG data can be used by top management to adopt informed business decisions, such as investment in renewable energy, energy efficiency, and supply chain management.
- Contribution to climate change mitigation.

Measure direct and indirect emissions, scope 1,2,3:

The GHG protocol has classified emissions in three categories according their scope. Scope1 - Direct emissions concern the emissions directly controlled by the organisation, while scope 2 and 3 - indirect emissions are those emissions caused by third party:

- **Scope 1**: Emissions from operations that are owned or controlled by the reporting company. Scope 1 emissions include direct emissions originating from sources owned or controlled by a company. This incorporates on-site energy sources such as natural gas and fuel, emissions from combustion in owned or controlled boilers and furnaces, as well as emissions from the company's fleet vehicles, including cars, vans, trucks, and specialised vehicles. Additionally, direct emissions extend to emissions discharged during industrial processes and on-site manufacturing activities. This include emissions from factory fumes and chemicals generated as part of the company's operational processes. In the case of the HORECA sectors Scope 1 emissions are those related to: heating, conditioning, sanitary hot water, lighting, equipment, vehicles, food processing, etc.
- **Scope 2** emissions encompass the indirect emissions associated with the purchased or acquired energy used by a reporting company. These emissions arise from the consumption of electricity, steam, heat, or cooling that is generated off-site. An illustrative example is electricity procured from a utility company. Since the generation of this electricity occurs off-site, the emissions resulting from its production and delivery to the reporting company are classified as indirect emissions falling under Scope 2**.** In the HORECA sector the emissions related to Scope 2 are the emissions caused by energy providers for producing, transporting and guarantee energy delivery (e.g. infrastructure and waste disposal).
- **Scope 3:** All indirect emissions, which fall outside the scope of Scope 2, are those occurring throughout the value chain of the reporting company. This encompasses both upstream and downstream emissions, signifying the environmental impact generated not only by the company's direct activities but also by the broader network of suppliers. By considering the entire value chain, companies gain a comprehensive understanding of the environmental footprint associated with their operations and products, extending beyond the boundaries of their immediate energy consumption. In the HORECA value chain Scope 3 emissions are those related to all the suppliers except energy providers. As example can be considered the emissions linked to food and beverage production, transformation, transportation and disposal of waste generated, or the emissions linked to an external laundry (e.g. cleaning products,

energy and water consumed, water depuration, delivery of clean bedding sets and towels).

Direct emissions are within the control of an organisation and can be measured and managed more directly (e.g. with an energy audit for the analysis of internal consumption). In contrast, indirect emissions, encompassing both Scope 2 and Scope 3 categories, arise from external sources linked to an organization's activities. Managing indirect emissions requires a collaborative approach, as they often involve interconnected processes beyond an organization's immediate operations. Understanding and addressing both direct and indirect emissions are crucial for a comprehensive and effective sustainability strategy. The identification and analysis of the hotspots results strategic to focus and tackle main emissions' sources and act with a collaborative approach across the value chain, these aspects will be deepened with the working groups (D3.7) and the living lab (WP5). A detail description of direct and indirect emissions can be found in the JRC technical report, Suggestions for updating the Organisation Environmental Footprint (OEF) method (Zampori and Pant 2019).

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ISO 14040:2006 LIFE CYCLE ANALYSIS, HISTORY AND DEFINITION

Life cycle assessment (LCA) (also known as life cycle analysis) is a methodology for assessing environmental impacts associated with all the stages of the life cycle of a commercial product, process, or service. For instance, in the case of a manufactured product, environmental impacts are assessed from raw material extraction and processing (cradle), through the product's manufacture, distribution and use, to the recycling or final disposal of the materials composing it (grave).

LCA methodology has evolved over time through the efforts of various organizations and individuals, driven by growing concerns about environmental sustainability and resource scarcity. It integrates the principles of GHG protocol for calculating the carbon footprint of products.

The roots of LCA can be traced back to the 1960s when the concept of "materials balance" emerged in the context of resource management. This concept emphasized the interconnectedness of materials throughout a product's life cycle, recognizing that the inputs and outputs of each stage influence the overall environmental impact.

In the 1970s, environmental concerns about pollution, resource depletion, and climate change gained prominence, leading to a growing interest in life cycle thinking. This shift in perspective encouraged a holistic approach to evaluating environmental impacts, considering the entire life cycle of products and processes.

A significant milestone in LCA development was the establishment of the International Organization for Standardization (ISO) 14040 standard in 2006. This standard provided a standardized framework for conducting LCAs, promoting consistency and comparability across studies. The ISO 14040 framework consists of four phases: goal and scoping, inventory analysis, impact assessment, and interpretation.

In recent decades, LCA has gained widespread adoption in various sectors, including environmental assessment, product development, policy analysis, and business decision-making. It has become a valuable tool for understanding and addressing the environmental impacts of products, processes, and organizations from a comprehensive life cycle perspective.

The four phases of the LCA framework are:

1. **Goal and scoping**: This phase define the purpose of the LCA study, the product, process, or organization to be assessed, and the system boundaries that will be considered. This phase is essential for defining the scope and ensure that is relevant for the intended audience.
2. **Inventory analysis:** The inventory analysis phase involves collecting and quantifying the energy and material inputs and outputs associated with the product, process, or

organization throughout its life cycle. This includes all of the activities and processes involved in the extraction of raw materials, manufacturing, transportation, use, maintenance, and end-of-life disposal. The inventory analysis is the most time-consuming phase of the LCA study, but it is essential for providing a comprehensive and accurate assessment of the environmental impacts.

3. **Impact assessment:** The impact assessment phase assesses the potential environmental impacts of the energy and material inputs and outputs identified in the inventory analysis. This is done using a variety of impact assessment methods, which consider the different types of environmental impacts that can occur (e.g., climate change, acidification, eutrophication). The impact assessment phase can be challenging, as it requires the use of complex models and data. However, it is essential for understanding the significance of the environmental impacts identified in the inventory analysis.
4. **Interpretation:** The interpretation phase evaluates the results of the impact assessment and draws conclusions about the environmental performance of the product, process, or organization. This includes identifying the key environmental impacts, comparing the results to other products, processes, or organizations, and drawing conclusions about the environmental implications of the findings. The interpretation phase is an important step in the LCA process, as it allows the results of the study to be communicated in a clear and meaningful way.

The LCA framework is a systematic and holistic approach to assessing the environmental impacts of products, processes and organisations. It can be used to identify opportunities for environmental improvement, inform decision-making and support sustainability initiatives as highlighted in the studies by Filimonau et al. (2011) and De Camillis et al. (2008;2010). By analysing the organisation features (building and equipment) and its bills, energy audits can identify internal consumption hotspots and highlight areas where energy-intensive processes or materials could be reviewed and replaced with more sustainable ones. Within the EE4HORECA project, with the HoReCa value chain maps realised in this deliverable, we will stimulate dialogue through working groups, bilateral interviews, qualitative surveys and bibliographic research, going beyond organisations boundaries to identify possible solutions across the value chain, stimulating open collaboration between buyers and suppliers. The knowledge emerged in this first phase will be collected in D2.2 Map the 'energetic' value chain of the sector and D2.3 Selection of best energy efficiency practices and will inspire companies engaged in the living labs foreseen in WP5 to collaborate and adopt new procurement standards with suppliers, extending the LCA approach beyond organisation a adopt solutions across the value chain, promoting the implementation of environmentally friendly practices and sourcing sustainable materials, fostering a more resilient and responsible HORECA supply chain.

Moreover, LCA ensures a well-rounded evaluation that goes beyond environmental considerations and can incorporate social aspects into the analysis, such as fair labour practices and community engagement. The LCA comprehensive approach aligns with the growing consumer demand for socially and environmentally practices in the HORECA industry, providing businesses with a competitive edge in a sustainability-driven market.

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EE4HORECA APPROACH, INTEGRATING VALUE CHAIN AND LIFE CYCLE ASSESSMENT TO IMPROVE HORECA VALUE CHAIN SUSTAINABILITY

Value chain analysis (VCA) and life cycle analysis (LCA) are two distinct but complementary frameworks for evaluating the performance and impacts of products, processes, or organizations. VCA focuses on the economic aspects of value creation, while LCA assesses the environmental impact of activities throughout a product's life cycle.

Despite their different perspectives, VCA and LCA can be effectively combined to provide a more holistic understanding of the overall impact of a product or process. LCA can provide valuable insights into the environmental consequences of a product's value chain, while VCA can identify opportunities for improvement in resource efficiency, waste reduction, and cost optimization:

- Identifying environmental hotspots: VCA can be used to identify critical points in the value chain where environmental impacts are most significant. LCA can then be used to further analyse these hotspots and quantify the associated environmental impacts.
- Prioritizing sustainability initiatives: By understanding the environmental impacts of their value chains, companies can prioritize their sustainability initiatives and allocate resources more effectively. LCA data can inform investment decisions and guide the development of environmentally friendly practices.
- Aligning business strategy with sustainability goals: VCA can be used to assess the potential costs and benefits of implementing sustainability measures across the value chain. This information can then be used to align business strategy with sustainability goals and ensure that environmental considerations are integrated into decision-making.

In the context of the EE4HORECA project are foreseen several opportunities for collaborative engagement with the organisations in the field specifically oriented towards the creation, testing, and validation of solutions. Within the framework of WP2 and WP3 four working groups with specialised stakeholder are delineated. These 4 collaborative sessions are tasked with mapping the HORECA value chain (1st working group), identifying its primary energy consumption centres, and collecting best practices from participating countries (2nd working group). The 3rd and 4th working group will be instrumental in crafting novel business models and establishing new benchmarks to enhance the sustainability of the HORECA value chain. The outcomes of these participatory approach will be then tested on a wider group of around 100 organisations through the living lab methodology, as foreseen within the structure of WP5 (living labs).

Fondazione Fenice, leader of WP2 Mapping study, together with University of Brescia leader of WP3 Business Models and Benchmarks, with the contribution of all the partners, activated the four working groups inviting more than 25 stakeholders from the countries involved in the project to have a solid base on which build the value chain analysis. The working groups count business owners, hotel association representatives, international brands sustainability managers and other stakeholders.

The first working group inspires to the several references of mapping the value chain present in the bibliography and aims to map all the actors within the value chain and their connections, identifying strategic stakeholders and influencers that can make the difference along the value chain. Mapping the value chain is a key component of the value chain analysis as it can be very difficult to see the interdependencies in a complex system without a clear picture of the value chain, its component and actors. Therefore, an open dialogue within the working group has been established favouring the comprehension of the link between activities and actors through focus groups, interviews, surveys and document analysis. The three Hotellerie, Restaurant and Caterign maps that has been developed within the project, are the starting point of the EE4HORECA and defines value chain activities, value chain actors, their main linkages and context in which they operate:

Value chain activities: 'Value chains activities' comprise all the activities from production to consumption, as well as waste utilization, along the customer journey. The blue arrows in the centre of the map track all the steps of the customer experience, from the organisation of the travel to the end of his journey. These arrows split in phases the progress of guest experience providing a logical division. The horizontal guest experience can be displayed also through vertical channels that collect all the actors involved in each phase of the guest experience, distinguishing internal or direct hotel main consumption under the blue arrows and indirect main sources of consumption on the upper part.

Value chain actors: Actors are all the individuals or organizations, enterprises and public agencies related to a value chain and therefore important for understanding its functioning and performance. They are often–but not necessarily–associated with particular value chain activities. In the maps presented below, in the **'other actors'** group, located in the top of the maps are characterised by indirect influence on the operators, in this group we included intangible values (local culture, values and traditions), financial operators and institutions that have a more general influence on the hospitality structures through initiatives such as laws and regulations.

Good and services suppliers, on the other side, are located close to the customer experience due to their strong direct influence on it.

Similar to the approach used in the GHG Protocol, in order to measure both the energy consumption and the resulting "energy" impact of each supplier, five key common components that involve all the suppliers were identified with the gold arrows on the right:

- Purchased goods & services,
- Capital goods,
- Fuel & energy related activities,
- Transport and distribution,
- Operational waste.

These components represent the upstream activities or indirect energy processes that are essential to the provision of services to the hotel's guests. The multi-faceted operational dynamics that each supplier is involved in have been divided into five main components:

- Purchased goods & services category includes all energy consumptions that occur in the life cycle of purchased products (food, consumables, textiles, etc…), excluding those from sources that are owned or controlled directly within the accommodation structure;

- Capital goods gather final products that have an extended life and are used by the company to manufacture a product, provide a service, or sell, store, and deliver merchandise and include all the infrastructures and machineries for the realisation of good purchased by the HORECA companies.

- Fuel & energy related activities gather the consumptions that are related to the production and delivery of fuel and other energy vectors (natural gas, electricity, etc.) excluding Scope 1 and Scope 2 components as the definition of GHG protocol.

- Transport and distribution energy used for the transportation and the distribution of the goods and services (logistic, truck fridges and freezers, etc.)

- Operational waste the production, management, and reuse operations of the waste generated in each process entail energy consumption that must be taken into account in the total demand.

This approach makes it possible to classify the suppliers according to their impact and identify initiatives to reduce the environmental impact of each supplier. By analysing Scope 3 emissions to the HORECA sector, it is possible uncover and improve operations to reduce the hidden environmental costs associated with activities such as supply, transport, procurement and waste management.

Vertical linkages: connect actors involved in different activities of the value chain, from input suppliers to producers, processors, wholesalers, distributors, all the way to the consumer. Vertical linkages are the commercial relationships involved in bringing the product up through the value chain. This type of linkages is highlighted along the columns where for each step of the customer experience are linked the main service providers involved.

Transversal factors: A transversal factor is considered one of those factors that can have a strong impact on the carbon footprint of the services offered and this include the type of the structure (budget or luxury), its dimension, the age of the building; its location; the purpose of the travel and the services provided by the structure.

In order to obtain the maximum from the project not a single map for the whole HORECA sector has been developed, rather three, one for the hotellerie , one for restaurants and one for catering services. The cross-checking validation within the working group strength the robustness of the three maps on the HORECA value chain. From these visual maps, necessary for capturing the context in which we are operating, in WP3 a calculation tool will be developed in order to create simulation scenarios on where main consumptions are located and where there is the major possibility to reduce the impact of the sector.

THE MAP OF THE ACTORS OF THE HORECA VALUE CHAIN

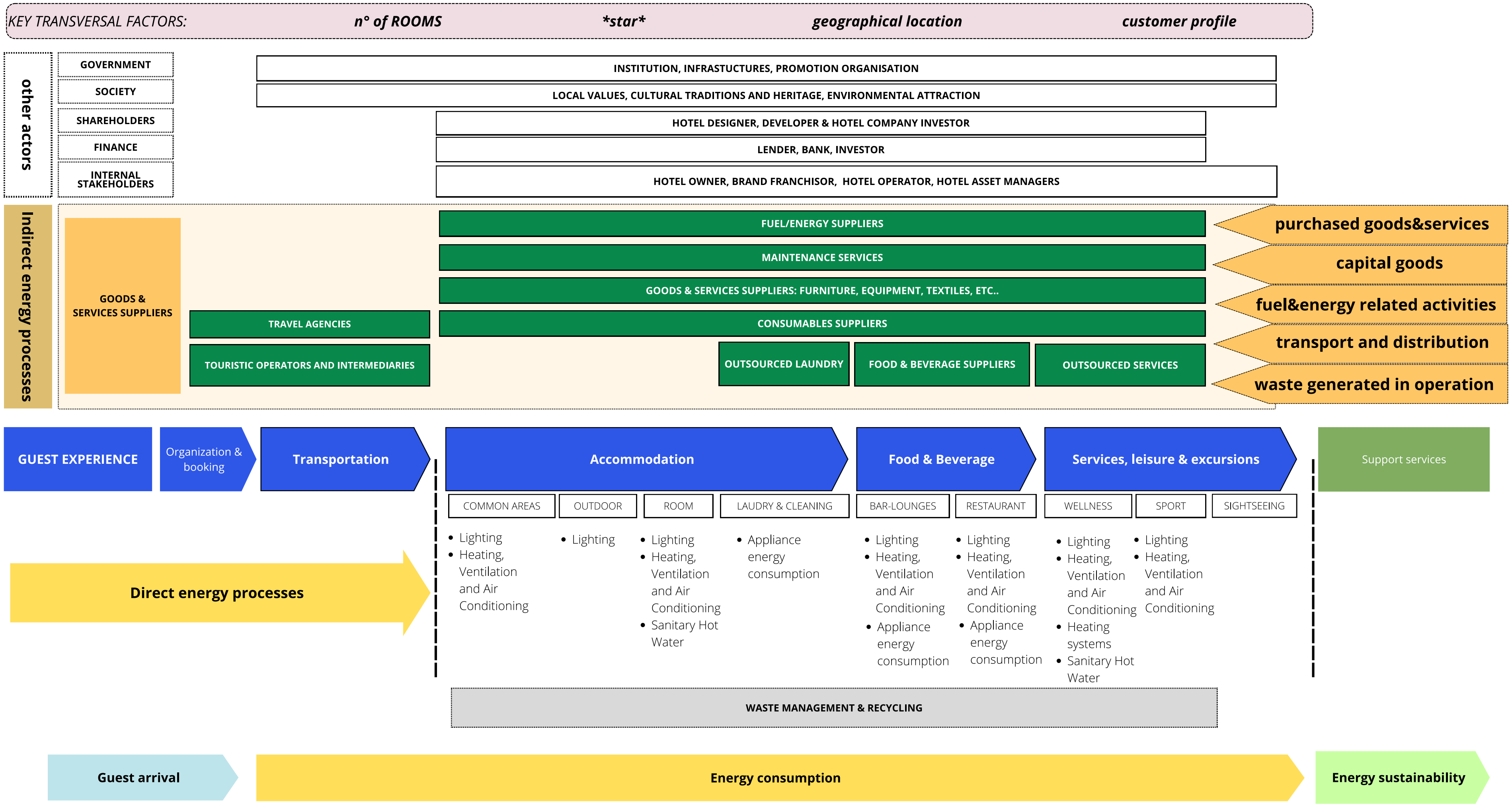

Figure 1 Map of the Hotellerie value chain

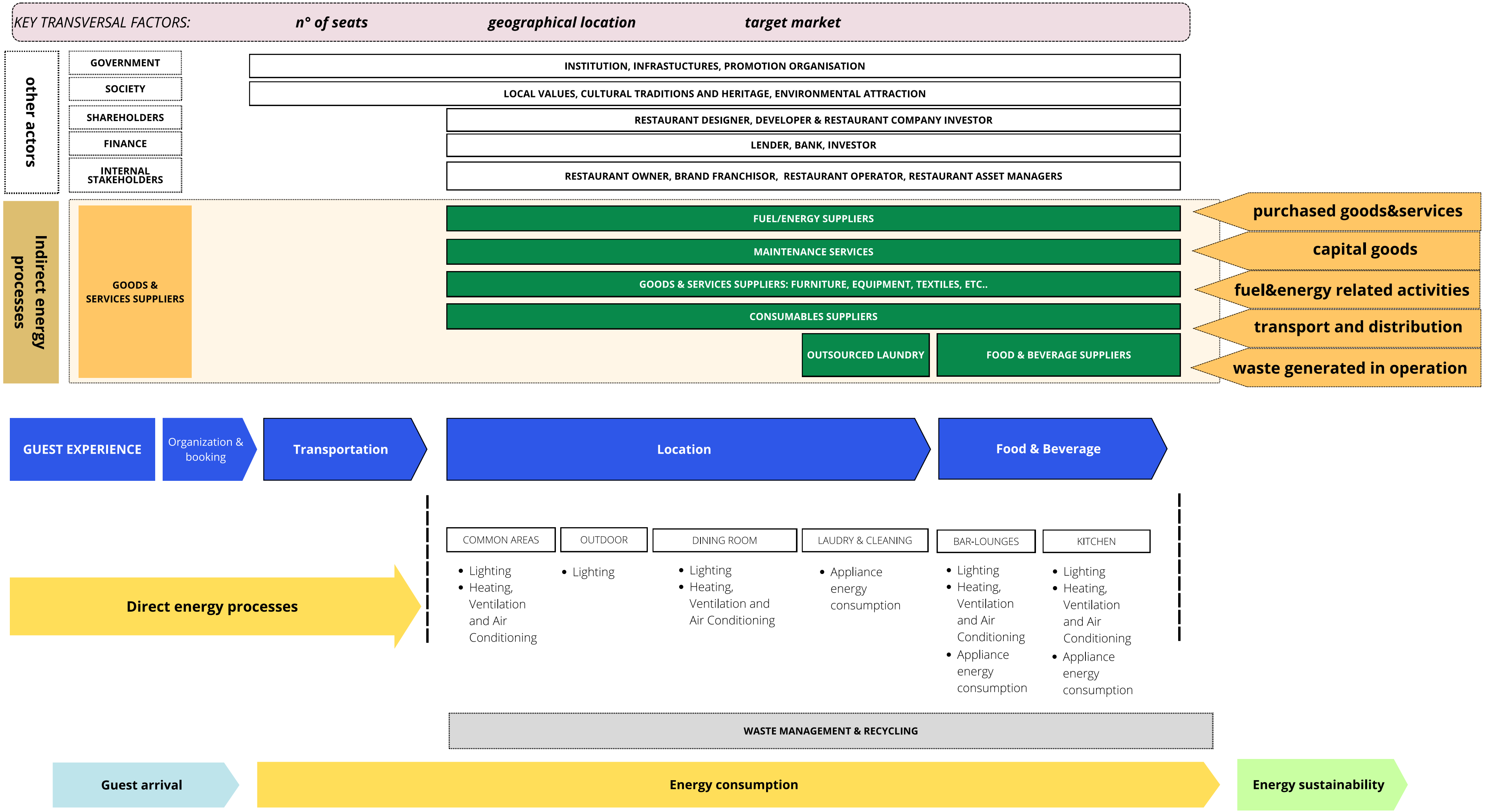

Figure 2 Map of the restaurant value chain

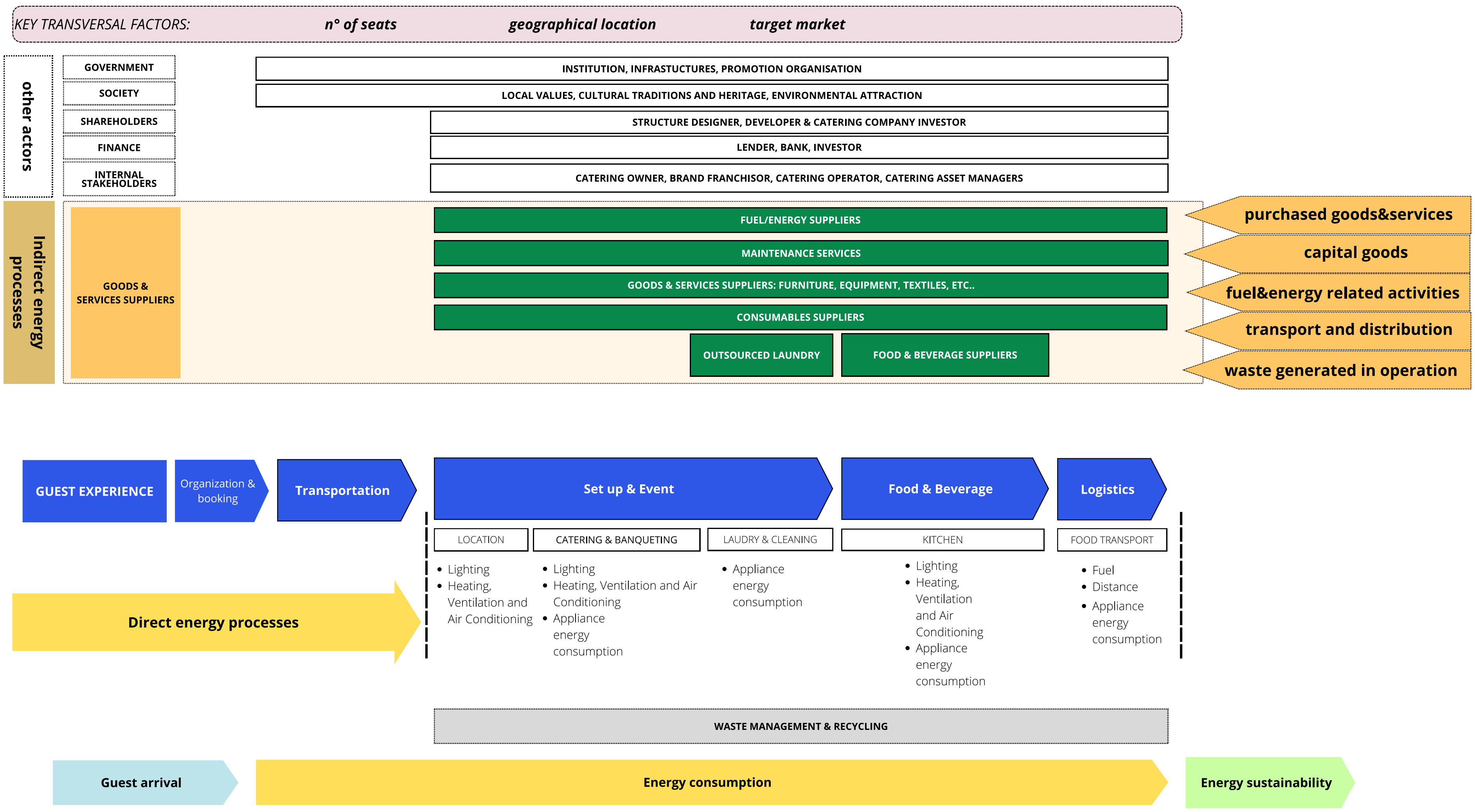

Figure 3 Map of the catering value chain

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