Zero waste power in HoReCa

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e-book

Zero Waste in HoReCa Curriculum

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Contents

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Contents

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Introduction

Introduction to the ZW Power project

ZW Power – 'Zero Waste Power in HoReCa' Project aims to address environmental challenges related to hotel, restaurant and catering industries in Europe. By raising the awareness of the advantages of zero waste ideology among vocational education students, the project aims to encourage the change in approach to managing a business in the HoReCa sectors. In addition to supporting new coming professionals in hotel and restaurant industries, the project aims to support existing business owners and managers in shifting their businesses into more sustainable operations, and better understanding of zero waste practices.

Zero waste is an approach focusing on waste prevention. It is an ideology intended for both communities **and businesses and should be first and foremost understood as a goal postulating change in their lifestyles and practices into more sustainable, rather than a hard target. Sustainability should be understood as an ability to meet present needs without compromising the ability of future generations to meet their own needs.** The concept of sustainability is based on three pillars that include natural resources and environment, social resources and economic resources.

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Introduction to the ZW Power project

The Zero Waste International Alliance explains that **zero waste is based on 'conservation of all resources by means of responsible production, consumption, reuse, and recovery of products, packaging, and materials without burning, and with no discharges to land, water, or air that threaten the environment or human health**.' (Zero Waste International Alliance, 2018) Mark Sainsbury, co-director of the UK's Sustainable Restaurant Association said that this kind of approach in regard to the HoReCa sector should be understood broader. 'Being sustainable in our industry includes paying staff properly, not overcharging customers, paying suppliers on time, getting involved with the community. To have a finite goal is an impossible aim. It [zero waste] is a journey and restaurants should strive to improve year-on-year. It's not something that can be achieved overnight.'

(Green Hotelier, 2010)

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Introduction to the ZW Power project

The main goal of the ZW Power project is to incorporate zero waste standards in vocational education and hotel, restaurant and catering sectors by implementation of new learning and training tools. The project is currently run in Croatia, Spain, Ireland, Slovenia and Italy by seven partners among whom there are three vocational catering schools, two adult education institutions and two private sector organisations. Through this project, partnering organisations will develop blended learning training resources that will facilitate building awareness, acquiring knowledge and skills and assessing business performance in regard to zero waste practices in the HoReCa sector.

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Introduction to ZW Power Curriculum

The ZW Power Curriculum is the first of educational resources of the Zero Waste Power in HoReCa Project. It is primarily addressed at participants of vocational education catering schools and aims to provide them with knowledge and skills they need to organise professional kitchens and catering facilities to reduce waste, protect environment and raise zero waste standards. Moreover, the curriculum will offer managers and business owners in the HoReCa sectors tools and procedures, to enable them to measure their zero waste practices.

The main aim of this curriculum is to promote the awareness of a zero-waste philosophy and to contribute to the expansion of attention on zero waste subjects as well as the introduction of new, more sustainable standards in practical work. In addition, the long-term goal of the curriculum is that the knowledge that will be gained by participants, and then their associates in hotel, restaurant or catering facilities will have a positive impact on concrete actions and changes related to day-to-day procedures.

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Furthermore, partners of the project hope that building such a capital of knowledge will contribute to raising standards in relation to zero-waste in the HoReCa organisations. In the designing of this curriculum, a broad desk-based research has been conducted in order to ensure that accurate and relevant information is included. A series of topics was selected, and factual and theoretical knowledge is presented on each of these topics.

The six thematic Chapters were established, which are as follows:

1. **Chapter 1 – Kitchen organisation in the HoReCa sector**
2. **Chapter 2 – Menu planning – Sustainable food**
3. **Chapter 3 – Waste reduction and recycling**
4. **Chapter 4 – Packaging**
5. **Chapter 5 – Energy**
6. **Chapter 6 – Chemical and pollution reduction**

The main body of the text presents factual and theoretical information with demonstrating how zero waste practices can be implemented in business reality. Each of the chapters is supported by learning outcomes matrix at the beginning and lesson plan at the end of the chapter. These notes are intended to support tutors and adult educators who work with catering and hospitality participants. Additionally, each chapter incorporates various tools such as checklists, calculation sheets and tracking sheets to support both participants and managers in implementing zero waste approach in practice.

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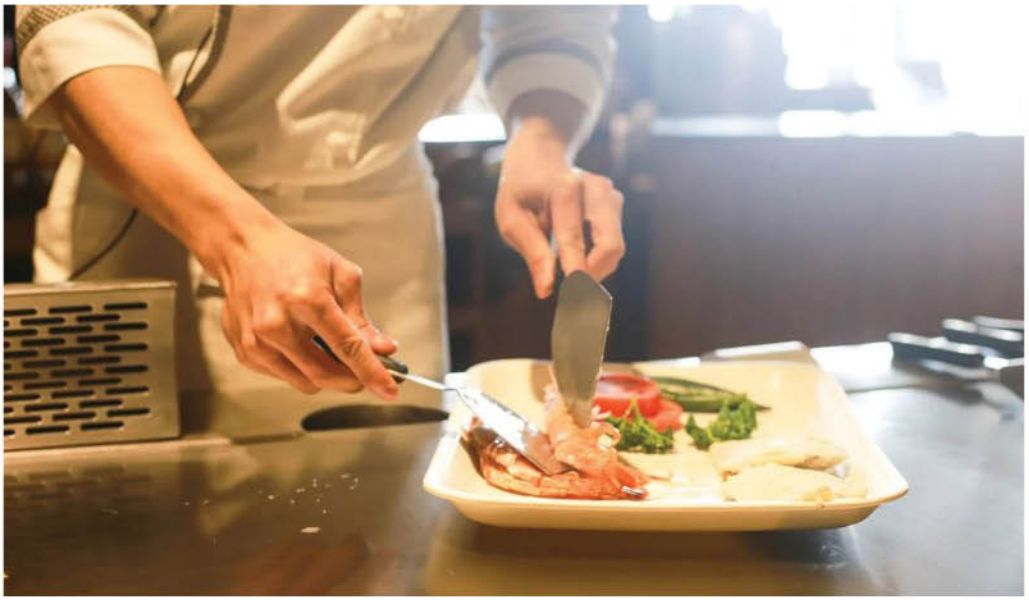
Introduction to zero waste concept in the HoReCa sector

The challenges and therefore the responsibilities, faced by the modern economies regarding environment protection are more serious than ever before. This is due to the disturbing and frequently reoccurring environmental data in recent years. The awareness of climate change has spread among all the branches of the world's economies. This forces businesses to understand that without some recognition of the negative impact that the industry has on the environment, no steps for improvement can be taken. The organisations representing hospitality, restaurant and catering sectors are also facing that challenge. Environmental management is no longer only a trend or marketing strategy to attract customers but has become a key aspect of day-to-day operations. Waste management, with a focus on food waste in particular is considered a core element of concern for establishments belonging to the hospitality and catering sectors.



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Introduction to zero waste concept in the HoReCa sector

According to the data presented by European Commission, the tourism sector (including hotel and restaurant sectors) contributes to the generation of 6.7% of waste generated around the globe. This may seem like a nonsignificant share, unless it is presented in absolute terms – 35 million tonnes of waste annually. It is considered that accommodation and food sectors are significant contributors to this waste, hence it is understood that they have a great responsibility in supporting the lead of the shift into more zero waste operations.

(Styles, Schonberger, & Galvez Martos, 2013)

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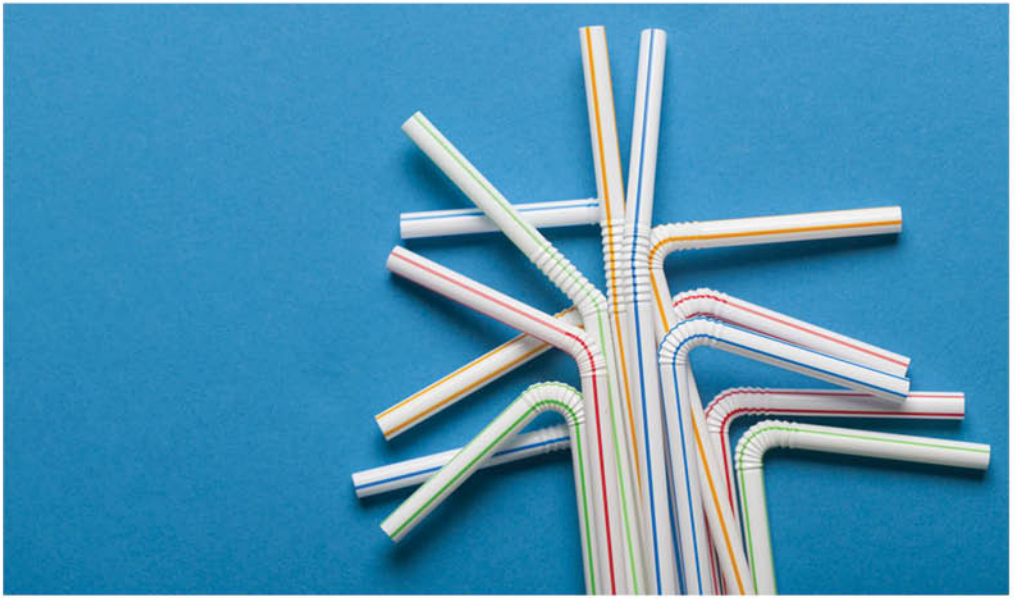
Introduction to zero waste concept in the HoReCa sector



In order to minimise the negative environmental impact of businesses, including those representing the HoReCa sectors, various regulations on national and European levels have been established. **The key goals set by the European Commission that are especially relevant from the perspective of the HoReCa industries include (European Commission, 2015):**

- **Recycling 65 % of municipal waste by 2030**
- **Recycling 75 % of packaging waste by 2030**
- **Reducing landfill to maximum of 10 % of municipal waste by 2030**
- **A ban on landfilling of all recyclable and biodegradable waste by 2025**
- **A 30% reduction of waste by 2025,**
- **Reduction of food waste per person of 30 % by 2025, and 50 % by 2030.**

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To support the implementation of a zero waste approach, the European Commission has accepted the hierarchy model of core guidelines for waste reduction. The guidelines are applicable not only to businesses, but to all individuals and policy makers, and aim to lead to overall more sustainable actions. The hierarchy includes following phases (Zero Waste International Alliance, 2018):

Figure 1: The Zero Waste Hierarchy

Source 1: Zero Waste International Alliance (www.zwia.org/zwh).

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To help understanding of the model, the phases of the hierarchy are accompanied by the following description (Zero Waste International Alliance, 2018):

1. **Rethink/Redesign – redesigning of business models to change the production and consumption schemes in order to decline resource-use and waste**
2. **Reduce – minimising the quantity and ecological footprint of consumption by primarily reducing the demand for resources**
3. **Reuse – products that become waste should be able to be re-used without any other pre processing**
4. **Recycle/compost – quality material recovery from recycling in order to reduce environmental impact of products lifecycle**
5. **Material recovery – recovery of materials from mixed waste**
6. **Residual management – what cannot be recovered from mixed waste is biologically stabilised prior to landfilling**
7. **Unacceptable – options that don't allow material recovery, have high environmental impact and threaten the transition to zero waste**

Chapter 1: Kitchen Organisation in the HoReCa

Introduction to Kitchen Organisation in HoReCa

The HoReCa industry, as an element of food systems that directly interacts with diversified units of the food supply chain as well as with a final consumer, plays an essential role in contributing to the positive implementation of sustainability practices in the food sector. The challenge is not only to recognise the necessity for sustainable changes, but also to examine every step of activity model in businesses to identify weak spots and take actions to introduce sustainable solutions. Without the contribution and dedication of HoReCa organisations, a change to more sustainable food system will not take place.

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Introduction to Kitchen Organisation in HoReCa

Introducing a zero waste approach to the HoReCa business should be conducted gradually and holistically – in all units and at all levels of the hierarchy. However, as the kitchen is a major link that contributes to food waste, which in turn compounds a significant part of general waste volume in most catering businesses, it's a good point to start from. **The first step in the beginning of a successful transformation of the kitchen into a zero waste space is to understand the processes that run in it, and the impact they have on the level of general business' sustainability.**

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Only when enterprises understand what are the areas that they need to change, they will be able to improve. Admittedly, not every stage of food production chain can be directly influenced by the HoReCa entities, however their sphere of impact extends while they start assessing their choices in areas such as sourcing, purchasing, preparation and consumption considering the perspective of sustainability. Therefore, it is crucial to build awareness of zero waste philosophy and sustainable kitchen operations, so that businesses in the HoReCa sector start developing and executing their own sustainable policies.

Objectives

After completing this chapter, you will:

- Gain an understanding of how to introduce sustainable operating practices into the organisation of the kitchen in HoReCa business;
- Become aware of real-life examples of zero waste practices in kitchen organisation in HoReCa businesses;
- Become aware of and be able to demonstrate sustainable sourcing strategies;
- Gain an understanding of the negative impact of unsustainable kitchen practices on the organisation, local economy and the environment.

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Unit 1.1 - Introducing zero waste practices to kitchen organisation

Introducing a zero-waste approach to the organisation of the kitchen in HoReCa businesses requires a good understanding of current practices. Managers and business owners are often not only unaware of the sustainable solutions available and objectives they should (and could) aim for, but also don't realise what is the actual state of their sustainable performance.

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Regardless of the type or nature of the HoReCa unit, the major challenge related to kitchen organisation from the perspective of a zero-waste approach is the amount of food wasted. Reducing food waste in the kitchen and serving area of any HoReCa business has a potential to drastically contribute to general improvement of the implementation of zero waste, as it helps to build awareness of the impact, benefits and costs of sustainable solutions for organisations. The adage 'what is measured can be managed' holds true regarding to this issue as well, showing that the **first phase in the procedure to introduce zero waste approach to the kitchen organisation in HoReCa business should be to measure current food waste (World Resource institute, 2019). The tool that can facilitate this is a food waste audit.**

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Conducting a food waste audit for a kitchen in a hotel, restaurant or catering business aims to provide required data and information on the specific type of waste generated, its general volume, origin and cost associated. A great advantage of the food waste audit for the organisation is that it successfully helps to map specific areas of kitchen organisation and their impact on food waste generation. More importantly however, it reveals the waste, that is usually not immediately noticed neither by kitchen staff nor managers. In addition, the results of the audit constitute a solid base for calculating costs related to food waste, and support development of cost-efficient purchasing strategies in the future. **The procedure of a food waste audit covers four steps** that incorporate processes beginning from measuring the waste volume to raising awareness of a zero-waste approach among staff and customers. These four steps are (International Tourism Partnership, 2014):

- **Measuring the food waste.**
- **Developing action plan.**
- **Reviewing progress on regular basis.**
- **Promoting good practices internally and externally**

Phase 1 - preparation to conduct a food waste audit

The preparation phase should involve the selection of a leader of the audit initiative. It can be a manager, a chef or any employee with authority to reorganise routine processes and monitor the level of other employees' tasks fulfilment. **Firstly, the leader should decide the timing and duration of the audit.** In order to receive accurate results, it is recommended that the food waste audit lasts one week (minimum three days) and is conducted during a period of regular kitchen activity. **Next, the leader should create a communication plan** to introduce to the staff responsible for implementing the audit, and to inform employees about the plan to inventory waste generating activities.

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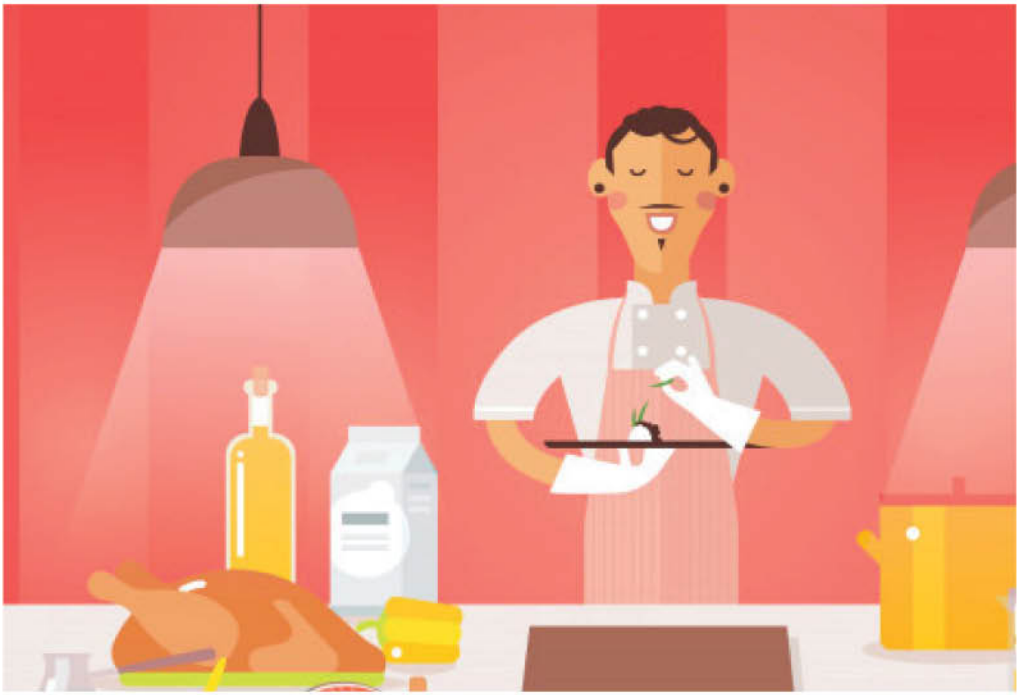
The leader should inform all kitchen workers and serving employees about the duration of the food waste audit, the planned changes to routine practices, and ensure that everyone understands his or her role. **The recycling strategy for all other non-food waste should be introduced,** in order to ensure that waste such as plastic, cardboard, glass etc. will be stored in separate containers to that of food waste. **If necessary, a training plan for all employees should be conducted**. The leader of the food waste audit should remember that the activity will be more effective, when the preparation phase has been properly introduced.

(Sustainable Restaurant Association, 2019)

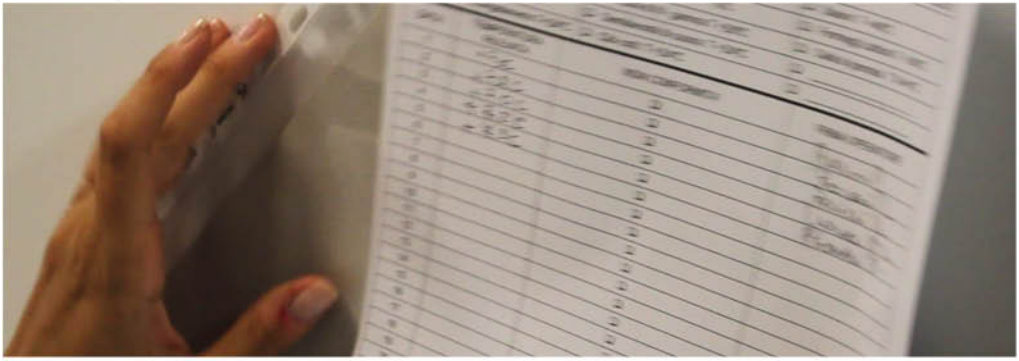


Another element that should be taken into consideration in the framework of the preparation phase is developing necessary audit documentation. The documentation should include the following (Sustainable Restaurant Association, 2019):

- A detailed description of the waste storage strategy for the duration of the audit. (The strategy should be available for all involved staff before the audit begins.)
- Food waste tracking sheet.
- Food waste cost calculation sheet.
- Action plan sheet.

There are various methodologies that can be applied in the process of measuring the food waste and calculating the cost of waste. Below, there is presented an example of the best practice from the perspective of effectiveness of the measurement and data accuracy.

Templates of the food waste tracking sheets and food waste calculation sheet that can be applied in alternative popular methodologies are available as attachments to this chapter. They can be used as draft templates by a leader of the food waste audit, to be adapted with consideration for specific requirements of his or her organisation, region or country.



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Phase 2- measuring food waste

Once all the necessary documentation is developed, and all employees have been introduced to the plan for a food waste audit, the next step is to measure the amount of food waste generated. **The procedure of measuring food waste should start from removing all single waste and general waste bins from the area where the audit is being conducted** (accept from kitchen, the audit may also cover serving area, bar, breakfast room etc.).

Three types of bins dedicated to food waste should be set up – one for preparation, one for spoilage and one for plate waste. Depending on the size and the setup of the kitchen, more than one bin from each type might be needed. **All the bins should be weighed every day and the resulting measurements should be reported on the food waste tracking sheet.**

Spoilage waste involves products that has gone off or has been contaminated; it also involves for example products that spoiled in storage.

Preparation waste involves leftovers from menu preparation and cooking such as trimmings, peelings, cooking errors, unserved food etc.

Plate waste is a food waste from the customers plates.

This will allow the auditor to monitor where the food waste comes from, and what is its exact amount. In addition, it can be beneficial to record on a separate sheet the type of the food waste that is coming back from the dining area – this may provide insight on the sizing of portions and favoured constituents of proposed menu. **Additionally, the liquid food waste, such as liquids and residuals from plates, liquid used in cooking that usually is pure into the drain should also be included in the process of food waste audit.** Depending on the approach used by the food waste audit leader, the liquid food waste can be measured separately or attributed to its origin e.g. preparation or plate waste.

(International Tourism Partnership, 2014)

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The templates of the food waste tracking sheets are available in appendices 1.1.1 and 1.2.1 of this chapter. These tracking sheets present alternative methodes of measuring food waste and can be adapted to use in various methodologies of food waste measurement.

Once, the waste tracking sheet is completed, it's finally time to calculate the cost of waste generated. The calculation activity allows the auditor to analyse the results of the food waste audit in order to measure the cost of waste per week, over a year. If access is available, actual data from disposal costs should be used.

(International Tourism Partnership, 2014)

The basic calculation can be conducted by introducing the results of measurements to the cost calculation sheet available in appendix 1.2 of this chapter.

Phase 3 - developing an action plan

The third step in conducting the food waste audit is developing targets for food waste reduction and recycling. It's recommended to start with prioritising the areas of kitchen operation that generated the most waste in phase 2. The results of the audit will be helpful here. **The leader of the food waste audit with cooperation from the organisation's manager, chef and in consultation with kitchen and serving personnel should decide on objectives to be achieved and the timescale to do it.** It is important to remember, even if the targets are ambitious, they should always be realistic!

Multiple sustainable recommendations for kitchen organisation in HoReCa industry have been already developed by various institutions and organisations. Below are presented examples of zero waste practices on management and employee levels in relation to various areas of kitchen organisation (Hortec Hospitality Europe, 2017):

Management level	Employee level
Product choice/purchase	
• Introduce or improve the strategy of measuring or predicting the expected number of customers • Clear communication to the suppliers of the needs or expectations regarding the products (e.g. avoiding oversized vegetables or bruised fruits etc.) • Check if the packaging of the products is intact and not damaged, that the shelf life is appropriate etc. • Monitor performance of the staff in terms of their level of implementation of zero waste	• Adjust the quantities of products ordered to the expected number of customers • Control the quality and adequacy of the products provided by the managers responsible for supply with the needs

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strategies	
Storing of products	
• Introduce adequate storing strategy e.g. the FIFO (First in First Out) or FEFO (First Expired First Out) • If necessary, train kitchen employees in storing strategy applied • Train all kitchen and service staff in effective hygiene standards • Monitor the need to keep over-ordering to a minimum. • Monitor performance of the staff in terms of their level of implementation of zero waste strategies	• Monitor the products in stock on a daily basis • Apply storing strategy introduced by the management team in order to avoid waste • Introduce storing strategies that help extending shelf-life e.g. under-vacuum, deep freezing or cook & chill • Strictly respect the cold chain process • Apply labels to ensure every product can be located when needed and the shelf life is being monitored
Food preparation and cooking	
• Introduce the half portion option to the menu • Manage customer expectations by preparing and serving dishes exactly as described on the menu • Provide proper kitchen equipment • Provide necessary training to the kitchen staff • Monitor performance of the kitchen staff in terms of their level of implementation of zero waste strategies	• Favour flavours and nutritious values over quantities • Calculate the quantities needed for the recipes • Use a good practice strategy based on having all the necessary ingredients measured, cut, peeled, sliced etc. before start cooking • Avoid unnecessary trimming • Try to use all parts of the products if possible • Use different cooking techniques for the same product (e.g. vegetables), in order to include it in different forms in different dishes • Use leftovers for preparing bouillon, soups, etc.
After the service, residual food and recycling	
• Offer staff meals – use products that are close to expiry date, unsold products or leftovers from the menu that are still good for consumption • Consider donating food leftovers • Regularly monitor food waste	• Encourage guests to take any of their leftover food home with them

Once the targets have been set, the managers should calculate the cost of the changes planned to be introduced, in order to realistically assess the effectiveness and adequacy of their implementation. One of the factors to take under consideration while establishing and prioritising objectives is, that some improvements will be possible to implement immediately and with no need for major investments or work routine reorganisation, while others will require longer time and more capital. Another valid factor to consider is to analyse what level of the food waste hierarchy model the changes relate to. The focus should be directed to those actions that are found at the top of the hierarchy model as they are most environmentally and economically valuable.

(International Tourism Partnership, 2014)

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Phase 4 - reviewing progress

Completing the food waste audit at the beginning of the endeavour to introduce zero waste solutions to a HoReCa organisation is essential in order to understand what the organisation's starting point is. However, it is equally critical to monitor the progress of set targets. **The audit leader in the HoReCa organisation should keep an ongoing record on how the food waste generation rates are changing.** A good practice could be to perform the food waste audit every quarter or every six months. Moreover, it is recommended to regularly talk to kitchen and serving staff and gather their feedback on progress being made and challenges being faced. This can help to keep members of the team engaged and motivated.

(Green Steps, 2016).

Phase 5 - promoting good practices internally and externally

Involving staff, suppliers and customers at every level of the proceedings to introduce zero waste policies is essential for creating the sense of common responsibility in achieving the objectives. Understandably, sharing the first results of audit analysis with customers may not always be desirable but keeping employees and suppliers up to date with results doubtlessly contributes to building the atmosphere of integrity. When data and information showing progress are available, presenting it to consumers can contribute to creating positive business image and increasing loyalty to the brand. Informing customers about the benefits of the introduced changes and how these changes can affect their experience may bring even more advantages.

(International Tourism Partnership, 2014)

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Unit 1.2 - Sustainable food sourcing strategies

The essence of the topic of sustainable food sourcing strategies for hotel, restaurant and catering entities is related to the impact of their food supplies on the environment. Naturally, food industry providers operate with much bigger quantities of products and ingredients than regular households, that's why the influence of their food supplies on the ecosystem is crucial. **Negative impact of food chains in HoReCa organisations can be monitored by estimating and controlling menu's carbon footprint and food miles.**

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Nowadays, sustainable sourcing strategies are increasing in their importance not only for businesses but also for governments around Europe, as due to extreme weather events the fear of shortages of some types of food more often becomes reality.

To achieve food sustainability, multiple sourcing strategies should be applied. **First and foremost, wherever possible food should be sourced locally. Creating networks with local producers and suppliers is essential. When buying from wholesale, it is advised to ask where suppliers are sourcing their products from and request more sustainable options if necessary. A valuable source of local products are farmers markets. When importing some products from abroad e.g. exotic fruit, it is advised to join with other businesses to bulk buy. It is also strongly recommended to learn from the suppliers who are the growers and producers they're buying from.**

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Food miles

The distance the food needs to travel from production before it reaches the consumer's plate. Food miles generate a negative impact on the environment as they contribute to the increased production of energy and pollution. Every single food mile contributes to menu's carbon footprint.
This simple online food miles calculator allows you to estimate the distance travelled by menu's components: https://www.foodmiles.com/more.cfm

Menu's carbon footprint

Is the greenhouse gas emission produced by growing, rearing, farming, processing, transporting, storing, cooking and disposing of the food served by hotel, restaurant and catering entities. The greenhouse gas emissions contribute to increase of pollutions and global warming.
On this website it is possible to check what types of food generate the highest carbon footprint: **http://www.greenea-tz.com/foods-carbon-footprint.html**

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Undeniably, this kind of local and responsible sourcing may sometimes pose serious challenges for regular practices in some businesses – it may require changing or supplementing suppliers, conducting research on how the products are grown, packaged or transported before they reach the storage of the hotel or restaurant. Another challenge is related to the time that is needed to help staff get used to new practices e.g. chefs may be accustomed to ordering what they want and when they want. However, turning towards more sustainable sources of food is an unavoidable and crucial step on the way to zero waste in any HoReCa industry. Additionally, in the long-term perspective it benefits not only the business but also local economy and community, as well as disadvantaged producers in poorer countries.

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Unit 1.2 - Sustainable food sourcing strategies

The food sourcing strategy that will allow HoReCa entities to reduce food miles to minimum levels, as well as dramatically reduce operating costs, is to grow their own fruit, vegetables and herbs. Understandably, not every hotel or restaurant has the capabilities to set up their own kitchen garden. The hotels or restaurants that lack the space to grow their own produce may look for other spaces such as rooftop gardens or allotments. The soil-free system based on the use of grow-lights providing year-round summer growing is one example of other available options (Tuppen, 2013).

The HoReCa businesses should recognise their responsibility in carrying out the sourcing processes in sustainable and environmentally friendly manner, whilst also encouraging and promoting fair-trade practices. Moreover, they need to recognise that it is their responsibility to encourage their suppliers to minimise the negative environmental impact of the products they provide.

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A good practice that could support incorporating sustainable sourcing strategies to usual practices is to create a sustainable food sourcing policy document. To provide sufficient information the document should cover four main areas:

- general aims of the business in relation to their sustainable food sourcing policies;
- core sustainable strategies in relation to sourcing various types of food such us meat, dairy products, fruits and vegetables, seafood etc. The strategies should include detailed information about the sources of foods, suppliers and their providers if possible;
- sustainable strategy on food waste and recycling regarding food supplies and its packaging;
- customer and stakeholder engagement strategy.

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Appendix 1.1.1 – Food waste tracking sheet (methodology 1)

This sheet presents a methodology of food waste tracking described in the module 1.

Instructions for Implementation:

- The amount of food waste generated (using kg) and the number of bins filled in each day should be recorded.
- All other non-food waste (e.g. plastic, cardboard, etc.) should be put into a separate bin ready for recycling.

Day of the audit	Date	Spoilage Waste		Preparation Waste		Plate Waste	
		Number of bins filled	Weight (kg)	Number of bins filled	Weight (kg)	Number of bins filled	Weight (kg)
1							
2							
3							
4							
5							
6							
7							
Total volume							
Percentage in total amount of waste generated							

This food waste tracking sheet was developed based on the free resources provided by **http://www.wrap.org.uk**

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Appendix 1.1.2 – Food waste tracking sheet (methodology 2)

See below an example of alternative food waste tracking methodology.

Instructions for Implementation:

- **The amount of food waste generated (using kg) and the number of bins filled in each day should be recorded. For one week of 6 or 7 days depending on your opening time.**
- **All other non-food waste (e.g. plastic, cardboard, etc.) should be put into separate bins ready for recycling.**

Day of the audit	Date	Spoilage Waste		Preparation Waste		Plate Waste	
		Number of 5 or 10 kg bins filled	Total Weight (kg)	Number of 5 or 10 kg bins filled	Total Weight (kg)	Number of 5 or 10 kg bins filled	Total Weight (kg)
1							
2							
3							
4							
5							
6							
7							
Total Weight (kg)							

This food waste tracking sheet was developed based on the free resources provided by http://www.wrap.org.uk

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Appendix 1. 2 – Food waste cost calculation sheet

Day of the audit	Date	Total weight of spoilage waste (Kg)	Total weight of preparation waste (Kg)	Total weight of plate waste (Kg)
1				
2				
3				
4				
5				
6				
7				
Total Weight		X1	X2	X3
		(X1+X2+X3)		
The waste disposal cost (Euro/Kg)		Y1 (Your waste disposal cost usually depends on your waste disposal contractor, if not available you can use the average waste disposal cost calculated for your region or country. If in your city/region/country you pay a flat tax per sq/mt or per activity, you must consider an environmental standard cost that you can find on our website at http://www.zerowastepower.eu/disposal-costs)		
Total average cost of food waste per week (Euros/Kg)		(X1+X2+X3) x Y1		
Total average cost of food waste per year (Euros/Kg)		[(X1+X2+X3) x Y1] x 52 or the number of your working weeks		

This food waste cost calculation sheet was developed based on the free resources provided by **http://www.wrap.org.uk**

Appendix 1.3 – Good practice case study

Details of the organisation: _____

Photo or logo of the organisation

Introduction

The Challenge

Conclusions and Recommendations

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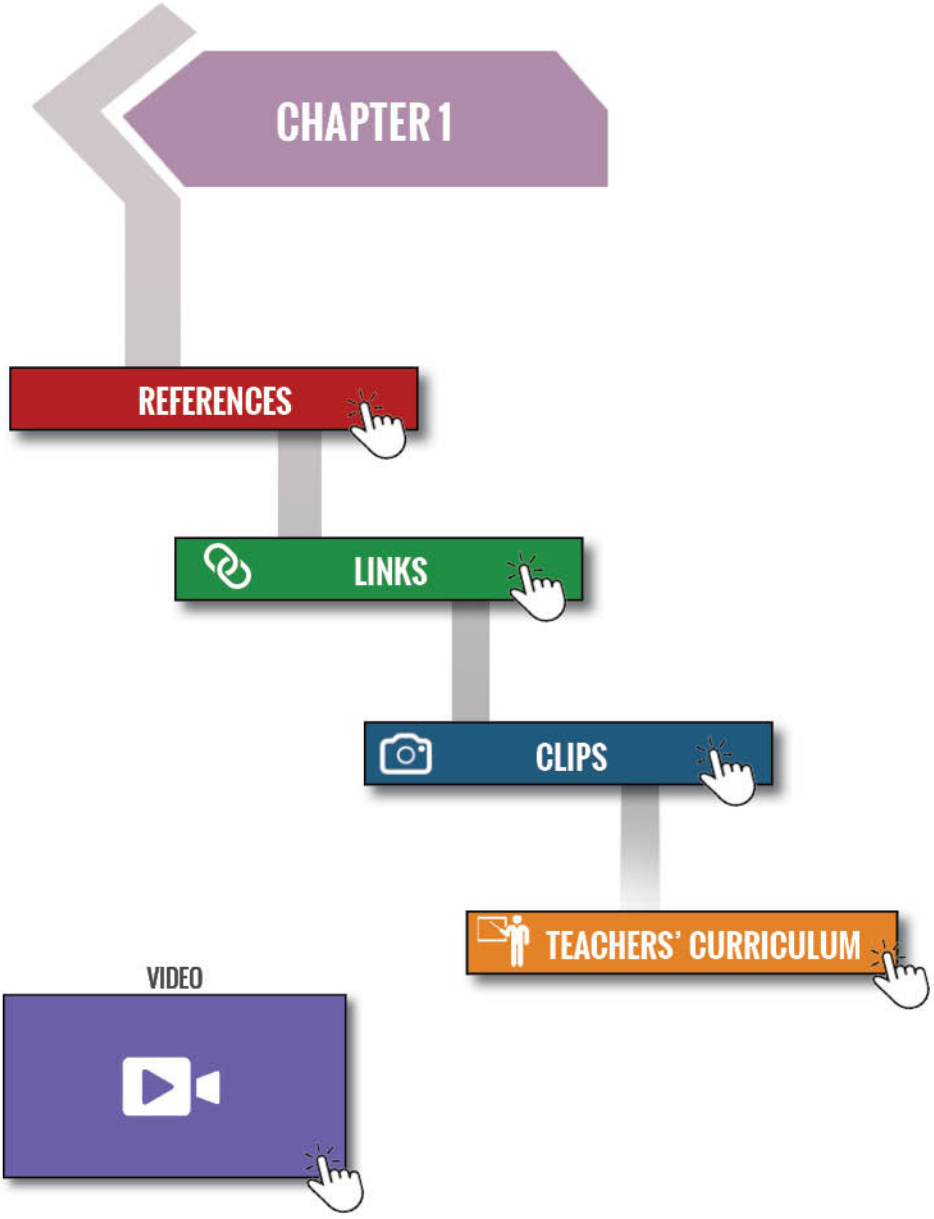

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Chapter 2: Menu Planning Sustainable Food

Introduction

Menu planning, also referred to as menu engineering, is commonly understood as a process of deciding what meals, food and drink items the catering or restaurant business is going to offer to its guests on their menus. It is a practice common in HoReCa industries – especially in the context of restaurants, hotels, catering and other units offering food products or dining services. Maximising business' profitability is generally indicated as the main goal of menu planning practices. However, it is essential to point out that menu planning is not merely a practice of analysing and designing a menu but is also fundamental in strategically maximising the restaurants profits. It should be considered as the study of meal quality and consumers expectations, as well as a philosophy leading the consumer to a desired purchase while at the same time adhering to their needs, values and aesthetics.

(James & Baldwin, 2003)

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Introduction

The debate on sustainability trends in various areas of operation, including menu planning in the HoReCa sector, has been ongoing within this industry for the past few decades. Nowadays, sustainable food consumption has become not only an item of discussion for industry experts or researchers, but also an important element of every-day eating culture. Therefore, the HoReCa businesses can no longer ignore the debate. Gradually, sustainability trends enter all areas of hotel, restaurant and catering organisations' operations. According to the What's Hot Culinary Forecast for 2019 published by National Restaurant Association representing over 380 000 restaurant units in USA, sustainability was ranked as the third most popular food trend. Moreover, in their latest industry report presenting predictions for 2030, the Association stated that sustainability will be integrated into every aspect of restaurant operations, with kitchen organisation and menu planning playing leading roles (The National Restaurant Association Research and Knowledge Group, 2019).

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Introduction

Similar changes are forecasted and can be already observed in the European market. According to the survey conducted by the International Trade Commission, the food industry was identified as the sector with the greatest increase in the number of customers demanding sustainable products and services (International Trade Centre, 2019). Adopting a sustainable approach towards menu planning in modern HoReCa organisations is however not only motivated by trends on the market, but first and foremost by the ever-broadening realisation and understanding of the impact that hospitality and catering industries have on the environment. .

Objectives

After completing this chapter, you will:

- Be able to indicate key principles of sustainable menu planning,
- Recognise main sustainable food labels in Europe,
- Become aware of sustainability trends in the HoReCa industry,
- Understand the value of a sustainable menu from the per spective of a business and a consumer.

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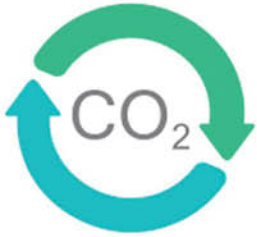
Unit 2.1 - Key principles of sustainable menu planning

From the HoReCa industry perspective, the menu planning process is an element of a business strategy that aims to generate profits for an organisation. There is no doubt that the menu, designed in an attractive way, is an invaluable asset for any business. Nowadays however, both customers and organisations are more and more aware of the impact that the carbon footprint and greenhouse gases generated directly and indirectly by the foodservice sector have on the environment. Hence, different environmentally friendly solutions in hotel, restaurant and catering organisations are being named among the leading innovations in the HoReCa sector in the beginning of the 21st century. This shift does not omit the menu planning process either. **In the perspective of ongoing changes in various levels of businesses' external environments, sustainable menu planning becomes not only a trend demanded by rising number of customers, but also an expected and necessary contribution of the HoReCa sector to the environmental cause.**



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Unit 2.1 - Key principles of sustainable menu planning

Sustainable menu planning reflects the decisions managers, chefs and organisers make regarding the selection of foods and beverages served in hotels, restaurants and catering units as well as during various events and conferences. It should be based on realisation that there are various sustainable options, and that it is the responsibility of the HoReCa businesses to gradually replace the non-environmentally friendly practices in their everyday routine. Furthermore, it is the role of managers and business owners to educate themselves and their staff on the selection of the new environmentally friendly options available, and the benefits of making healthy and environmentally responsible choices.

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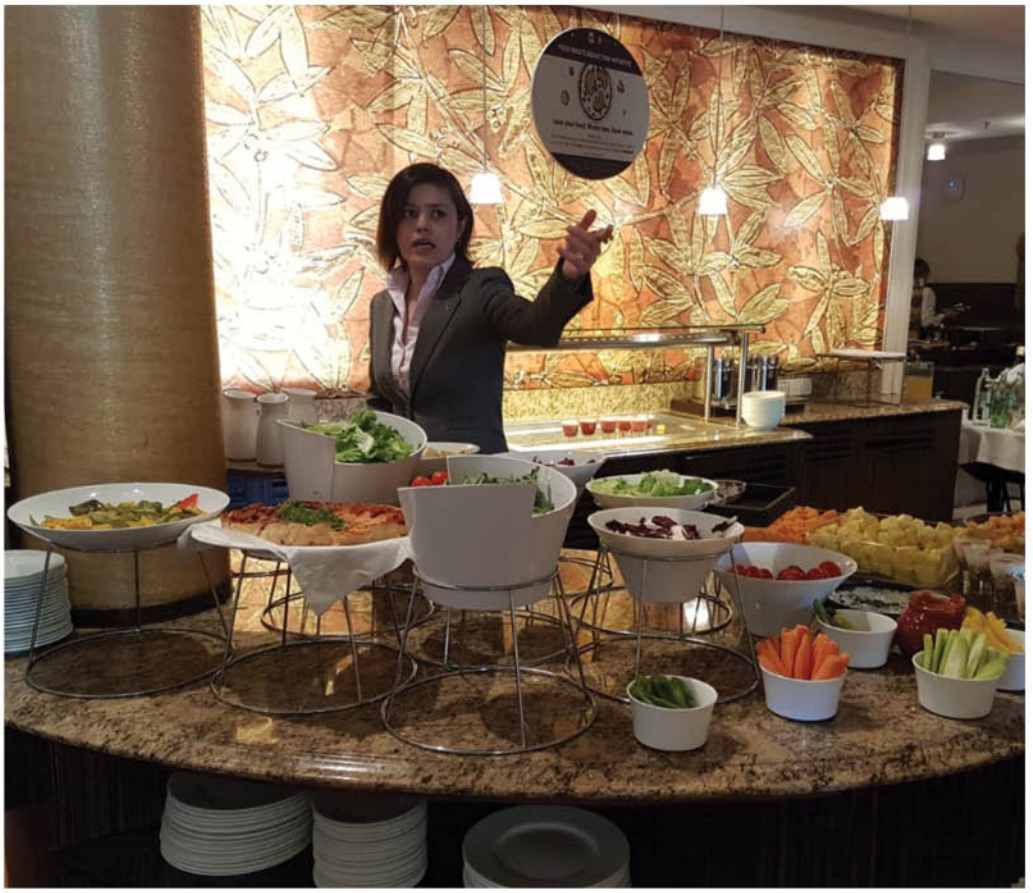
Unit 2.1 - Key principles of sustainable menu planning



When designing a menu, the responsible manager or chef needs to take into consideration various factors. Among them there are for example: capabilities and the number of the kitchen staff, space and equipment in the kitchen, cost and available supplies, competitors' offerings, type and location of the organisation, current trends as well as general nutrition guidelines.

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Unit 2.1 - Key principles of sustainable menu planning

There are many lenses through which the HoReCa organisations may look at when considering the sustainability options in their practices. However, in order to ensure that the menu is designed respecting the core sustainability rules and values, the menu planning and designing process should guarantee that the fallowing **five key principles of a sustainable menu planning** are considered (The Culinary Institut of America, Harvard T.H. Chan, School of Public Health, 2019): **respond to the needs of the business and consumer, transparency regarding sourcing and preparation, include seasonal and local products, reduced portion sizes, and reduced number of dishes.**

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Unit 2.1.1 - Key principles of sustainable menu planning

On the one hand, a menu should be able to respond in the best possible options and needs of the consumers in terms of providing expected food or drink service. However, accept from offering a unique dining experience, first of all a menu should be designed in a consistent and knowledgeable manner to ensure it is healthy, tasty and safely prepared. A menu should reflect the general recommendations on healthy eating and a balanced diet. The European Commission has adapted food-based dietary guidelines, to serve as recommendations in European scale for individuals, to inform them about specific nutrition requirements and health needs. Due to country-specific nutrient intake levels, availability of food products, and cultural characteristics, the guidelines are usually unique to the member state, taking from healthy nutrition pyramids, eat-well plates or circles of nutrition. Nonetheless, the guidelines developed and adapted in the European Union countries plus Switzerland, Iceland and Norway are characterised by core similarities. One of the most important goals of the guidelines is to encourage individuals to make more sustainable consumer choices. Hence, the HoReCa sector businesses around Europe should take into account these recommendations.

(European Commission, 2019)

On the other hand, a menu also serves as a marketing tool for a business. In general, the main aim of a menu is to generate the income for an organisation. Through learning who the customer is, what the expectations and needs of the customer are, what are the capabilities of the kitchen, a restaurant or catering company should be able to provide a menu that considers those and other factors, while still being able to maximise income. Taking both of those perspectives into consideration, the move towards sustainability on the scale of an individual business or the whole restaurant and catering industry, requires for menus to be designed based on a balance between the needs of the consumer and the business.

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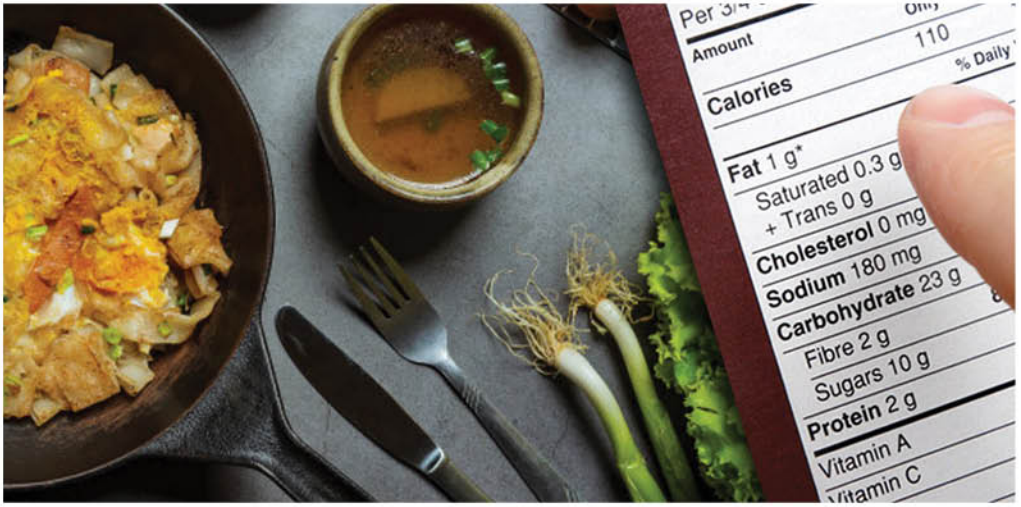
Unit 2.1.2 - Transparent about sourcing and preparation

Providing customers with information about food production methods, sourcing strategies, nutrient values, and environmental impacts is not only a good practice for restaurant and catering organisations but a necessity from the perspective of sustainability. A growing interest in environment protection results in consumer engagement being driven by the rise in food safety and ethics across global supply chains. Given that, food operators are more often expected to be sharing information about their own practices. It is important to remember, that in today's internet-driven era consumers can learn about what they eat regardless of what details chefs and business managers share in their menus.

Additionally, sharing sufficient information on the ingredients and cooking methods used to prepare certain dishes helps to significantly minimise the amount of ill-thought choices by the consumers, which contributes to minimising the plate waste generated.



Unit 2.1.3 - Includes seasonal and local meals

When designing sustainable menus, it is highly recommended to draw the ideas and inspiration from local farmers and their crops. **The advantages of local sourcing include working with small, local producers who may not only be more willing to experiment with varieties but are also more flexible and able to adjust to changing needs and customers' expectations.** A focus on local foods also contributes to supporting local economy, building community and creating new development opportunities.

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Unit 2.1 - Key principles of sustainable menu planning

Unit 2.1.3 - Includes seasonal and local meals

Admittedly, sourcing sustainably grown foods is very challenging, however the environmental cost of food is largely determined by how it is produced. Sustainable sourcing although challenging is necessary. Sustainable strategies for sourcing local ingredients should be connected with supporting environmentally friendly farms and producers.

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Also, seasonal fruits and vegetables can help create unique flavours as well as new marketing opportunities. It is recommended, instead of rewriting their menus every season, restaurants should replace meals that are already out of season with seasonal-based ingredients. **A sustainable menu should offer at least 30% seasonal dishes, with a minimum of two seasonal dishes per each of its sections.**

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Unit 2.1.4 - Reduced portion sizes

Reducing portion size and emphasizing calorie quality over quantity has become a good practice for some businesses across the HoReCa industry. **Moderating portion size is considered to be one of the biggest steps foodservice operators can take towards reducing food waste.** In addition, it is important to underline that portion reduction should not be replaced by offering multiple dish sizes. This practice often encourages consumers to order bigger portions, as they are often afraid of losing the value offered by the meal when ordering the smaller portion. Instead it is recommended that a sustainable menu should change the value proposition for customers from an emphasis on quantity to a focus on flavour, nutrient quality, culinary adventure, new menu formats, and the total culinary and dining experience.

Unit 2.1.5 - Reduced number of dishes

In the case of a menu, less is truly more. A small menu makes the decision-making process easier for consumers. It decreases the probability of overordering and minimises the amount of plate waste produced. On the other hand, it helps serving staff - as instead of remembering many items of the menu, they may focus on the features of each individual dish. In addition, a **smaller menu is less expensive to maintain and is more flexible when subject to seasonal changes.**

Simultaneously to rationalising the number of dishes in their menu, foodservice operators should incorporate a process of reducing the amount of ingredients used across the menu. For example, the same ingredients should be used various times, cooked in different ways across number of dishes.

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Unit 2.2 - Ecolabels and environmentally friendly products

Ecolabels are a form of certification applied for a product or a service, that aim to guarantee the standards in relation to, for example, supply chain or production process. The ecolabel ensures standards are transparent and guarantees that the product or service will meet specific expectations of consumers.

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Each label includes a set of policies that the product or service needs to fulfil in order to be able to use the label. Ecolabeling, unlike some certification marks described in European and national legislations, is a volunteering method of certifying environmentally friendly performance and intends to help customers who wish to take environmental concerns into account when shopping, while making the most informed decisions.

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Unit 2.2 - Ecolabels and environmentally friendly products

There are different labels and certifications used and applied regarding the environmental performance of a product or service around the world. Ecolabeling is only one type of such certification. In order to help understand those diversified certification schemes and to ensure the credibility and authenticity of labels, the International Organisation for Standardisation (ISO) has identified three categories of labels in the market. Ecolabeling is included into the first group (Global Ecolabeling Network, 2019):

- Type 1: a voluntary scheme, based on multiple criteria and involvement of a third-party evaluator, that awards license authorising the use of environmental label indicating overall environmental preferability of a product in its category;
- Type 2: informative environmental self-declaration claims;
- Type 3: voluntary programmes aiming to provide environment-related data of a product, under pre-set parameters established and verified by a third-party.

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As an international certification scheme, ecolabeling has become a very useful tool firstly for governments and European institutions, to encourage a shift towards more environmentally-friendly practices; secondly for ecological businesses to build a strong position and recognition of the market; and last but not least for consumers to be able to adjust their purchasing decisions based on their values and belief that the chosen product or service will have less of a negative environmental impact than its substitutes. In general, there are three key aims of ecolabeling (Global Ecolabeling Network, 2019):

- Protecting the environment
- Encouraging environmentally sound innovation and leadership
- Build consumer awareness of environmental issues

Ensuring that ecolabels really stand behind the standards and values that they promote, it is crucial that they maintain their credibility and recognition. Organisations such as Global Ecolabeling Network (GEN), aims to improve and develop the ecolabeling of products and services on a global scale and oversee the redeeming procedures and standards set by certain labels (Global Ecolabeling Network, 2019). Monitoring existing ecolabels and their standards on a global scale is facilitated by organisations such as the 'Ecolabel Index'. Its website provides a free and open access to 463 ecolabels in 199 countries and in 25 different sectors (Ecolabel Index, 2019).

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Unit 2.2 - Ecolabels and environmentally friendly products

How can HoReCa organisations benefit from ecolabels?

DIFFERENTIATION the ecolabel helps building market advantage

CREDIBILITY the ecolabel guarantees standard of environmental performance

VALIDATION the ecolabel proves environmental values of organisation

RIGOUR the ecolabel is guaranteed by independent evaluation

RECOGNISIBILITY the ecolabel is recognised by a worldwide market

RELEVANCE the ecolabel concentrates on relevant issues

INSPIRATION the ecolabel promotes sustainable approach and values

Ecolabels exist in almost every major industry, including each of the HoReCa sectors. When implementing sustainable strategies into the design of their menu, HoReCa businesses should become aware of various ecolabels functioning in the food market (especially if their supply chain is long e.g. when they import ingredients from abroad). Basing the menu on products that are awarded ecolabels is not only a vital guarantee for the consumer that a business is fulfilling its ecological obligations, but also helps genuinely mitigate company's negative environmental impact (Legrand, Sloan, & Chen, 2017).

Ecolabel Index contains in total over one hundred ecolabels under the category of food. Each of the labels is characterised by clear and very restrictive regulations that guarantees its value for businesses and consumers. Some of the labels are awarded on an international scale, others on smaller – regional or national range.

Some of the more commonly known food ecolabels are:

- Fair Trade – it certifies products that were created in an environmentally-friendly manner, but only if farmers and workers were paid fair salaries and their working conditions were safe.

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- Direct Trade – it certifies farms and products in coffee and chocolate industry, that are characterised by ethical trading standards, especially regarding sustainable growth of local communities in developing countries and ethical labour regulations.
- Non-GMO – this ecolabel guarantees that products and land where they were cultivated are not genetically modified.
- Animal Welfare Approved – it certifies that animals were raised in ethical conditions – free-range or outdoors, and with application of high-welfare farming methods.
- Carbon Reduction Label – this ecolabel guarantees that the carbon footprint created during the whole production process is systematically measured and the producer take actions in order to constantly minimise it.

Accept from choosing foods and products awarded with ecolabels, HoReCa units may take a step further and adjust their overall kitchen and menu planning operations and practices to standards of ecolabels addressed directly to restaurant and catering organisations. Although this process will sometimes require changes and adjustments in overall practices of HoReCa organisations, that are in turn connected with high investments of time, management and sometimes financial capital, the labels certify that organisations are committed to sustainable practices and are taking actions to minimise and ease their negative impact on the environment. Ecolabels bring various additional benefits such as competitive advantage and recognisability.

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Unit 2.2 - Ecolabels and environmentally friendly products

The examples of more recognisable ecolabels in the HoReCa sector include:

- **Green Seal** – it is an ecolabel standard for restaurant and food service operations as well as hospitality units, that considers various aspects of their activities such as extraction of raw-materials in everyday practices, use and reuse or disposal of materials, cleaning products and services used or even materials used in building and production process.
- **Green Table** – is an ecolabel directed to restaurant professionals, suppliers and other supply chain related parties. Its main aim is to promote sustainability standards in menu design, high quality of ingredients and reduction of food related waste.
- **Ocean Wise** – this ecolabel is awarded to any HoReCa and markets that demonstrate high level of seafood awareness and promote ocean-friendly buying decisions.
- **LEAF (Leaders in Environmentally Affordable Foodservice)** – is awarded to restaurants and catering units characterised by high sustainability standards, expressed for example by serving local, organic food, reducing their energy and water use, reduce waste and use environmentally-friendly supplies

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Unit 2.3 - Trends and expectations of modern consumers

"If your menu has the word 'sustainability', your ingredients are considered 'clean' and you're prepared to tell the stories behind the food you're serving, then you're already living in the restaurant of the future". This conclusion from the "Industry Report" by the National Restaurant Association indicates the importance of turning the practice of menu planning in a more sustainable direction. The report clearly shows that **modern consumers are becoming increasingly interested in processes that contribute to the dish being served on their plate.** Nowadays, a lot of consumers' attention is payed to food sourcing and production process, supply chain and even restaurant packaging and waste management systems applied. Sustainability has found its place in the report's top ten predicted trends that are going to shape how hotel, restaurants and catering units will change by 2030. **It seems clear that the caterers will have to not only find the ways to drive environmental costs down but also showcase their efforts to attract consumers who are becoming more and more interested in anything related to sustainability.**

(The National Restaurant Association Research and Knowledge Group, 2019)

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The "Industry Report" is not the first to reveal the growing power of the sustainability culinary trend. Similar conclusions can be found in the survey conducted by the International Trade Commission on behalf of the European Commission in 2019. The survey aims to research what are the factors impacting trade in modern Europe. The results proved that over 85% of retailers in various sectors of the European industry indicated sustainability to be the dominant factor in their product sourcing strategies. The demand on sustainably sourced products was especially high in the food sector including food service, where over 98% of business owners reported increased sales of sustainable products in the scope of past five years. **In general, the key findings of the report highlighted that consumers in major European Union markets demand the food industry to be more engaged in social and environmental causes, and to be more transparent on the practices they apply on regular basis.**

(International Trade Centre, 2019)

Among the sustainable trends in kitchen organisation and menu planning practices, zero waste cooking was indicated as one of the dominant movements in 2019. This trend is based on reducing the amount of food waste produced in the process of preparing, cooking and serving food in restaurant and catering businesses. Admittedly, some waste in foodservice sector is practically unavoidable, however the zero-waste cooking approach demands businesses to identify the areas for improvement and indicate necessary changes into the areas where it is possible. The zero waste approach to cooking is particularly beneficial from the perspective of sustainability when supported by side actions such as (National Restaurant Association, 2019):

- Reducing the amount of food and ingredients in stock,
- Using smaller plates at buffets,
- Serving smaller portions,
- Purchasing smaller quantities of food and ingredients more frequently,
- Properly storing and measuring temperatures for foods that spoil quickly,
- Avoid bottled water and instead serving plain or filtered tap water in reusable jugs or bottles,
- Crafting menus to utilize as much of ingredients as possible.

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Unit 2.3 - Trends and expectations of modern consumers

According to the 2019 edition of the annual "Menus of Change" report, plant-forward cooking is another of the dominant trends among modern culinary strategies. Plant-forward, known also as plant-based cooking is an umbrella term to describe vegetarian, vegan and plant-reach approaches in professional cooking. In the scope of past two years, business researchers have been systematically observing how this trend slowly but systematically emerged and transitioned from the fringes of dining culture to the mainstream media, impacting many other trends in professional kitchen. The authors of the report go so far as to claim, that "vegetable-centric menus are not a hot trend anymore, but rather, a new normal". The findings of the report suggest that foodservice providers need to pay more attention to the sustainable options offered in menus, as greenhouse gas production, land use, and healthy nutrition are becoming top priorities in consumers decision making process.

(The Culinary Institut of America, Harvard T.H. Chan, School of Public Health, 2019)

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Another trend that is very visible on the foodservice market in most European Union countries is a dramatically changing attitude towards meat consumption. Except from serving meat from local and organic farmers and ensuring that it is produced to high environmental and animal welfare standards, the recommendations presented in 2019 Culinary Forecast for restaurant and catering businesses include a reduction of the amount of meat served per plate and a shift instead to offering more vegetarian options. In fact, **the recommendations reach further than just minimising the amount of meat served, but also suggest a reduction of the amount of other products of animal origin, such as dairy products and eggs** (National Restaurant Association, 2019).

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Unit 2.4 - Benefits of sustainable menu for businesses and consumers

The growing strength of trends that aim towards a shift in more sustainable menu planning and cooking seems undeniable. Although, introducing sustainable solutions to menu planning is not an easy process and the HoReCa organisations that decide to follow those trends face a lot of challenges, it is foreseen to be an unavoidable change. Adapting sustainable practices although challenging, may be the source of various benefits for the HoReCa organisations.

One of the undeniable benefits is an improved brand image. The overall negative environmental impact of the HoReCa sector can significantly impact the image of organisations operating in the sector. However, according to various studies (e.g. National Restaurant Association, 2019; European Commission, 2019), customers especially in relation to food and beverage services, favour businesses that practice sustainable habits and positively impact their social and ecological environment. Therefore, implementing sustainable strategies when menu planning as well as other actions of the HoReCa organisations can vastly contribute to building their

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Unit 2.4 - Benefits of sustainable menu for businesses and consumers

Since the main goal of every business is to generate profit, the area of the main concern is to look for and implement strategies that allow the reduction of costs and maximise profits. **Introducing sustainable strategies to menu planning and other operations of the HoReCa sector organisations leads to more efficient practices that contribute in turn to reduced amount of resources and effort invested, which enhances productivity and minimises costs.** Some of the changes necessary for implementing sustainable solutions into the menu planning process, such as changing suppliers for more eco-friendly and sourcing new products might require additional investment and may be more expensive to implement. Nevertheless, in the long-term perspective, the research suggests that the results justify the investment.

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Unit 2.4 - Benefits of sustainable menu for businesses and consumers

On the other hand, consumers also benefit from the sustainable and zero waste solutions adapted in HoReCa organisations. **One of the most important benefits to recognise is a positive impact on consumers health.** As determined in the opening sentence of guidelines for sustainable healthy diets by Food and Agriculture Organisation of United Nations in its 2018 report, next to degradation of environment and natural resources, malnutrition and unhealthy eating habits are the most critical challenges faced by modern world.

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Unit 2.4 - Benefits of sustainable menu for businesses and consumers

The problem is serious not only because numbers of the undernourished people has been growing for several years, but also because the number of overweight and obese people increases at accelerating pace all over the world. Research shows that globally over 2 billion adults and over 40 million children are overweight. At the same time, 820 million people experience hunger on daily basis. Both undernutrition and overeating have clear negative impact on health, well-being and productivity of individuals. Hence, promoting positive and sustainable eating habits as well as implementing sustainable menu strategies in the HoReCa businesses creates health benefits for the consumers (FAO and WHO, 2019). Additionally, social, demographic and economic factors are highly contributing to shifts in eating habits. For example, changing lifestyles with less time for cooking, result in consumers more often reaching for take-away and eat out options. The quality and sustainability of menus offered, and ingredients provided plays ever important role.

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Unit 2.4 - Benefits of sustainable menu for businesses and consumers

Plus, positive sustainable practices promoted by businesses in HoReCa can encourage consumers to adopt more sustainable options in their own every-day cooking.

Moreover, it is important to remember that patterns of modern food consumption and production have been proven to have a critically negative impact on the environment and natural resources on the global scale. **As an example, the above mentioned, FAO and HWO report states that "food production accounts for the use of 48% of land and 70% of freshwater resources respectively at the global level" (FAO and WHO, 2019). Reducing those and other negative impacts in long term perspective can indisputably improve living conditions of individuals as well as contribute to building more sustainable communities and restoring some of the natural resources.**

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Appendices

Appendix 2.1 - Quick Action Checklist to Identify Sustainable Elements of Menu

Area	Task	Yes	No
Certifications and ecolabels	Most of the ingredients used to compose the meals are awarded environmentally friendly eco labels		
	Producers and suppliers of ingredients are certified with schemes guaranteeing environmental practices and fair labour regulations		
	Noncertified products are sourced locally		
Sustainable principles	Needs of a restaurant and a consumer are satisfied in a balanced way		
	Seasonal options in menu are available		
	Information about food production methods, sourcing strategies, and environmental impacts are available in the menu		
	Nutrient values of each meal are available in the menu		
	Menu is composed with an account for local/regional/national nutritional guidelines		
	Information on the ingredients and cooking methods used to prepare certain dishes are available in the menu		
	Multiple portion sizes are available		
	Portion are reduced to an optimal size, **emphasizing calorie quality over quantity**		
	Number of dishes offered is minimised		
	Same ingredients are used various times, cooked in different ways across number of dishes		
	Served meat originates from local and organic farmers and is produced to high environmental and animal welfare standards		
	Number of meat-based dishes is reduction to minimum		
	Product of animal origin such as dairy products and eggs are limited to minimum		
	Plant-based dishes are the core of menu		

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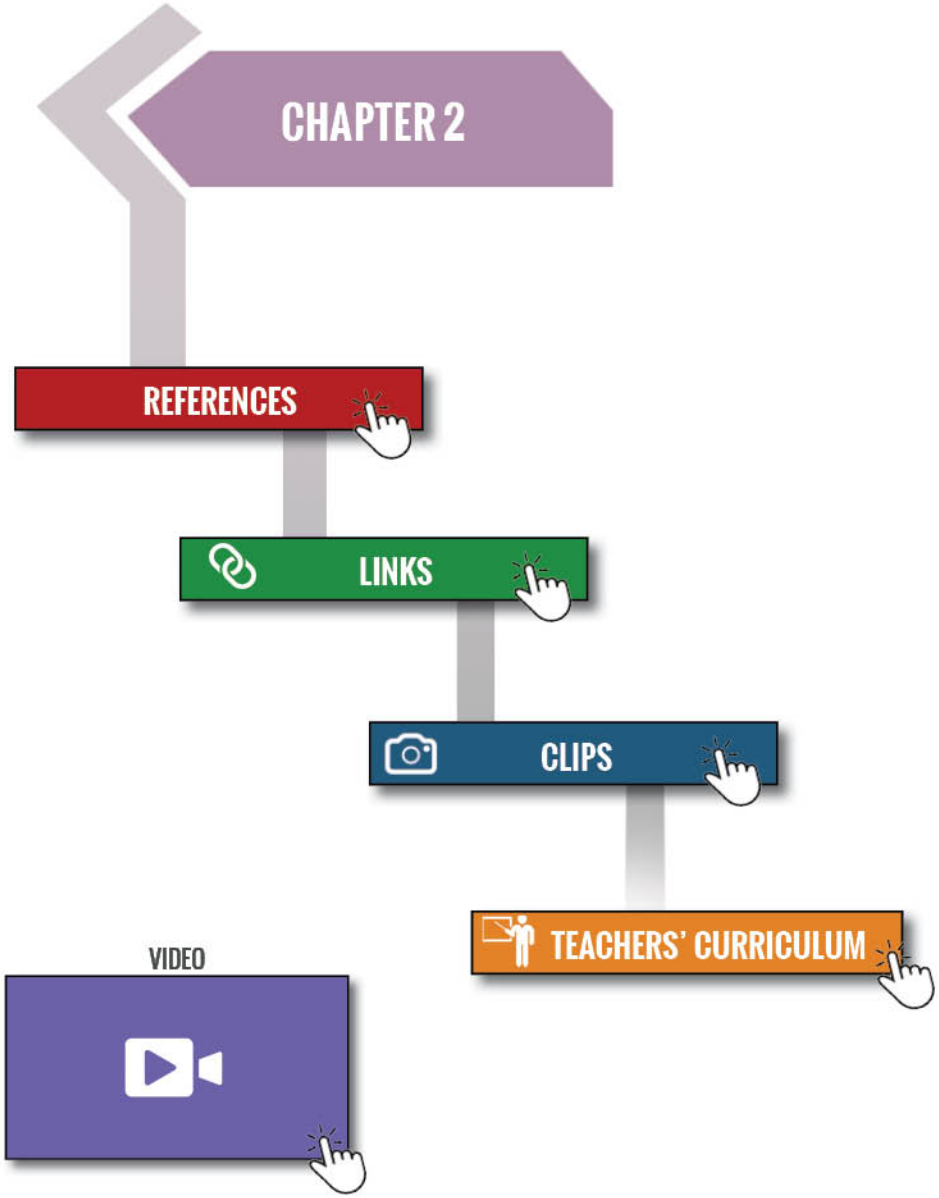

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Chapter 3: Waste Reduction and Recycling

Introduction

As is the case with all industrial activities, the everyday operations in the HoReCa businesses generate waste. A comprehensive EU report on best environmental practices in the tourism sector (including hospitality, restaurant and catering) from 2013, indicated that hotels in the UK generated 1 kilogram of unsorted waste per guest per night. This contributed to generating 66 tonnes of waste per hotel on an annual basis. The research conducted in Germany and Austria at a similar time showed the total waste generation was 1.98 kilograms per guest-night (European Commission, 2013). Faced by these and similar statistics, national governments with support of European legislation, have demonstrated their commitment to addressing the substantial issue of waste. It has become more clear, that the impact of the amounts of waste generated, accompanied by poor waste management strategies in some of the HoReCa facilities has serious implications for "hygiene and health, environmental quality, resource and economic sustainability" in Europe.

(European Commission, 2013)

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Introduction

Therefore, a strong emphasis on adopting effective waste management strategies in the HoReCa can be observed. **Recycling of waste, understood as recovery actions leading to reprocessing waste materials into products that can be reused, whether for original or other purposes** (European Commission, 2019), is considered as a role-model action. **However, considering the overall amount of waste generated, recycling is not enough anymore. Referencing the key principles of circular economy, HoReCa facilities need to direct their focus first to available reuse and waste reduction strategies.**

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The waste generated in the HoReCa sectors involves a wide range of waste streams such as housekeeping, catering, reception and public areas. There are also various types of waste generated, starting from organic, cardboard, glass or paper to metals, plastic and even some hazardous waste such as chemicals or electronic equipment. HoReCa businesses in Europe face a lot of challenges while sorting and recycling their waste.

The challenges are related for example to the constantly increasing costs of waste disposal, poor waste management infrastructure, space taken by the waste fractions in valuable back-of-the-house areas or noise generated by waste compaction and collection.

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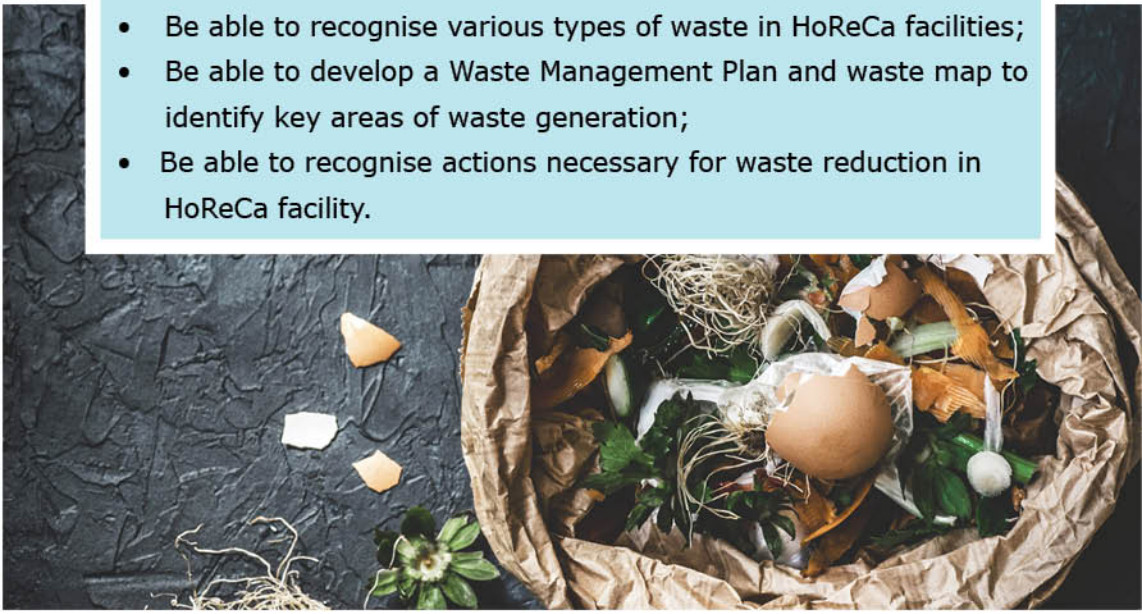
Introduction

Catering and restaurant service providers face additional problems related to the major type of waste generated there - organic food waste. The problem of food-related waste in professional kitchens in the HoReCa sectors was already explored in chapter one of this curriculum. Strategies and tools that can help tackle this problem and a monitoring approach was presented. This chapter will focus most of all on identifying key areas contributing to waste generation in the HoReCa facilities and demonstrating adequate waste reduction and recycling strategies to address this challenge.

Objectives

After completing this chapter, you will:

- Be able to identify key areas of waste generation in HoReCa facilities;
- Be able to recognise various types of waste in HoReCa facilities;
- Be able to develop a Waste Management Plan and waste map to identify key areas of waste generation;
- Be able to recognise actions necessary for waste reduction in HoReCa facility.



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Unit 3.1 - Key areas and types of waste in the HoReCa facilities

According to the official data collected by European Commission, the composition of waste generated in hospitality and catering units is similar to regular household waste. **In general, the HoReCa waste comprises of two main components: dry waste (nonbiodegradable) and wet waste (biodegradable). Organic waste, glass, paper, cardboard, plastic and metal are named among the main fractions of waste generated in the HoReCa facilities on regular basis.** The waste composition in accommodation and catering companies varies seasonally. In addition, due to hotels and restaurants often being localised in correlation to main tourist routes, the waste is often generated in sensitive areas, containing for example high natural resources. To present a complete and complex picture of the HoReCa waste generation in Europe, it is important to mention the link between restaurants and hotels with packaging waste. The overall HoReCa sector is considered as one of the key contributors to the packaging waste including plastic and metal packages in the continent. This being mainly due to single-use and individually wrapped items so popular in accommodation units and restaurants. We will explore this topic further in the next chapter.

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Unit 3.1 - Key areas and types of waste in the HoReCa facilities

Waste in the HoReCa sector is also related to energy and water consumption in hospitality and catering facilities (European Commission, 2013). **The "Best Environmental Management Practice in Tourism Sector" report by European Commission, allows to identify five areas of hotel and restaurant operations which are the main streams of waste production in the HoReCa facilities (European Commission, 2013):**

- **General management (back-of-the-house and maintenance)**
- **Procurement**
- **Housekeeping**
- **Catering and kitchen**
- **Reception and public areas**

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Depending on the specification of the accommodation or catering unit, other areas may contribute to the overall waste generation schemes as well. To effectively address the issue of waste generation in the HoReCa sectors, next to recognising the main areas contributing to waste production, it is also crucial to identify the main types of waste generated.

The general statistics presented at the beginning of this unit allow to differentiate accommodation and catering waste into two categories: wet (biodegradable) and dry (nonbiodegradable).

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Unit 3.1.1 - Biodegradable waste

Biodegradable waste includes first and foremost food and drink waste and is related mostly to the catering and kitchen as well as serving areas of the HoReCa businesses. The overall data on food waste in Europe indicates that one third of food that has been produced is being wasted. Unequal distribution of food is only one of the serious consequences of such dealings. Social and health problems, and environmental consequences are some of the other resulting issues. Food waste is associated with an annual emission of over 4 million tonnes of greenhouse gases. Almost 200 million cubic meters of fresh water and 28 million tonnes of fertilizers are used to grow or produce food that is not being consumed at the end of the process. The Food and Agriculture Organisation of United Nations, indicates "a culture of abundance and behaviour patterns" as the sources of such distinctive waste-related numbers, and describes preparation and consumption stages as being mostly responsible for food waste generation (FAO, 2011).

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The hospitality and food service industry in Europe plays a significant role in the amount of food waste generated in the continent. A report on waste prevention in hospitality and restaurant facilities in Nordic countries, conducted in 2012, showed that over 27% of overall waste generated in Nordic economy originated from hotels and food service units. The study showed that about 70% of this loss could be avoided and about 50% of the food waste was generated outside the kitchen – in the service and consumer areas (Nordic Council of Ministers, 2012). The reflection of these trends and numbers can be found also in other European regions and countries.

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Responding to those observations, national governments around Europe with support from European Commission, have undertaken various actions to help hoteliers and restauranteurs in tackling this problem and its consequences. **One of the most effective strategies promoted is a zero-waste approach to kitchen and serving operations in the HoReCa businesses. The approach, focusing on preventing food waste generation in the first place, helps to effectively minimise the negative impacts of waste production on both the environment and the business.**

The 'Food Waste Hierarchy' tool was developed as an element of the zero-waste approach, to serve as guidelines for the HoReCa sector on how to fight food waste generation by maximising the use of food and minimising food waste.

In order to strongly emphasise the need for taking actions leading to more prevention of food waste, this model was modified to create the **'Food Recovery Hierarchy', which focuses on actions that organisations can take to "prevent and direct wasted food".**

(United States Environmental Protection Agency, 2019)

Figure 1: *The Food Waste and Food Recovery Hierarchy*

Source 2: *https://www.epa.gov/sustainable-management-food/food-recovery-hierarchy*

The six recommended stages for managing food resources by accommodation and catering organisations were identified (United States Environmental Protection Agency, 2019):

- **Source reduction** – the highest priority should be to prevent waste. HoReCa organisations can implement this strategy by performing a food waste audit. This is a tool designed to identify and measure amount, type and sources of waste to develop successful strategies of preventing waste generation. The procedures and tools necessary to conduct Food Waste Audit in kitchen and restaurant areas were described in chapter one of this Curriculum. Additionally, accommodation and catering units can implement better waste reduction habits such as ensuring proper storage techniques or improvement of purchasing process. A checklist of various positive habits was developed and is provided as an attachment to this unit in order to support the HoReCa units in their shift towards more sustainable practices (appendix 3.1 of this chapter).

- **Feed hungry people** – redirecting unspoiled, healthy food to people in need should be a priority practice of food waste management system in every HoReCa organisation. Through establishing connections with local food recipient organisations such as foodbanks, soup kitchens or shelters; hotels and restaurants can contribute to creating community support networks. Additionally, such practices can help to save money for waste disposal and avail of tax benefits offered in many European countries for companies that donate food.

- **Feed animals** – the third stage of the hierarchy is directing food scraps to farmers, zoos or producers that make animal or pet food. This practice may be regulated by national legislation, however contacting local farmer networks should help to make this procedure easy and profitable for both sites

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- **Industrial uses** – food wastage can be directed to obtain biofuels or bioproducts. The HoReCa organisations can perform some of the processes to reuse bioproducts in their own facilities and use it for example as an extra source of energy. Although, it is important to remember that various countries may have different regulations allowing hotel and restaurant units to implement such practices.

- **Composting** – food wastage that cannot be redirected to any of the above processes should be turned into compost to feed and nourish the soil. Organisations may create their own composting programmes or use existing composting services available in their closest environment.

- **Landfill/incineration** – only the food, that cannot be further redirected to organisations supporting people in need, feeding animals, obtaining bioproducts or for composting should be sent to landfill or incineration to generate waste.

The 'Food Recovery Hierarchy' provides managers and owners of HoReCa organisation with clear directions, which they should base their food management strategies on. It presents the most to the least preferable ways of approaching the food waste problem in HoReCa organisations.

Unit 3.1.2 - Nonbiodegradable Waste

The main types of nonbiodegradable waste in restaurant and hostility sectors identified by European Commission (European Commission, 2013) and later by American Journal of Climate Change (Ezeah, Fazakerley, & Byrne, 2015) based on their study conducted in four popular tourist destinations in Europe, include:

Table: Popular nonbiodegradable waste in the HoReCa facilities

Type of waste	Components
Household waste	Dirty paper and wrapping used in kitchen/restaurant area, plastic wrapping or bags, composite wrappers
Cardboard and paper	Packaging,
Plastic	Bags, bottles, household goods, individual portion wrappers for different types of products
Metal	Tin cans, jar lids, soda cans, food containers, aluminium packaging, mayonnaise, tomato sauce and mustard tubes
Glass	Bottles, jars, flasks
Cloth	Tablecloths, bedlinen, napkins, clothes, rags
Wood	Wooden packaging, pallets

Source: Based on Ezeah, Fazakerley, & Byrne, 2015

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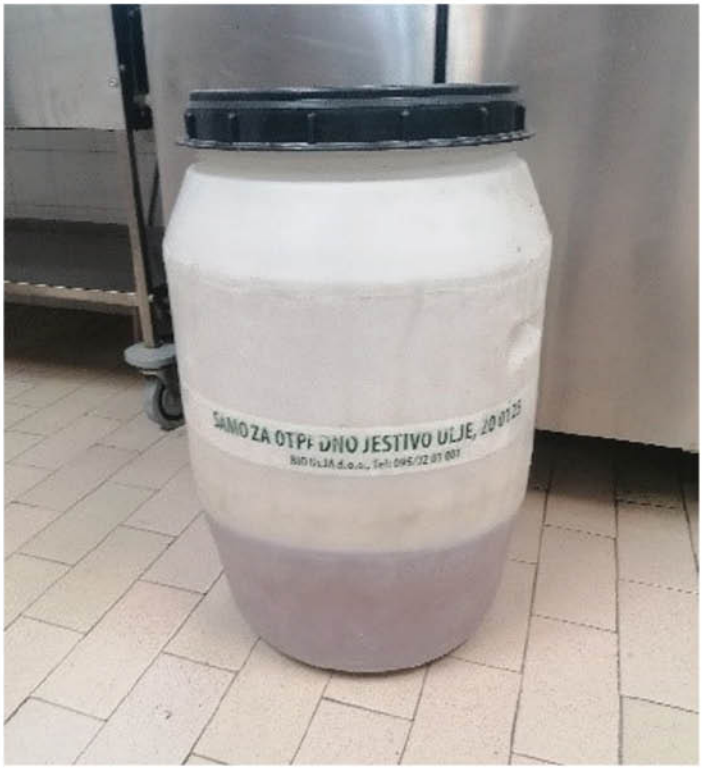
Unit 3.1 - Key areas and types of waste in the HoReCa facilities

Unit 3.1.2 - Nonbiodegradable Waste

Nonbiodegradable waste is generated in all departments of the HoReCa organisation. For instance, the housekeeping department has a major impact on the generation of various waste such as towels, robes, linens, bathroom amenities (e.g. shower gels, shampoos, soaps etc.), cleaning chemicals as well as items left behind by guests such as medications, newspapers and batteries. Office and reception departments contribute mainly to the production of paper and cardboard waste, for instance: maps, brochures, printed documents; as well as electronic waste – monitors, computers, printer tonners etc. Public and garden areas strongly contribute to generation of wooden waste e.g. boxes and pots, but also glass and plastic example, bottles and cans left behind by guests. And finally, back-of-house departments generate various types of waste related to supply and maintenance such as packaging waste, laundry waste, paint, metal tools, furniture etc.

(International Tourism Partnership, 2014)



Unit 3.1.3 - Water waste

According to data collected by 'Water Sense' – a programme of the Environmental Protection Agency in USA aiming to protect water supplies – water used in the country's food and hospitality related facilities alone accounts for about 15% of the total water used in business and commercial establishments. The research showed that most of the water was used in the kitchen by various processes and equipment related to preparation, serving and cleaning. Other areas of restaurant and hotel operations contributing to generation of water waste included cooling and heating, use in rooms and restrooms, and landscaping (United States Environmental Protection Agency, 2019).

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Unit 3.1 - Key areas and types of waste in the HoReCa facilities

Unit 3.1.3 - Water waste

There are two main approaches that should be taken in to account, process of water waste reduction and management (GreenHospitality.ie, 2018):

1. ***Measurement*** *– through regular measurement of water waste, business owners or managers can build a comprehensive understanding of water-related practices in their organisation. It is crucial to first understand how much water is being used, followed by what are the sources of this use in the organisation.*

2. ***Minimisation*** *– one of the most important sources of water waste is related to poor water-related behaviours of both staff and customers. An effective communication strategy should be developed and implemented on regular basis to encourage development of water oriented internal culture.*

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Some good practice examples that might be adapted by the HoReCa businesses to prevent and reduce water waste include (GreenHospitality.ie, 2018):

- **Double meters in areas contributing to highest water waste e.g. kitchen**. Data collected should be reviewed on regular basis and when consumption exceeded accepted norms, prevention measures should be taken

- **Towel Reuse Programme** – hotel guests should be encouraged to hang up their towels for reuse unless fresh towels are required. It's important to ensure the staff follows through this policy

- **Linen Reuse Programme** – the linen in rooms doesn't need to be changed on everyday basis during the guest stay. Guests should be encouraged to inform the staff when they want, the linen to be changed

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Unit 3.1 - Key areas and types of waste in the HoReCa facilities

Unit 3.1.3 - Water waste

- **Reduction of water pressure** – in guests' toilets, public spaces and across the property
- **Sensors in taps, urinals, bathrooms;** replacing two tap sinks with mixed sinks (95% of running water in two taps sinks, never touches user's hands!).
- **Installing dual flash in toilets**
- **Pool covers** – should be always in place when pool is not used (contributing also to energy waste reduction!)
- **Rainwater harvesting** – water captured during rain showers can be used e.g. for gardening or pool backwash

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- **Employee training** – a communication strategy to inform staff on the water-saving practices should be implemented and coordinated by respective managers and team leaders. Monitoring of the practices and providing regular feedback contributes to building an understanding of expected results.

- **Customer and guest communication programme** – engaging with customers to encourage them to contribute to water-saving attempts plays a crucial role. Customers should be informed on actions that are expected from them, underlying potential benefits can support the staff in this process.

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Unit 3.2 - Waste management plan and waste audit

To effectively address the problem of waste in their facilities, the HoReCa managers and business owners should consider introducing a waste management plan to their operations. **A waste management plan for hospitality or catering unit should take the form of written, internal policies that look at the entire life cycle of waste within a business. Based on observations, the plan should cover goals for minimising waste and its negative impacts; and present strategies on what needs to be done to achieve these goals.** The waste management plan should look at the problem of waste in organisation considering all areas of its generation, storage, transportation and disposal.

(European Commission, 2012).

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To gather data and the information necessary for the development of an effective waste management plan, a waste audit should be introduced. Conducting a general waste audit in the HoReCa facility should be a regular practice. The aim of waste audit is to investigate and identify the sources, composition, weight, volume and destinations of the waste generated (Green Hotelier, 2009). For this reason, the audit should cover main operation areas such as kitchen or housekeeping, also side areas such as administrative unit, warehousing and public spaces of the HoReCa business. Sometimes, for practical reasons, it is impossible to perform the audit in all sections of the HoReCa facility at the same time. If it is reasonable, it is recommended to divide audit activities in time, however steps should be taken to ensure that the results will not be impacted.

(Owen, Widdowson, & Shields, 2013)

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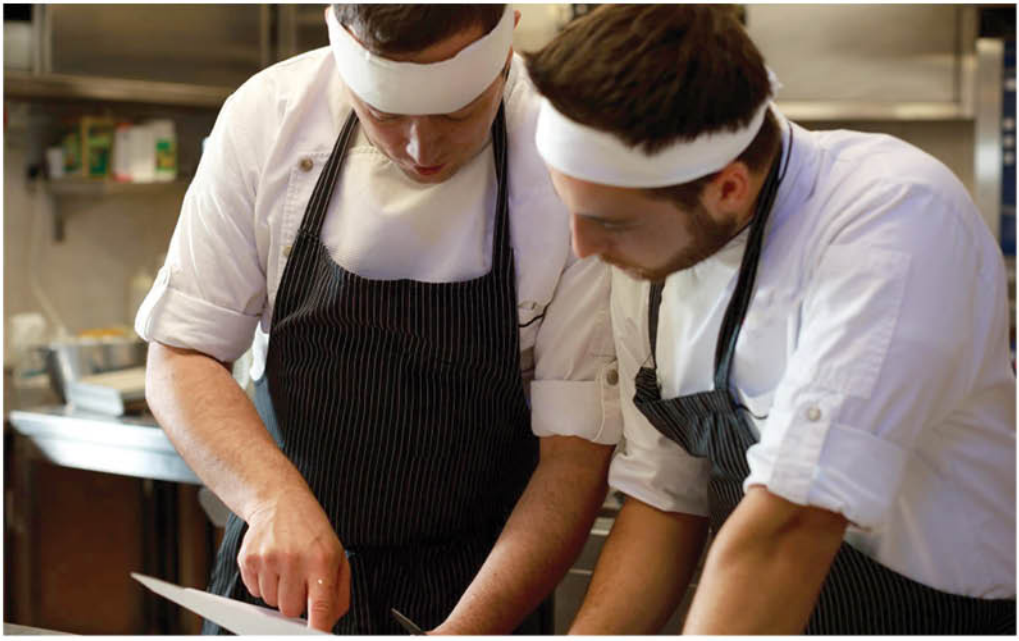
There are various methodologies, recommendations and guidelines available for the HoReCa organisations to lead them to conducting waste audit. Businesses may run it on their own or choose one of the growing numbers of professional services offered on the market. The methodology presented below is based on designing a waste map – an effective tool providing overview of waste and activities leading to its generation (Owen, Widdowson, & Shields, 2013). **The key steps of waste audit procedure for the HoReCa facility include: building an audit team, developing waste map and activity charts, establishing goals and creating work plan, and finally green procurement and stock management strategies.**

Unit 3.2.1 - Building an audit team

Selecting a general leader of the audit activity and sub-leaders, who will be responsible for coordinating the audit in different sections of the HoReCa organisation should be a first step in the process. The audit team should be comprised of staff from all key areas of the hotel or restaurant, e.g. management, procurement, housekeeping or kitchen; and should collaborate through the entire duration of the activity. Involving personnel from different areas of hotel or restaurant operations can provide logistical insight to the existing waste management systems. Moreover, sub-leaders can support the waste audit process by collecting necessary data and implementing audit activities within their section.



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Unit 3.2 - Waste management plan and waste audit

Unit 3.2.1 - Building an audit team

All necessary audit activities should be discussed, planed and agreed by the audit team, and sub-leaders should be informed of the exact procedures and tasks that should be implemented in their operational units. For example, while performing a general audit in a hotel, a food waste audit in kitchen and serving areas or an audit of housekeeping should be implemented. These actions can support the team to obtain the most concrete and detailed data. However, the leader of the waste audit should always monitor, and coordinate performed activities in all areas of operation.

(International Tourism Partnership, 2014)

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Timing

Deciding on the timing and duration of the audit should be the first tasks for the audit team. **Depending on the size of the facility, the audit should last from two days to two weeks. It should be conducted during the time of regular activity and should be repeated minimum twice a year.** Important questions that should be considered while performing waste audit in the HoReCa organisation are for example hotel occupancy rate, nonroutine activities such as renovation works, special events or conferences etc. The management team may decide to keep the timing of the audit a secret from bottom-line employees, customers and guests in order to ensure that the waste amounts recorded will be a true representative sample of regular practices.

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Rules and Regulations

Guarantying proper safety measures, and educating staff involved in the implementation of the audit on health and safety matters, should be a key priority for the audit team. **Providing necessary equipment such as gloves, garbage bags, weighing scale and containers and clearly communicating rules on how the audit will be run and waste amounts recorded is necessary to ensure a successful completion of the activity. The clear rules of garbage disposal should be agreed**. It might be necessary to temporarily introduce different coloured bags or stickers to identify the source of waste in common waste disposal areas. Moreover, audit team in hospitality units, should remember that waste collected from guest rooms may contain their personal and private information and measures should be taken in order to prevent any leaks of confidential information.

(International Tourism Partnership, 2014)

Additionally, a communication plan should be developed to inform staff responsible for implementation of the waste audit on the inventory procedures and measures. And finally, audit documentation, any monitoring sheets and reporting templates necessary should be developed and distributed among key staff members.

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Unit 3.2.2- Developing a waste map and activity charts

A waste map is a graphic representation of the facility, that includes information of waste produced in its various areas. **The first step to create a waste map is to obtain a site layout – it can be a simple sketch covering all operational areas of the facility or an official plan of its building(s).** It is important to consider all functionalities of the building(s) on the map and not only main areas, as often some waste sources may be hidden, and staff or managers do not realise the impact on general waste amounts. While creating the map it is recommended to ensure there is enough space for marking comments and references.

(Owen, Widdowson, & Shields, 2013)

Once the layout is developed, it is the time to introduce information on waste generated and resource used (resource include not only raw materials but also employees time, utility usage, storage etc.). At this stage, the involvement of the audit sub-leaders in different areas of organisation's operation is crucial. The procedure of creating waste map requires a waste audit leader to visit each of the areas identified on the site layout and report all types of waste produced and resources lost and its measured or estimated amounts. This process can and should be supported by audit activities implemented on a scale of all significant areas of the business, for example kitchen, restaurant and housekeeping unit. *(Owen, Widdowson, & Shields, 2013)*

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If data on the amount and type of waste collected in the unit was not measured by internal audit activities, the audit leader should discuss with key staff members, and collect relevant information on (Owen, Widdowson, & Shields, 2013):

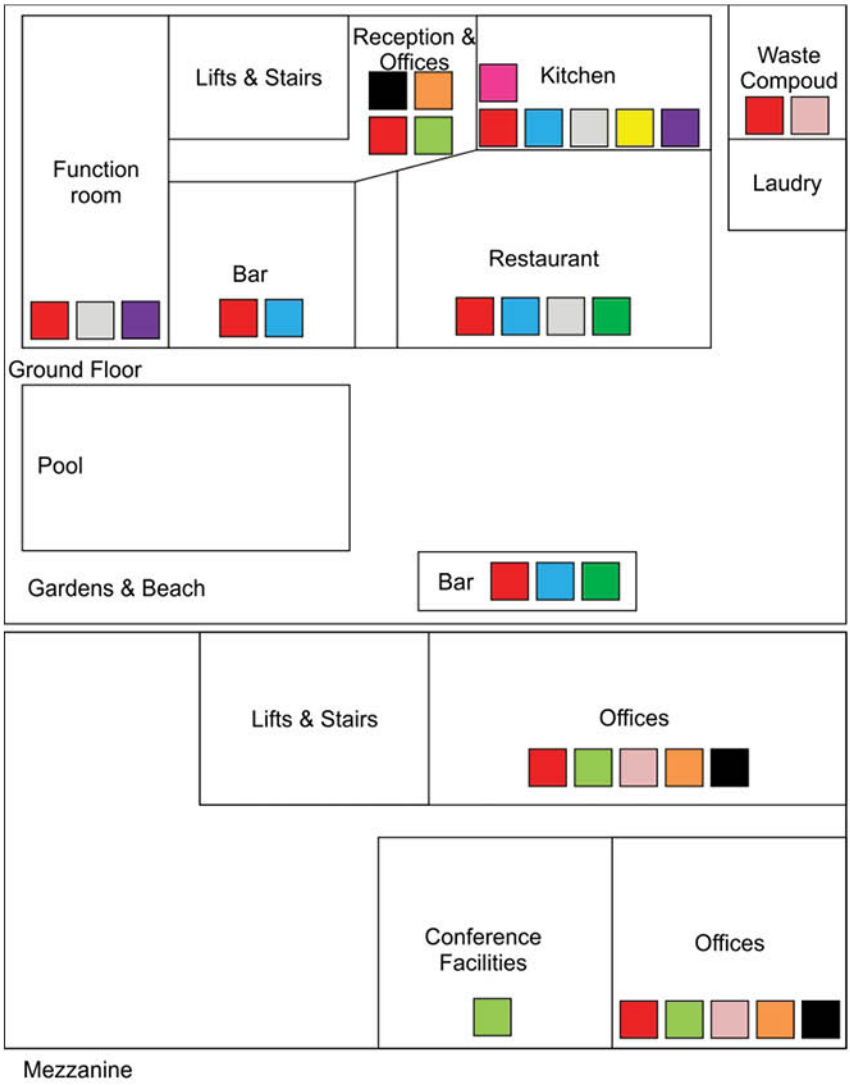
- Number of bins in the area
- Type of bins or waste in the area
- Volume capacity of bins
- How full the bins usually are when collected?
- Typical collection frequency

This data will enable him or her to estimate the weight of waste collected. Additionally, the audit leader should identify the amount of waste segregated for recycling or reuse and record utility use for example water, electricity and gas. Analysing activity areas in certain units of the organisation, the audit leader should also cover the purchasing, storage and other strategies characteristic for the unit, that might contribute to waste production. Asking questions such as "what happens to cleaning detergent containers when emptied?", "how ordered goods are sorted?" or "what happens if ordered goods are damaged?". Answers to such questions help to gather detailed information and encourage staff to think about hidden sources of waste. Once all data and information were identified, they should be marked on the map.

(Owen, Widdowson, & Shields, 2013)

An example of a simple waste map with colour coding allowing to identify various waste types has been presented below:

***Figure 2:** Waste map of an all-inclusive hotel*



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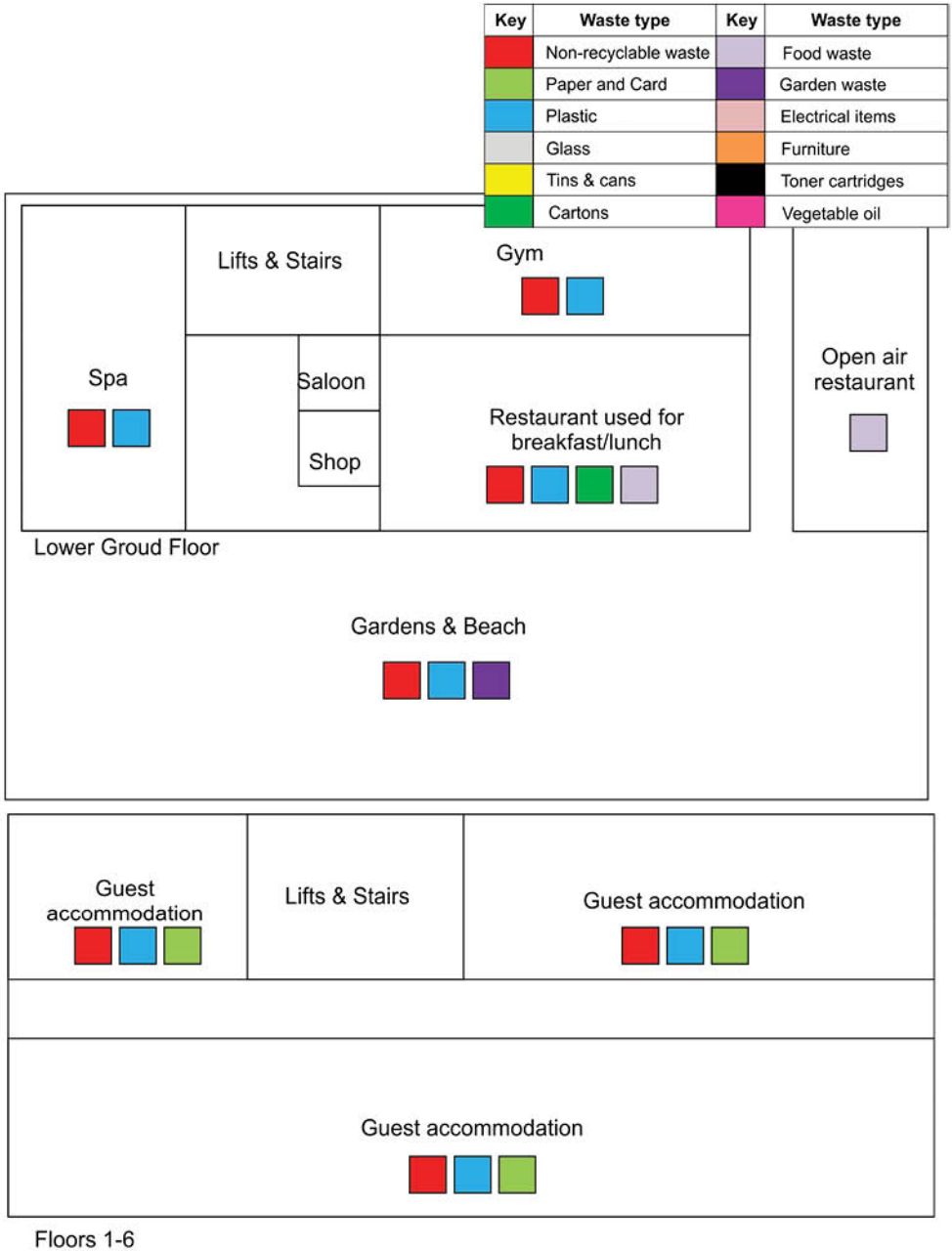
Key
Waste type
Key
Waste type
Non-recyclable waste
Food waste
Paper and Card
Garden waste
Plastic
Electrical items
Glass
Furniture
Tins & cans
Toner cartridges
Cartons
Vegetable oil
Lifts & Stairs
Gym
Spa
Saloon
Shop
Restaurant used for breakfast/lunch
Open air restaurant
Lower Groud Floor
Gardens & Beach
Guest accommodation
Lifts & Stairs
Guest accommodation
Guest accommodation
Floors 1-6

Adding together the different waste measures from each department gives an overall estimate not only of the amount of waste the hotel or restaurant facility produces (which actually could be provided by the waste contractor without the need to perform the audit in the first place), but most importantly about the structure of the waste generated, areas that produce the most waste and strategies of waste management in different units and in general. This can in turn help identify costs that could be reduced by better waste management.

(Owen, Widdowson, & Shields, 2013)

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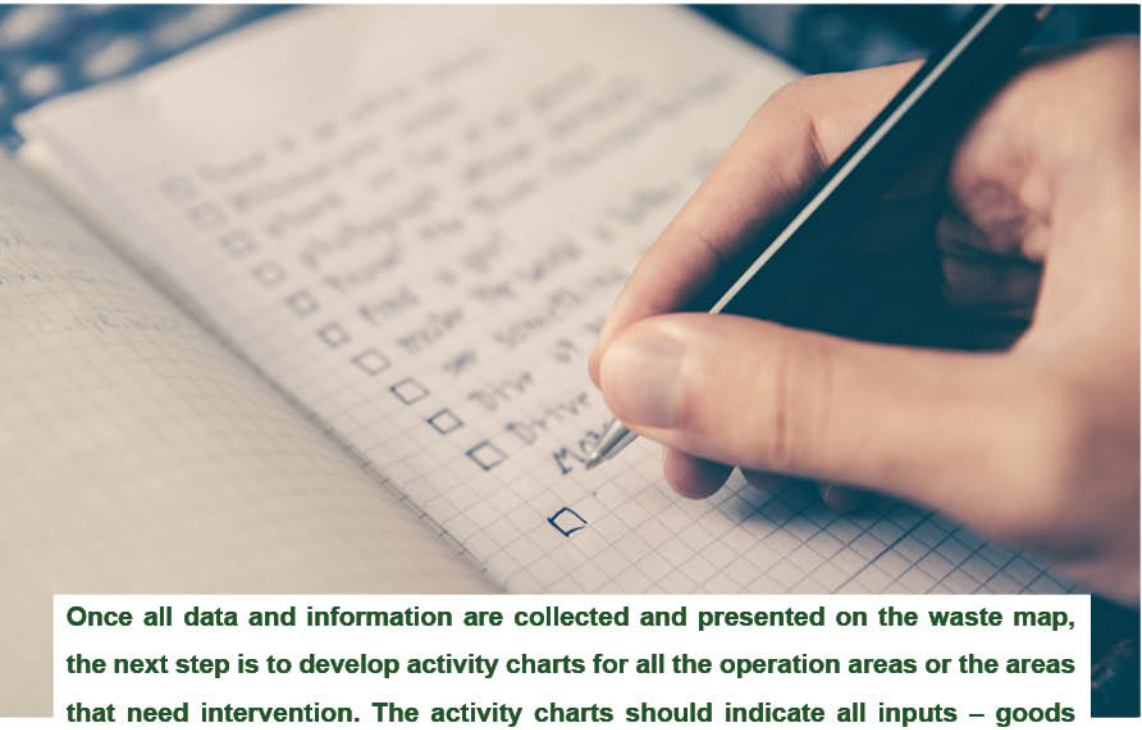

Once all data and information are collected and presented on the waste map, the next step is to develop activity charts for all the operation areas or the areas that need intervention. The activity charts should indicate all inputs – goods and products; and outputs – the waste produced, in the unit. A close cooperation with unit staff and leaders is crucial at this stage to better understand the practices performed regularly in the unit. If completed in a detailed way, the activity charts can help managers to indicate ill-functioning elements of activity schemes or practices contributing the most to waste production.

(Owen, Widdowson, & Shields, 2013)

At this stage, it is important to look at the actual cost of the waste, as it is necessary to analyse the invoices and bills indicating the value of inputs and outputs.

Unit 3.2.3 - Establishing goals and creating a work plan

A completed waste map and activity chart will allow HoReCa managers or business owners to better understand:

- Which operation areas contribute to highest waste production
- The type of waste generated
- Which activities contribute the most to waste production
- The cost of waste generated

Knowing the above, the leader of the waste audit activity in cooperation with managers of the organisation and leaders of different units, should be able to identify areas of operation that require intervention in the first place. Next, opportunities for improvements should be identified and goals to reduce the amount of waste (and the cost related) set.

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Managers and key staff members should also design strategies to replace or improve previous practices. Hence, it should be considered that changes to some routine practices in different units of the business' operations might be required as a result of the audit.

(Owen, Widdowson, & Shields, 2013)

Based on the findings of these analysis, an action plan of tasks and strategies should be designed, and the staff responsible for implementing the changes indicated. An example of a simple action plan to reduce waste and cost of the waste in key hotel areas is presented below.

Figure 3: Work plan for actions to be taken as a result of waste audit

Area for improvement	Action to be taken	Timescale for implementation	Responsibility
Housekeeping	Implement bulk toiletries system in guest accommodation:		
	• Further investigate prices and systems from suppliers	1 month	Housekeeping manager
	• Agree preferred approach	3 months	Hotel manager
	• Purchase system	4 months	Hotel manager
	• Provide training to staff	6 months	Housekeeping manager
	• Roll out new approach	7 months	Housekeeping manager
Kitchen and restaurant area	Introduce food waste monitoring scheme into kitchens and restaurants:		
	• Discuss monitoring scheme and approach with key kitchen and restaurant staff	1 month	Food and beverage manager
	• Develop recording sheets	1 month	Food and beverage manager
	• Provide training to staff	2 months	Food and beverage manager
	• Roll out monitoring process	2 months	Food and beverage manager
	• Monitor usage.	3 months	Food and beverage manager

Source: (Owen, Widdowson, & Shields, 2013)

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Unit 3.2 - Waste management plan and waste audit

Unit 3.2.3 - Establishing goals and creating a work plan

A waste audit should be held at least two times a year in order to monitor the changes and improvements. It is recommended, that the areas that were covered in the action plan will be the key focus of next audit activities. However, except from shifts in management strategies and regular practices, the behavioural change in staff, suppliers and customers is necessary. For this reason, a broad communication strategy is recommended, to inform all sides involved about the objectives and strategies adapted. Training tailored to the specific needs of the staff in different units should be provided and employees should be aware of the waste reduction and recycling standards accepted.

(Owen, Widdowson, & Shields, 2013)

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Unit 3.2.4 - Green procurement

An important step that businesses can take in order to support their waste management strategies is adapting green procurement practices. **Green Procurement described also as 'environmentally friendly procurement' is defined as "an approach to purchasing products and services that always take into account the economic, environmental and social impacts of organisation's buying choices" (Eades, 2012).** Sustainable procurement requires all elements of the business supply chain are characterised by high environmental and ethical standards. It requires planning and researching while sourcing for suitable products, services and suppliers in order to ensure that their activities go along with organisation's values and their negative impact on the environment is as low as possible.

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Moreover, the company needs to analyse the environmental consequences and impacts of the products or services at the different stages of their life-cycle such as manufacturing, transporting, storing, handling, using and disposing (International Institute for Sustainable Development, 2013). Hence, some of the elements that HoReCa organisations should take into consideration while deciding on their purchasing strategy should include energy and water efficiency, packaging and waste, carbon footprint, recycling possibilities, food miles etc. In order to ensure that green procurement strategies in the HoReCa businesses are well planned and implemented, organisations should develop procurement programmes into their waste management programmes and ensure their integration with daily operational practices.

(International Institute for Sustainable Development, 2013)

Unit 3.2.5 - Stock management strategies

One of the most important streams of waste production in the HoReCa organisations is kitchen and kitchen related processes. Statistics indicate that up to 10% of food purchased in food service businesses is wasted even before it reaches the customer's plate. One of the main reasons is a poor stock management. Stock, or inventory management is a strategy that can support HoReCa organisations in improving their supply management practices, reducing waste amount and cost related to the supply practices. By enabling organisations to track the ingredients and products that come in and out of the stock, inventory management system allows to control the supply status and flows.

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Key principles of developing an effective stock management strategy in the HoReCa organisation include. (The Restaurant Times, 2019):

- ***Regular monitoring*** *– a staff member such as a chef or manager should be designated to coordinate the stock monitoring practices. All the kitchen employees should contribute to monitoring the flow of supplies, recording the changes daily. Monitoring may be facilitated with use of reporting sheets, recording products remaining in and taken out of the stock or digital systems.*

- ***FIFO (First In First Out) method should be applied in order to avoid spoilage and waste.*** *To support this method, it is recommended to use transparent containers with clear descriptions, informing the date of arrival and spoilage of the product. This inventory method should allow businesses to use existing products before bringing in fresh supplies. The shelf-life of products should be monitored on regular basis in order to ensure that those with shorter spoilage date, or ones that soon will be out of date will be used first.*

- ***Products and ingredients with an impending spoilage date should be used to prepare existing dishes, or specials often offered off the menu to guests.***

- ***All kitchen staff should be trained in the stock management strategies****, and the kitchen management or chef should be responsible for monitoring the implementation of new strategies.*

Appendices

Appendix 3.1 – Quick Checklist of Positive Habits to Minimise Food Waste.

The checklist below presents a list of ideas that the HoReCa facilities should consider in their everyday routine to prevent food loss and waist.

It is recommended that a shift towards more sustainable food waste practices begin from conducting a food waste audit and was supported by an information campaign directed to all staff of the facility.

Area	Task	Yes	No
Preparation and storage	Avoid preparing meals ahead of time		
	Use cook-to-order instead of bulk-cooking toward the end of the day		
	Use leftovers from the day before		
	Freeze fruits and vegetables for reuse in future		
	Marinate meats to extend shelf life		
	Use leftover ingredients in different recipes		
	Use see-through storage containers		
	Don't peal fruits and vegetables if not necessary		
	Eliminate inedible and unnecessary garnish		
	Immerse wilted vegetables in warm water to reuse		

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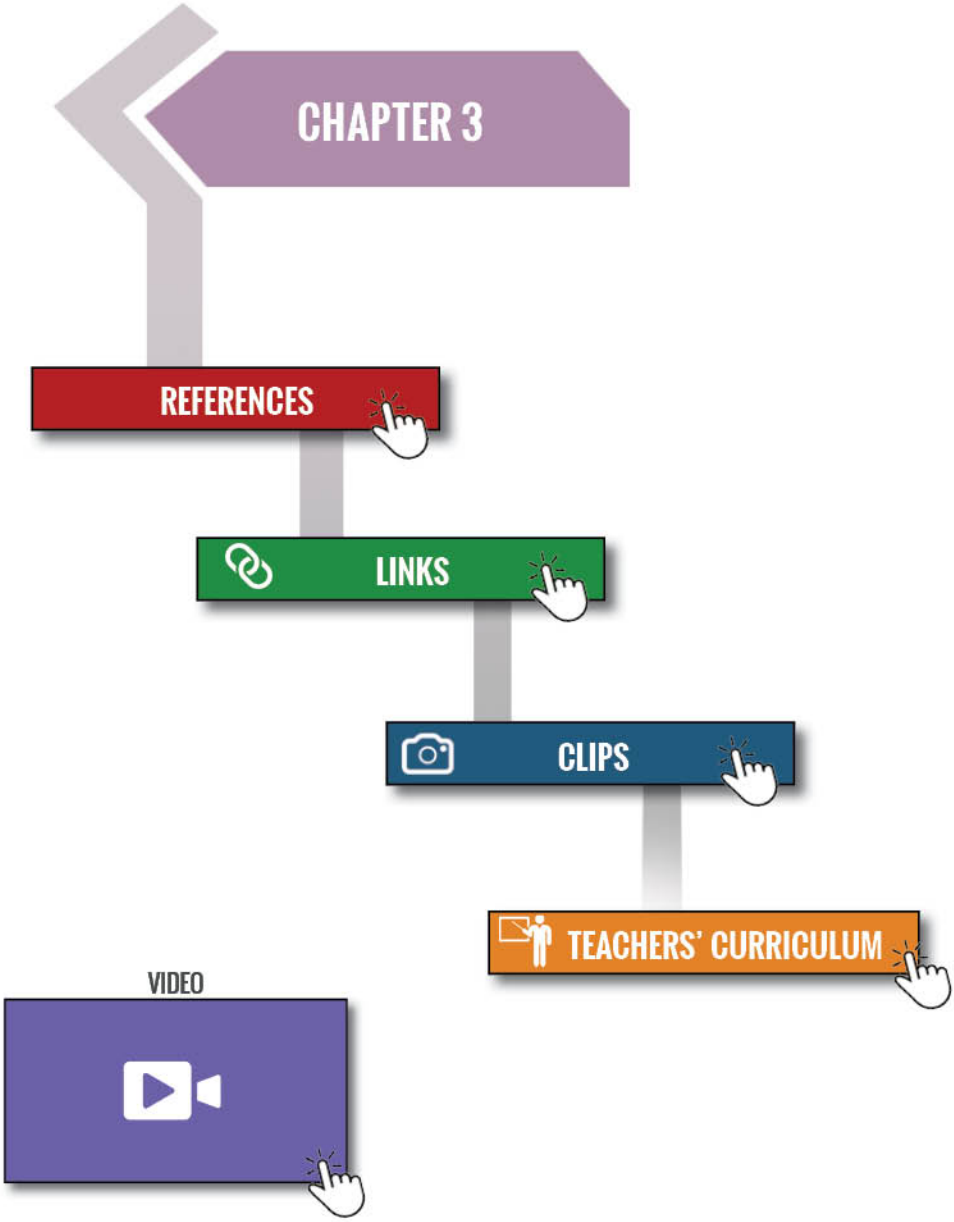
Shopping and supply	Use reusable containers and bottles instead of single use		
	Buy bruised or odd shaped vegetable or fruits at a discount to use e.g. for soups		
	Buy local foods		
	Choose suppliers with positive food waste management strategies (Encourage your present suppliers to positive change)		
	Do regular inventory checks		
	Prepare shopping lists		
	Increase the frequency of shopping to reduce spoilage		
Serving area	Increase the frequency of shopping to reduce spoilage		
	Provide taste samples for hesitant customers		
	Offer take-away containers for leftovers		
	Introduce 'pay-per-item' instead of 'all-you-can-eat' approach in your buffet		
	Remove trays from buffet to encourage customers to take only as much food as they need		
	Use smaller plates and bowls for serving food		
	Offer different portion sizes		
	Decrease portion sizes		
	Ask customers about their preferences before automatically serving bread, chips or side items		
	Promote food waste prevention among customers		

This checklist was developed based on EPA's "Food Loss Prevention Options for Restaurants". Available at: https://www.epa.gov/sustainable-management-food/how-prevent-wasted-food-through-source-reduction



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Chapter 4: Packaging

Introduction to Chapter 4

This is the fourth module of the Zero Waste in HoReCa Curriculum. This module addresses the topic of packaging, specifically packaging waste in the HoReCa industry. The idea of waste management can seem like a straightforward one. The reduce, reuse and recycle concepts have been established for a long time, and yet there is still an issue with plastic waste in our landfills and oceans. In order to combat this and to reduce packaging waste, we will take a threefold approach. First, we will examine where packaging waste is coming from in HoReCa businesses and learn how to monitor it. Next, we discuss the correct separation and disposal of waste. Finally, we will explore packing waste reduction in the form of reusable packaging and sustainable packaging.

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Objectives

Once you have read through this chapter and completed this short unit on Packaging in the HoReCa industry, you will have achieved the following objectives:

- You will gain an understanding of what packaging is, and where it comes from.
- You will learn the importance of monitoring packaging waste, and how to implement a monitoring plan for optimal packaging waste management.
- You will recognise the benefits of recycling packaging and understand the barriers that can be faced in the HoReCa industry when recycling.
- You will gain an appreciation for packaging waste management, with an ability to create a packaging waste management plan and strategy for your workplace.
- You will have an increased comprehension of green procurement and the impact of green marketing.

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Unit 4.1 - Packaging waste in HoReCa

Unit 4.1.1 - What is packaging?

Before we can work to reduce or eliminate packaging waste, it is important to first understand what packaging is and why it is needed. So, what is packaging? **Packaging is defined as the material used to display, contain, protect or transport a product. Most common materials used in packaging are plastics, glass, paper and cardboard, wood, and aluminium** (Eurostat, 2019). Packaging is one of the most important elements in the movement of goods. **The types of packaging used are influenced by the following factors: transport methods, distance and duration of time travelling, the product type, any preservation required, marketing needs, shelf-life expectations and handling** (Eurostat, 2019). While steps are being made to reduce the environmental impact of packaging, there are still some approaches to packaging that are deemed to be problematic for packaging and food waste. In worst case scenarios, packaging practices – such as slack-filling/selling air, attaching free/ excess items, and downsizing – can in fact result in unnecessary packaging, therefore creating waste.

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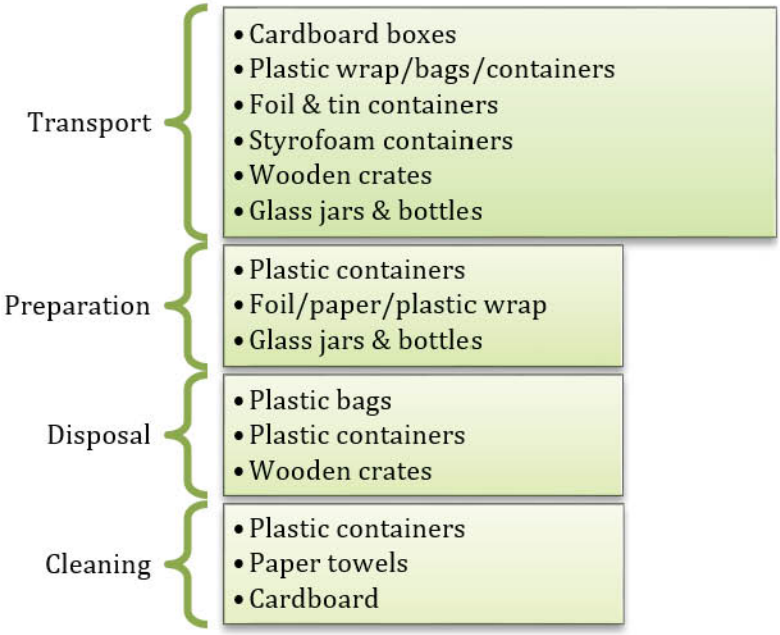
Unit 4.1.2 - Packaging waste

The total demand for plastic in Europe has risen to 49 million tonnes per year, of which nearly half is used for packaging (Schweitzer et al., 2018). In 2016, Eurostat (2019) measured the volume of packaging waste for Europe at 86.4 million tonnes – that equates to an average of 169.7kg of packaging waste produced per resident of the EU 28 countries. These averages changed per country, with Croatian inhabitants generating 54.9kg and people in Germany creating 220.6kg of packaging waste.

Figure 4.1 Know Your Packaging Sources



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Unit 4.1 - Packaging waste in HoReCa

Unit 4.1.2 - Packaging waste

Over a ten-year period, the approximate total volume of packing waste generated by the EU-28 since 2007 is 811.7 million tonnes. **Eurostat (2019) identified the most significant packaging waste came from paper and cardboard (41%), followed by plastic and glass (19% each), wood (16%) and metal (5%).**

The tourism industry contributes significantly to packaging waste in Europe. Tourists generate nearly twice as much solid waste per person as residents (European Commission, 2013). In a study conducted by the European Commission (2013) restaurants and accommodation providers were named as major contributors of packaging waste. They determined that packaging alone attributed to approximately 40% of a hotel's waste generation. **Cardboard, plastics, aluminium and glass are the various packaging materials most frequently used across all aspects of the HoReCa business. These materials are used in the transportation of goods (both in raw material and final product forms), in the preparation of goods and services, in the disposal of waste, and in the cleaning of service areas.** It is important to note that there are other functions of a HoReCa business that can generate packaging waste, such as: administration, merchandise for guests and customers, and marketing.

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Unit 4.1.3 - Problematic packaging design

Packaging in any form contributes to waste. However, problematic packaging design can increase the volume of disposed packaging. Firstly, let's look at small format packaging often used to contain condiments, butters and spreads, milk, and sugars. Sachets are sold in the hundreds of billions each year and represent 10% of the packaging market across the globe (Schweitzer et al., 2016). These sachets and containers are frequently used in catering services, and in most cases are not recycled thus producing waste. They also contribute to food waste as they are often left unfinished by customers and are disposed of by businesses.

(Schweitzer et al., 2016)

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Unit 4.1 - Packaging waste in HoReCa

Unit 4.1.3 - Problematic packaging design

Research has shown that small format packaging, as well as flexible and multi-layered packaging are the most waste intensive. These types of packaging are often used in pre-prepared and convenience foods. The need for reduced food preparation time, and the increased call for food on the go, have resulted in a huge increase of packaging (Schweitzer et al., 2016). Taking for example the pre-prepared bag of salad that contains dressing, cheese and croutons – this product contains 4 pieces of packaging. There is also the argument that this bag of salad may be less nutritionally beneficial than buying a head of lettuce, as the leaves are usually treated in the likes of chlorine to have a longer shelf life.

(Schweitzer at al., 2016)

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On-the-go foods like pre-packaged sandwiches and wraps and pre-cut fruit and vegetables all have short lifetimes on the shelves and have a heavy dependence on refrigeration. There is an increasing demand for packaging that will assist in lengthening shelf lives, incorporating tools like moisture absorbers, oxygen scavengers and ant-microbial coatings. While these may help the businesses and producers combat food waste, often these smart-packaging solutions increase the number of materials used in the making of the packaging thus reducing their recyclability

(Schweitzer et al., 2016)

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Unit 4.2 - Management and disposal of packaging waste

The generation of packaging waste in the HoReCa sector can be traced to four main processes: transportation, production, disposal and cleaning (European Commission, 2013). The introduction and implementation of a packaging waste management strategy will ensure that packaging waste is managed and correctly disposed of. **There are two key elements involved in the effective management of packaging waste: assessment and monitoring of packaging waste, and the separation and disposal of waste.**

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Unit 4.2.1 - Monitoring packaging waste

Monitoring is an essential part of any waste management plan (European Commission, 2013). In order to competently monitor packaging waste, it is important that an initial inventory of the sources that contribute to packaging waste in a HoReCa business is carried out. The main streams of packaging waste (transport, production, disposal, cleaning) can and should be further broken down in specific activities and assessed based on the packaging waste they produce - a sample survey used to create this inventory can be found in appendix 4.1 of this chapter. This inventory is beneficial to management and employees, providing them with a full overview of the packaging waste generated by their establishment. It also can assist in the calculation of the costs associated with packaging waste disposal, with a focus on future cost savings once this waste is managed at an optimum level.

(European Commission, 2013)

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Unit 4.2 - Management and disposal of packaging waste

Unit 4.2.1 - Monitoring packaging waste

Once the initial assessment has been completed, a periodical and consistent monitoring plan should be developed. In appendix 4.2 of this chapter, you will find a sample monitoring tool for packaging waste. This examines the volume of packaging waste once it has been segmented into different packaging types: glass, paper/cardboard, plastic, wood, metal, and general waste. On-going monitoring and reporting of packing waste volumes will allow for the evaluation of costs, and potential cost savings, of packaging waste prior to implementing best practice sorting and again once it is being separated correctly.

(European Commission, 2013)

It will also be possible to set measurable targets for packaging waste reduction that will help to assess the effectiveness of recycling strategies in the business.

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Unit 4.2.2- Separation of packaging waste

A heavy reliance on landfills in the past has meant that landfill space is quickly diminishing with time. This has led to increased collection and disposal costs associated with waste, and these costs are likely to continue to increase (European Commission, 2013). There are significant economic incentives for organisations in the HoReCa industry to reduce their waste, particularly with regards to packaging. In some cases, the organisation pays twice for it: once at purchasing and again at disposal (European Commission, 2013). We have already established that paper and cardboard, plastic, glass, wood and metals are the main materials used in the manufacturing of packaging (Eurostat, 2019). A study produced by the European Commission (2013) looked at how each of these materials could be recycled and what benefits their recovery would have on the environment:

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Unit 4.2 - Management and disposal of packaging waste

Unit 4.2.2 - Separation of packaging waste

Packaging Material	Recycling or Reuse	Benefits to the Environment
Paper and cardboard	• Separate by weight (light weight paper, to heavy weight cardboard) and send for recycling • Return boxes to suppliers for reuse where possible • Look for possible reuse applications on-site – possible reuse in storage	• Reduce dependence on landfill; and depletion of natural resources
Plastic	• Send for recycling and reproduction into new plastic products • Return containers to suppliers for reuse where possible • Look for possible reuse applications on-site – possible reuse in storage	• Reduce dependence on landfill and depletion of natural resources • Reduce energy consumption and air pollution
Glass	• Send for recycling and reproduction into new glass product • Return bottles to suppliers for reuse where possible • Look for possible reuse applications on-site – possible reuse in storage, or use in décor	• Reduce dependence on landfill and depletion of natural resources • 20-30% reduction in energy consumption • Reduction in oil consumption
Foil and cans	• Send for recycling and reproduction into new products • Look for possible reuse applications on-site	• Reduce dependence on landfill and depletion of natural resources • 75-90% reduction in energy consumption and air pollution
Wood	• Send for recycling and reproduction into new products • Return crates to supplier for reuse where possible	• Reduce dependence on landfill; and depletion of natural resources
Wood	• Send for recycling and reproduction into new products • Return crates to supplier for reuse where possible • Look for possible reuse applications on-site – possible use in energy generation or storage	• Reduce dependence on landfill; and depletion of natural resources
Other types of packaging	• Return to supplier for reuse where possible • Work with suppliers to reduce non-recyclable packaging • Look for possible reuse applications on-site	• Reduce dependence on landfill; and depletion of natural resources

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Bad packaging waste management practices can affect resource and financial sustainability, health and hygiene in the workspace, and the overall perception of the organisation (both on a staff level and a customer level). So, what is the best practice for the disposal of packaging waste? **Packaging waste cannot separate itself; the correct sorting and disposal is led by the people that interact with it. Therefore, an optimised strategy for the correct disposal of packaging waste needs to be examined for the following people: customers/guests, employees and management.**

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Employees and Management

Research has shown that choosing recyclable packaging materials alone is not enough to change attitudes towards a more recycling-friendly work environment. A study of McDonalds restaurants in Finland found that while 93% of the packaging was recyclable, in practice only 29% was being recycled as a result of poor waste management practices.

(Schweitzer et al., 2018)

With a view to creating positive attitudes to the recycling of packing waste, facilities must be put in place to aid employees to effectively separate waste:

- **Clearly labelled bins or containers need to be allocated for different packaging materials (paper, glass, tins, plastic),**
- **Providing a clean and dry storage space for packaging that will be returned to suppliers for reuse,**
- **Recycling diagrams and information posters in staff areas, providing clear information on what types of materials are to be recycled and how.**

In addition to these provisions, **regular employee training is also important to reiterate the importance of packaging waste management. Management may also look at incentivising or promoting innovation among employees to develop new ways of reusing existing packaging,** thus removing the need for disposal altogether.

Customers/Guests

Customers and guests can have a huge impact on the success of packaging separation campaigns in the HoReCa industry. They are the end user of the products and services provided in these businesses, and as a result they contribute to the packaging waste creation (REPAK, 2018). **In order to implement best practice strategies for waste disposal, it is imperative that you include the customer in the process where possible. To enable customers to change their behaviours regarding packaging disposal, customer education is required. This can be achieved by clearly presenting information about what the organisation is trying to achieve, and most importantly providing simple and straightforward steps they can take in the separation of waste (both at home and at the establishment).**

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Unit 4.2.3 - Barriers to recycling and packaging disposal

While there are clear strategies that can promote and aid the recycling of packaging waste in the HoReCa industry, there are also some barriers faced by businesses in this sector (European Commission, 2013). The first issue that can affect the success of packaging recycling initiatives is the availability of floor space. Best practice recycling of packaging waste strategies would suggest the need for considerable floor space for segregated bin systems and storage of reusable packaging. However, this is not always possible in an establishment with minimal floor space. These businesses may also have limited access to storage space externally. In these instances, the organisations may need to find innovative solutions to their recycling management issues.

Figure 4.2
Combatting the barriers of recycling

Floor space: Assess current availability of floor space. Look for alternative places to put recycling bins. Is there a space up high to place items going back to suppliers? Can you sort waste in front-of-house areas?

Local authorities/ Waste collection providers: Contact your local authority/waste collection provider to enquire about alternative recycling services. Are there any other waste collectors in your area?

Another factor that can influence the success of recycling is the infrastructure in the locality of the business (European Commission, 2013). Options of where to send recyclable materials are **most often dictated by the local authority or waste collection providers.** This may hamper the effective separation and sorting of packaging materials, resulting in an increase usage of general waste bins.

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Unit 4.3 - Sustainable practice

In 2016, an NGO called Ocean Conservancy organised an international costal clean up in 112 countries, during which they found a staggering 13.8 million items discarded in oceans and on beaches. Included in this figure was approximately 350,000 take away containers, 400,000 straws and 420,000 plastic lids (Ocean Conservancy, 2017). These alarming figures highlight the significant global issue with waste disposal in our seas and oceans, as well as littering and dumping. They also bring the question of sustainability to the fore. Should we continue to contribute to these statistics in our current purchasing and provision practices? The answer is no! This is a global phenomenon, that is unlikely to be changed in one swift movement. Therefore, it is important as individuals, consumers, business managers/owners, and members of the community that we make and influence small changes to help in the fight against packaging wate. We have examined the sources of packaging waste in HoReCa businesses and established a plan to sort and recycle packing waste correctly. While these first steps will have an impact on landfill waste, it is also important to evaluate sustainable practices, such as reusable practices, within the realm of the HoReCa industry.

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Unit 4.3.1 - Reusable packaging

Before we can evaluate the impact of reusable packaging on HoReCa businesses, it is first essential that we gain an understanding of what reusable packaging is. **Definitions of reusable packaging tend to be similar, describing it as packaging that can be returned to suppliers and used again to deliver products to a business (GWP Group, 2019). There are already several packing solutions that are deemed reusable, such as plastic and wooden pallets, plastic bulk containers, shipping racks, and on a more local level, handheld reusable bags and containers.** This form of reusable packaging – between suppliers and their customers – has proven to effectively reduce the volume of food spoilage, especially in the case of fruit and vegetables.

(Schweitzer et al., 2016)

According to the GWP Group, a packing company in the UK, another concept of reusable packaging comes in the form of **'opportunistic reuse' – meaning to take packaging that was initially intended for single use and reuse/repurpose it for something else** (GWP Group, 2019). For example, a single use plastic container that once held a food product can be cleaned and reused as a storage container. Although this is more widely considered a repurposing technique rather than reusable packaging, it reduces waste creation and has some inherent cost benefits as well. Think back to the inventory taken of the sources of packaging materials that appear in various aspects of a HoReCa business (appendix 4.1). Now consider the lifecycle of these materials – are they single use materials or can they be reused (either returned to the supplier or repurposed in a different part of the business)? The assessment tool in appendix 4.3, will help managers and business owners to evaluate the reusability of the packaging materials across the business.

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Unit 4.3.2 - "Reusable" practice

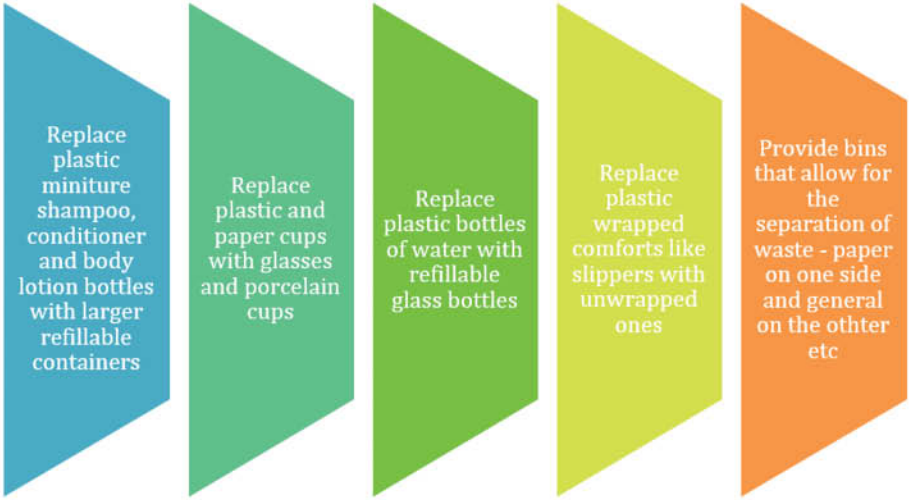
So far, we have only really considered the reusability of large-scale packaging used to transit and deliver products to a HoReCa business, and briefly examined repurposing some single use packing materials as well. However, to fully comprehend sustainable practices for packaging, we must look at the packaging that is being given to the end user – the customer/guest. **The 'reuse' strategy can be most impactful to the reduction in packaging waste when aimed at the customers.** There are a number of changes in practice that can reduce packaging waste in accommodation and catering services offered by HoReCa businesses to their customers.

Accommodation - Guests of accommodation providers regularly have a variety of comforts and amenities offered to them in their rooms. Products like shampoos, conditioners, creams, soaps etc are frequently packaged individually. These products contribute significantly to packaging waste, and unless the hotel has provided segregated bins in the room, this waste is going straight to landfill sites.

It is also worth mentioning that in the case where the 'shampoo bottle' is not fully used by the guest and put in the bin by staff, it contributes to chemical waste as well (European Commission, 2013). Other features in guest rooms also add to packaging waste like plastic/paper cups for water and hot drinks, individually packaged tea, coffee and milk plastic wrapped guest slippers, plastic bottles of water etc. Businesses can work to reduce packaging waste with a few small changes in practice outlined in Figure 4.3.

(European Commission, 2013)

Figure 4.3 Reusable Strategy in Guest Rooms



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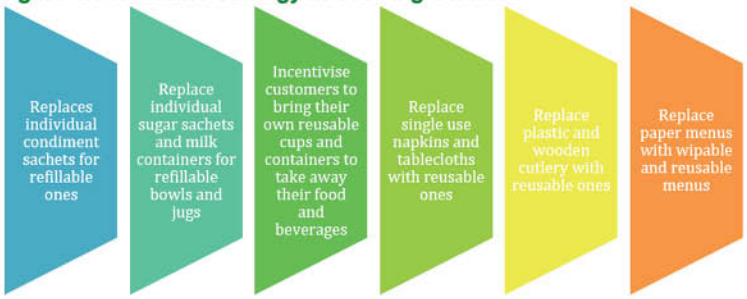
Catering Services – Similarly, services provided to customers by restaurants, cafés, catering services, fast food and food on-the-go establishments produce a large amount of packaging waste. We have already discussed the issues of both packaging and food waste that results from the use of individual sachets and pre-packaged foods (section 4.1.3). However, there is also a vast quantity of packaging waste created from paper napkins and tablecloths, plastic/wooden cutlery, and take-away containers.

Figure 4.4 Reusable Strategy in Catering Services



People in South Asia use 'tiffin boxes' – reusable stainless-steel lunch boxes – to transfer their meals. This has inspired an initiative in Brussels in which several restaurants have created a partnership. Customers buy their lunch/dinner, and have it delivered by couriers on bikes. Customers are then encouraged to wash out the containers and return them to the courier then next day or when they are next getting a meal delivered (Schweitzer et al., 2016). While this initiative is successful in Brussels, it requires the co-operation of other restaurateurs in the locality and may time some time to establish. In the meantime, there are a number of quick action steps that can be implemented to reduce packaging provided to the customers – see figure 4.4.

(European Commission, 2013)

Unit 4.3.3- Considerations for reusable practices

Before HoReCa organisations move to follow reusable practices, they must look at all elements involved in implementing them. **Considerations like floor space, delivery times, health and safety standards, and costs involved should all be examined.**

(GWP Group, 2019)

Floor Space and Delivery Times – The strategy of reusing packaging, specifically when returning packaging to a supplier for reuse, depends on the availability of floor space on the premises. In cases where floor space is limited, it may not be possible for HoReCa businesses to hold reusable packaging for suppliers. This becomes more of an issue when deliveries from suppliers are not frequent. Therefore, the success of a reusable packaging system with suppliers will require storage space and/or frequent deliveries with the supplier.

(GWP Group, 2019)

Health and Safety Standards – It is crucial when providing a service to members of the public that the introduction of new strategies is fully compliant with hygiene standards, such as HACAP, and local restrictions. This must be considered when packaging is being reused or repurposed in food preparation areas, and also in the provision of other amenities like refillable bottles of water, condiments, and hygiene products.

(European Commission, 2013)

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Cost vs Savings – There are of course some costs involved in moving to reusable packaging for products. Investment will be necessary to provide refillable bottles and containers needed to replace sachets, miniature bottles and plastic bottles. However, the return on investment will be considerable in comparison to the cost of buying these products in their current state. In terms of reusable containers from suppliers, research has shown that there is reduced spoilage of products on delivery which is an immediate saving for the organisation (GWP Group, 2019). The GWP Group (2019) also found that savings on the cost of delivery per trip can be as high as 40-70%.

Other Considerations – There are also 'social' benefits of implementing a reusable model for packaging. By using reusable packaging, organisations are reducing the material sent to landfill, reducing their carbon footprint, and of course they can inform their customers/guests about the great work they are doing to help the environment.

(GWP Group, 2019)

Unit 4.4 - Green Procurement

In this chapter, we have looked at the sources of packaging waste in a HoReCa business, we have assessed the best ways to separate and dispose of this waste and discussed reusing our packaging to eliminate waste. Nevertheless, there is still more we can do in our fight against packaging waste. **Businesses must work towards choosing more eco-friendly packing sources, transitioning to sustainable alternatives for single-use plastics.** This is quite a challenging transition for a business to make without causing disruption to the functioning of their business (Schweitzer et al., 2016). As with reusable packaging strategies, **there are factors that should be analysed before choosing sustainable alternatives, namely shelf life and locality, and recyclability and volume.**

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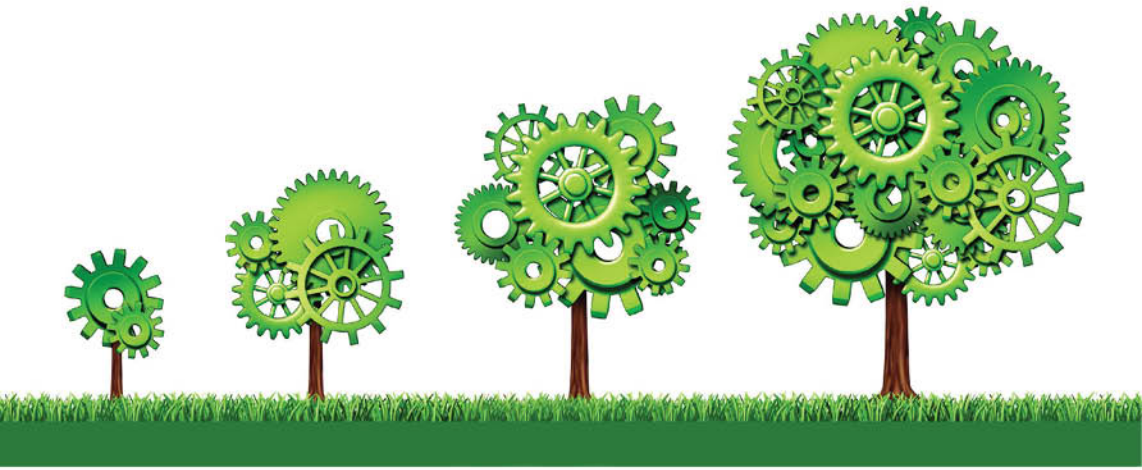
Unit 4.4.1 - Considerations for green procurement

Shelf Life and Locality – As previously mentioned, the shelf life of products will influence the type of packing used. This is especially important when choosing sustainable alternatives to single use packaging, as the 'green' option must be able to maintain the shelf life of the product when traveling long distances and in different modes of transport (European Commission, 2013). It is also important to think about the locality of the sustainable packaging source. **Research suggests that the environment benefits of choosing eco-friendly packaging can be negated by the carbon footprint if it is coming from far away. Hence, it is recommended that sustainable alternatives are found as close to the business and/or supplier as possible.**

(Schweitzer et al. 2016)



Recyclability ¬and Volume – Packaging recyclability and volume are the most important factors that should be analysed when making green procurement decisions (European Commission, 2013). Efforts to make packaging more light weight in order to reduce the carbon emissions of transport, has resulted in increased flexible and multi-material packaging. This packaging is increasing difficult to recycle (Schweizer et al., 2016). Other materials to be avoided are polyvinyl chloride (PVC), low density polyethylene and polystyrene as they are all difficult to recycle (European Commission, 2013). So how do you go about green procurement? **It is recommended that, where possible, compostable packaging materials are most suited to a green procurement strategy. There are a variety of products in the market that are biodegradable. However, it is interesting to note that biodegradable products can take up to 1,000 years to break down in a landfill. Compostable products take 90 days to break down and can be break down in as little at 6 weeks in a commercial compositing facility.**

(Down2Earth Materials, 2019)

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Unit 4.4.2 - Going Green

Green Team - For a green procurement effort to be successful, the European Commission (2013) suggests that a green procurement team is established. The team, comprising of employees from a range of departments or a purchasing department, should work to promote and support the efforts of the organisation to replace packaging with sustainable alternatives. The team is responsible for identifying new opportunities in green procurement across the business and should have the support of senior management or business owners.

Local Initiatives - The European Commission (2013) also recommends that HoReCa businesses conduct basic research before beginning a green procurement strategy. Local authorities and agencies may be able to identify initiatives and incentives for local green procurement.

Green Marketing - While of course there are vital environmental benefits of adopting a green procurement strategy, there is added-value to the organisation as well. **HoReCa businesses can benefit greatly from 'green marketing'. This concept is based on the idea that you inform your customers and guests about your efforts to reduce packaging waste.** If you have changed practices and are now reusing packaging, or you have replaced packaging sources with sustainable alternatives, or a mixture of both, you can capitalise on these ethical and sustainable practices by advertising to customers and getting them involved in the process where.

Appendices

Appendix 4.1 – Survey to assess current sources of packaging waste across different activities in a HoReCa business

Assess different services of your HoReCa business, examining the packaging waste produced by different activities in this function. What packaging waste is generated in this area? Is this packaging recycled or sent to landfill with general waste?

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Service: Kitchen										
Types of Packaging	Food Preparation		Food Preservation		Cleaning		Appliances		Storage	
	General Waste	Recycled	General Waste	Recycled	General Waste	Recycled	General Waste	Recycled	General Waste	Recycled
Plastic										
Paper/Cardboard										
Glass										
Wood										
Metal										
Other										

Service: Restaurant/Bar										
Types of Packaging	Condiments/ Snacks		Decoration		Merchandise		Cleaning		Other:	
	General Waste	Recycled	General Waste	Recycled	General Waste	Recycled	General Waste	Recycled	General Waste	Recycled
Plastic										
Paper/Cardboard										
Glass										
Wood										
Metal										
Other										

Service: Administration										
Types of Packaging	Office Management		Reception of guests/ customers		Laundry services		Technical services (lighting)		Other:	
	General Waste	Recycled	General Waste	Recycled	General Waste	Recycled	General Waste	Recycled	General Waste	Recycled
Plastic										
Paper/Cardboard										
Glass										
Wood										
Metal										
Other										

Service: Purchasing/Transport										
Types of Packaging	Delivery of products from supplier		Transport of final good		Storage		Other:			
	General Waste	Recycled	General Waste	Recycled	General Waste	Recycled	General Waste	Recycled	General Waste	Recycled
Plastic										
Paper/Cardboard										
Glass										
Wood										
Metal										
Other										

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Appendix 4.2 – Packaging Waste Monitoring Tool: Cost Calculation

(To be completed weekly, bi-weekly, or monthly)

Day of audit	Date	Total volume of general waste (Kg)	Total volume of plastic waste (Kg)	Total volume of paper waste (Kg)	Total volume of glass waste (Kg)	Total volume of wood waste (Kg)	Total volume of metal waste (Kg)
1							
2							
3							
4							
5							
6							
7							
		X1 = Subtotal	X2 = Subtotal	X3 = Subtotal	X4 = Subtotal	X5 = Subtotal	X6 = Subtotal
Total volume		Total Volume = (X1+X2+X3+X4+X5+X6)					
Average cost of packaging waste disposal		(Total Waste Collection Costs/Total Volume of Waste)					
Average cost of packaging waste disposal per material		Y = (Cost of waste collection per material / total volume of that material)					
		Y1 = (Cost of general waste collection /x1)	Y2 = (Cost of plastic waste collection /x2)	Y3 = (Cost of paper waste collection /x3)	Y4 = (Cost of glass waste collection /x4)	Y5 = (Cost of wood waste collection /x5)	Y6 = (Cost of metal waste collection /x6)

This food waste cost calculation sheet was developed based on the free resources provided by http://www.wrap.org.uk

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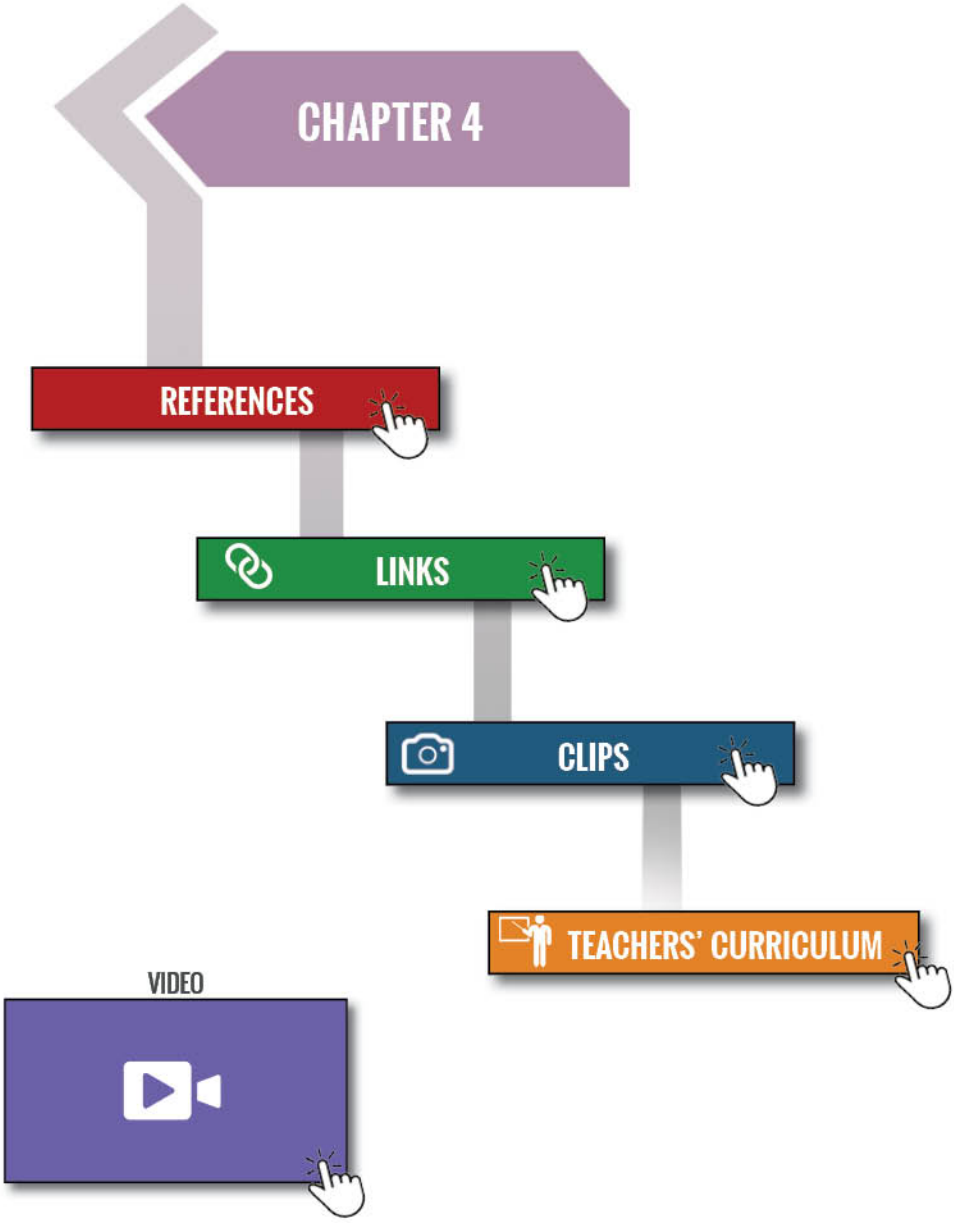
Appendix 4.3 – Survey to evaluate the types of packaging waste that come from various streams of a HoReCa business

Use this tool to assess different services of your HoReCa business, this time focusing on the type of packaging waste. Is it single use packaging which must be disposed of? Or can the packaging be reused – either in the form of returning it to the supplier or repurposing it within the organisation?

Service: Kitchen										
Types of Packaging	**Food Preparation**		**Food Preservation**		**Cleaning**		**Appliances**		**Storage**	
	Single Use	**Reusable**	**Single Use**	**Reusable**	**Single Use**	**Reusable**	**Single Use**	**Reusable**	**Single Use**	**Reusable**
Plastic										
Paper/Cardboard										
Glass										
Wood										
Metal										
Other										
Service: Restaurant/Bar										
Types of Packaging	**Condiments/ Snacks**		**Decoration**		**Merchandise**		**Cleaning**		**Other:**	
	Single Use	**Reusable**	**Single Use**	**Reusable**	**Single Use**	**Reusable**	**Single Use**	**Reusable**	**Single Use**	**Reusable**
Plastic										
Paper/Cardboard										
Glass										
Wood										
Metal										
Other										
Service: Administration										
Types of Packaging	**Office Management**		**Reception of guests/ customers**		**Laundry services**		**Technical services (lighting)**		**Other:**	
	Single Use	**Reusable**	**Single Use**	**Reusable**	**Single Use**	**Reusable**	**Single Use**	**Reusable**	**Single Use**	**Reusable**
Plastic										
Paper/Cardboard										
Glass										
Wood										
Metal										
Other										
Service: Purchasing/Transport										
Types of Packaging	**Delivery of products from supplier**		**Transport of final goods**		**Storage**		**Other:**			
	Single Use	**Reusable**	**Single Use**	**Reusable**	**Single Use**	**Reusable**	**Single Use**	**Reusable**	**Single Use**	**Reusable**
Plastic										
Paper/Cardboard										
Glass										
Wood										
Metal										
Other										



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Chapter 5: Energy

Introduction

This is the fifth module of the Zero Waste in HoReCa Curriculum. This module addresses the topic of Energy in the HoReCa industry. This chapter will explore energy consumption across various aspects of a HoReCa business. It will assess where energy is consumed and lost and will outline the many fast acting steps that can be taken by organisations to reduce their consumption. Long-term investments will also be investigated. This chapter will discuss the importance of an energy management plan, the value of an energy champion in each business, and the steps than can be followed in an audit. Finally, the chapter will evaluate the use of renewable energies in HoReCa businesses.

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Objectives

Once you have read through this chapter and completed this short unit on Energy in the HoReCa industry, you will have achieved the following objectives:

- *You will gain an understanding of how energy is used in the HoReCa industry.*
- *You will learn about quick action steps that can be taken to reduce energy consumption in the short run.*
- *You will receive further knowledge about the long-term investments that can be made to help reduce energy consumption.*
- *You will recognise the importance of monitoring energy consumption, and how to implement a monitoring plan for optimal energy management.*
- *You will gain an appreciation for renewable energy sources, with a focus on renewable energies that may be used in a small-medium HoReCa company.*

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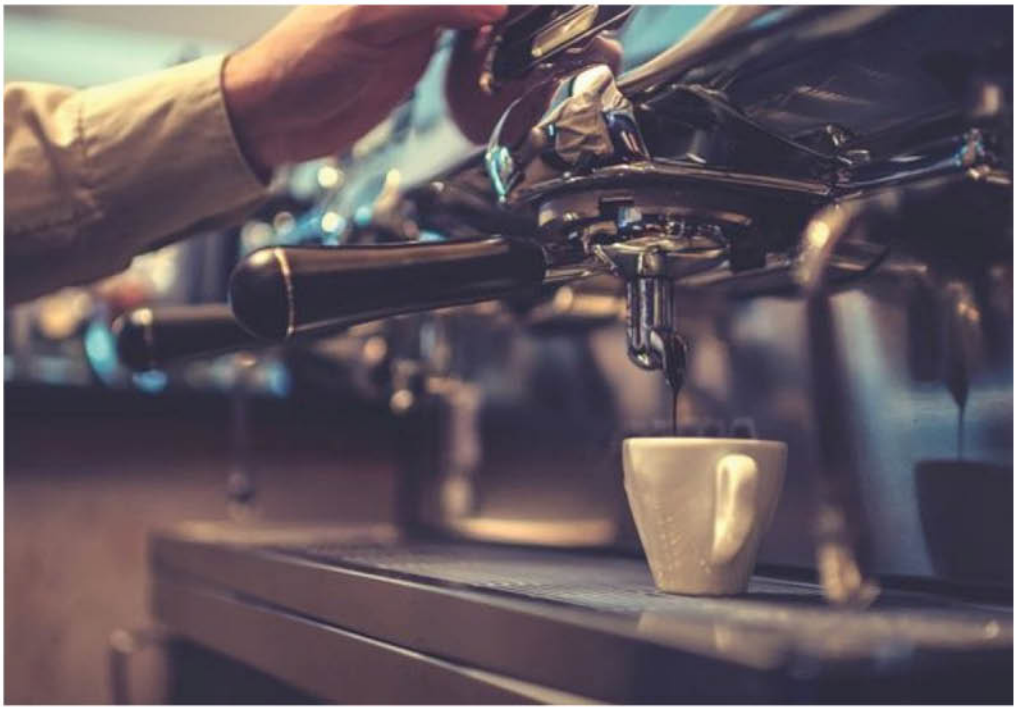
Unit 5.1 - Energy consumption in HoReCa

Recordings of greenhouse gases in 2018, published in a bulletin by The World Meteorological Organisation, showed that greenhouse gasses reached another record high last year (WMO, 2019). Despite the attempts made by governments, these levels continue to rise year on year. With this is mind, the need for Zero Waste and increased energy efficiency is more important than ever. What does this mean for the HoReCa industry? What can be done to help? The first steps that need to be taken in answering this question is to examine the trends of current energy consumption in HoReCa businesses.



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A study conducted in the UK by Carbon Trust (2018) looked at the carbon emissions produced by the hospitality sector. They found that businesses in the hospitality industry produced upwards of eight million tonnes of carbon emissions in one year. The same report estimated that the cost of producing energy across the sector equated to £1.3 billion (approx. €1.525 billion). Further research has shown that HoReCa businesses focused on providing accommodation contribute significantly to global greenhouse gas figures. European hotels were deemed to have contributed 21% of yearly global greenhouse gas recordings (European Commission, 2013). The catering industry in the UK has an estimated energy consumption of 21,600 kWh per year, costing businesses on average 4-6% of their operating profitability (The Carbon Trust, 2018). Any efforts made to reduce energy costs and increase efficiency will lead to direct increases in profits for the business.

(Carbon Trust, 2018)

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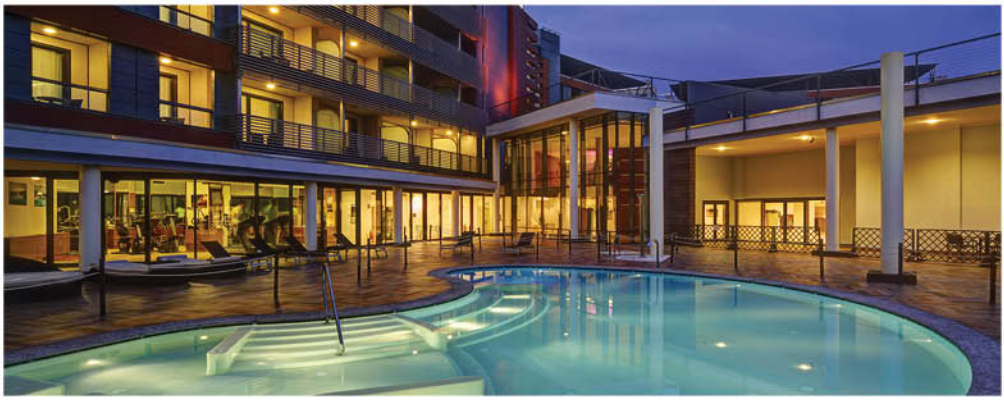
Unit 5.1.1 - Areas of consumption in HoReCa

Energy consumption rates vary across different aspects of the business. It is important to get an understanding of where energy consumption is coming from before attempting to make processes more efficient and/or making changes to current practices.

Hotels

The European Commission (2013) examined the energy consumed of a typical large sized hotel. Electricity accounted for roughly 40% of the energy expended, used to run the following areas of the hotel: lighting (45%), heating and ventilation (26%), water heating (6%), food services (5%) and other services (18%). This report also stated that the kitchen used 10% of the overall energy used, while laundry services took up a further 5% (European Commission, 2013). These figures are likely to vary due to the size of the hotel and the facilities it offers. This is particularly true in the case of kitchens, where the energy consumption was as high as 25% of the total energy consumed in some cases.

(European Commission, 2013)



Kitchens and Catering

It can be a little more challenging to get an overview of the energy usage in kitchens and catering services, mainly due to the variety of kitchen appliances available as well as the size of the space, and the practices of the chefs and cooks working in the kitchen (Mudie et al., 2016). Mudie et al., (2016) conducted a study of a selection of 14 restaurants in the UK, focusing specifically on electricity use in commercial kitchen settings. They summarised that electricity accounted for 60-63% of the energy used in catering activities, with the most energy intensive appliances in the kitchen being the refrigerator and freezer (using 41% of electricity). These were followed by heat appliances, such as: bain-marie and heat lamps (16%), fryers (13%), and ovens (12%) (Mudie et al. 2016). These figures fluctuated depending on the efficiency of the appliances, their maintenance and the behavioural practices of the employees using them.

(Mudie et al., 2016)

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Unit 5.2 - Energy management practices

The implantation of basic corrective actions can result in energy savings of up to 10% (European Commission, 2013). This means, businesses in the HoReCa sector can save money on their energy bills through a change in practices alone. These corrective actions can be taken across many aspects of the business. We will look at implementing these changes in the kitchen, laundry and cleaning processes, heating and ventilation, and lighting. It is also important to look at the efficiency and maintenance of appliances and machinery used in these businesses as well.

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Unit 5.2.1 - Kitchen practices

Operating a commercial kitchen both uses and wastes large quantities of energy. In some kitchens as little as 40% of the energy consumed is used in the storage and preparation of food. A considerable amount of the energy is wasted and dispersed in the form of heat (Carbon Trust, 2012). A more efficient kitchen operation can have a significant impact on the levels of energy consumed.

Kitchen Layout

The layout of the kitchen is important when discussing energy efficiency. For example, let's look at the effect of a refrigerator or freezer placed next to an oven, or an appliance that generates high levels of heat. This will result in the refrigerator working harder to maintain the level of coolness required, and consequently means there is higher energy usage. It is therefore suggested that refrigerators are placed further away from heat sources in the kitchen.

(Mudie et al., 2016)

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While this a best practice suggestion, **it is not always possible to do this in circumstances where floor space is lacking in the kitchen area. Another barrier to this best practice is the physical workflow of chefs working in the kitchen. Often, work processes in the kitchen are grouped together based on the food type or course type**, such as meat preparation or dessert production in certain areas of the kitchen. In these circumstances, chefs often prefer the fridge, ovens, and other appliances needed for the cooking of these foods in the same area, regardless of energy efficiency.

(Mudie et al., 2016)

Operational Behaviours

There are other operational behaviours that can impact the energy efficiency of the kitchen. Looking again at refrigerators and freezers; while we have already discussed the importance of location, it is also important to consider the usage. **Refrigerators and freezers are the most frequently used appliance in the kitchen. The continuous opening, or leaving the doors open for a prolonged time, increases the amount of energy required to maintain coolness**. Self-close hinges that will ensure the doors cannot be left open, shift specific fridges to ensure that all the ingredients for one service (for example breakfast) are kept in one location, and more efficient menu planning are just some strategies that can be employed to reduce the energy needs of the fridge and freezer.

(Carbon Trust, 2012)

The inefficient use of grills and heat holding appliances (heat lamps and bain maries) regularly leads to increased energy use. Grills are often switched to maximum heat for the full length of a food service period, which expends high levels of energy and heat. The study conducted by Mudie et al. (2016) examined the grill usage in two restaurants; restaurant A maintained maximum heat in the grill for the full service, while restaurant B lowered the grill's heat during times when it was not needed. In doing this, restaurant A consumed 49kWh and restaurant be consumed 14 kwh, showing a 71% saving in energy consumption through a small behavioural change (Mudie et al., 2016). **In a similar vein, heat lamps and bain maries are often left on at high levels throughout the duration of the food service**. Mudie et al (2016) have estimated that the elimination of heat lamps could save 48kWh of energy per day in a commercial kitchen – a saving of 16% of the energy consumed in the kitchen. This may not be a feasible option for kitchens that have a need of heat holding appliances, so Mudie et al. (2016) have suggested the installation and use of timers and sensors (where possible) to reduce the energy consumption of these appliances. The same suggestion is applicable to other appliances too (such as fryers, ovens and hobs) where the installation of timers, reducing heat levels, or turning off these appliances when not in use can have a huge impact on energy consumption.

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Unit 5.2 - Energy management practices

Unit 5.2.1 - Kitchen practices

In terms of cleaning practices **within the kitchen or bar areas, dishwashers and glass washers also consume considerable amounts of energy. Simple behavioural changes like maximising the dishwasher loads, using cleaning products that are suitable with lower temperatures, and using the economy setting can dramatically reduce the energy requirements in this function of the kitchen** (Carbon Trust, 2012). Some dishwashers have drying modes included to dry the contents. Reducing the drying times or using the residual heat in the dishwasher to dry the dishes will again help to reduce the energy needed.

(Carbon Trust, 2018)

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Unit 5.2.2 - Laundry Processes

Laundry services account for approximately 15-20% of the energy consumption of a large hotel, but these figures can vary in smaller establishments. Research conducted by the European Commission (2013) examined the cost and energy output incurred in the laundry operations of business in HoReCa sectors. They calculated that the cost of doing laundry for one room with an occupancy rate of 75% in one year, generating 4kg of laundry per night it was occupied, was €479. This means that a large hotel with 100 rooms, keeping the level of occupancy and laundry generated constant, will cost €47,900 for one year. **The processes involved in providing a laundry service include high temperature washing, tumble drying, and multi-roll/industrial ironing which are all energy intensive. Energy consumption can be reduced with a change in practice in relation to the volume, management of laundry and drying.**

(European Commission, 2013)

Figure 5.1 - Inform your guest about your efforts to reduce energy and water consumption with a reuse scheme. Provide them with information cards, stating the following information:

- The impact of water and energy usage on the environment
- The reduction in water and energy used that results from following the reuse scheme
- Requesting that guests get involved in the initiative through the reuse of towels and sheets
- Simple directions for reusing towels and sheets

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Reducing Volume

The most effective and quickest way to see a decrease in energy consumption for laundry services is to reduce the volume. Laundry minimisation is a tactic used by many hotels to lessen the cost of laundry services around the world. Hotels, guest houses and other accommodation establishments ask their guests to reuse their towels and bed linen where possible. **The success of this initiative depends on three things: 1) informing the guests, 2) staff training, and 3) adequate rails or hooks for guests to hang their towels for reuse** (European Commission, 2013). The European Commission (2013) evaluated the energy savings of a reuse scheme in their example of a 100-room hotel at 75% occupancy. If 30% of guests participated in reusing their towels and linen, reducing the laundry load to 3kg per room, then the annual energy savings would be approximately 86,000 kWh. The full environmental benefit of laundry reuse programmes depends on the volume of laundry avoided, and the efficiency of the laundry methods used, water required, appliance efficiency, detergents used etc.

(The European Commission, 2013)

Efficient Laundry Management

Efficient management of laundry is vital to the concept of energy reduction. The first step is to sort laundry into batches depending on the washing and drying constraints. Heavy fabric items like towels and bathmats should be washed separately from bed linen as these items will have different detergent and drying requirements. Further separation may be needed if there are fabrics with excessive soiling, for example tablecloths and napkins that may need fats and oils removed. Once sorted into various batches, laundry can then be washed more cost-effectively as well as in a more energy conscious manner.

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The use of lower temperatures when washing, in conjunction with low-temperature detergents can have a significant impact on energy consumption. Taking an example of 10kg load of washing; reducing the temperature from 60'C to 40'C can reduce the consumption of energy by 0.7 kWh. This is roughly an energy saving of 40%. Washing similar fabrics together can also help to reduce the energy consumption. Washing synthetic fabrics required 20% less energy than washing the same volume of pure cotton.

(The European Commission, 2013)

Drying

Laundry drying is another energy intensive process. Large scale laundries in a hotel typically use a forced thermal drying process, with an estimated consumption level of 1.4 kWh per kilogram of fabric laundered. Best practice solutions to the level of energy consumed in forced thermal drying often relates to the selection of appliances, such as selecting a washing machine with a high g-force spin rate meaning there is less water retention in the fabric and therefore less drying required. Smaller scale laundries often use tumble-dryers to dry clothing, using large quantities of gas or electricity to evaporate the water. Combatting this may be a little easier for small accommodation premises, where they may be able to naturally dry clothes at certain times of the year, dramatically reducing the energy usage and costs in these cases.

(The European Commission, 2013)

Unit 5.2.3 - Heating and Ventilation

Heating and ventilation systems expend significant levels of energy in HoReCa businesses. Heat, ventilation and air conditioning (HVAC) systems are used to control the temperature, humidity and quality of air, and in doing so need to transfer heat and moisture into and out of the air. It is estimated that 30%-50% of energy costs in hotels are the result of HVAC systems (European Commission, 2013). Simple measures, focusing on temperature regulation, can be taken to help reduce the energy consumption that comes from HVAC systems. **Reducing the temperature thermostat by 1'C can reduce the energy consumption for heating by 10%. In summer, closing shutters and curtains to maintain a natural coolness in a room can help to reduce the need for air conditioning as well.**

(European Commission, 2013)

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Timing and Zoning Controls

More substantial energy savings can be made where HVAC systems are optimised fully. A 100-room hotel can expect energy savings of 323,000 kWh in one year, when heating and ventilation practices are optimised (European Commission, 2013). **Best practice methods to enhance the performance of HVAC systems recommend the installation of timing and zoning controls**. In circumstances where the building is not in use for periods of time, such as night time in the case of cafés or morning time in the case of late opening restaurants, start and stop controls can be used to minimise the use of heating or cooling systems during out of hours periods. This of course will vary depending on external weather conditions, but optimum start stop controls can help reduce energy costs by at least 10%.

(Carbon Trust, 2017)

Zoning controls also assist with temperature regulation and reduce energy consumption. Various areas will have differing heat and cooling requirements. For example, the suggested optimum heat for a kitchen is 16-18'C in the winter months. This may seem a little low, but it is important to remember that a considerable amount of energy is expended in the kitchen in the form of heat so chefs and kitchen staff are often heated by the activity in the kitchen itself (Carbon Trust, 2012). However, a temperature band of 19-21'C is deemed to be more appropriate for guest rooms, bars and lounge areas are best heated at 20-22'C, and restaurants or other dining areas are best suited to a temperature of 22-24'C during the cold weather seasons (European Commission, 2013). More sophisticated HVAC systems use sensors to determine the occupancy of a room and will adjust the temperature as needed, thus eliminating fully heating rooms when occupancy rates are low.

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Unit 5.2.4 - Lighting

Lighting is an important element of any HoReCa business. It is often used to create and attractive and comfortable setting for customers, as well as health and safety for all people on the premises. Lighting is used in various ways; lighting communal areas such as receptions and corridors, security lighting, atmospheric lighting in guest rooms restaurants and bars, functional lighting for parking facilities and signage (Carbon Trust, 2018). It is a highly energy intensive activity across all businesses in the HoReCa sector. Savings of up to 50% can be achieved through the implementation of lighting policies, the use of efficient lighting technology, and the installation of lighting controls.

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Lighting Policies

One of the most straightforward strategies aimed to reduce energy consumption of lighting is to introduce a "switch off" policy. Areas that are left unoccupied should have the lights switched off. Strategies such as this should be used within reason – turning off the lights in an empty restaurant during opening hours will not entice any customers to come in, however unoccupied rooms in a hotel do not need to be lit up. Staff training is vital to the success of this policy. Labelling light switches will also aid staff and guests to use appropriate lighting when necessary. It is important to consider the health and safety of staff and customers using areas of the premises that are unlit. Professional advice may be useful to assist with this.

(Carbon Trust, 2017a)

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Efficient Lighting Technology

Lighting technology refers to the lamps or light bulbs used to deliver light. **Lamps in the past have used incandescent, halogen and fluorescent bulbs to deliver light with varying colour temperature and range. However, in the last 10 years the development of LED (Light Emitting Diodes) and OLED (Organic Light Emitting Diodes) lamps has resulted in more energy efficient lighting.**

You can see a comparison of the lighting hours and efficiency of the different lamps in figure 5.2 (Carbon Trust, 2017a). There was a reluctance to move to the LED lamp when it was first introduced as there were concerns about the colour range of LED lights. However, LED lamps can match the colour temperature range of previously used lamps, they are also easy to control and heat up quickly (Carbon Trust, 2017a). Changing lamps to a more efficient LED equivalent can considerably lower the dependence on energy. The European Commission (2013) examined the energy savings of a hotel in Latvia that implemented a complete light replacement programme. The hotel – complete with 170 rooms, 6 conference rooms, restaurant and bars and a floor area of 6,911m2 – reduced its energy usage by 121,500 kWh.

Figure 5.2 – Lighting hours and efficiency of lighting lamps

Standard Incandescent	• Lighting Hours: 2,000 - 3,000 hours • Efficiency: 5 - 20 lm/W
Tungsten Halogen	• Lighting Hours: 2,000 hours • Efficiency: 15 - 24 lm/W
Tubular Fluorescent	• Lighting Hours: 10,000 - 12,000 hours • Efficiency: 60 - 105 lm/W
Compactn Fluorescent	• Lighting Hours: 6,000 - 15,000 hours • Efficiency: 45 - 80 lm/W
High Pressure Sodium	• Lighting Hours: 12,000 - 30,000 hours • Efficiency: 25- 85 lm/W
Metal Halide	• Lighting Hours: 6,000 - 20,000 hours • Efficiency: 50-113 lm/W
LED	• Lighting Hours: 25,000 - 75,000 hours • Efficiency: 70-150+ lm/W

Intelligent Lighting Systems

Business in the HoReCa industry would also benefit from the use of intelligent lighting systems like sensors, photocells, and key-card controls. These smart systems can help businesses to achieve energy savings of 30-50% (Carbon Trust, 2018). Sensors can be installed in back-of-house areas, such as storerooms/cellars and offices, and in common areas like corridors and guest toilets. Daylight sensors, known as 'photocells', can be used to monitor natural daylight coming into the building and control the need for artificial light accordingly. Photocells can also be useful in outdoor areas, where lighting would not be required during the day but would be needed after dark. Photocells can be combined with occupancy sensors to increase the efficiency of these lights even further (Carbon Trust, 2018). Further occupancy linked controls, such as key-card controls, are particularly useful for hotels and accommodation providers. Key-card controls cut off electricity supply to the guest's room when the key is not inserted (ideally when the guest is not in the room). Not only does this help reduce the lighting usage, it also helps to save energy from other electrical appliances like televisions and HVAC systems.

(European Commission, 2013)

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Unit 5.3 - Advanced energy efficiency measures

While we have examined some of the short- or medium-term actions that can assist in preventing energy loss and thus increasing energy efficiency, there are some more long-term measures that can help in achieving this goal too. **Scheduled and regular servicing of all energy emitting appliances, eco-friendly appliances, and building renovations are essential longer-term actions that will help to achieve energy efficiency in a HoReCa business.**

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Unit 5.3.1 - Maintenance

Regular and scheduled servicing of your appliances and systems in the organisation can aid in the reduction of energy consumption. It is imperative that these maintenance checks are carried out on all energy-using equipment across the business to prevent energy losses. It is always recommended that any maintenance carried out follows the instructions set out by the manufacturer. Other suggestions include regular cleaning and removal of debris from vents, frequent monitoring and cleaning of filters, and regular inspections of pipes (European Commission, 2013).

Heating and Ventilation – **A poorly maintained heating boiler can increase costs by 30%** (Carbon Trust, 2017b). Fans, air ducts and other components that are dirty or faulty directly affect the efficiency of HVAC systems, and as a result increase the costs of running these systems. Regular cleaning of ventilation systems can help increase efficiency by up to 50% (Dexma, 2019). Time and zoning controls need to be checked regularly to ensure they are being updated with changes in daylights savings, and to ensure they are performing in accordance with the settings.

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Lighting

Lighting systems like sensors and intelligent technologies need regular upkeep. It is essential that light fittings and sensors are kept clean and tested regularly to ensure optimum performance. Lighting that is performing inefficiently will produce high levels of heat, which can result in the increased need for cooling systems in hot weather (European Commission, 2013). **Uncleaned light fittings can also mean a fall of light levels of up to 30% in a 2-3 years period**. Similarly, windows left uncleaned prevent natural light from entering the establishment, ultimately leading to increased need for artificial light.

(Carbon Trust, 2018)

Kitchen Appliances – Energy costs of catering operations can be significantly reduced through routine maintenance checks. **It is vital that any corrosion, scale or deposits are cleaned away from any cooking appliances to maintain effective heat transfer. Maintenance of heating elements, burners, valves and thermostats are also important. Refrigerator and cold storage doors should be checked frequently to ensure the seals are still actively working, they should also be cleaned to prevent the build-up of dust and grime.** Most importantly, freezers should be defrosted regularly, and evaporation coils in refrigeration units cleaned and kept ice-free.

(Carbon Trust, 2012)

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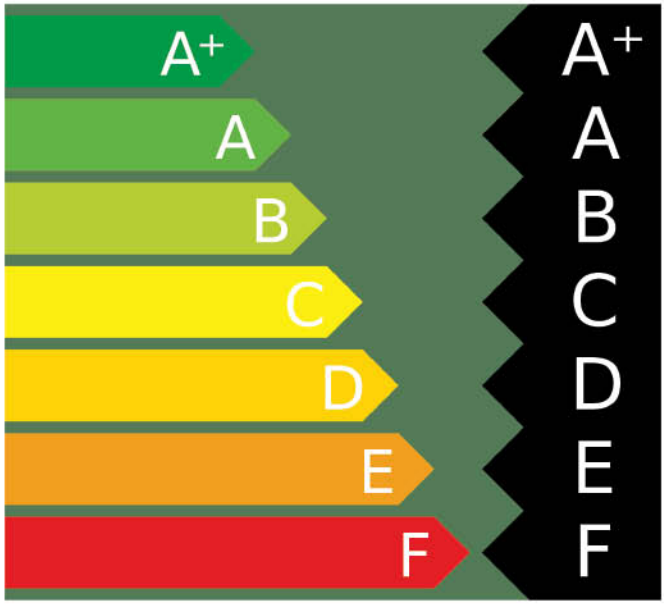
Unit 5.3.2 - Appliance Efficiency

While regular maintenance of appliances throughout the HoReCa business is important to help keep energy consumption levels low, acquiring new higher efficiency appliances can make a significant impact on consumption levels as well (European Commission, 2013). The notion of replacing all appliances for higher efficiency ones straight away may not be a practical solution for any business. However, **as appliances come to the end of their life cycle and need to be replaced, it is recommended that they are replaced with newer technologies that can help to combat energy use. The cost inherent in choosing more ecologically friendly appliances must of course be considered, but research has shown that the initial cost is far outweighed by the future savings in energy.**



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(Carbon Trust, 2012)

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Unit 5.3 - Advanced energy efficiency measures

Unit 5.3.2 - Appliance Efficiency

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Laundry Services - Taking an example of a washing machine. A small business that offers a laundry service could justify a slight increase in the cost of replacing a washing machine due to the energy and water savings. In fact, by choosing a machine with higher efficiency, a small business would break even if they invested an additional €700 on a machine. A larger establishment, looking again at our example of a 100-room hotel, could justify an additional investment of several thousand euro if they chose more eco-friendly models of washing machine – such would be the savings in energy and water.

(European Commission, 2013)

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Catering Services – Most catering services required the use of various appliances, whether the kitchen is in a restaurant, hotel, private catering company or even a canteen. Therefore, it follows that the biggest savings in energy use can be obtained through the purchasing of energy efficient equipment in the kitchen. We have previously discussed changes to the practice that catering staff can employ to reduce the energy consumption. However, as staff are often preoccupied with delivering high quality food to customers and meeting demand, practices like turning off or down the heat on appliances when not in use are not always easy to implement. This is where the advancement of technology can assist.

(Carbon Trust, 2012)

Outlined below are examples of newer appliances that will increase energy efficiency (Carbon Trust, 2012):

- **Induction hobs** heat pots and pans through induction currents that are generated from magnetic fields. These hobs heat up quickly and transfer the heat to the pan instantly. When the pan is lifted from the hob the heat stops immediately. Induction hobs can reduce energy consumption from 15-50%.
- **Ranges and gas hobs** with individual gas burners, can be individually controlled and are more efficient than solid top ranges. Fitted with an automatic shut off valve, the gas is turned off once the pan is removed. Energy consumption savings of up to 30% can be achieved by using this form of appliance.
- **Deep fat fryers** that are higher in efficiency can heat in 10-12 minutes and can reduce the energy consumption of 50% compared to less efficient models that need to be left on for the full duration of a food service.

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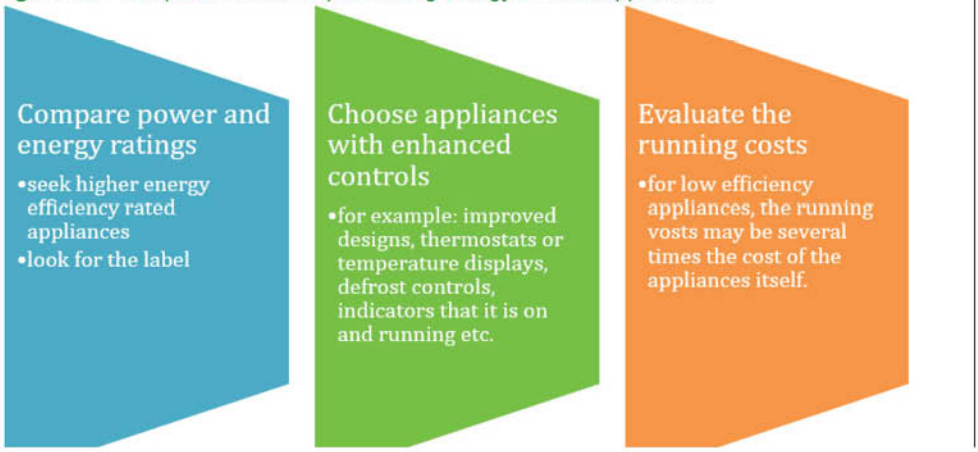
Other things to note when purchasing new kitchen appliances include: triple glazed doors on conventional ovens can reduce energy use by 3%, combi-ovens that absorb the steam and moisture generated through cooking can reduce energy by 16-30%, thermostat controlled grills and heat lamps can reduce heat generation, and the installation of ventilation systems that reuse the heat generated in the kitchen all working to reduce energy use (Carbon Trust, 2012).

When looking at purchasing new appliances for any part of the business, it is important that the functionality of the business, the volume of customers or guests, and the current usage of a similar appliance are considered. Think about replacing appliances that are over 15 years old with newer more efficient models. Figure 5.3 outlines a simple checklist to think about when purchasing energy efficient appliances.

(Carbon Trust, 2012)

Figure 5.3 – Simple checklist for purchasing energy efficient appliances



Unit 5.3.3 - Premises efficiency

Considerable energy savings can be made through the renovation of the premises itself (European Commission, 2013). **Research has indicated that larger businesses in the HoReCa industry refurbish their premises every 7-10 years. This gives HoReCa businesses ample opportunity to improve the building's envelope and reduce energy costs by as much as 40%** (Carbon Trust, 2012). **There are two key areas of focus that can assist with these energy savings: heating and ventilation systems and lighting.**

Heating Ventilation and Air Condition (HVAC) Systems – We have examined best practices to improve the energy efficiency of HVAC systems, focusing on the importance of regular maintenance of HVAC systems, in addition to examining the effectiveness of zone and sensor controls. There is also a substantial benefit of heat recovery systems that work to repurpose the heat generated in processes, such as the kitchen, and move it to other areas of the building that may require heat, such as common areas (dining rooms, receptions, bathrooms etc). These measures of course depend on having integrated HVAC systems and sensor controls. If these are not present in the building, a period of renovation is the time to include them. While there can be concerns over the investment costs involved, there is usually a relatively short payback of the investment in a few years.

(European Commission, 2013)

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Lighting – Similarly, we have discussed the benefits of light zoning controls on the reduction of energy consumption, and again an advantageous time to install these sensors would be during a general refurbishment of the building envelope. However, there are other measures that can be taken during renovation that can reduce the need for lighting at all, thus reducing energy consumption. Simple guidelines that aim to maximise the effectiveness of lighting include the use of light materials, high gloss paints and surfaces to reflect any natural light in dark areas, and matt finishes on the walls in areas that get direct sunlight. More cost heavy actions would be replacing windows to optimise the light, choosing the correct window (for example glazed or unglazed) depending on the natural light coming in and the need for privacy instead of replacing all windows with the same type. Lastly, the use of indoor partitions can assist the improvement of natural light being absorbed and dispersed in the building .

(European Commission, 2013)

Unit 5.4 - Energy audit and monitoring

Various studies have been done on the energy consumption of businesses in the HoReCa industry, offering a wide variety of tips and hints that can help employees, management and business owners to reduce their energy consumption. **One common recommendation found in all aspects of best practice measures for energy consumption is the importance of an energy monitoring plan. In order to successfully control and lower energy consumption in any scenario, it is vital that energy consumption is monitored (European Commission, 2013). Unnecessary consumption, energy losses and inefficient appliances and practices can all be detected by a continuous monitoring strategy.** A study conducted by the European Commission (2013) outlined the steps that are recommended in a best practice energy management plan – see in **figure 5.4** below.

***Figure 5.4** – Sample Energy Monitoring Plan*

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This plan, like many others, starts with an initial energy audit which is used to identify all the areas that energy is consumed in the business. Following on from this, the current energy consumption levels are recorded and set as a benchmark for future energy consumption strategies. It is suggested that organisations seek advice from energy strategist experts, that will work with companies to create a tailor-made energy reduction plan, setting goals and giving some recommendations on what other measures need to be taken. However, this may not be feasible or necessary for smaller business in the HoReCa sector. One of the key factors for the success of this plan is the establishment of an energy management team who will be responsible for the continued monitoring of energy consumption, training employees in new energy efficient practices and who will review the progress of the energy strategy.

Unit 5.4.1 - Energy consumption audit

As stated previously, **the first and one of the most important steps of an energy management plan is to establish how and where energy is being consumed in all aspects of the business and premises. This can be achieved by completing an energy audit.** In appendix 5.1 of this chapter, a simple and easy energy audit has been developed to assist HoReCa business to assess the sources of their energy consumption.

Once the initial audit has been completed, but before any actions are taken to reduce energy consumption, a benchmark measurement should be taken. This will allow the energy management team or business owner to evaluate if their energy reduction strategies are having a positive impact on their consumption.

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Unit 5.4 - Energy audit and monitoring

Unit 5.4.1 - Energy consumption audit

There are many ways to go about measuring the energy consumption of a HoReCa business. **The simplest way to do this is to record the monthly costs of energy producing resources, such as electricity and other fuel bills.** Bills sent by energy providers will outline the kilo-watt hours (kWh) used on the premises, with more detailed bills showing a breakdown of the price per unit used, and/or dividing the usage between daytime and night-time hours where different rates apply (European Commission, 2013). **In the case where there is a break down based on the day/ night usage, this may help the management team to determine new strategies to reduce out of hours consumption.** For restaurants and other catering services, a more intricate benchmark can be developed based on the number of cover meals served, which would calculate the energy consumption per plate.

(European Commission, 2013)

For larger businesses with a greater occupancy rates, useful tools like energy meters and data loggers may be fitted to high energy consuming appliances (such as ovens and dishwashers). The information from these tools can be directly attached or sent to a computer.

(European Commission, 2013)

There are also a range of online tools available that can assist the energy management team in setting benchmarks and assessing their overall energy consumption. For example, the Hotel Energy Network (found at www.hes-unwto.org) provide a range of services to help hotels reduce their energy consumption. They assess consumption, provide advice on energy saving measures, measure the carbon footprint and so on. This is just one example of many organisations that have been set up to help businesses in the HoReCa industry manage their energy consumption.

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Unit 5.4.2 - Action checklist

Section 5.2 examined the various short-run changes in practice that will have an immediate impact on consumption if implemented. **These low-cost actions can be combined to create a 'quick action' strategy that will show immediate returns for the business. Appendix 5.2 of this chapter shows a sample 'Quick Action Checklist' to help with this.** This checklist can be amended for each area of the business, or as one general one for smaller businesses.

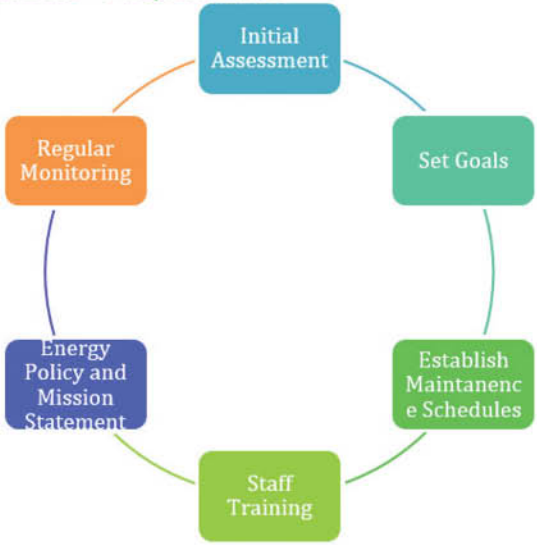
Unit 5.4.3 - Energy manager or energy management team

The management of energy monitoring plans is no small task. **While there are plenty of guidelines on strategies that businesses should follow, it is important that each business creates a plan that fits the size and purpose of their business. It is for this reason, that having a dedicated energy manager or management team is vital** (Carbon Trust, 2011). **The energy manager or team must have full commitment of the senior management or business owner to be successful.** We have already outlined some of the tasks that an energy manager will have to perform – namely the energy consumption audit and quick action checklist. However, there are additional responsibilities that must be carried out. **Figure 5.5** depicts the key responsibilities of an energy manager or management team.

(Carbon Trust, 2011)

Whether it is an individual or a team, it is imperative that those in the role really champion the energy goals and policies set out. These goals must be regularly reviewed and assessed as to their succesion. This is just one example of many organisations that have been set up to help businesses in the HoReCa industry manage their energy consumption.

Figure 5.5 – Responsibilities



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Unit 5.5 - Renewable energy

The focus of this chapter has been on understanding the consumption of energy in the HoReCa sector and finding ways to reduce consumption in order to help businesses become more eco-friendly. Thus far, it has been assumed that all energy consumption was based on electricity and other fuels, like gas and oil. We have worked to reduce the demand for energy produced by fossil fuels. However, **in order to progress HoReCa businesses in the move towards zero waste, we must examine the effectiveness and use of renewable energies in the industry.** So, what is renewable energy? **Renewable energy forms are those that do not pollute the environment during production. The use of renewable energy stops further depletion of finite resources and does not release the carbon emissions found in fossil fuels back into the atmosphere (European Commission, 2013). There are multiple types of renewable energy, for example: biomass, solar energy, wind power, hydro power and geothermal energy (Karabuga et al., 2015)**. We will examine the effectiveness of solar, biomass and wind energies for businesses in the HoReCa industry.

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Unit 5.5.1 - Renewable energy in HoReCa

Solar Power - **Research shows that the most exploited forms of renewable energy come from solar power**. As previously discussed, solar power can be used in the most basic form to provide natural light in the building. **In terms of producing energy, solar power often refers to photovoltaic solar power – this is the generation of electricity through solar panels that are integrated on the building's envelope or roof**. **Solar power is often considered to be the most accessible form of renewable energy for small-medium businesses** (Hotel Energy Solutions, 2011). Of course, this will depend on the building itself – is there suitable exposure to the sun, is there a large enough area on the building to place the solar receptors?

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Unit 5.5 - Renewable energy

Unit 5.5.1 - Renewable energy in HoReCa

There are various ways that solar power can be utilised in a business. The first is to provide energy for all functions of the business. In a case where the premises are small and there is not enough space to house the full number of panels needed, combi-systems allow for the use of solar power first, and then backed up by another energy source if necessary. In a similar vein to combi-systems, solar power can be used for energy in specific functions of the premises, such as water heating, or in the case of a hotel, swimming pool heating. There are also technologies that allow for excessive build-up of solar energy to be sent to the local electricity grid, providing tax incentives for the business and helping the local environment as well.

(Hotel Energy Solutions, 2011)

Biomass Energy – Biomass energy refers the use of biodegradable products, made from animal, vegetable, forestry and agricultural waste to provide energy. These waste products are bound together to make pellets or chips that are burned in a combustion boiler to produce energy (European Commission, 2013). Usually used for creating heat and running HVAC systems, biomass energy is carbon neutral. **Biomass is regularly used in connection with another form of energy, like solar power, to provide energy for all aspects of the business**. The practicality of this form of energy for businesses in HoReCa again depends on a few factors. Space is needed to house the chips or pellets that will be used in the boiler, while the boilers themselves can vary in size from small to large. Another factor that needs to be considered is the location of the business, or rather its proximity to a supply of biomass materials, and its ability to garner energy from another source.

(Hotel Energy Solutions, 2011)

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Wind Power – Wind energy is a concept that has be used for thousands of years to pump water and mill grain. However, a more modern take on wind energy relies on the wind to turn turbines, thus creating energy which is converted into green electricity (Hotel Energy Solutions, 2011). The installation of free-standing wind turbines on-site has the potential to create hundreds of kilo-watt hours of energy. One of the biggest prohibitors to this is the amount of space that the business has around the premises. The success of this form of energy is also conditional on regular movement of the turbine blades from wind. It is therefore important to have a knowledge of local weather, with special attention paid to wind patterns and movements.

(European Commission, 2013)

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Unit 5.5 - Renewable energy

Unit 5.5.1 - Renewable energy in HoReCa

Off Site Renewable Energy - **There are a wide range of renewable energy sources that businesses in HoReCa can utilise**. We examined the effectiveness of solar, wind and biomass power. However, **it must be noted that there is likely to be a vast number of small or micro companies that do not have the means or space to invest in establishing these energies on-site**. There are also other sources of renewable power, such as geothermal power or hydro power, that should also be considered as providers as energy to HoReCa organisations (European Commission, 2013). It is for this reason that off-site renewable energy sources must be explored by businesses. **HoReCa organisations may be able to purchase 'green electricity', generated from a renewable energy source off-site. This way, companies are still committing to green and renewable energy sources rather than using finite resources, without needing space or large investments.**

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Unit 5.5.2 - Considerations for choosing renewable energy

There is no doubt that a move towards renewable energy sources has significant environmental benefits. However, it is important that all aspects of a move to renewable energy are considered.

The first factor to think about before moving to renewable energy is to know the locality. While the move to renewable energy may be the way of the future, **there may be local regulations that need to be considered before any investments are made**. On the other hand, **local authorities or the national government may offer substantial tax benefits for greening your electricity**, so it is recommended that proper research is conducted about this before any steps are taken. **Local weather is also factor when considering some of the renewable energy sources**, so as previously stated, it is important to knowledge of weather patterns before moving forward.

(Karabuga et al., 2015)

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Unit 5.5 - Renewable energy

Unit 5.5.2 - Considerations for choosing renewable energy

The next element of renewable energy investment that should be considered is the size and energy need of your business. Large investments in renewable sources may not be feasible or even needed depending on the type of business you have. It is therefore recommended that businesses seek advice for energy consultants. These consultants will be able to assess the current energy needs of the business and advise on renewable energy measures accordingly (Hotel Energy Solutions, 2011). As with fossil fuelled energy systems, it's also important that renewable energy technologies are maintained regularly and a cost benefit analysis of maintenance or replacement parts should be completed.

(European Commission, 2013)

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Appendices

Appendix 5.1 – Energy Audit to assess the current sources of energy use

Assess different services of your HoReCa business, examining the use of energy in each area.

Service Area	Process	Energy Consumed		Notes (if more than one source, list them)
		Yes	No	
Kitchen	Appliances used in cooking process - ovens, grills, heat lamps, fryers, ranges, microwaves, kettles etc			
	Appliances used in the preparation of food - processors, blenders, mixer machine, electric whisk etc			
	Appliances used in cooling, freezing and storage of food and beverages - refrigerators, freezers, cool rooms etc			
	Dishwashing appliances			
	Water heating			
Bar /Restaurant/ Café	Music for atmosphere setting			
	Glass washing			
	Bottle fridges			
	Beverage pumps			
	Ice machine			
	Coffee machines & kettles			
Administration / Reception Areas	Office equipment - printers, computers, telephones			
	Telephones			
	Display signage or TVs			
Accommodation	Water heating for bathrooms			
	Underfloor heating			
	TVs, radios, alarm clocks			
	Mini-bar or small refrigerator			
	Sundry sockets			
Lighting	All internal lighting			
	Outdoor lighting			
	Emergency lighting			
Heating, Ventilation & Air Conditioning	Heating systems - central heating, radiators, fire burners			
	Cooling systems - air conditioning, fans			
	Ventilation systems - kitchen ventilation (extractor fans), bathroom fans			
Sundry Activities	Sockets used for cleaning - hoovering			
	Building alarms			
	Hand dryers			

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Appendix 5.2 – Quick Action Checklist that can work to lower the energy consumption in each service area of the business (Carbon Trust, 2012)

Area	Service	Task	Completed		Notes
			Yes	No	
Kitchen	Cooking	Keep hot plates, grills, hobs, and gas burners clean			
		Turn off (or lower temperatures) on grills, heat lamps, extraction fans etc when not in use			
		Create a regular servicing and cleaning schedule for all appliances, including servicing thermostats and timers			
		Install microwave ovens to cook or reheat smaller quantities of foods			
		Avoid overfilling kettles and saucepans, and use lids to retain heat			
		Only switch on equipment when necessary - discourage the practice of switching on equipment that is not needed			
		Make a note of preheat times on appliances and display them somewhere clearly for kitchen staff			
	Cleaning	Ask staff to report leaking dishwashers or taps			
		Create a regular servicing schedule for dishwashers, and regular plumbing checks for taps and drains			
		Maximise loads in dishwasher by stacking correctly, and avoid half loads being run			
		Use economy setting on dishwashers where appliance			
		Ensure staff are turning off taps after use, and that heated water is not left running			
	Storage	Move refrigerators and freezers away from heat generating sources			
		Create a defrosting schedule			
		Check seals on refrigerators and freezers, and replace if needed			
		Make sure equipment is set at recommended temperatures			
Heating, Ventilation & Air Conditioning	Heating & Cooling	Ensure thermostats are set correctly			
		Install localised thermostat controls for various areas of the business if applicable			
		Check insulation levels of the building and increase where possible to reduce heating requirements			
		Note any areas of the premises where door or window seals are not working efficiently, creating a draught and losing heat. Plan to repair if needed			
		For more advanced systems, set a "dead band" between heating and air conditioning so that the systems do not work at the same time			
		Create regular maintenance schedules for heating systems and radiators			
		Create regular maintenance schedules for air conditioning or cooling systems, and a clean rota for fans and filters			
	Ventilation	Create a cleaning schedule for ventilation filters, ensuring grease traps in the kitchens are periodically cleaned			
Lighting		Switch off all non-essential lighting out of hours			
		Install timers ad sensors for lights in low occupancy areas			
		Keep lamps, bulbs, light fixtures clean and free from dust			
		Replace lamps with energy efficient bulbs, like LEDs or OLEDs			

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Appendix 5.3 – Renewable Energy (RE) Best Practice Case Study

Photo or logo of the organisation

Details of the organisation:

Energy Source Before Change to RE	Renewable Energy Source Use

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Appendices

Change of Practice to Reduce Energy Consumption

Comments and Recommendations on moving to Renewable Energy

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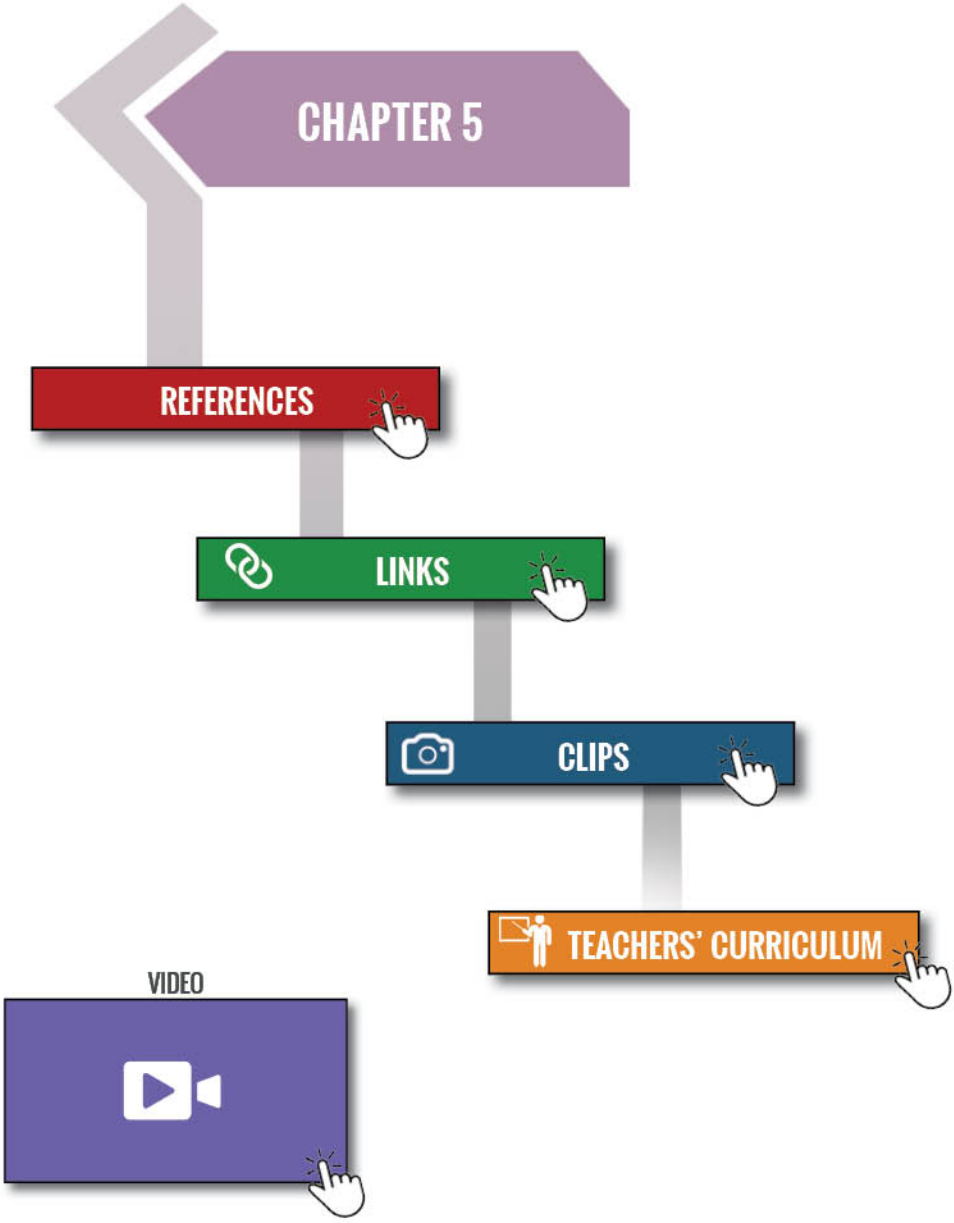

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Chapter 6: Chemical and Pollution Reduction in HoReCa

Introduction

This is the sixth module of the Zero Waste in HoReCa Curriculum. This module addresses the topic of reducing chemical use and pollution generation in the HoReCa sector. This chapter will examine the presences of chemicals in many of the activities carried out by businesses in the HoReCa sector, looking at why we should reduce chemical use. We will also explore the best methods to reduce chemical consumption in a change of practice approach and will also briefly look at the environmental benefits of ecolabels. The second part of this chapter will focus on pollution, outlining what is pollution and how HoReCa organisations can reduce the pollution generated by their business. Finally, this chapter will look at carbon foot printing, giving some guidance on how to measure it and what benefits HoReCa businesses could experience from carbon foot printing.

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Objectives

Once you have read through this chapter and completed this short unit on Chemical and Pollution Reduction in the HoReCa industry, you will have achieved the following objectives:

- *You will learn the importance of reducing chemical use, and the various ways to manage the use of chemicals in a HoReCa business.*
- *You will gain an appreciation for ecolabel products and their benefits on the environment.*
- *You will gain an understanding of what pollution is, and how it is in generated.*
- *You will have an increased comprehension of direct and indirect behaviours in HoReCa that affect pollution.*
- *You will recognise the benefits of carbon foot printing and understand the methods used to measure the carbon footprint of an organisation, product or service.*

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Unit 6.1 - Chemical Use in HoReCa

Unit 6.1.1 - Presence of chemicals in HoReCa activities

We have been combining raw materials to produce new chemicals and materials for thousands of years. Natural resources like air, water, minerals, oil, natural gas and metals have been mixed in many forms to create a vast array of everyday items, such as: clothing, food and beverages, cleaning products, hygiene products, decorating materials etc (EcoTourismKenya, 2020). The list of products that contain chemicals goes on and on, and chemically enhanced produces saturate the market across multiple sectors, including the HoReCa industry. The most common aspects of chemical use in HoReCa businesses are food and beverage production, cleaning and laundry services.

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Food and Beverage Production

Traditionally when we think of chemicals, harsh chemicals used for cleaning, decorating, or scientific discovery come to mind. However, **chemicals are widely used in the production and transportation of food and beverages** (European Court of Auditors, 2019). The presence of chemicals can occur in four ways: regulated use, supply chain residuals, packaging, and contaminants.

EU regulated chemicals like food additives, flavourings and enzymes are used to enhance food flavour and appearance, and to extend the shelf-life.

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Unit 6.1 - Chemical Use in HoReCa

Unit 6.1.1 -Presence of chemicals in HoReCa activities

Chemicals are also used in various packaging materials to ensure the product remains fresh and is undamaged during transport. In terms of supply chain residuals, medicines for livestock, pesticides and feed additives are also potential contributors to chemical consumption. Finally, chemicals are also found in naturally occurring contaminants, environmental pollution and contaminants arising during processing (European Court of Auditors, 2019). Looking at a cup of coffee as an example, there are three steps in the production process that have the potential for chemical contamination: 1) residual pesticides used to help the plant grow, 2) environmental contaminants from the present of heavy metals in the soil the plant was growing in, 3) processing contaminants in the roasting/grounding of the coffee beans.

(European Court of Auditors, 2019)

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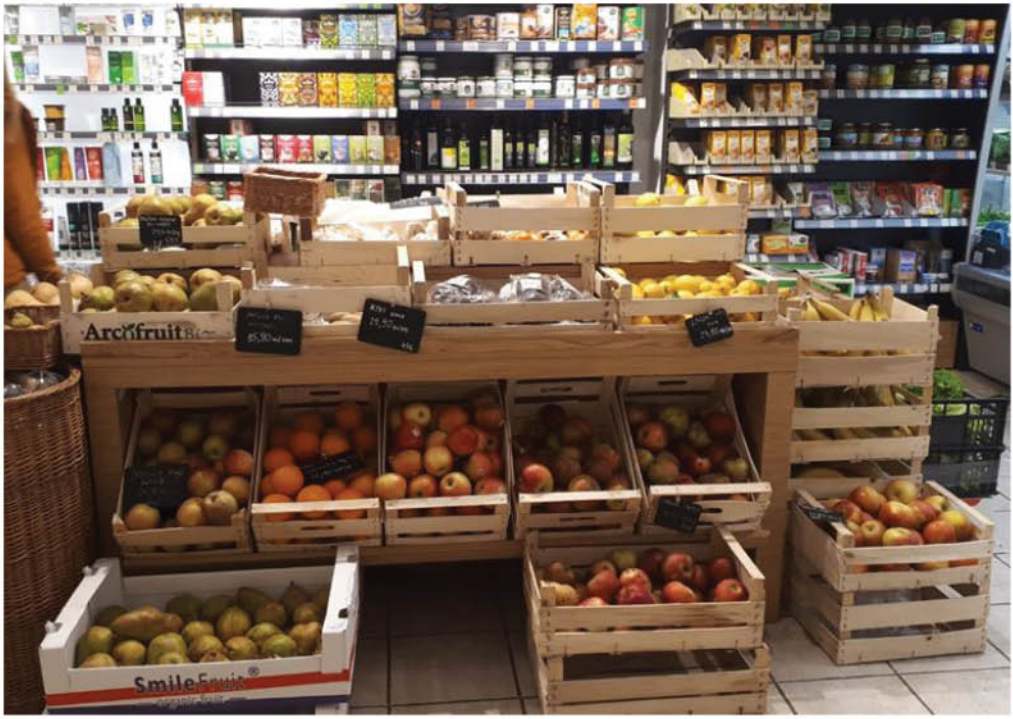
The European Union is highly committed to ensuring the safety of the food and beverages its citizens are consuming. There are substantial regulations put in places for all foods produced within the EU, and for the food items that are coming into the market from outside of the EU. However, a study conducted by the European Court of Auditors (2019) found that there are considerable stresses on the model set out by the European Union, and not every member state is able to monitor the food entering their country as exhaustively as the strategy suggests. This leads to increased risks of chemical hazards in food and beverages, which have a serious impact on the health of consumers.



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Cleaning and Laundry Services

A significant amount of chemicals are used in the cleaning of guestrooms and bathrooms in establishments providing accommodation. A study conducted about the use of chemicals in hotels found that chemicals are often used well in excess of the manufacture's recommendations (Leslie, 2016). According to Leslie (2016), the reasons for this were to reduce the time needed for cleaning while also achieving higher levels of hygiene.

Excessive use of chemicals has also been noted in laundry practices as well. Chemical dosing for laundry should coincide with the volume of laundry and the weight of the materials. Not only is there a wastage of detergent, but overuse of chemical detergents results in the need for extra water for rinsing, meaning there is more water wastage as well.

(European Commission, 2013)

Other Forms of Chemical Use in HoReCa

The production of food and beverages, and practices involving cleaning and laundry tend to be the most chemical intensive activities of HoReCa businesses. That being said, there are other activities that contribute to chemical consumption. **Leisure facilities like massage treatments, indoor and outdoor swimming pools, and steam rooms or saunas all require considerable chemical use in the application or maintenance of these services. Textiles, like towels and bed linen, can also add to chemical consumption**, depending on the make-up of the materials and the colour. Lastly, HoReCa businesses use chemicals in their pursuit of setting a nice atmosphere for their guests or customers. Air fresheners to mask smells in guestrooms or bathrooms and paint used to decorate customer areas are just some instances of this.

(European Commission, 2013)

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Unit 6.1.2 - Why reduce chemical use?

From the food that we eat to the spray that we use to clean the windows, it is clear that chemicals are present in a variety of products used, practices followed, and services offered in HoReCa businesses. What remains to be seen is why we should try to change this? Our bellies are full, and our windows are sparkling, so there is an element of "if it isn't broken, don't fix it". However, it is impossible to ignore the implications of being so heavily reliant on chemicals in the HoReCa sector, this being the impact on the environment and the impact on health.

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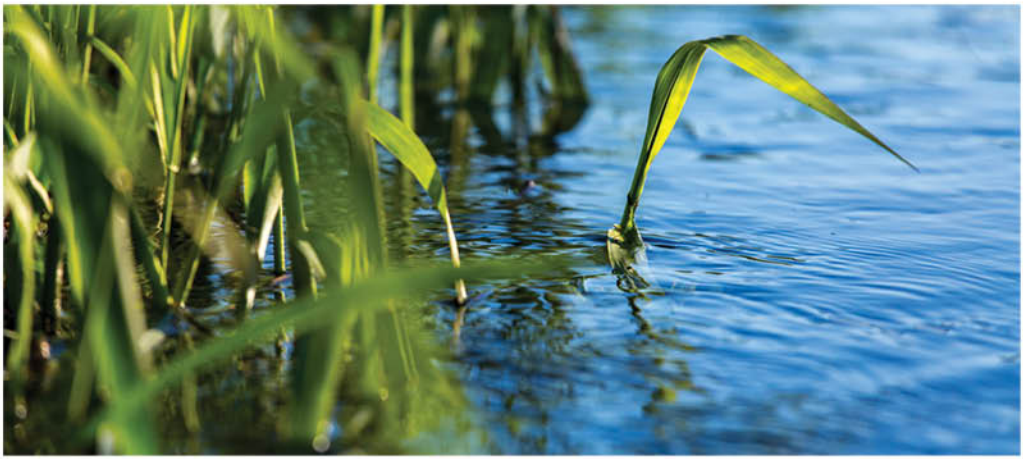
Environmental Impacts

The chemical industry is one of Europe's largest manufacturing industries, relying on finite resources to create new materials for further manufacturing or end use by consumers (European Commission, 2020b). **The production of these materials in large industrial plants adds to air pollution in the form of carbon emissions.** Depending on what the chemicals are being used for, once in their consumable phase they may be adding to further pollution of land and water. For example, look at chemical products used for cleaning. We have already discussed the overuse of chemicals in this area, but what happens to the waste? More often than not, wastewater from cleaning is flushed down the drain. How is this being treated, or is it returned to nature in this state? The answers to these questions will affect the impact these chemicals will have on water pollution (EEA, 2019a). Another example of environmental impacts can be seen in the case where chemicals were added to packaging for improved shelf life. We know from chapter four that these increasing complex materials are harder to recycle. This means the chemically enhanced packaging could end up in a landfill, further adding to land pollution.



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Unit 6.1 - Chemical Use in HoReCa

Unit 6.1.2 -Why reduce chemical use?

Effects on Health

Chemical based cleaning products are one of the most hazardous products in a HoReCa business. **Used daily, cleaning products like detergents, polishes, surface cleaners etc can be harmful to health** (European Commission, 2013). For example, if continuously coming into contact with the skin, cleaning products can result in contact dermatitis which can cause sever discomfort and pain for the sufferers. When considering the effects on chemicals on our health, we tend to think of the more obviously absorbed substances like harsh chemicals on the skin, or the fumes from cleaning products, or the additives used in foods. However, there are instances where the chemicals are being ingested without our knowledge.

Research has shown that medicines given to livestock like antibiotics, can still be present in the end products that consumers ingest. Worryingly, this can build tolerances in the body for anti-biotics, meaning the effectiveness of anti-biotics when needed would be lessened.

(European Court of Auditors, 2019).

There are other instances similar to this one, where hidden chemicals are harming the health and wellbeing of people. The most alarming case of this is dust. A study to examine the occurrence of chemicals in household dust found that harmful chemical particles were present in 90% of dust sampled. Chemicals are released into the air and settle as dust on items in the house, where later adults and children can inhale small particles or absorb them through the skin (NRDC, 2016). The same study examined the types of chemicals present and determined that these chemicals are often linked to respiratory issues, immune system and digestive problems, and in some cases cancer.

(NRDC, 2016)

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Unit 6.1.3 - Managing chemical use

There should be no doubt that there is a need to reduce chemical consumption across the board, but how can businesses in the HoReCa industry achieve this. There are two steps businesses can immediately take to reduce consumption, the first is a change of everyday practices, and the second is to monitor chemical use.

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Change of Practice

We briefly discussed that there are some practices carried out by HoReCa businesses that add to the consumption of chemicals. However, there are a number of quick action steps that can be taken to combat this. Figure 6.1 of this chapter outlines a variety of steps that can be taken in the cleaning, laundry and management of amenities processes in a HoReCa business (European Commission, 2013). **Efficient cleaning alone can reduce chemical consumption by at least 50%, and significantly reduces water consumption by as much as 25%** (European Commission, 2013).

Figure 6.1 *Change of Practice Suggestions*

Activities	Change of Practice
Efficient Cleaning	Turn off taps during cleaning
	Use microfiber cloths and mops
	Use a single flush of 3 litres on a dual flush toilet when cleaning
	Dilute concentrated cleaning products according to the manufacturer's instructions – it is important to note that dilution volumes may need to be adjusted based on the hardness of water
	Avoid the use of fragrances and air fresheners where possible
Laundry	The dose of chemicals used should be measured to the volume and material make-up of laundry
	Pre-treat or "spot" stained materials with stronger chemicals like hydrogen peroxide
	Use detergents that work at lower temperatures
Amenities	Maintain the appropriate temperature of a swimming pool through optimised management, thus reducing chemical consumption
	Convert existing outdoor swimming pool to a natural pool through the installation of natural plant-based filtration systems

There are some methods that can be employed by management to ensure that the efficient cleaning and laundry practices set out are achieved. A simple example of this is the clear indication of fill levels on cleaning equipment like spray bottles. This prevents the overuse of chemicals and works to reduce the occurrence of incorrect dilution of chemicals too (European Commission, 2013). Another example of this may be the installation of chemical dosing units. Large scale washing machines used in the laundry service of hotels regularly have in-built dosing options. However, for smaller operations using standard washing machines, chemical dosing units can be retrofitted. This will enable the use of more precise volumes of detergents and conditioners.

(European Commission, 2013)

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Employee Training

Staff training is crucial to the success of these changes in practice. The European Commission (2013) has identified three areas in which training should be given to employees of HoReCa businesses: safe handling of chemicals, efficient cleaning, and chemical management. Furthermore, it is also recommended that a safety data sheet is created, listing all chemical products and outlining their correct usage and dosage (European Commission, 2013). For businesses with employees coming from different parts of the world, it is vital that this information is displayed in all employee languages.

Monitoring Chemical Use

Effective chemical management calls for the monitoring of chemical use (European Commission, 2013). According to a report by the European Commission (2013), accommodation providers are required to submit a statement that outlines their use of chemicals, both ecolabel and non-ecolabel varieties, if they wish to comply with EU ecolabel criteria. Therefore, while it is a necessity for some accommodation providers to do this, it makes sense that all businesses in the HoReCa sector keep an account of their chemical use. **In implementing a monitoring plan for chemical use, the business will be able to examine the effectiveness of chemical reduction strategies and keep an account of any potential savings to the business. Monitoring chemical use can be achieved in three easy steps** (European Commission, 2013):

1. Make a list – List all types of chemicals used, the quantity purchased, and note if they have an ecolabel or not.

2. Create a plan – Set measurable targets to reduce consumption and consider environmentally friendly alternatives.

3. Involve employees – Train staff regularly, focusing on chemical management, efficient cleaning, and health and safety. If needed, identify one employee that will be responsible for creating data sheets with safety information and correct procedures for chemical use.

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Benefits of Chemical Reduction

Combining the advice provided in this section, appendix 6.1 of this chapter provides HoReCa businesses with a checklist of actions to help reduce chemical use. There are considerable benefits to businesses in pursuing this goal. **In additional to the environmental benefits and the safeguarding of the employee health, there are considerable cost benefits involved in chemical reduction strategies.** Chemical products contribute a great deal towards consumable costs, so it follows that reducing the volume used will result in direct cost savings for the business.

(European Commission, 2013)

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Unit 6.1.4 - Ecolabel products

What are ecolabel products?

Reducing chemical use will have significant impacts on the environment, and regular monitoring by managers will enhance the success of such strategies. Nevertheless, more can be done to reduce chemical consumption in HoReCa establishments, and this relies heavily on green procurement of ecolabel products.

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Ecolabel products are so named because in their production and lifecycle they have substantially lower effects on the environment than their conventional counterparts (European Commission, 2013). There are a variety of ecolabel images used to inform consumers that the product is environmentally friendly. ISO certified ecolabels like EU Ecolabel, Blue Angel and Nordic Swan examine products in a range of ways: energy consumption, ecotoxicity, cleaning effectiveness (European Commission, 2013). It is suggested that products carrying these ecolabels are the leading environmentally friendly products that offer high cleaning performance. The EU Ecolabel has now certified over 78,000 products, ranging from cleaning products to decorating materials to tissues and textiles.

(European Commission, 2013)

Changing to ecolabel products

What is the impact of choosing these ecolabel products on the environment? The European Commission (2013) examined the most important criteria that are required for ecolabel products, and the benefits to the environment in choosing ecolabel products. Focusing on cleaning and hygiene products, textiles and toilet paper, the findings are outlined in figure 6.2. **In most cases, the impact of choosing ecolabel products means a decrease in air and water pollution, reduced human toxicity and harm caused to ecosystems, and a reduction in the generation of waste.**

(European Commission, 2013)

There is often a stigma associated with changing to ecolabel products, this being the cost of these products. Research has shown that the slight increase of cost in moving to ecolabel products will have a quick return on investment in the form of reduced waste costs. There are also some cases where the local authorities give monetary dispensation to organisations that have employed a green policy, included in which is a move to ecolabel products.

(European Commission, 2013)

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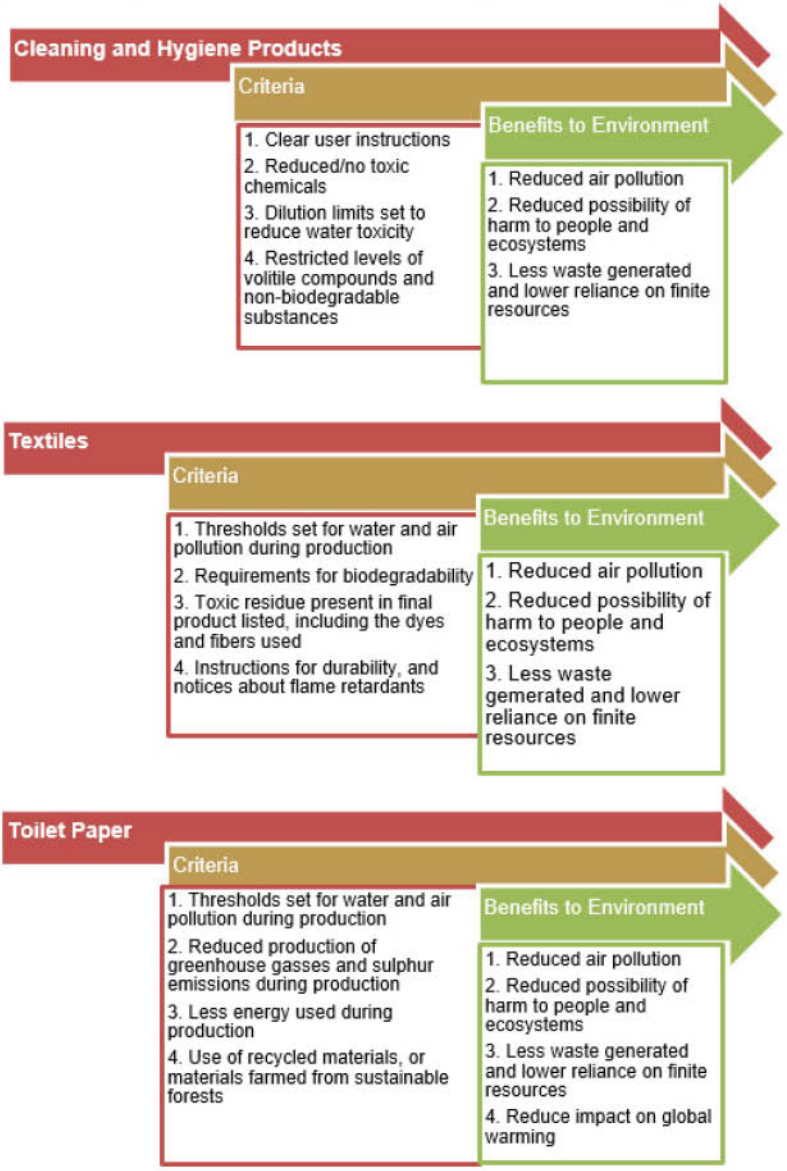
Unit 6.1 - Chemical Use in HoReCa

Unit 6.1.4 -Ecolabel productsuse

Figure 6.2 – *Impact of Ecolabel Products (European Commission, 2013)*



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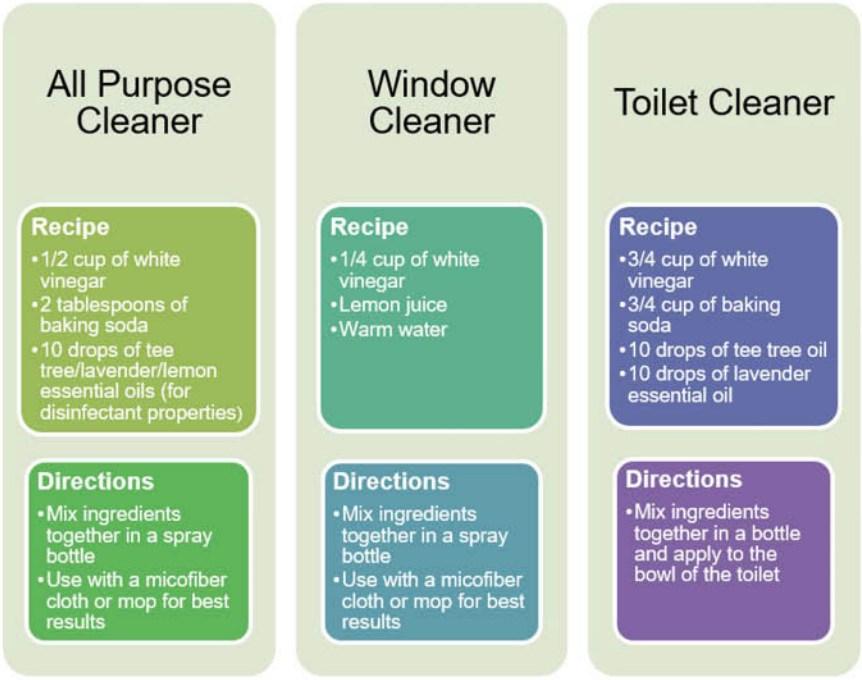
Green Alternatives to Ecolabels

Although it is widely recommended that ecolabel products replace the more conventional chemical brands, there are other alternatives that will reduce chemical use. **Homemade or traditional cleaning recipes boast significantly less chemical use with the same cleaning power. Staples in the home like vinegar, lemon, baking soda, and essential oils can clean almost anything** (Keeper of the Home, 2017). Some recipes for homemade cleaning products are detailed in figure 6.3 (The Green Parent, 2020). While these recipes may be useful in the home, it is important that HoReCa businesses bear in mind the health and safety regulations outlined by HACCP when choosing their eco-products.

Figure 6.3 – *Homemade Cleaning Recipes (The Green Parent, 2020)*



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Unit 6.2 - Pollution in HoReCa

Unit 6.2.1 - What is Pollution?

Before we examine pollution and its generation in the HoReCa sector, we must first establish what is pollution, and what are the impacts of pollution on our planet. So, what is pollution? **Pollution is defined as the introduction of harmful and poisonous substances, called pollutants, into the environment** (National Geographic, 2020). Naturally occurring events like a volcanic eruption can create natural pollutants like volcanic ash and gasses. However, the majority of pollutants that are causing adverse changes to our planet are a result of human actions, such as: burning fossil fuels for electricity or transport, waste management and disposal, and the emissions from chemical, industrial and agricultural industries (National Geographic, 2020). **Pollution significantly impacts the water, air and land around us.**

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Air Pollution

Air pollution affects our environment in many ways. **Pollutants in the air, called greenhouse gasses, are incredibly harmful to our ecosystems. Air pollution is assessed by calculating the levels of four elements found in the atmosphere: Ozone (O3), Nitrogen Dioxide (NO2), particulate matter (PM) and sulphur dioxide (SO2)** (WHO, 2020b). The effect these four elements have on the environment can differ. For example, when sulphur dioxide and nitrogen oxide mix with moisture in the air, they create something new – acids. These acids later return to the earth in the form of acid rain, and usually in a location far removed from where it was generated. Research has shown that acid rain can devastate forests as well as lakes and water streams.

(National Geographic, 2020)

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Unit 6.2- Pollution in HoReCa

Unit 6.2.1 -What is Pollution?

Aside from the effect on the environment, one of the most prominent impacts of air pollution is on our health. While the reduction of air pollution has been the focus of many policies at EU and global levels, toxic levels of pollution still remains in the air that we breathe. According to a study conducted by the World Health Organisation (WHO) in 2016, 556,000 premature deaths in Europe were the result of both ambient (outdoor) and household air pollution (WHO, 2020a). A combination of sunlight, sulphur dioxide and nitrogen oxide create what is known as 'smog'. This brown thick fog sits in the air like a haze of air pollution, impacting the effectiveness of sunlight and increasing the respiratory issues of people living in the vicinity of smog.

(National Geographic, 2020)

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Water Pollution

The Earth is made up of over 70% of water; 96% of that water is in our oceans, 2.5% of it is fresh water in lakes and glaciers, and the remainder is moisture in the air (National Geographic, 2020). Bearing this in mind, we are in an age where fresh and clean water is a scarcity due to climate change and pollution. Research by the United Nations found that approximately 4,000 children die every day as a result of drinking unclean and unsafe water (National Geographic, 2020). **A report by the European Environment Agency (EEA, 2019) stated that all four of Europe's seas are heavily polluted. Most water pollution is caused by human activity. Runoffs from industrial and chemical factories, untreated sewage and oil spills are just some examples of human activities that contaminate our waters.**

(EEA, 2019)

Plastic is another common contributor to water pollution. Dumping in the oceans has led to the development of phenomena like the Great Pacific Garbage Patch (National Geographic, 2020). Plastic is also detrimental to the health of marine life. Decomposing and microplastic fibres are ingested by marine life in the seas and oceans. In some cases, people are later ingesting these pollutants through their food.

(National Geographic, 2020)

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Land Pollution

Like the generation of pollution in air and water, human activities contribute considerably to the pollution of the land, and more specifically the soil. For example, the use of chemicals, like pesticides, and fertiliser can greatly affect the ecosystems around them. Pesticides are commonly used in the agricultural sector to kill insects that may impact the growth of crops. However, these chemicals are harmful to plant life, animals, and people who may be ingesting it when eating the very fruit or vegetable it was used on to help grow (National Geographic, 2020). Another regular contributor to land pollution is rubbish and landfill sites. Littering, or the dumping of rubbish in an un-sanctioned site increases the pollutants in the soil. In addition to this, landfill sites that are not correctly sealed off can contaminate the soil around them.

Unit 6.2.2 - Reducing pollution in the HoReCa industry

There is no doubt that pollution is devastating the environment. We know that, for the most part, human activities are the leading force in the creation of pollution, whether these activities are carried out by the individual, an organisation, or a whole industry. The time for change is here, and it is vital that organisations in the HoReCa sector join the fight against pollution too. In a study conducted to measure the effects of tourism on pollution, global tourism was accountable for 8% of global greenhouse gasses (Lenzen et al., 2018). With tourism expected to grow by 4% each year (Lenzen et al., 2018), the impacts of tourism on pollution will only be lessened if organisations in this sector change their behaviours. To get a full understanding of the pollution creation for different aspects of HoReCa businesses, it is important to first note that there are both direct and indirect behaviours that can cause pollution.

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Direct Behaviours

Direct behaviours that impact the creation of pollution are the actions taken by an organisation that can be fully influenced by the business owner or manager (European Commission, 2013). **We have already seen some examples of direct actions that impact the creation of pollution, namely energy consumption and product procurement.**

The production of fossil fuels for consumption as well as their use in the generation of energy accounts for 80% of Europe's greenhouse gasses (European Commission, 2020a). In chapter five, we explored the relationship between energy consumption and the various processes in a HoReCa business, and established a range of actions that can be taken to reduce the consumption of energy, such as: setting controls on lighting and heating systems, insulating and energy proofing the building, using energy efficient appliances, and streamlining practices with the intention of reducing energy consumption. Moreover, **the most significant step a HoReCa business can take to reduce pollution is to switch from finite resources to renewable resources for their energy.** Renewable energy produces no greenhouse gasses, so a move to generating energy from renewable sources instead of fossil fuels will infinitely reduce the carbon footprint of a HoReCa organisation.

We have also briefly explored the concept of food miles (chapter 1), this being the term that refers to the greenhouse gasses created in the production and transportation of food. **Research shows that food production alone accounts for 26% of greenhouse gasses (Ritchie, 2019). While the generation of these greenhouse gasses** is done elsewhere and not a direct result of decisions made by the organisation, the purchasing of products with excessive food miles is deemed to be a direct behaviour that contributes to pollution. **It is important that chefs/purchasing managers/ owners understand the carbon footprint of the produce they put on their menus.**

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Unit 6.2- Pollution in HoReCa

Unit 6.2.2 -Reducing pollution in the HoReCa industry

Did you know that 1,260 litres of water are needed to make all the ingredients for an averaged size (725 gram) margherita pizza (Water Footprint Network, 2020)? Or that 2,400 litres of water are needed to make the beef, cheese and buns in a cheeseburger (EEA, 2019b)? If we take a deeper look at the environmental impact of a cheeseburger, the production of an average beef patty creates more carbon emissions than driving a large car for 15 kilometres (EEA, 2019b). The European Commission (2013) examined the carbon footprint of a restaurant meal and found that 87% of its emissions were offsite greenhouse gasses and can be reduced through green procurement. HoReCa businesses can reduce the impact that their chosen ingredients have on the environment by buying local, naturally produced and seasonal products, reducing air, land and water pollution in the process.

(European Commission, 2013)

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As previously discussed, sorting, recycling and reducing packaging are all actions that reduce pollution. The correct recycling of packaging materials like plastic or aluminium prevent these materials from being either sent to landfill, thus reducing land pollution, or from being incinerated which would reduce air pollution. In addition to this, by sending these materials to a recycling plant where they can be repurposed, there are estimated 50-70% reductions in energy and greenhouse gasses compared to producing these products from new/raw materials.

(European Commission, 2013)

The procurement of eco-friendly products doesn't only apply to food products. Earlier in this chapter, we also examined the concept of **moving to ecolabel chemical products**, or perhaps moving to homemade cleaning products. This action has a threefold impact on the environment – it **reduces air pollution in its production, it reduces land pollution in situations where leaks from chemical plants occur, and it reduces water pollution in the waste water which is a consequence of the cleaning process.**

(European Commission, 2013)

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Indirect Behaviours

Indirect behaviours are the actions that management does not have control over and cannot directly influence. These are usually activities related to a lack of information on behalf of local service providers, and the behaviours of third-party influencers, like customers and guests.

(European Commission, 2013)

On the one hand, we have seen the effectiveness of a properly implemented waste management policy on reducing pollution to land, air and water. On the other hand, however, there can also be indirect impacts on pollution from waste management. This mostly applies to the management of water and sewage waste. In Europe, we are very fortunate that clean water comes from the tap and dirty water is disposed of down the drain (EEA, 2019c). In most cases, wastewater treatment is carried out by local, regional or national authorities.

There is little or no influence to be made by business decision makers in the process. Nevertheless, i**t's important that businesses in the HoReCa sector understand where their waste is going and how it is being treated**. Water waste treatment centres in urban areas work to remove toxins and bacteria that are harmful to the environment before the water it is released back into nature (EEA, 2019c). However, there are cases where waste is being released straight back into the environment without being treated with harmful effects to natural ecosystems. For this reason, it is crucial that HoReCa business owners inform themselves on the local provisions for water waste treatment.

One of the most unpredictable indirect behaviours that affects pollution levels is that of customers or guests. It is not possible for managers or business owners to offset some actions taken by customers. For example, the mode of transport used to get a customer to and from a hotel or restaurant can have considerable effects on carbon emissions (European Commission, 2013). While this is not something that can be controlled, **there are some behaviours of guests you can hope to influence, such as: attitudes towards separating waste in bins provided; reusing towels and linens in rooms; bringing reusable containers or cups to cafés; switching off lights and appliances that are not being used**. Information is key to guiding the behaviours of guests. As mentioned in previous chapters, outlining zero waste policies to encourage customers can prove to be a very successful strategy, and in doing so lessen the carbon footprint of the organisation (European Commission, 2013).

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Other Forms of Pollution

Although air, water and land pollution have the most significant impact on the environment and wellbeing of the earth's population, there are other forms of pollution that must be taken into consideration when discussing the HoReCa industry, namely light and noise pollution.

Most frequently occurring in built up urban areas and cities, **light pollution is defined as excess light in the sky at night** (National Geographic, 2020). It can be hard to identify light pollution, as it very often depends on human perceptions. For example, one person's atmospheric lighting may be another person's irritation. **Five of the most common types of light pollution are: light trespass, clutter, sky glow, glare, and over-illumination (Hub Pages, 2020). Light pollution is one of the least talked about forms of pollution, but it's impact on the environment and human health must not be overlooked.** Looking firstly at the impact on health, excessive exposure to light at night-time can slow the body's production of melatonin. Melatonin is a hormone that helps keep your immune system fighting against any toxins in the body. Reduced levels of melatonin have been attributed to many forms of cancer (Hub Pages, 2020). Light pollution can also be harmful to the environment. Not only has it been connected to the increase of algae build up on lakes, but research also shows that increased light in the night sky can create confusion for nocturnal animals in differentiating between night and day (National Geographic, 2020). Furthermore, it is estimated that 4 to 5 million birds die as a result of collisions caused by light pollution every year (Hub Pages, 2020). Light pollution cannot be ignored and must factor into the pollution reduction practices of HoReCa businesses. One suggestion, from the European Commission (2013), is the installation of timer and sensor controlled outdoor lighting, angled in such a way as to provide minimal or no up lighting.

The final form of pollution that must be considered when discussing the HoReCa industry is noise pollution. Similar to light pollution, noise pollution is not often considered and occurs regularly in built up areas. **Noise pollution is defined as excessive noise in an area** (National Geographic, 2020). Although there are no specific health effects, noise pollution can irritate people in the locality. **On an environmental level, it can be detrimental to some animals, especially those depending on sounds waves and sonar** (National Geographic, 2020). Managers and owners of HoReCa businesses should be aware of any noise pollution their organisation is emitting. It is important that any outdoor activities or social events are mindful of local curfews and local inhabitants. Additionally, accommodation providers should consider the noise pollution from surrounding businesses, as this could factor in the comfort level of their guests. To combat this, sound proofing walls, ceilings, and windows will help to keep out noise in the area (European Commission, 2013).

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Unit 6.2- Pollution in HoReCa

Unit 6.2.2 -Reducing pollution in the HoReCa industry

Make the Change, Reduce Pollution

It is clear that there are a number of actions that could help businesses in HoReCa to reduce their pollution generation. Such a large array of potential actions can lead business owners or managers to wonder "where do I start?". To help with this, we have created a 'Reducing Pollution Checklist'. Combing all of the knowledge shared throughout this handbook, appendix 6.2 of this chapter provides a comprehensive checklist of measures that can be done by HoReCa organisations to reduce pollution. This checklist ranges from best practice changes actions, to green procurement or larger investments.

Unit 6.2.3 - Measuring your carbon footprint

Best practice strategies for businesses to manage their carbon emissions will of course vary depending on the business size, the good or service offered, and the location. There is one common recommendation present in all strategies, and that is the need for businesses to understand and measure their carbon footprint. **It is essential that business calculate their carbon footprint before taking any action;** this way they will be able to monitor and assess the success of the strategies they put in place (Carbon Trust, 2018). For some businesses, there is a requirement on a local or national level to calculate and report their carbon footprint, while other businesses like to do this as part of a wider strategy. So, how does a business in the HoReCa sector go about assessing their carbon footprint?

Calculating Carbon Emissions

In a study carried out about the best methods for carbon foot printing, Carbon Trust (2018) have determined that there are two methods used to calculate the carbon footprint of an organisation: measuring the carbon emissions for the organisation as a whole, or, measuring the carbon emissions of a specific product or service. Looking first at the activities collectively undertaken by a business, Carbon Trust (2018) outline six steps that should be taken to calculate an organisational carbon footprint - see figure 6.4. Carbon Trust (2018) have also outlined a step-by-step guide for measuring the carbon footprint of a specific product or service. This is a similar approach to that of the organisational calculation but is outlined in five steps. – see figure 6.5.

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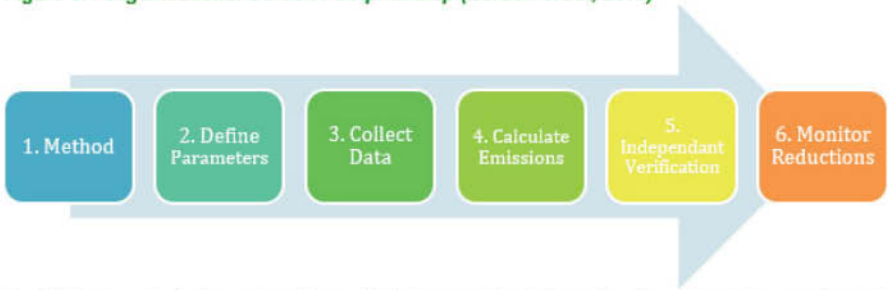
Unit 6.2- Pollution in HoReCa

Unit 6.2.3 -Measuring your carbon footprint

Figure 6.4 ***Organisational Carbon Footprint Map (Carbon Trust, 2018)***



1. **Method** – It is important to establish a method for collecting the data required for calculating carbon emissions, ensuring to use the same method in later calculations. This will safeguard more accurate calculations.

2. **Define Parameters** – Set clear instructions on which aspects of the business will be assessed. The bigger and more complex the organisation is, the more difficult this can be, but it is important that these parameters are set. Some examples of activities: fuel consumption, electricity consumption, supply chain goods and services, distribution of services or good to customers, and waste management.

3. **Collect Data** – Collect data from fuel (both for the premises and any transport receipts), electricity and water bills. These bills will give unit amounts of usage for each resource. Gather information about volumes of waste and try to obtain mileage information for products or services provided by suppliers. It is important to note areas where data is not available too.

4. **Calculate Emissions** - Carbon footprints are measure in tonnes of C02. To calculate this, you must use the data collected in the previous step and apply it to a standard emissions equation, called "emissions factors".

5. **Independent Verification** – Once this assessment of carbon emissions is completed, businesses may want to have their calculations verified by an independent company – especially in the case where these figures will be submitted to local or national agencies. This step however is optional.

6. **Monitor Reductions** – The final stage is to monitor the carbon emissions. Repeating steps 1-4 will allow businesses to assess the success of their carbon reduction strategies.

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Figure 6.5 ***Product/Service Carbon Footprint Map (Carbon Trust, 2018)***

1. **Map out the Processes** – Focusing on one specific product or service, map out or list all of the activities, processes, and materials/ingredients that are used to produce it.

2. **Define Parameters** – Decide on which aspects of the business will be assessed. Focus on emissions from direct actions rather than indirect actions, such as the emissions created by a customer/guest.

3. **Collect Data** – Collect consumption data from activities, processes and materials. Like the data from an organisational calculation, collect information on the consumption of fuel, electricity and water used to create the product or service. Again, seek to gather information about volumes of waste, and figures for transport mileage.

4. **Calculate Emissions** – Using the data collected, calculate the carbon emissions using the emissions factors equation (found online).

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Unit 6.2- Pollution in HoReCa

Unit 6.2.3 -Measuring your carbon footprint

Carbon foot printing is a complex process. It requires commitment, time and accuracy to be completed effectively. In addition to the two methods outlined above, there are a range of online tools available to calculate the carbon emissions of businesses. Some of the providers of these online tools, also offer paid carbon footprint assessment services. This may be useful for business managers/owners who may not feel confident in doing this process themselves, and/or may not have the time to commit to it. Figure 6.6 has some examples online tools than can assist HoReCa businesses with this.

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Figure 6.6 Examples of Online Calculators for Carbon Emissions

Carbon Footprint: https://www.carbonfootprint.com/small_business_calculator.html

Carbon Trust: https://www.carbontrust.com/resources/tools/carbon-footprint-calculator

Climate Care: https://climatecare.org/calculator/

Benefits of Carbon Foot printing

Carbon foot printing can provide many benefits for HoReCa businesses. Not only does it help management and staff to understand the carbon emissions inherent in the business processes, it also helps businesses to identify possible cost saving opportunities and to manage any potential long term risks the organisation may have.

(Carbon Trust, 2018)

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There are also reputational benefits for businesses. Customer's like to be informed about the carbon costs of their purchases or practices too. According to a Carbon Trust survey, 67% of consumers in Germany, France and the UK would like to see carbon footprint labelling on their products (Carbon Trust, 2018). The benefits of green marketing opportunities shouldn't be overlooked by HoReCa businesses. The commitment of an organisation to reduce carbon emissions can help differentiate them from other competitors in their sector. Thorough promotion of carbon emission strategies can also help to enhance the brand and overall perception of the business, potentially attracting new customers and guests to the establishment. For instance, 75% of consumers surveyed in France said they would take a more positive view of a company that had actively worked to reduce their carbon footprint.

(Carbon Trust, 2018)

Appendices

Appendix 6.1 – Chemical management checklist

Area	Service	Task
Efficient Practices	Cleaning	Turn off taps during cleaning
		Use microfiber cloths and mops
		Use a single flush of 3 litres on a dual flush toilet when cleaning
		Dilute concentrated cleaning products according to the manufacturer's instructions – it is important to note that dilution volumes may need to be adjusted based on the hardness of water
		Avoid the use of fragrances and air fresheners where possible
	Laundry	The dose of chemicals used should be measured to the volume and material make-up of laundry
		Pre-treat or "spot" stained materials with stronger chemicals like hydrogen peroxide
		Use detergents that work as lower temperatures
	Other Amenities	Maintain the appropriate temperature of a swimming pool through optimised management, thus reducing chemical consumption
		Convert existing outdoor swimming pool to a natural pool through the installation of natural plant-based filtration systems

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Completed		Notes
Yes	No	

Appendix 6.1 – Chemical management checklist

Area	Service	Task
Chemical Monitoring	List	Type and quantity of chemicals
		Quantity of chemicals purchased
		Ecolabel or not environmentally friendly
	Plan	Examine current levels of chemical left
		After one cleaning/laundry cycle, measure the volume remaining to establish the volume used at current levels
		Examine the expected chemical use, following the dosage set by manufacturers
		Set new targets for chemical use
		Clearly mark the correct dilution levels on cleaning equipment
		Install automatic chemical dosing units if needed
	Involve	Create chemical data sheets outlining the following: chemical type, use, suggested measurements, health and safety
		Appoint a leader to implement the organisation's chemical policy
Staff Training	Topics:	Chemical management
		Efficient Cleaning
		Health and Safety when using chemicals

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Completed		Notes

Appendix 6.2 – Pollution reduction checklist

Area	Service	Task	P
			Air
Energy	Change of Practice	Keep hot plates, grills, hobs, and gas burners clean	x
		Turn off (or lower temperatures) on grills, heat lamps, extraction fans etc when not in use	x
		Create a regular servicing and cleaning schedule for all appliances, including servicing thermostats and timers	x
		Install microwave ovens to cook or reheat smaller quantities of foods	x
		Avoid overfilling kettles and saucepans, and use lids to retain heat	x
		Only switch on equipment when necessary - discourage the practice of switching on equipment that is not needed	x
		Make a note of preheat times on appliances and display them somewhere clearly for kitchen staff	x
		Create a regular servicing schedule for dishwashers, and regular plumbing checks for taps and drains	x
		Maximise loads in dishwasher by stacking correctly, and avoid half loads being run	x
		Use economy setting on dishwashers where appliance	x
		Move refrigerators and freezers away from heat generating sources	x
		Create a defrosting schedule	x
		Create regular maintenance schedules for heating systems and radiators	x

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Appendices

Pollution Reduced			Completed		Notes
Water	Land	Light & Noise	Yes	No	
x					
x					
x					
x					
x					
x					

Appendix 6.2 – Pollution reduction checklist

Area	Service	Task	P
		Create regular maintenance schedules for air conditioning or cooling systems, and a clean rota for fans and filters	x
		Create a cleaning schedule for ventilation filters, ensuring grease traps in the kitchens are periodically cleaned	x
		Switch off all non-essential lighting out of hours	x
		Install timers and sensors for lights in low occupancy areas	x
		Keep lamps, bulbs, light fixtures clean and free from dust	x
	Investment	Invest in establishing renewable energy sources, like solar and wind power, on or off site of the business	x
		Install windows with triple glazing that will maximise protection of heat and cool air	x
Waste Management	**Change of Practice**	Separation of waste based on the material type: glass, metals, plastic, paper,	x
		Replace single use plastic condiments with refillable bottles	x
		Replaces plastic and paper cups with glasses and ceramics	x
		Replaces plastic water bottles with glass refillable ones	x
		Remove single use textiles like paper napkins and tablecloths and replace with reusable textiles	x
		Turn off taps during cleaning	
		Use microfiber cloths and mops	
		Use a single flush of 3 litres on a dual flush toilet when cleaning	
Chemical Use	**Change of Practice**	Dilute concentrated cleaning products according to the manufacturer's instructions – it is important to note that dilution volumes may need to be adjusted based on the hardness of water	

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Appendices

ollution Reduced			Completed		Notes
x					
		x			
		x			
		x			
x	x				
x	x				
x	x				
	x				
	x				
	x				
	x				
x					
x					
x					
x					

Appendix 6.2 – Pollution reduction checklist

Area	Service	Task	P
		Avoid the use of fragrances and air fresheners where possible	x
		The dose of chemicals used should be measured to the volume and material make-up of laundry	x
		Pre-treat or "spot" stained materials with stronger chemicals like hydrogen peroxide	x
		Use detergents that work as lower temperatures	
		Maintain the appropriate temperature of a swimming pool through optimised management, thus reducing chemical consumption	
		Convert existing outdoor swimming pool to a natural pool through the installation of natural plant-based filtration systems	
Supply Chain	Green Procurement	Choose ecolabel cleaning and hygiene products	x
		Choose sustainable ingredients for menus - sourced locally, grown organically, in season etc	x
		Select recyclable packaging materials	x
		Use green energy - source green electricity generated through renewable energy sources off site	x
Building		Ensure the building is fully sealed to prevent heat loss during winter, and cold air loss during summer	x
		Check insulation levels of the building and increase where possible to reduce heating requirements	x
		Install energy efficient lighting, indoors and outdoors, that has minimal up lighting	x
		Use non-toxic paints during internal decoration	x
		Install heat recovery systems to reuse heat generated through business practices, like cooking	x
		Ensure proper sound proofing of the building to prevent noise pollution	

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Appendices

ollution Reduced			Completed		Notes
x					
x					
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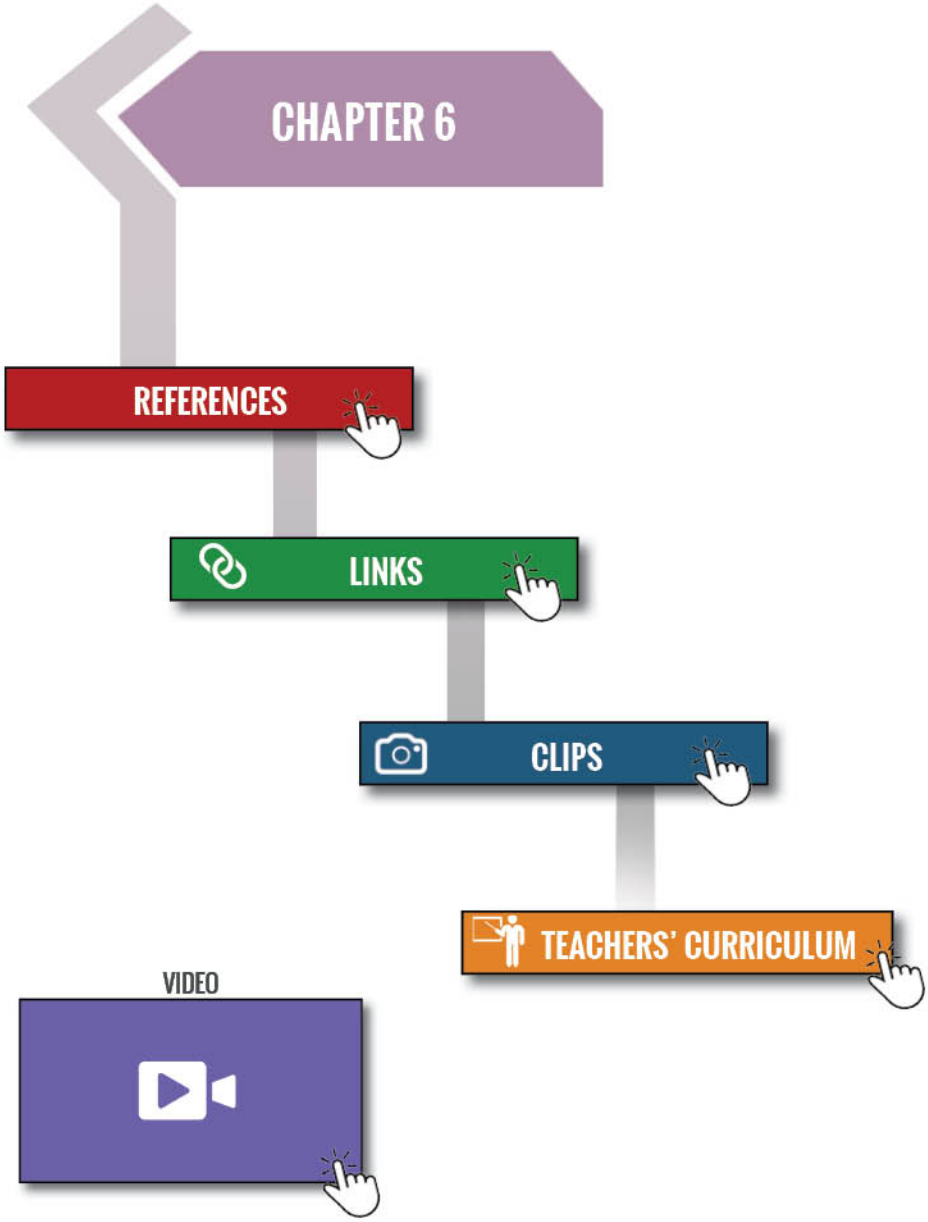

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Conclusion

The 'Zero Waste Power in HoReCa' project aims to address environmental challenges faced by hotel, restaurant and catering industries in Europe, and to promote the advantages and methods of a zero- waste strategy through the development of this curriculum. Focusing on business owners and managers, as well as vocational education participants, this curriculum has raised the awareness and understanding of zero waste practices. We have examined best practices changes in procedures that can be carried out across HoReCa businesses. We have also explored the benefits of implementing audit controls and performing regular monitoring, in addition to the impacts of green procurement. There were six areas of focus in this curriculum: kitchen organisation, menu planning and sustainable food, waste reduction and recycling, packaging, energy, and chemical and pollution reduction. The findings in each chapter are presented below.

Chapter 1: Kitchen Organisation in HoReCa

A zero- waste approach to kitchen operations in the HoReCa organisations requires an overall understanding of undergoing practices. From a perspective of the industry as a whole, a turn in a more sustainable direction is not possible, unless businesses are aware of the mistakes that they make and opportunities available to them for improvements. **Food waste is one of the biggest challenges faced by hospitality, catering and restaurant businesses in thier kitchen operations**. Not only does it contribute to a negative image of the sector in relation to the environmental impact of food waste, but it also results in high costs for individual businesses. Hence, reducing food waste can be considered as a key factor to greater implementation of the zero-waste approach in the HoReCa organisations.

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Measuring current food waste is the first step to introduce zero waste approach to a HoReCa business. A food waste audit tool was presented to support organisations and build awareness of the importance of regular monitoring activities. Conducting a food waste audit for a kitchen in a hotel, restaurant or catering business provides data and information on the type of waste generated, its volume, origin and cost associated.

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Chapter 2: Menu Planning - Sustainable Food

Menu planning is the practice of researching and selecting meals, food and drink items that the catering or restaurant businesses are going to provide to guests. It is a complex process related to such aspects as meal quality, consumers expectations, products and ingredients availability, consumers needs and values as well as environmental impacts. The core aim of menu planning process is maximising business' profitability. In this a more modern world, where expectations of consumers in the face of climate change are shifting the general trends in the way that food is grown and prepared, HoReCa organisations need to adjust their menu planning strategies to new realities.

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Sustainable food consumption has become a new standard, and as research has shown, sustainable practices will soon become key elements determining success on the market. However, it should be noted that a change towards more sustainable menu planning is equally motivated by the impacts that food related sectors have on the environment, accompanied by a clearer understanding of the positive impacts that hospitality and catering industries can have on consumption behaviours on a broader scale.

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Chapter 3: Waste Reduction and Recycling

General operations in a HoReCa business generate great amounts of waste on daily basis. That waste impacts negatively on the social, economic and ecological environment. Hence it is extremely important for businesses, and the HoReCa sector in general, to undertake actions aiming to minimise those negative impacts. **Mapping, measuring and monitoring waste generation are best practice methods that should become a standard practice in hotel, restaurant and catering organisations.** The support in this process is provided by the circular economy model and recycling strategies. There are various methods available for organisations that will support them in increasing the waste reuse and recycling rate. However, **due to the amounts of waste generated, it is clear that recycling is not enough anymore. HoReCa facilities need to concentrate on reuse and waste reduction strategies.**

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Waste generated in HoReCa organisations comes from all types of activities and operation areas. Organic waste, glass, paper, cardboard, plastic and metal are named among the main waste fractions. The HoReCa sector is considered as one of the key contributors to packaging waste in Europe. Additionally, waste in the HoReCa sector is also related to energy and water consumption.

An effective strategy for solving the waste problem in individual organisations needs to be based on recognising the main areas contributing to waste generation and identifying the main waste types produced. Once organisations build an understanding and a realisation of this data, there are multiple tools and resources available to support them in successful implementation of waste management and reduction strategies. Some of those tools were presented in the third chapter.

Chapter 4: Packaging

Packaging is defined as the material used to display, contain, protect or transport a product. The most common materials used in packaging are plastics, glass, paper and cardboard, wood, and aluminium. The types of packaging used depends on the following: transport methods, distance and duration of time travelling, the product type, any preservation required, marketing needs, shelf-life expectations and handling. The volume of packaging waste for Europe was measured at 86.4 million tonnes – that equals to an average of 169.7kg of packaging waste produced per resident of the EU 28 countries. The tourism industry contributes significantly to packaging waste in Europe. Tourists generate nearly twice as much solid waste per person as residents. The generation of packaging waste in the HoReCa sector can be traced to four main processes: transportation, production, disposal and cleaning.

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Monitoring is an essential part of any waste management plan. An initial assessment is needed to see what the sources of packaging waste are. Once that has been done, a plan to regularly monitor packaging waste should be created. Continuous monitoring will help to manage the costs associated with waste disposal. It will also help to plan for future reduced packaging. A heavy reliance on landfills in the past has meant that landfill space is quickly diminishing with time. It is important that a strategy for the correct separation and disposal of waste is created. Materials should be sorted by type: paper/cardboard, glass, plastic, aluminium and metals, wood. Where possible, these materials can be further sorted by weight, for example with paper sort from light weight paper to heavy duty cardboard. Some packaging materials can be repurposed or returned to suppliers.

Chapter 5: Energy

Energy consumption is a significant part of all businesses in the HoReCa sector. Therefore, it follows that it should be given due consideration by business owners, senior management, employees, and to some extent guests/customers too. In this chapter, we examined the main areas of energy consumption in HoReCa companies – lighting, heating, and cooking. We discovered that simple changes in practices with little or no financial investment by the business can have an immediate result in reducing energy use. **Actions such as, switching off appliances, changing light bulbs, reducing the volume of laundry can all work to lower the energy consumed by an organisation. We also explored actions that require more of an investment like efficient appliances, regular maintenance of appliances, and improvements that can be made to the building's envelope.**

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Common across all research was the recommendation that an energy monitoring plan is needed. This will allow organisations to assess their current energy consumption and where it was come from, and to measure the reduction in energy from their change in practices and larger investments. It was also noted that the success of such initiatives can depend on having a dedicated energy manager or team, who will work to ensure energy policies are followed and regular monitoring occurs. Finally, this chapter briefly evaluated the employability of renewable energy resources in providing energy for HoReCa businesses – evaluating the adaptability of solar power, wind power or biomass energy. While these sources are beneficial to the environment, it is not always a plausible option for companies to establish a renewable energy source on-site. So, it was recommended that businesses investigate the opportunity to source 'green electricity' from local vendors.

Chapter 6: Chemical and Pollution Reduction

This chapter was divided into two sections. First, we examined the process of reducing chemical use in HoReCa industries. Chemical substances can be found in a range of products, from food to beverages, cleaning supplies to hygiene products, and textiles like linen and towels to toilet paper. While these chemicals are used to enhance products in various ways, they are hugely harmful to the environment and to health. For example, chemical run offs from factories, wastewater from cleaning, and air pollutants from fresheners all add to ongoing issues with water, air and land pollution. In addition to this, we saw that chemicals can cause issues with the skin, respiratory and immune systems, and in some cases include cancer forming cells

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It's clear that steps need to be taken to reduce chemical use, so in this chapter we explored the following options:

1. Change of practice: Modifying cleaning and laundry practices for reduced chemical use.
2. Employee Training: Train staff on efficient cleaning methods, health and safety of handling chemicals, and chemical management.
3. Monitoring: Establish a plan to monitor the use of chemicals in the business, examining the quantities of chemicals bought and used, and set targets for future use.
4. Ecolabels: Replace products with ecolabel alternatives, reducing the health risks and environmental impacts associated with traditional products.

In the second part of this chapter, we looked at pollution. We defined the three main types of pollution: water, air and land. Direct behaviours, such as energy use, current practices and green procurement can all have a significant impact on pollution generation. However, it is important to note that there are also indirect processes that can impact pollution, for example: water waste management and the behaviours of third-party influencers. HoReCa businesses must also be aware of other types of pollution in the form of light and noise pollution. We outlined some of the key steps businesses can make to reduce pollution, to name a few: switching to green energy, green procurement of products, change of practice. Finally, we assessed the concept of carbon foot printing. Carbon foot printing can be very useful to HoReCa businesses in terms of creating an environmentally friendly brand. There are also potential cost savings for organisations. The two recommended methods for measuring the carbon footprint are:

1. Measuring the carbon footprint of the whole organisation
2. Measuring the carbon footprint of a specific product or service.

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Calculating Zero Waste

There is no quick and easy way to reach zero waste. Achieving zero waste in a HoReCa business will require the decision makers to follow the zero waste ethos and implement the practices outlined in this curriculum across all areas of the business. Every business in the HoReCa industry is different, even those that offer the same service will differ in their waste generation, energy consumption and levels of environmental impact. As a result of this, there is no set figure that can determine zero waste across the HoReCa sector.

The only way you can determine if your zero waste practices are taking effect is to measure and evaluate your waste and consumption at multiple stages. We have created useful tools to help you do this:

- Appendix 1.1 and 1.2 will help you to determine the volume and cost of the food wastage in your business.
- Appendix 2.1 offers a checklist to help you develop the sustainable plate
- Appendix 3.1 provides you with a check list of actions to follow to reduce food waste.
- Appendix 4.1, 4.2 and 4.3 will help you to evaluate the type and locale of your packaging waste and the cost this is incurring for your business.
- Appendix 5.1 provides a checklist to establish energy consumption in your business, ad appendix 5.2 outlines the actions that will help you reduce your energy use.
- Appendix 6.1 give you a checklist to help ensure you are managing your chemicals correctly, and lastly appendix 6.2 is a tool developed to help you reduce your pollution generation.

The key to using these tools for zero waste is to take an initial measurement, implement the best practices outlined in the corresponding chapters and monitor the results of your actions by taking further measurements. The aim of these tools is to reduce consumption, make your practices and resource usage more efficient, and to reduce waste.

Thank you for taking the time to read our Zero Waste Power in HoReCa curriculum handbook. If you have any questions, or would like to learn more about this project, please visit our website at **http://www.zerowastepower.eu** or contact us on Facebook @ZeroWasteProjectEU.

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