



GREEN GAMES IN TOURISM & HOSPITALITY

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STATE OF THE ART REPORT

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0. Executive Summary

- A state of the art to outline the literature and current practices relating to vocational education, waste management and tourism and hospitality

1. Introduction

1.1. Problem Statement

Within the European Union, there has been a focus on establishing regulations with regard to environmental awareness and prevention solutions in European countries over the past 30 years. One particular area of focus with regard to the regulation of environmental solutions



and the “green movement” is the waste of food and water. A resolution passed at the European Parliament meeting in Strasbourg designated 2014 as the “European Year Against Food Waste” (“European Parliament resolution of 19 January 2012 on how to avoid food wastage” - <http://bit.ly/10kHwMN>). This European Parliament resolution “calls Member States to encourage the introduction of food education courses, at all levels of education”.

As noted by the European Parliament, “Among other initiatives, member states should introduce school and college courses explaining how to store, cook and dispose of food” (“Press Release - Parliament calls for urgent measures to halve food wastage in the EU” - <http://bit.ly/wzLFyX>).

In the context of this very conformant European priority, the central aim of the proposed project is to develop an online digital game and game-based-learning-methodology, along with associated guidelines and training for learners, for the understanding and implementation of knowledge, skills, strategies, tools and regulations related to food and water waste and energy management within the Tourism and Hospitality sector, in addition to advocating attitudinal change and endorsement of relevant environmental values.

According to a report titled “Attitudes to vocational Education & Training” (<http://bit.ly/qfRCgC>), developed by the Directorate-General for Communication of the European Parliament in 2011, “With VET’s ability to guide & influence society in line with the EU’s wider policy goals in mind, it is disconcerting to find that less than a half (48%) of all respondents think VET encourages environmentally friendly attitudes, with 30% saying it fails to do this. At least one-third of respondents agree that VET does not promote environmentally friendly attitudes in 11 countries. This outcome poses a challenge for VET’s potential in supporting the green agenda & in assisting Europe’s transition to a low-carbon economy”.

The lack of environmental consideration in VET is due, in part, to the focus of European & National priorities on awareness & promotion, as opposed to education & the provision of educational material. Therefore, the requirement to contribute to VET training to help educate on “the green economy” remains relevant, both for the well-being of EU citizens, but also for the development the economy (“We must see that ‘green’ & growth go together” – Barroso, J.M. European renewal: state of the Union address 2011. European Parliament, Strasbourg).

This is particularly relevant for the tourism & hospitality sector. A report, “Hospitality going green”, issued by Ernst & Young in 2008, has noted that: “Hotel companies are increasingly encouraging environmentally friendly practices and embracing sustainability through both developmental and operational strategies with initiatives such as education programs” (<http://bit.ly/YkgzIL>). Another research paper, developed by CEDEFOP in 2012 titled “Green skills and environmental awareness in vocational education and training”, has noted that major policies across countries (in particular in Greece) include “to integrate environmental sustainability principles within key sectors, e.g. tourism” (<http://bit.ly/KZ0qm6>). Also, in a CEDEFOP report “Skills for green jobs”, in 2010, the potential for green restructuring of the economy is noted as being most obvious across a range of economic activities, including “other economic activities, for example leisure and tourism” (<http://bit.ly/g4pUkE>).



The Green Games in Tourism/ Hospitality project aims to innovate and support improvements in VET systems and practices by developing a digital “serious” game along with associated guidelines and training for students, vocational teachers and others receiving, providing or participating in vocational training in the tourism and hospitality sector.

1.2. Conducting the Study

This report provides an overview of the current state of the art of environmental awareness and waste management practices in the EU and the pedagogy related to the teaching of these subject areas in the tourism and hospitality sector in particular.

The study has been conducted through extensive desk based research in order to develop an overview of the current state of research in the area of food & water waste and education, particularly in the tourism and hospitality industry & with a view to EU regulations & requirements. The results of this report seek to develop a comprehensive knowledge base for the GG/TH project encompassing the most important aspects of the subject area with the express purpose of supporting students, vocational teachers and others in VET in the hospitality and waste management sectors.

In addition, this research aims to acknowledge the various benefits of presenting such information through digital games. It offers examples of their use in developing specific hospitality, waste management and related competencies and their applicability to real life scenarios and good practice. It looks at current digital games in the tourism and hospitality education sector, as well as game genres such as resource management games in other fields in order to determine the most appropriate and pedagogically effective features that would be applicable to this game.

A needs analysis has also been conducted to determine the requirements in current hospitality and waste management industries and the difficulties students and vocational teachers face with regard to the subject area.

This research is going to provide the project group with a clear understanding of what already exists in this area so that the project will be in a strong position of understanding when it comes to the development of the projects game. In addition, this report will be available for students and trainers and will provide them with information related to digital resource management games, digital games in the tourism & hospitality and waste management sectors and the transfer of competencies through such games.

The desk-based research has been key for this study – documentation of the state of the art regarding food & water waste & energy management education in the tourism and hospitality industry has been a key factor. Furthermore, interviews have been held with different hospitality schools to understand the pedagogy of the sector and identify the related pedagogical opportunities.

2. The Tourism and the Hospitality Sector in Europe

This chapter is aimed to provide an overview of the tourism and the hospitality sector in general. Some of the main environmental impacts of the sector are then described and emphasis is made in three of the main areas of the hospitality sector where we identify that the project “Green Games in Tourism & Hospitality” will have opportunities to act upon: waste and food waste, water use and energy management. Information and statistics are provided for these three main areas of concern so that we can better understand the impact of the sector and more clearly define the scope of the project.

Tourism

The growth of world and European tourism has reached new proportions. In 2012, one billion tourists travelled throughout the world with over half - 535 million - visiting a European destination. This expansion is set to continue with international tourist arrivals in Europe due to reach 744 million by 2030¹. The sector continues to grow, with number of visitors to Europe increasing year on year as shown by Figure 3.1.

International Tourist Arrivals to Europe (million)					
	2000	2005	2010	2011	2012
Europe	388.0	448.9	485.6	516.4	534.2
Northern Europe	46.4	60.4	62.8	64.0	64.9
Western Europe	139.7	141.7	154.4	161.5	166.6
Central / Eastern Europe	69.3	90.4	95.0	103.9	111.6
Southern / Med Europe	132.6	156.4	173.5	187.0	191.1

Figure 2.1: International Tourist Arrivals to Europe (Source: ibid)

The tourism sector generated approximately €335 billion in earnings (in absolute terms) in Europe in 2012, making it one of the largest industrial sectors and key to the EU’s economic and social well being.

This trend, especially in Europe and the USA, is expected to continue with the so-called ‘Baby Boomer’ generation, aged 46 – 65 tending to control more wealth and spending. In the USA alone, this group, by 2015, is expected to control 60% of the wealth and 40% of the funding, and as they approach retirement, much of this will be spent on travel². Growths in the middle class in China and India will also lead to greater tourism and travel, much of it directed to Europe.

¹ World Tourism Organisation *Working Together in Europe - A Shared Leadership* UNWTO, Madrid, 2014

² Deloitte *Hospitality 2015, Game Changers or Spectators?* Deloitte, London, 2010

For many individual Member States tourism is one of the main sources of income and employment. For example in Spain in 2012 tourism accounted for 11% of gross domestic product, and as reported by the latest estimates, generated 11.9% of total employment – the single largest economic sector in Spain³.

Hospitality

A large part of the hospitality sector is closely linked to the dynamics of the tourism economy. The hospitality sector is a diverse industry ranging from hotels, motels, guest houses, restaurants, pubs, bar, cafés, clubs, canteens and caterers.

Hotels and restaurants are obviously an important component of the tourism industry, although it should be noted that restaurants serve locals as well as tourists. Europe is the largest tourism destination in the world with a market share of around 50%, and people are spending over 1.5 billion nights in hotels and similar establishments in the EU27.

Hospitality companies in Europe are predominantly of small and medium-size: 99% have less than 50 employees and as many as 92% have fewer than ten workers on their payroll.

Contribution to the economy

The hospitality sector in Europe is an important contributor to the European economy, through its impact on employment, growth and tax contributions. In terms of turnover the hotel and food service sector counts for more than €1.0tn (70% of the EU tourism sector), equal to approximately 8.1% of total economic output, with gross value added in the sector (the contribution it makes to economic growth) of more than €460bn, or 3.7% of GDP. In 2010, the hospitality sector contributed around €126bn to government treasuries in excise duties, VAT and employment and social security taxes.

The hospitality sector is a highly labour intensive service sector employing about 10 million persons across the EU. As well as directly employing workers in companies operating in the hospitality sector, those companies support, indirectly, the activity in a broad supply chain, as well as the induced, general economic activity generated by employees in the sector. For example, the agricultural sector is notable as a significant contributor of raw materials for the hospitality sector i.e. constituent ingredients in restaurant food and beverages. As such the hospitality sector has a key role in supporting not just economic aims but also social objectives through support of rural and regional economies. Additional sectors that are linked to a successful and thriving hospitality sector include: tourism, transportation, culture, construction, etc.

The sector provides jobs across the skills spectrum: from the highly qualified, to low-skilled and “breakthrough” jobs for those just entering or reentering the labour market. Indeed, a study

³ State Secretariat for Tourism, Ministry of Industry, Energy and Tourism of Spain, Madrid, 2014 quoted in *Working Together in Europe - A Shared Leadership*

carried out by EIM (Small Business Research and Consultancy) in November 1999 for the hospitality sector showed that the hotel and restaurant sector is the most important provider of “first jobs”. The sector thus provides many young people with their first employment experience, allowing them to enter the working world, providing vital experience and training, and opening the door to future jobs. Similarly the sector helps the unemployed to reintegrate into the working environment.

The growth in employment in the sector has been significant, with 29% more people in jobs in 2010 than in 2000 (representing over 2.5m additional workers in employment). This increase is particularly notable when viewed against the wider economy as a whole, where the total number of jobs increased by 7.1% over the period (less than 1% a year). There was a marked divergence in performance after 2008, where general employment in the economy declined, whereas average employment across Europe in the hospitality sector continued to increase (albeit masking some decline in individual countries). As shown in the figure below, the hospitality sector supported approximately 16.6m jobs, or one out of every 13 jobs in Europe. About 10 million European jobs were directly in a hospitality related enterprise and a further 6.4m jobs were stimulated through additional supply chain demand and spending of employees’ wages on other goods and services.

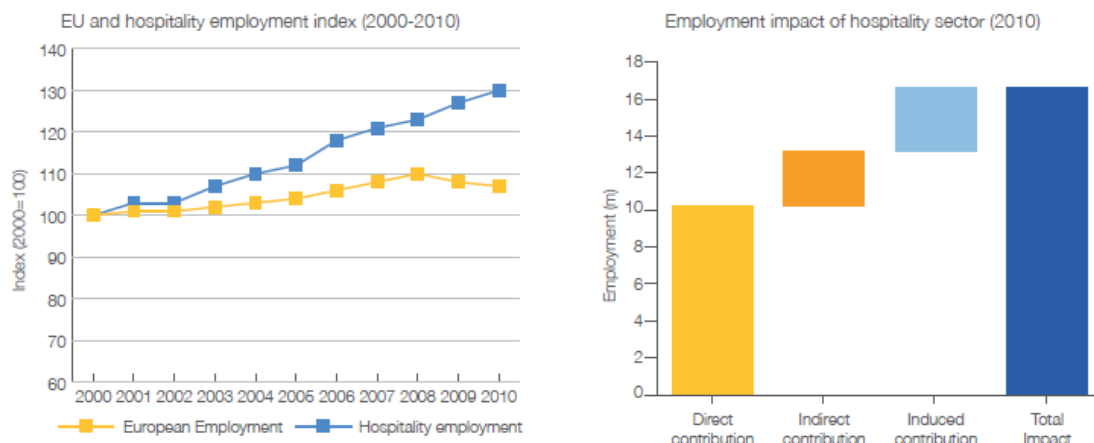


Figure 2.2: Employment index and impact of hospitality sector (Source: Eurostat)

Considering the growth of the tourism and hospitality sector and the related increased consumption of resources and production of emissions, it is now more than ever vital to consider and minimize the environmental and resource impact of tourism, to ensure it is sustainable. This is also vital to ensure that tourism can continue into the future – if our resources are seriously depleted, that may not be a viable option.

2.1. Overview of the Sector regarding Environmental Issues

The tourism and the hospitality sector have been important aspects in the economic development of many regions in the world. However, along with these benefits come negative consequences for the environment (Graci & Dodds, 2008). As one of the world's fastest and largest growing industries, its development is placing great stress on the environment (Persic-Zivadinov & Blazevic, 2010).

Environmental impacts of tourism and hospitality can be both direct and indirect and they can occur at global and local levels. However, the changes that are identified at the global scale are ultimately the resulting effects of the changes occurred at multiple local levels. (Gössling 2002).

The tourism industry is closely linked to climate change as it involves the movement of people from their homes to other destinations and the accommodation and servicing of these people in host locations prior to their returning home. Many aspects of this business cycle are accompanied with a heavy carbon footprint and as more time and money is being dedicated to leisure, the tourism industry is playing a larger role in global greenhouse gas emissions. The World Tourism Organization (UNWTO), in its paper "Climate Change and Tourism: Responding to the Global Challenges," estimates that CO₂ emissions generated directly from the tourism sector account today for 5% of global CO₂ emissions but may be higher (up to 14%) if measured as radiative forcing, i.e. the warming caused by CO₂ as well as other greenhouse gases. To understand the magnitude of these numbers it should be noted that if we compare tourism with the emissions of countries then tourism would be the 5th bigger polluter worldwide. In fact the amount of emissions produced by tourism, an activity that each person is not engaged more than 4-5 weeks each year, is bigger than the emissions produced by billions of people leaving and working for one year in big industrialized countries or new emerging economies.

As tourism is such a multifaceted industry, including sectors from accommodation and restaurant businesses to the transport sector with airlines and car rental companies, the range of pollution both in the local and global scale is wide. For the purpose of estimating emissions, the tourism industry has been divided into three main elements: transport, accommodation, and activities. Although carbon dioxide (CO₂) is the most frequently measured output, other greenhouse gases resulting from people's activities make a significant contribution to global warming. The table below shows the carbon emissions from global tourism's three main components.

Emission source	CO ₂ (metric tons)	Percent
Transport subtotal	985	75
Air transport	517	40
Other transport	468	35
Accommodation	274	21
Activities	45	4
TOTAL	1,307	100
Total worldwide	26,400	—
Share (percent)	—	4.95

Figure 2.3: Emissions from global tourism (Source: UNWTO, 2007)

Transport—particularly aviation, which has a greater warming effect because of altitude—generates more emissions than accommodation, but hotels still account for 21 percent of emissions, as shown. Transport of all kinds generated the largest proportion of CO₂ tourism emissions, at 75 percent. Air transport accounted for 40 percent, followed closely by cars at 32 percent. According to UNWTO estimates, an average tourist trip generates 0.25 metric tons of CO₂, with long-haul flights being the major culprits.

There is tremendous variation in emissions across tourism segments and within individual trips. Trips by coach and rail account for 34% of all trips, but for only 13% of all CO₂ emissions (excluding emissions from accommodation/activities). Conversely, long haul travel accounts for only 2.7% of all tourist trips, but contributes 17% to global tourist emissions.

The hotel sector generates emissions mainly through the use of heating and air-conditioning systems and through the maintenance of restaurants, pools and bars. Naturally, the amount of emissions varies according to the size, type and location of the hotel establishment. (UNWTO).

Chlorofluorocarbons (CFCs) and halons are the main ozone depleting substances used in tourism. Sources for these substances are the construction of tourist facilities and the daily operations such as the use of air conditioners, refrigerators and fire extinguishers. Emissions from jet aircrafts belong to this category as well. (UNEP).

Projections

By 2035, tourism's contribution to climate change may have grown considerably. A recent scenario developed by Scott et al. (2008) considers different emission pathways, including a 'business as usual' projection based on anticipated growth rates in tourist arrivals, as well as distances travelled by various means of transport. These projections indicate that in terms of the number of trips made, global tourism will grow by 179%, while guest nights will grow by 156%. Passenger kilometers travelled will rise by 222%, while CO₂ emissions will increase at by

about 152%. In less than thirty years and if no action is taken today, the CO₂ emission generated by tourism will be more than three times higher than today.

Shift towards sustainability

The Tourism and Hospitality Sector should therefore contribute towards a more resilient economy and environment. In challenging economic conditions it may be tempting to view the protection and management of our environment as a luxury; but as demonstrated herein, protecting the environment can go hand in hand with reducing costs.

In the current economic climate, it is true to say that the easiest Euro made is the Euro saved, and this is most definitely the case for the tourism industry. All tourism and hospitality businesses currently pay waste, water and energy charges, all necessary for the day to day running of the business. However, for many these costs are now a significant overhead, and with prices only likely to rise, this is a real area of concern. Therefore, any supports which can help businesses to cut costs rather than jobs, is key in the current economic climate.

Despite the lack of clear, universally accepted metrics, there is a noticeable shift toward sustainability that is well underway, with momentum demonstrated by a growing number of sustainability programs and initiatives which have arisen both internally in the hospitality industry (via hotel owners, managers and operators) and externally in the environmental community. Current thought in facility management, and specifically hospitality operations, is largely focused on optimizing operational efficiency (and the resultant cost savings) in primarily three areas: energy, water, and waste. Energy consumption, water usage and the generation of enormous amounts of waste are contributors to global environmental problems which are starting to be targeted by the hospitality/hotel industries.

The hotel accommodation sector in Europe is dominated by small businesses, which provide around 90 per cent of the total number of rooms, and studies show that small independent hotels are less proactive about the environment than large hotel chains.

Saving opportunities

Sustainability issues touch on nearly all aspects of hospitality businesses ownership and management, necessitating the alignment of environmental, social, and financial factors to promote responsible business operations over time.

While technological innovation has considerable potential to achieve reductions in greenhouse gas emissions, this will, given the high growth rates in global tourism, not be sufficient to achieve absolute reductions in energy use and emissions. Behavioral changes (tourists) as well as structural change (tourism industry) is therefore of great importance in reversing the trend of growing greenhouse gas emissions in tourism.

Doing sustainable tourism business in the era of climate change is not just political correct; it is a competitive advantage. It seems clear that for those actors embracing mitigation and being pro-active in addressing climate change, there will be new business opportunities. Current societal trends have already created new markets for low-carbon tourism products, and these

markets can be expected to grow in the future. Final consumers are becoming more selective as regards the environmental sustainability of the goods and services they purchase.



Although there is diversity within the hospitality fields, there are common efficiency measures that can be utilised to improve the profitability, reputation and environmental performance across all sectors. Key cost savings can be found in relatively simple changes in the management of energy, water, waste and resource use. Properly managing resources can ensure client comfort and service while providing businesses with the added benefit of cost savings and recognition as a sustainable organisation.

Staff engagement is critical to the success of any sustainability program and will be a powerful driver to change within the organisation. Implementing the necessary process changes required for sustainability and efficiency improvements in the workplace is dependant on the cooperation and involvement of everyone in the organisation. People are generally willing to contribute to being more sustainable and efficient when they are given the appropriate information on how their actions can make a difference in improving the environment and help the business run more effectively.

2.1.1. Food and Food Waste

Food waste is composed of raw or cooked food materials and includes food loss before, during or after meal preparation in the household, as well as food discarded in the process of manufacturing, distribution, retail and food service activities. It comprises materials such as vegetable peelings, meat trimmings, and spoiled or excess ingredients or prepared food as well as bones, carcasses and organs.

Waste management is a challenge for hotspot tourist destinations, owing to the concentrated generation of waste in a small area during peak season. Whilst it is estimated that tourism generates 35 million tonnes of solid waste globally, the hospitality sector in the UK is responsible for 1.8 million tonnes of waste generation per year (WRAP, 2011). The majority of this is from pubs and restaurants, but UK hotels also generate almost 500 000 tonnes of waste per year.

The greatest costs associated with waste are generally not those that are charged at the back door but the actual costs associated with the materials that are being disposed.

According to the report “The True Cost of Food Waste within Hospitality and Food Service, WRAP”, each year the hospitality sector in the UK serves over 8 billion meals, and produces over 2.87 million tonnes of food and associated packaging waste. Nearly 1 million tonnes of this waste produced is food waste. Three quarters of this food waste could have been eaten and is equivalent to throwing away one in six meals served. Throwing this much food waste

away has a considerable impact that goes beyond the commonly reported costs associated with waste collection.

The table below breaks down food waste by Manufacturing, Household, Retail and Food Service sector data. This approximate percentage breakdown does not include the agricultural food waste but it gives an overview of the room of maneuver we have acting upon the food service sector.

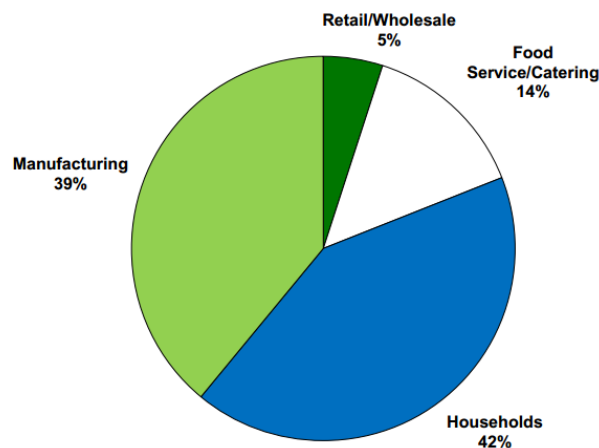


Figure 2.4: Percentage breakdown of EU27 food waste (Source: Preparatory Study on Food Waste)

On this basis, EUROSTAT estimates annual food waste generation in the EU27 at approximately 179kg per capita, generating a total of about 170 Mt of CO₂ eq. in the EU each year. In particular, the hospitality sector generates an average of 25kg of food waste per capita for EU27. There is a notable divergence between the EU15 at 28kg per capita (due to a higher trend of food waste in the restaurant and catering sector) and 12kg per capita in EU12.

According to the report “Preparatory study on food waste across EU 27, by the EC”, while food waste costs approximately €120 a tonne to compost, the costs associated with the purchase, cooking and storage of the food for a restaurant are more than €3,000 per tonne.

Waste Management is one of the simplest tasks any hotel, restaurant or bar can undertake. Solutions are generally of no or low cost with excellent returns. Many solutions focus strongly on employee awareness, the continuity of waste management actions and on-going waste benchmarking.

Waste streams generated by hotels include wastes from construction and refurbishment, consumables (e.g. paper, toner, batteries), durable goods (e.g., furniture, office equipment, appliances), F&B wastes, hazardous materials (e.g. cleaning solutions, fluorescent bulbs), and recyclable oil. Hoteliers employ a variety of strategies to reduce, reuse, and recycle wastes to minimize processing and hauling costs. Vendors are increasingly providing ‘waste-to-energy’ processing services, whereby wastes are processed into alternative energy sources such as natural gas or biodiesel fuel and sold back to hoteliers at reduced prices.

Improving resource efficiency will conserve energy and reduce carbon emissions, as well as save your business money. At the same time it reduces natural resource consumption and reduces carbon emissions.

To improve the resource efficiency there are plenty of practices and recommendations that could be followed. More information about this is given in chapter 4 but it is critical to be conscious about the amount of food waste generated the type of food that is being wasted, the behavior of consumers, the causes by which the food is wasted and the level of knowledge the staff has regarding the life and expiration of food.

Causes of food waste generation strongly resemble those identified in the Household sector and are discussed below (Preparatory study on food waste across EU 27, by the EC):

- Portion sizes
Consumers eat 92% of the food they serve themselves, according to a 2005 study at Cornell University 25 . Where portion sizes are imposed, in cafeterias/canteens for example, food waste is generated that might have been avoided by allowing customers to serve themselves and pay for their serving by weight. There seems to be scope to optimise set portion sizes of dishes. Where a self-service option is not viable, a choice of portion size may reduce food waste generation by recognising that individuals have different portion needs.
- Awareness
Hospitality industry awareness of food waste is growing in line with overall environmental awareness, but is currently still low, according to WRAP's hospitality industry food waste study, there is evidence of significantly higher awareness in businesses that had their food waste collected separately, as workers physically confronted the quantities of food waste they had generated.
- Logistics
Difficulties in planning in the hospitality industry can be linked to variability in the numbers of customers anticipated. Two key issues stand out here:
 - Reservations: where reservations are expected, the quantity of food needed, particularly highly perishable products, is much easier to estimate
 - Buffets: where food is served via a buffet, customers often expect that nothing will run out, particularly in the luxury market, causing businesses to prepare and cook substantially more than will be consumed. Free or all-you-can-eat buffets may furthermore increase the amount of food taken and not consumed by customers. A final logistical issue in restaurants is cooking, according to the 'just in time' principle. Where food is overcooked or not cooked at the same time as the rest of the table's dishes, it is commonly discarded and the process is restarted.
- Attitudes
The practice of taking home restaurant leftovers is frowned upon in some parts of Europe, a practice that would enable substantial reduction of restaurant food waste.
- Knowledge

The lack of clearly defined channels for hospitality industry enterprises to direct edible food towards charitable organisations may strongly impact the diversion of edible food waste from opportunities for reuse.

2.1.2. Water Use

Tourism is both dependent on fresh water resources and an important factor in fresh water use. Gössling (2001) estimated that direct water consumption for tourism in 2000 amounted to 9,274 million m³ globally, representing 3.4 % of domestic water consumption and 0.3 % of total water consumption. This consumption is concentrated in tourism destinations that may be vulnerable to water stress. For example the Mediterranean region has low renewable freshwater resources per capita, but is a tourism, and therefore water-stress, 'hotspot'.

Water stress is a function of renewable freshwater availability, abstraction rates, and the proportion of consumptive use. Because a significant portion of tourism is concentrated in areas where renewable water resources are comparatively small and water stress is high, tourism can account for relatively high proportions of domestic (potable) water consumption in some localities, regions and even countries. Hof and Scmitt (2011) report average water consumption of over 700 L per person per day in Mallorca (Spain) that hosts a high density of tourism. Peak tourism demand often occurs during summer when water availability is at its lowest, and tourist water consumption is often considerably higher, per capita, than resident water consumption. Furthermore, tourism demand for water is projected to increase considerably over the coming decades, while climate change will reduce the availability of freshwater in lower mid-latitude regions such as the Mediterranean and increase the frequency of severe droughts (Gössling, 2011). Thus, tourism can lead to significant local and regional impacts associated with water stress and with energy-intensive desalination and water importation via ship (Mallorca, Greek islands, Italy, Spain).

Similarly, wastewater generation can increase by multiples during peak tourism seasons in popular destinations with smaller indigenous populations. This poses a particular challenge, as treating such peaks in wastewater flows requires high capital investment in 'oversized' modular wastewater treatment plants (WWTP) and careful operational management to ensure adequate treatment under different flow rates. Unfortunately, the level of wastewater treatment is low in some popular tourism destinations, and there is particular concern about inadequate wastewater treatment on the perimeter of the Mediterranean sea.

Water costs are therefore a significant expenditure for the tourism and hospitality sector. Taking into account the average of water consumption per tourist, the water consumption in hotels is estimated in about 14 hm³ of water annually and water costs are likely to rise in future years as greater investment is required within the network to ensure continuity of supply. Tourists need and consume water when washing or using the toilet, when participating in activities such as ski tourism (snowmaking), when using spas, wellness areas or swimming pools. Fresh water is also needed to maintain hotel gardens and golf courses, and is embodied

in tourism infrastructure development, food- and fuel production (Chapagain & Hoekstra, 2008; Gössling, 2001; Hoekstra & Hung, 2002; Pigram, 1995; Worldwatch Institute, 2004).

Water is mainly used in the hospitality sector in the following way:

In the hotel:

- Rooms: The shower is the major consumer of water in the hotel rooms. The toilet and tap represent lower consumption because the client does not stay too long in the room.
- System of domestic hot water (DHW) : Consumption of DHW in a hotel is very important, besides a correct distribution of this throughout the building will minimize losses in the ducts.
- Cooling: The consumption of the cooling towers of a hotel can reach 20-30% of total water consumption.
- Laundry: Hotels generate a lot of dirty clothes (more than 200 kg per wash) which generally washes the hotels own laundry.
- Green spaces: The green spaces of the hotels can become one of the largest consumers of water in the building, therefore, a good choice of plants and irrigation system to use can mean big water savings.

So, hotels consume water on a domestic basis (bathrooms, F&B, laundry), as well as 'process' water for facility operations (heating, ventilation and air conditioning (HVAC), irrigation, cleaning and maintenance). Hotels also collect and in some cases treat greywater (i.e. water generated from domestic activities) and blackwater (i.e. sewage) generated by guests and back of the house operations. Typical water conservation measures employed by hoteliers include fixture retrofits, towel and linen reuse programs, HVAC and plumbing system improvements, and use of recycled / rain water for process and irrigation use.

Up to 50% of high quality drinking water consumed by hotels is used to flush toilets. Simple measures, such as controlling water flow to guest showers and taps can result in considerable savings. A significant cost associated with hot water production is the cost of energy used to heat water. Hot water typically costs 3-4 times more than cold water. Therefore, reductions in hot water use can result in substantial cost reduction.

In the restaurant:

- Restrooms: Currently in most of the European countries the bathroom is required in bars and restaurants. The main use corresponds to the bathroom toilet and urinal.
- Kitchen: The kitchen in a restaurant is where water is used in all activities: used for washing, washing food, cooking, cleaning ... It is important for employees to be aware of water saving technologies and implement water saving habits in the kitchen.
- Bar: Some appliances such as coffee makers and machines are used throughout the day and their primary element is the water.

- HVAC System: Many air conditioning systems in restaurants use water for both heating and cooling.
- Laundry: An efficient washer should not consume more than 12 liters of water per kg of clothes in the normal cotton cycle at 60 ° C , ie 60 l per cycle for a washing capacity of 5 kg.

The largest uses of water in restaurants are associated with equipment and processes that take place in the kitchen. Restrooms follow kitchens as the second highest water use in restaurants.

Reductions in water used by the hospitality sector not only improves competitiveness of the business but also reduces its environmental footprint, by minimising chemicals used to treat water, and energy used to pump and heat water.

Operating costs and environmental impacts are influenced by water use. Industry estimates suggest that implementing water-efficient practices in commercial facilities can decrease operating costs by approximately 11 percent and energy and water use by 10 and 15 percent, respectively. Because food service facilities use hot water for many tasks, reducing water use can provide real benefits by decreasing energy bills.

The introduction of water-saving technologies as well as awareness through publicity campaigns in various languages are tools that help significantly reduce water demand from tourism uses. For example, applying habits and basic water saving technologies such as efficient showers or toilets with 3 and 6 liters of discharge, we can easily achieve savings of about 20% water. These savings amount to about 3 hm³ of water. Small changes mean big savings which not only affect the business economy but also enable better management of the existing water resources. There are plenty of water saving opportunities within the hospitality sector which are further discussed in chapter 4.

Finally, we must not forget the relationship between energy and water. A large amount of energy is used not only to heat water but also to purify the water from the water collection point until its return to the environment once purified. A study by Antonio Estevan in 2002 ("Energy consumption in the cycle of urban water use") calculates the emissions of CO₂ around 9 kg per m³ of water consumed. Typically, electric power produces more emissions of greenhouse gases than other types which suffer less energy transformations such as gas.

2.1.3. Energy Management

Hotel energy consumption is influenced by physical and operational parameters according to the publication "Hotel Energy Solutions (2011), Analysis on Energy Use by European Hotels". The physical parameters common to most buildings include size, structure and design of the building (prevailing architectural / construction practices), geographical and climatic location, the age of the facility, the type of energy and water systems installed, the way these systems are operated and maintained, types and amounts of energy and water resources available locally, as well as energy-use regulations and cost.

Operational parameters that influence energy use in hotels include operating schedules for the different functional facilities in the hotel building, the number of facilities (restaurants, kitchens, in-house laundries, swimming pools and sports centres, business centres, etc.), services offered, fluctuation in occupancy levels, variations in customer preference relevant to indoor comfort, on-site energy conservation practices, as well as culture and awareness of resource consumption among personnel and guests.

Energy consumption in hotels is amongst the highest in the non-residential building sector in absolute values. For most hotels, energy use falls in the range 200-400 kWh/m²/yr., for example, 215 kWh/m² in Italy, 287 kWh/m² in Spain, 280 kWh/m² in Greece, 420 kWh/m² in France. The difference lies on the efficiency process and the unitary consumption of the users (especially in thermal necessities when considering the diverse external temperatures and divergent comfort temperature between the natives and the rest).

Space conditioning (heating/cooling, ventilation and air-conditioning) is the largest single end-user of energy in hotels, accounting for approximately half of the total consumption – it is thus widely accepted that outdoor weather conditions and floor areas are among the main factors affecting energy use in hotels. The indoor temperature levels also greatly influence the quantity of energy consumed in a building.

Domestic hot water is commonly the second largest user, accounting for up to 15 per cent of the total energy demand. Lighting can fluctuate between a range of 12-18 per cent and up to 40 per cent of a hotel's total energy consumption, depending on the category of the establishment. Services such as catering and laundry also account for a considerable share of energy consumption, particularly considering that they are commonly the least energy-efficient. Sports and health facilities are typically high energy consumers.

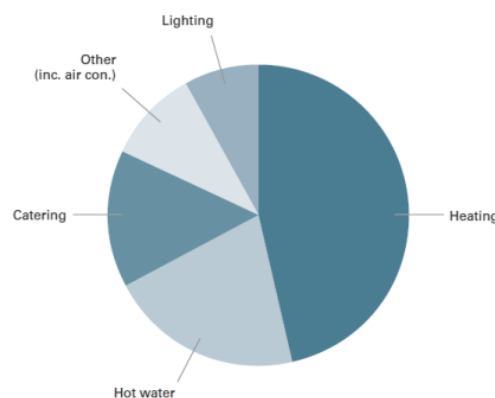


Figure 2.5: Breakdown of overall energy use in an average hotel (Source: Carbon Trust – Energy efficiency)

On the other hand, according to the Energy Information Administration, restaurants consume nearly three times the energy of the average commercial building. Long hours of operation,

specialized equipment and sheer demand make up much of the substantial consumption, but overall the energy consumption by foodservice buildings is excessive and often wasteful.

Not surprising, the largest portion of energy use is consumed by cooking and food preparation, followed closely by heating, ventilation and cooling as a whole (HVAC). The pie graph below shows the average breakdown of energy use at foodservice operations. The graphs below show energy per square foot and annual energy use in terms of cost in dollars per square foot.

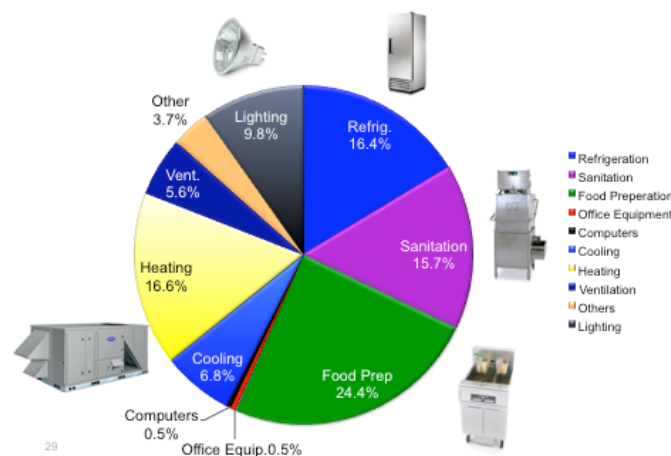


Figure 2.6: Breakdown of overall energy use in an average restaurant (Source: <http://www.sustainablefoodservice.com/>)

Despite their high energy usage, very little industrial or academic research exists pertaining to the current consumption and energy reduction strategies of commercial kitchens. There has been substantial research relating to energy use and reduction in the building fabric and envelope, which may be applied to these premises. However, beyond the procurement of more energy efficient cooking appliances, very little innovation has been achieved from catering operations. Indeed, the designs of cooking technologies have remained virtually stagnant since their creation.

The reduction of energy use from food preparation and cooking is seen as the largest challenge for hospitality establishments if they are to meaningfully reduce consumption in line with national and European targets. Bohdanowicz and Martinac (2007) refer to average energy consumption of between 4 and 6 kWh per cover meal served. However, this value varies considerably depending on the type of meal served.

The UK Carbon Trust and the Chartered Institute for Building Services (CIBSE) estimate that the total energy use of Britain's catering industry is in excess of 21 600 million kWh per year. CIBSE and the UK Carbon Trust estimate that 50% of this originates from non-commercial catering operations (hospitals, ministry of defence, schools, etc.), ~20% is attributed to hotel and guest house kitchens and the remaining 30% originating from the activities of commercial kitchens (restaurants, public houses, cafes, etc.).

Energy costs and consumption within the hospitality sector can vary depending on the equipment, location and organisational practices, however, energy and cost savings can be found in every area of the industry.

Energy is usually by far the biggest utility cost. It therefore, offers the biggest opportunity for savings. Energy costs have risen substantially in recent years and are forecast to continue increasing above inflation for the foreseeable future, therefore giving even a greater incentive to focus on energy management.

Energy saving measures range from no cost measures, such as awareness-raising and training, through low cost items like replacement of light-bulbs, where payback is less than 24 months, to larger projects requiring capital investment – boiler replacement, air conditioning improvements, installing Combined Heat and Power (CHP) plants, etc.

Reductions in energy used by the hospitality sector not only improve competitiveness of the business but also reduce emissions of greenhouse gases, which are responsible for climate change. Reductions in the burning of oil and gas and in use of electricity generated from fossil fuels all reduce the impact on the environment.

Awareness is a key to any reduction programme and all employees need to be made aware of how their actions can reduce CO₂ emissions and also help the company by reducing costs. Allied to this awareness must be the ability of the company to monitor performance and compare consumption. Given the energy intensity of most commercial hospitality based businesses, there are ample opportunities for savings.

2.1.4. References

- Hotel Energy Solutions (2011), Analysis on Energy Use by European Hotels: Online Survey and Desk Research, Hotel Energy Solutions project publications
- PREPARATORY STUDY ON FOOD WASTE ACROSS EU 27 (2010), European Commission (DG Env), Bio Intelligence Service
- The Hospitality Sector in Europe (2013), An assessment of the economic contribution of the hospitality sector across 31 countries, HOTREC
- Best Environmental Management Practice in the Tourism Sector, David Styles, Harald Schönberger, Jose Luis Galvez Martos (2013), JRC Scientific and Policy reports
- CURRENT TRENDS AND OPPORTUNITIES IN HOTEL SUSTAINABILITY (2012), HVS
- Sustainability Toolkit – Hospitality (2009), NSW Business Chamber
- Resource Efficiency in the hospitality Sector (2011), EPA, greenhospitality.ie
- The True Cost of Food Waste within Hospitality and Food Service (2013), Final report, WRAP
- Saving energy without compromising service, Hospitality (2012), Carbon Trust
- Carlson, Paul Michael, "The Hospitality Industry's Response to Climate Change: Is the Response Sufficient?" (2012). UNLV Theses/
- Dissertations/Professional Papers/Capstones. Paper 1360.
- The Travel & Tourism Competitiveness Report (2008), Deloitte

2.2. EU Policy Brief



The hospitality sector is subject to rules at local, national, EU and international level. These rules cover a large number of policy areas, which are listed in this section.

In recent years sustainability matters have become increasingly important for European Union policies. The hospitality industry has always showed its interest in contributing to the environment aspect of sustainability by focusing amongst others on:

- Handling of waste;
- More efficient use of resources, including water and energy;
- Application of new, greener technologies.

As a major end-user of food products, serving millions of meals to European consumers, the hospitality industry is an important player in the food chain and is directly concerned by EU food legislation and policies. The management of food waste involves several policy areas including sustainable resource management, climate change, energy, biodiversity, habitat protection, agriculture and soil protection. This section provides an overview of the existing EU and MS measures to reduce the environmental impacts of food waste.

Biodegradable waste diversion targets of the Landfill Directive 1999/31/EC

The Council Directive 1999/31/EC of 26 April 1999 also known as the Landfill Directive, sets as a policy target the staggered reduction of biodegradable municipal waste (BMW) going to landfill. The Landfill Directive places an absolute target on the tonnage of BMW that can be land filled by 2006, 2009 and 2016 by linking the quantity permitted to the quantity produced in 1995. Thus the Directive obliges MS to reduce the amount of biodegradable waste in landfills by 65% by 2016 compared to 1995 levels. This means, for instance, that if BMW production doubles between 1995 and 2016, only 17.5 % of BMW produced in 2016 can be land filled. As of 2006, MS are restricted to land filling a maximum of 75% of the total amount by weight of BMW produced in 1995. This target becomes 50% in 2009 and 35% in 2016. However, the Landfill Directive does not submit countries to binding specifications on methods for disposal of BMW not sent to landfills, a situation which has led most MS to opt for incineration.

Waste Framework Directive

Directive 2006/12/EC of the European Parliament and of the Council of 5 April 2006 aims to protect human health and the environment against harmful effects caused by the collection, transportation, treatment, storage and disposal of waste. On June 17th 2008, the European Parliament adopted a legislative resolution approving the Council's

common position for a new Waste Framework Directive. The Waste Framework Directive was reviewed with the aim of simplifying it, providing clearer definitions and strengthening the measures required on waste prevention. The revised Directive will streamline EU waste legislation by replacing three existing directives: the current Waste Framework Directive, the Hazardous Waste Directive and the Waste Oils Directive.

The revised Directive:

- sets new recycling targets to be achieved by MS by 2020
- strengthens provisions on waste prevention through an obligation for MS to develop national waste prevention programs and a commitment from the EC to report on prevention and set waste prevention objectives
- sets a clear, five-step hierarchy of waste management options in which prevention is the preferred option, followed by re-use, recycling and recovery, with safe disposal as the last recourse
- clarifies a number of important definitions, such as recycling, recovery and waste, also draws a line between waste and by-products and defines end-of waste criteria

Furthermore, there is a clear strategy towards the separate collection and treatment of bio-waste:

Article 22 “Bio-waste”: “Member States shall take measures, as appropriate, and in accordance with Articles 4 and 13, to encourage:

- a) the separate collection of bio-waste with a view to the composting and digestion of bio-waste
- b) the treatment of bio-waste in a way that fulfils a high level of environmental protection
- c) the use of environmentally safe materials produced from bio-waste

Thematic Strategy on the Prevention and Recycling of Waste

The Thematic Strategy on the prevention and recycling of waste sets a direction for EU action and describes the ways in which waste management can be improved. The aim of the strategy is to reduce the negative impact on the environment that is caused by waste throughout its lifecycle, from production to disposal. The main focus of the strategy for preventing waste production is on reducing the environmental impact of waste and products that will become waste. In order to be effective, this impact must be reduced at every stage of a resource’s lifecycle. The strategy places particular emphasis on biodegradable waste, two-thirds of which must be redirected for disposal using methods other than landfill as is required under Directive 1999/31/EC.

Green Paper on bio-waste management in the EU

In December 2008, the Commission published a Green Paper on bio-waste management in the EU and launched a consultation process to gather opinions on whether a specific stand-alone EU Bio-waste Directive was needed. The purpose of the

Green Paper was to explore options for the further development of the management of bio-waste by reviewing the current situation of bio-waste management in the EU.

Communication on future steps in bio-waste management in the European Union

In May 2010, the Commission released a Communication on bio-waste management in the EU, including recommendations on managing bio-waste such as encouraging the usage of separate collection as well as laying out the future planned steps on the part of the EC for addressing bio-waste in the EU. The key tenets of EC future action related to bio-waste include: encouragement of prevention of bio-waste, treatment of bio-waste according to the waste hierarchy, protection of EU soils via a focus on compost and digestate, investment in research and innovation and efforts to reinforce the full implementation of the existing set of EU waste legislation.



Among food and other resources, the hospitality sector uses substantial amounts of energy providing comfort and services to its guests, typically with an alarmingly low-level of energy efficiency.

Improving energy efficiency in hotels and in restaurants starts with enhancing the performance of the buildings themselves. The most important EU directive for energy efficiency in buildings is that on the Energy Performance of Buildings (EPBD 2002/91/EC).

The main objective of the EPBD is to define a holistic approach to promote cost effective improvement of the overall energy performance of buildings. The present EPBD sets three types of requirements that must be implemented by EU Member States:

- Minimum energy performance requirements for new buildings and for large existing ones that undergo major renovation with the aim of achieving improved energy performance, thermal comfort and lower energy bills.
- Energy performance certification that provides information on the energy needs of a building and on what can be improved. It should be presented to potential buyers/tenants so that they have an independent assessment of the energy-use aspects of the buildings, enabling informed decisions to be taken. An energy performance certificate is required only when buildings are newly constructed, sold or rented out and is valid for a maximum of 10 years.
- Inspection of medium- and large-size heating and air-conditioning systems at regular intervals so that their energy performance can be monitored and optimised. On the basis of this inspection, which shall include an assessment of the system efficiency and sizing compared to the heating / cooling requirements of the building, advice to the users on the replacement of the boilers, other modifications to the heating system and on alternative solutions shall be provided.

Aspects to be included in energy performance calculation methods:

- thermal characteristics of the building (shell and internal partitions, etc.), including airtightness
- heating installation and hot water supply, including their insulation characteristics
- air-conditioning installation
- ventilation
- built-in lighting installation (mainly the non-residential sector)
- position and orientation of buildings, including outdoor climate
- passive solar systems and solar protection
- natural ventilation
- indoor climatic conditions, including the designed indoor climate

Aspects for which the positive influence should also be taken into account where relevant:

- active solar systems and other heating and electricity systems based on renewable energy sources
- electricity produced by CHP
- district or block heating and cooling systems
- natural lighting

3. Key Features regarding Sustainability in European Education in the Tourism and Hospitality Industry

3.1. Education in Tourism and Hospitality

As far back as 1997 the World Tourism Organisation, UNWTO, stated that higher education in tourism is a crucial element in achieving customer satisfaction and in improving competitiveness of businesses and tourist areas. Since then this sector has experienced large growths in the number of students and the number of academic publications⁴.

In relation to the need for investment and support of the tourism and hospitality industry, one recent survey across EU Member States indicates that several areas are seen as vital, including 'hard' and 'soft' infrastructure development. In 'soft' infrastructure, education and training is identified as the main area of investment required, with 55% of respondents seeing it as the top area for public investment. See Figure 3.2 below:

⁴ FAYOS-SOLÁ, E. *Educación y formación en la nueva era del turismo: la visión de la OMT*. In: (Ed.) Human capital in the tourism industry of the 21st century. Madrid: WTO, 1997. p. 59-79

Airey, D., 2005, *Growth and Development*, in: Airey, D., Tribe, J. (eds.), *An International Handbook of Tourism Education*, Elsevier, Oxford, pp. 13–24.

STERGIOU, D.; AIRE, D.; RILEY, M. *The evaluation of the teaching individual academics in UK's tourism higher education: developing a construct for teaching profiles*. *International Journal of Tourism Research*, v. 5, n. 1, p. 62-67, 2003.

Top priority areas for public investment in tourism infrastructure among European Members States

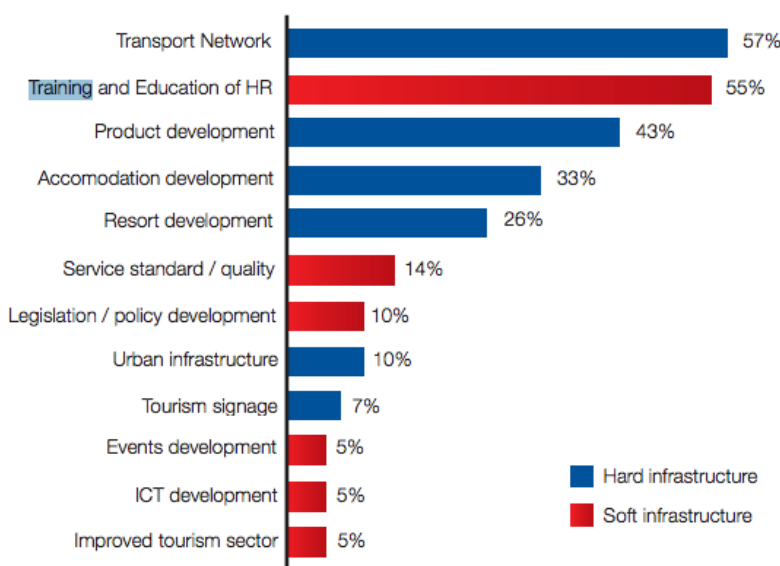


Figure 3.1: Top Priority areas for public investment in tourism infrastructure in Europe⁵

Some examples of initiatives and priorities in individual countries included:

Flemish Community of Belgium: Investing in the attractiveness of employment and training of tourist personnel and the reinforcement of a welcoming and professional tourist reception.

FYR Macedonia: Development of an efficient management plan for education and training of human resources in the field of tourism, especially training of local staff of accommodation facilities.

Israel: Measures being taken to improve soft infrastructure include upgrading of proficiency of employees in all tourism vocation, the creation of demand for tourism studies and employment opportunities

Monaco: The development of language skills and strong sense of welcome are considered to be extremely important to deliver excellent quality.

Norway: Training programmes are being developed for employees during low season to upgrade skills and make tourism jobs more attractive.

Portugal: innovation capacity, entrepreneurship of education and training of HR aiming at offering high service quality.

Russian Federation: The development of human resources and improvement of service quality in the field

⁵ World Tourism Organisation *Working Together in Europe - A Shared Leadership* UNWTO, Madrid, 2014

of tourism.

Switzerland: The task over the coming years is to take appropriate measures to make tourism more professional.

To accommodate the growth of the industry and the need for well educated and trained staff at all levels, universities and educational institutes (especially the newer ones) have recognized tourism as an attractive addition to their courses and subjects for three distinctive reasons⁶:

1. As a means to attract students
2. Because tourism is such a growth sector
3. To provide programmes which offer links with graduate employment

As a result, the past few decades have seen a massive growth in tourism and hospitality education, especially in higher level educational units. For example, at University degree level alone, in the UK, enrolments into programmes grew from about 20 in the year 1972⁷ to 9,000 in the year 2011⁸.

In all, in the UK, by 2010, there were over 1,500 separate tourism and travel related courses in place. These include courses at School Foundation levels (14 – 16 year olds), Further Education (16 years onward), and at Higher Education (Undergraduate and Postgraduate levels).

Many national and international associations and networks have also been developed to support tourism and hospitality education. These include:

- The Association for Tourism and Leisure Education (ATLAS) - established in 1991 to develop transnational educational initiatives in tourism and leisure.
- the Travel and Tourism Research Association (ttra) - founded in 1970, ttra is a non-profit association whose purpose is to enhance the quality, value, effectiveness and use of research in travel marketing, planning and development.
- European Association of Hotel Schools (AEHT) - The prime objective of the association is to promote a European outlook among Hotel and Tourism Schools. Founded in 1988, AEHT has a membership of around 430 schools/colleges, with an AEHT national representative in 44 European countries.
- International Association of Scientific Experts in Tourism (AIEST) - founded in 1951, AIEST aims to improve the worlds travel and tourism industry through analysis of trends and latest developments in tourism and farsighted solutions for problems as they arise.

⁶ Ayikouru, M., Tribe, J., Airey, D., 2009, Reading Tourism Education: Neoliberalism Unveiled, *Annals of Tourism Research*, vol. 36, no. 2, pp. 191–221.

⁷ Airey, D., 2005, *Growth and Development*, in: Airey, D., Tribe, J. (eds.), *An International Handbook of Tourism Education*, Elsevier, Oxford, pp. 13–24.

⁸ Walmsley, A., 2012, *Tourism Intelligence Monitor: Report on Tourism Higher Education in the UK 2012*, Association for Tourism in Higher Education, Brighton.

- International Academy for the Study of Tourism (IAST) - The goal of the Academy is to further the scholarly research and professional investigation of tourism.

3.2. Education in Tourism and Hospitality Systems in Different Countries

Across Europe, different Member States tend to take different approaches with regard to training for the tourism sector. In countries such as Ireland, Spain and Germany this type of training mainly occurs at Further or Higher Education level, with students aged 18 and above. In other countries such as the UK, Austria and France this type of training can begin at an earlier age, from about 15 and then continue to 20 or 21.

Most training is given at post secondary level, in Further Educational Institutes, Institutes of Technology and Universities.

In Ireland almost all of the training in this sector is done at Further Education and Higher Education Levels⁹.

Several Colleges of Further Education provide courses to levels FETAC 5 and 6 certificate levels¹⁰. The Higher Education Courses from levels 6 – 8 (Certificate, Diploma and Degree) are provided by the Institutes of Technology and cover 2 to 4 year courses. Very few courses are provided at University level. All but 2 of the Institutes of Technology in Ireland are offering a range of courses in this sector, up to and including degree level, including:

- Higher Certificates in Front Office, Bar Supervision, Tourism and Hospitality, Culinary Arts etc.
- Trainee Manager Development Programmes
- B.A. Degree in Culinary Arts
- Honours Business Degree in Tourism
- Restaurant Operations Management
- National Traineeship in Professional Cookery
- Total Immersion Cookery Programme

Most of the courses are supported by Failte Ireland, the Irish Tourism Body and many are given part-time, while the students also work in hotels, restaurants etc.

In Germany a range of courses are provided relating to the tourism sector¹¹.

Three year courses are given for:

- Chef
- Restaurant Specialist
- Hotel Specialist

⁹ More information at: <http://www.picktourism.ie/>

¹⁰ This awards system is explained here: <http://www.nqai.ie/awardsframework.html>

¹¹ <http://berufe.hotel-intern.de/>

- Hotel Manager

Two year courses are given for: Skilled Worker.

Usually these are at post-secondary school levels with higher level courses leading toward the hotel manager qualification.

A wide range of subjects and skills are taught at these courses varying from all aspects of food knowledge and preparation to day-to-day economic and hospitality skills for hotel related courses.

Some environmental related material is taught in some of these courses including:

- An explanation of possible pollution sources
- The eco-credentials of the training company and case studies
- How to implement the relevant regulations on environment protection
- The economical and environmental benefits of green energy- and material usage
- How to avoid waste; environmentally friendly waste management of substances and materials

In the UK many courses are available in the tourism sector. While some of these are given at secondary school level, most are offered in higher education and cover all levels, from Certificate to PhD levels. These can be both part time, for those already in the workplace or full-time. This is not including cooking and culinary arts courses. These are summarized in Figure 3.3 below¹².

Across the UK, thousands of these courses are being offered full time (FT) part time (PT), sandwich (SW), apprenticeships (A) and through distance learning (DL) These are shown in Table 3.1 below.

Type of Course	Mode (FT/PT/SW/DL/ A)	Subject	Number of Courses
NVQ (All Courses) Levels 1-3	FT/PT/SW/DL/A	Travel/tourism	1053/435
Foundation Degree	FT/PT/SW/DL	Travel/Tourism	92 *
Bachelor of Arts	FT/PT/SW	Tourism (Combined Studies)	803
Bachelor of Arts	PT/FT/SW	Tourism (Single Subject)	90
Bachelor of Arts	FT/PT/SW	Travel (Combined Studies)	128
Bachelor of Arts	FT/PT/SW	Travel (Single Subject)	6
Higher National Diploma/Higher	FT/PT	Tourism	22

¹² Fidgeon, Paul *Tourism education and curriculum design: a practitioner perspective* VISTAS Education, Economy and Community The University of West London Journal Volume 1 (2) October 2011, p 22-43

National Certificate			
Higher National Diploma/Higher National Certificate	FT/PT	Travel	19
PG Diploma/MA	FT/PT	Travel/Tourism	111

Table 3.1: Types of University courses in Tourism/Travel in the UK (2010)

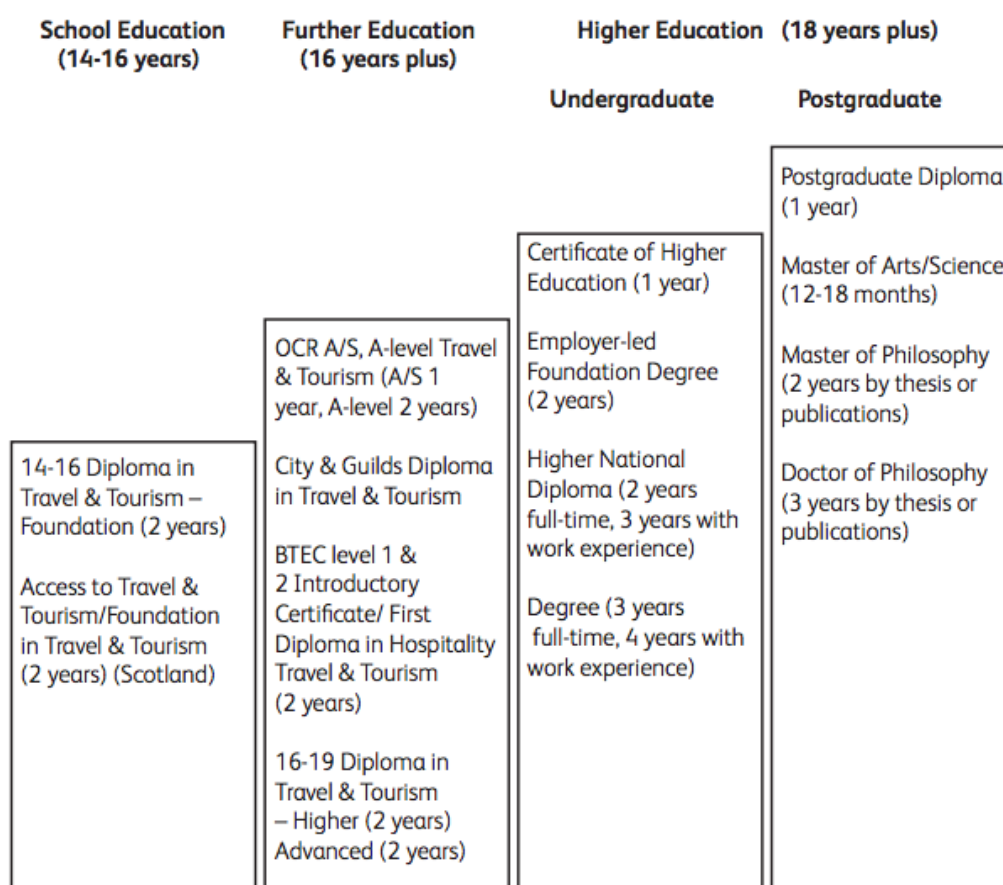


Figure 3.3: Tourism related courses in the UK

A range of subjects are being offered in these courses in the UK including:

- Theories of human resource management
- Written communication skills
- Marketing theory
- Hotel & restaurant operations
- Managerial accounting
- Introduction to the travel & tourism industry
- Microcomputer literacy

- Ethics and social responsibility
- Entrepreneurship & innovation
- Managing service quality
- Interpersonal relation skills
- Principles of tourism development
- Practical work experience

Environmental or sustainability issues do not appear to be prominent in the curricula.

In Spain 80 universities are offering courses for the acquisition of a university degree in tourism. Several of these programmes are included in the top 100 ranked Hospitality and Tourism Programmes in the World¹³.

Several of these are in the process of adapting their curricula to fit into the common European system of credits (ECTS - European Credits Transfer System) to promote the comparability of studies and the mobility of students and graduates, to promote European cooperation and to promote the European dimension of higher education.

A study of some of these tourism education programmes identified the 6 main skills being taught in the Spanish universities:

1. competence in assessing the tourism potentials and the prospective analysis of its operation
2. competence in leading and managing (management) the different kinds of tourism organizations
3. competence in identifying and managing tourist areas and destinations
4. competence in knowing the operating procedure of the field of housing and in restoration
5. acquiring knowledge in the field of operational procedures of brokerage firms and
6. the competence in planning and managing human resources of tourism organizations

These skills are mainly related to knowledge from the area of business administration and marketing - the area of knowledge that focuses a bigger amount of credits, not only for compulsory subjects but also for optional subjects in the degree of tourism. This also appears to show the lack of importance given to skills related to customer service orientation, to the value of cultural heritage, to the understanding of legal framework governing tourism activities or to the knowledge of political and administrative structures.

In Spain, like the UK, as well as the University level courses in Tourism and Travel, there are many other courses provided both at Higher Level Vocational Training Level and at Intermediate Level Vocational Training¹⁴.

¹³ Bustelo, Francisco Espasandín. Fernandez, Carmen Díaz. Quirós Tomás, Francisco Javier *Higher education of tourism in Spain and its adaptation to the European higher education area* rap — Rio de Janeiro 44(5):1259-266, Sept./Oct. 2010

At Higher Level, the following courses are provided:

- Chef (Higher Technician in Kitchen Management)
- Restaurant Specialist (Higher Technician in Catering Services Management)
- Hotel Manager (Higher Technician in Tourist Accommodation Management)

At Intermediate Level the following courses are given:

- Skilled Worker in the hospitality industry (Technician in Cookery and Gastronomy)
- Skilled Worker in the hospitality industry (Technician in Catering Services)

The curricula for these courses are, as would be expected, mainly to do with the specific topics at hand and relevant to the various subjects studied. Some specific environmental subjects are covered within these subjects as follows:

- Monitoring of environmental management in catering establishments, recognising their benefits, as well as their implications at a health level:
- Consumption vs. reduction, how they are related and the environmental benefits of reduction.
- Concept of resource reuse and the environmental advantages of reuse.
- Identification of those energies and / or resources which are less harmful to the environment and those that are desirable from an economic point of view.
- Identification and classification of the different types of waste and their environmental effects.
- Possible effects caused by the food industry.

Across Europe generally, according to one expert, education in tourism is undergoing a process of adaptation and change to the new demands of a global stage characterized by important changes in the labour market, an increasing global competition, continuous technological advances, changes in demand patterns - students want a high probability of employability and employers want employees with a high level of training — and by the requirements of the European higher education area¹⁵.

There appears to be some diversity in the curriculum across the sector, from course to course and country to country, for a number of reasons:

- the lack of agreement on the content of the curricula of tourism, which is expressed in the debate over the value of general subjects versus specific ones
- the consequences of labour mobility in tourism;

¹⁴ Source: Beatriz Amorena (Escuela de Hostelería de Galdakao), Sixta Barrenetxea, 24, 48960 GALDAKAO Bengoetxe - Bizkaia

¹⁵ *ibid.*

- the informal links between tourism industry and academic research, which prevent the effective transfer of knowledge
- the importance and implementation of cooperative education in tourism studies and
- the need for a transnational debate when it comes to educational issues in tourism in the context of emerging international content of curriculum and the global distribution of graduates from tourism.

3.3. Sustainability Training in Tourism and Hospitality

Sustainability is now widely accepted as a major element of tourism and is predicted to become one of the key elements of the sector by 2015¹⁶. Already 95% of business travellers surveyed believe that that hotel industry should be undertaking green initiatives.

But, while sustainability is increasingly seen as a prominent factor in hospitality decision making, it is still not embedded in business thinking and certainly is not a major element of education and training in the sector.

Although industry leaders are aware of the sustainability agenda, action is not yet being taken to recognize the enormity of the changes that will impact on the sector. Those who embed sustainability across their business from strategy to operations, from brand value to asset management will be prominently positioned and those who do not, will fall behind. And one of the key areas where the sector can prepare for the sustainability agenda in is training and human capital development¹⁷.

Furthermore, while much has been written about sustainability education in general, very little has been published or taught regarding sustainability concepts and practices within courses in the hospitality curriculum¹⁸. Given the depth and breadth of this industry worldwide, the need for future leaders with core values toward sustainability is critical and the need to increase the sustainability element into curricula is acute.

An essential component of sustainability education centers on environmentally conscious behavior and therefore, it is paramount that more is learned about the relationship between human actions and the environment¹⁹. This is especially true of resource intensive sectors such as tourism. It is only by learning about the resources that are consumed in this sector that students will change their behavior towards more sustainable actions.

Improved awareness has been shown to influence individual lifestyle choice²⁰. One function of

¹⁶ Deloitte *Hospitality 2015, Game Changers or Spectators?* Deloitte, London, 2010

¹⁷ *ibid.*

¹⁸ Deale, C., Nichols, J., & Jacques, P. *A Descriptive Study of Sustainability Education in the Hospitality Curriculum*. Journal of Hospitality & Tourism Education, 21 (4) 34-42. 2009

¹⁹ Deale, Cynthia S. and Barber, Nelson *Sustainability: What Matters to Students, Educators, and Hospitality and Tourism Professionals?* BEST EN Think Tank X Networking for Sustainable Tourism, 2009

²⁰ GfK Research *Americans Reach Environmental Turning Point...Companies Need to Catch Up* 2007

knowledge is to help maintain strong attitudes. Incorporating sustainability into the hospitality management curriculum will increase knowledge of the environment and ultimately change attitudes and behaviour. This is essential to ensure sustainable tourism in the future.

By 'carrying out' sustainable activities in game based learning, for example, it is more likely that students will then make the right choices in their actual work in kitchens, restaurants, hotels, etc.

Initial research indicates that while there are pockets of sustainability based education around Europe, this topic is not widely taught to tourism and hospitality students. Nor does there appear to be any agreed or widely accepted environment-related curriculum to teach these students.

In Ireland, for example, a brief study of the curricula in four Institutes of Technology Tourism and Hospitality Departments, has shown that there are three broad categories of inculcation of sustainability into the curricula²¹:

1. In one of the institutes, currently there is little or no formal training on sustainability and resource efficiency. In addition it was noted that changes to the curriculum tend to happen incrementally and at a slow pace. Costs, stock control, basic operational management are not included, either directly or indirectly in the teaching modules used in this Institute
2. In two of the Institutes there is currently a significant amount of teaching in relation to good resource management (water, waste, energy and food) but there is no formal training nor any complete modules relating to environmental/resource issues and the level of training provided is probably not detailed enough in parts.
3. In one Institute, environmental issues and resource management are taught as a full specific module to final year degree level tourism and hospitality students, called *Hospitality Resource Efficiency (Environmental Management)* This is a detailed module covering many different sustainability topics such as: Global Environmental Impacts of Tourism; Environmental Management Systems; Eco-Labeling – Green Certification; Utility Management – Cost Saving through EMS: Energy Management; Utility Management – Cost Saving through EMS: Waste Management; Utility Management – Cost Saving through EMS: Water Management; Food Waste Minimisation; Why Green your business?; Review of current Green marketing; Corporate Social Responsibility

It is felt that categories 1 and 2 above are the most common in tourism and hospitality education in Ireland and across Europe. While there are exceptions (individual Institutes providing detailed and specific environmental training, here are there), these are the exceptions rather than the rule.

http://www.csrwire.com/press_releases/15416-Americans-Reach-Environmental-Turning-Point-Companies-Need-to-Catch-Up-According-to-Gfk-Roper-Green-Gauge-R-Study

²¹ From discussions with Heads of Department in each Institute.

Fully integrated and compulsory modules relating to environmental protection and sustainability appear to be rare, at present.

3.4. Recommendations

In a time of great economic uncertainty, there is a need to promote tourism and hospitality and to ensure a high quality workforce through education etc. This sector continues to grow and expand year on year.

However, as the sector grows, it is also consuming more and more resources in relation to energy, waste, water and food. It is vital therefore to ensure that resources are not exploited unsustainably and in order to do that sustainable tourism must be embraced. This appears to be accepted in the industry as both customers (tourists) and providers (hotels, travel companies etc.) are becoming more and more conscious of the environment and the need to protect is and reduce excessive material consumption.

To ensure more sustainable practices in the industry, the students coming in to the sector nowadays must be educated as to the need for sustainable resource management and waste prevention to ensure a long term, sustainable and viable tourism sector.

It appears that while there are some moves towards sustainability in some training curricula, these are mostly ad hoc and often 'hidden' in more traditional topics and subjects. Environmental-related subjects and topics need to be highlighted, compulsory and transformed into more formal and high-profile curricula elements.

Sustainability needs to be inculcated into curricula and innovative methods of training, such as game based learning tools are very helpful to achieve this goal.

4. Sustainable Best Practices and Prevention Initiatives in the Tourism and Hospitality Industry

This chapter aims to give an overview on good and best practices, how hotels and restaurants manage their environmental impact in a sustainable manner. Environmental management systems as well as sustainability labels and initiatives are introduced as they are a good instrument for owners and managers to systematically identify and solve environmental issues and use the results also for external communication. Within the areas of food and water waste avoidance and energy efficiency various sources on technical and organisational measures are available. This report gives an overview on these measures but could not provide a comprehensive guidance on implementation or on technical details. Beside this the usage of renewable energies is touched.

Awareness and barriers for implementation

A survey about the environmental awareness in Europe concluded that the majority of hoteliers perceive environment as an important factor in the development and well-being of both tourism and hotel industry, although the environmental knowledge and practices of European hoteliers depends greatly on the region. Various environmental initiatives are already taking place in the industry. The energy-efficient lighting, together with towel and linen reuse programs are among the most commonly mentioned initiatives, followed by waste minimisation measures. As regards the incentives that would encourage hotel managers to undertake environmentally- oriented initiatives in their hotels, the possibility of reducing the operational costs is the one by far the most commonly pointed out. Furthermore the will to decrease the negative environmental impacts has been underlined, together with the requirement of customers. (Environmental Awareness in the Hotel Industry, Bohdanowicz, 2003 <http://www.greenthehotels.com/eng/Hotels2003Eng.pdf>)

Main barriers for the implementation of sustainable good practice in the tourism and hospitality industry are:

- Lack of information about good practice
- Lack of management commitment
- Unskilled stuff
- Poor design of existing facilities

These could be addressed by provision of independent information, advice and training to the various environmental aspects and a better understanding of the cost and benefit of investments.

Overview Environmental aspects on facility level

As mentioned in Chapter 2 Tourism industry is resource intensive. Hotels have been found to have the highest impact on the environment of all commercial buildings, except of hospitals. The table gives some indicators on environmental aspects in German restaurants/hotels by class

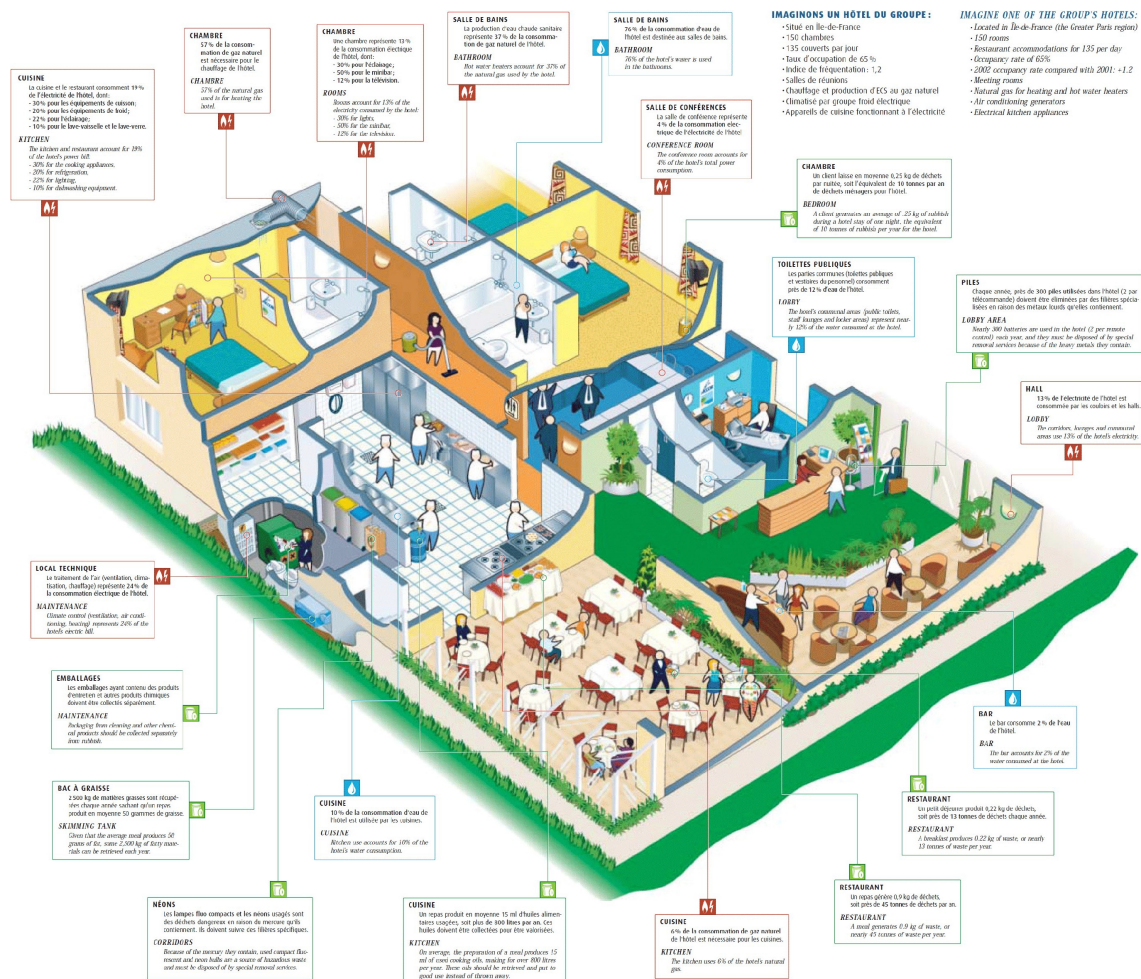
		Accommodation				Restaurants
		0-2 stars	3 stars	4 stars	5 stars	
Energy	Energy demand per night (n) or per dish (d)	73.2 kWh/n	52.5 kWh/n	56.2 kWh/n	120.6 kWh/n	12.3 kWh/d
	Energy costs per turnover	7.7 %	6.8 %	5.9 %	5.0 %	6.7 %
	Energy demand for heating and hot water per heated m ²	159.2 kWh/m ²	165.4 kWh/m ²	137.6 kWh/m ²	141.4 kWh/m ²	265.0 kWh/m ²
Climate	CO ₂ -Emissions per night (n) or per dish (d)	24.7 kg/n	16.9 kg/n	21.0 kg/n	47.6 kg/n	4.1 kg/d
Water	Water demand per night (n) or per dish (d)	347 liter/n	250 liter/n	308 liter/n	522 liter/n	55 liter/d
Waste	Waste per night (n) or per dish (d)	9.1 liter /n	4.0 liter/n	3.4 liter/n	3.7 liter/n	1.7 liter/d

Quelle Dehoga

The picture below was taken from the Accor Planet 21 page²² and it gives a nice overview on environmental aspects of a 150 Room hotel in the greater Paris region.

²²

http://www.accor.com/fileadmin/user_upload/Contenus_Accor/Developpement_Durable/img/PLANET_21/docs/FR/image_dd_va_vf.pdf



4.1. Sustainability labels and initiatives

Several initiatives, labels, programs and awards aim to make hospitality business more sustainable.

4.1.1. Labels

With the voluntary agreement to meet the criteria of sustainability labels, hotels and restaurants commit to certain standards regarding their environmental performance. Businesses also use these labels as marketing instruments. There is a vast variety of certificates with several orientations (~100 worldwide, ~ 60 in Europe). The impact of ecolabels on consumer choices is overvalued. An overview of a selection of labels could be found on <http://www.ecolabelindex.com/ecolabels/?st=category,tourism>. http://www.hotelleriesuisse.ch/files/pdf1/Durchblick_im_Label_Dschungel.pdf contains an elaboration of several sustainability labels. Below some examples for international and national labels are given. The selection is made to show the different approaches for awarding.

The Green Globe Standard (<http://greenglobe.com>) is an international structured assessment of the sustainability performance of travel and tourism businesses and their supply chain partners. Businesses can monitor improvements and document achievements leading to certification of their enterprises' sustainable operation and management. The Green Globe

Standards is a collection of 337 compliance indicators applied to 41 individual sustainability criteria grouped in the categories of sustainable management, social economic, cultural heritage, and environment. The applicable indicators vary by type of certification, geographical area as well as local factors. The standard is a *process orientated approach* aiming at continuous improvement based on management standards for quality and environment ISO 9001 and ISO 14001.

EMAS is a voluntary tool available for any kind of organization aiming to improve its environmental and financial performance and communicate its environmental achievements to stakeholders and society in general. The success of the *process driven approach* is measured *based on the performance*. This makes EMAS one of the most effective but also sophisticated environmental labels.

The viabono certificate (<http://www.viabono.de/>) is a German label for the tourism business and assigned on the basis of benchmarking for environmental performance indicators. If a facility is better than 30% of a representative amount the certificate could be awarded. A *performance based benchmarking approach* is used by several other labels e.g. “eco hotels”, “DEHOGA Umweltcheck”.

The Certified Green Restaurant label (<http://www.dinegreen.com/restaurants/standards.asp>) awards restaurants based on a criteria catalogue covering the areas:

- Water Efficiency
- Waste Reduction and Recycling
- Sustainable Furnishings and Building Materials
- Sustainable Food
- Energy
- Disposables
- Chemical and Pollution Reduction

For each of these areas a comprehensive list of criteria/measures, for example: “Energy Star furnace” with a according rating is given, e.g. 3 points. The label is in 2, 3 or 4 stars depending on the overall points achieved. These criteria may be a good starting point for measures in a computer game. This *performance based criteria approach* is also used in other labels like “travelife”.

Further important European labels are:

- Eco-Label for Tourist Accommodation Services and campsite services: ELTAS (EU flower)
- HVS EcoServices Ecotel
- DEHOGA scheme in Germany
- Hotel Label in Austria
- Tourist accommodation eco-label in Luxembourg
- The Green Key in Denmark, France, and other European countries

- Nordic Swan Ecolabel for Hotels in Scandinavian countries
- Catalan Emblem in Catalunya

4.1.2. Sustainability initiatives

Sustainability initiatives could be found in most of the international hotel chains. They are driven by the requirement to manage the cost of resources like energy and water but are also communicated for marketing purposes.

- The International Hotels Environment Initiative (IHEI) www.ihei.org is a industry partnership out of 18 (January 2014) international hotel companies aiming to establish standards in environmental and social responsible business. They provide a platform for their members to share best practice examples and exchange to certain topics in working groups. Additionally they provide publications, tools and programs.
- PLANET 21 (acor) <http://www.accor.com/en/sustainable-development/the-planet-21-program.html> is an example for an criteria based initiative of one hotel chain.

4.1.3. Sustainability awards and information campaigns

Sustainability awards are assigned by different organizations for outstanding performances. Most of them are not specific for hospitality industries.

4.2. Environmental Management

Environmental management could be seen as a systematic approach to establish continuous improvement regarding environmental impact and helps to monitor and reduce it. This could make business more competitive and more independent from rising resource prices.

The standard for environmental management system (EMS), ISO 14001, gives good guidance for the implementation of an effective management system. However, for most tourism facilities this approach is too complex and time-consuming. Several of the previously mentioned labels provide assistance for simplified environmental management systems, tailored to the needs of small and medium-sized hospitality facilities.

Following steps are usually recommended to implement a simple environmental management system:

- Decision by the hotel management to implement an EMS
- Nomination of the “Environmental Manager”
- Initial data collection and structural set up
- Conduct a walk-through audit

Maintenance of a continuous improvement cycle is often organized within these 4 steps:

- Plan: Evaluate current status, identify possible measures, set up an action plan and report
- Do: Implement measures
- Check: Collect relevant data and evaluate the success of pilot measures
- Act: Improve measures and report

Additionally, EMSs sometimes make requirements on regular information and awareness training of staff.

4.3. Food and Food Waste

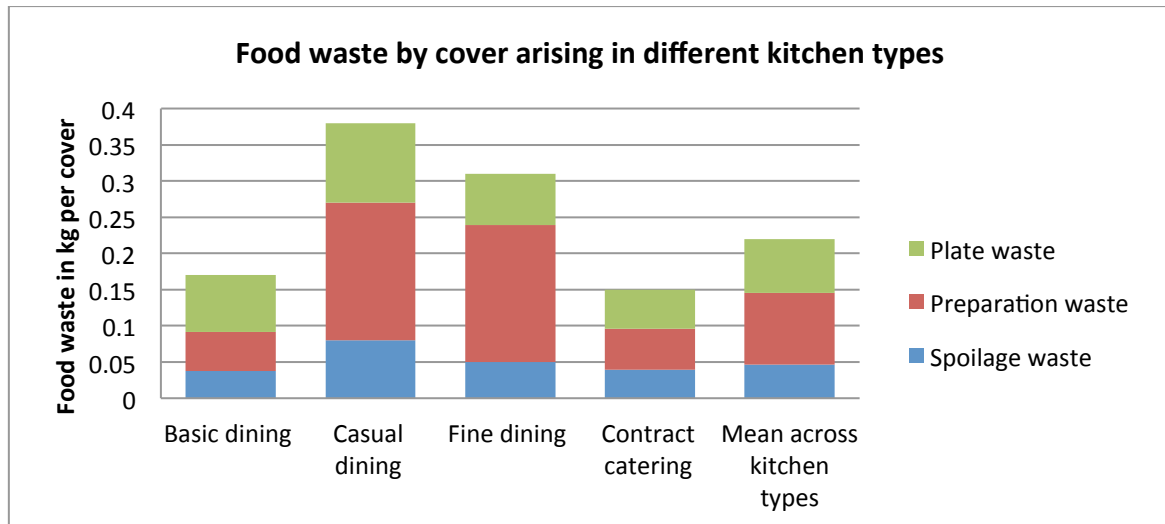
A comprehensive study on food wastage in hospitality and food service in the UK²³ came to the conclusion that about 18% of the total food purchased by weight is wasted. Up to 75% of this could be avoided by. Following table and diagram differentiate the waste generation of one cover by type of service and process.

Food waste arising point	Basic dining	Casual dining	Fine dining	Contract catering	Mean across kitchen types
Spoilage waste (%)	22%	21%	16%	26%	21%
Preparation waste (%)	32%	50%	61%	38%	45%

²³

<http://www.wrap.org.uk/sites/files/wrap/The%20True%20Cost%20of%20Food%20Waste%20within%20Hospitality%20and%20Food%20Service%20Sector%20FINAL.pdf>

Plate waste (%)	waste	46%	29%	23%	36%	34%
Waste per cover (kg)	per cover	0.17	0.38	0.31	0.15	0.22

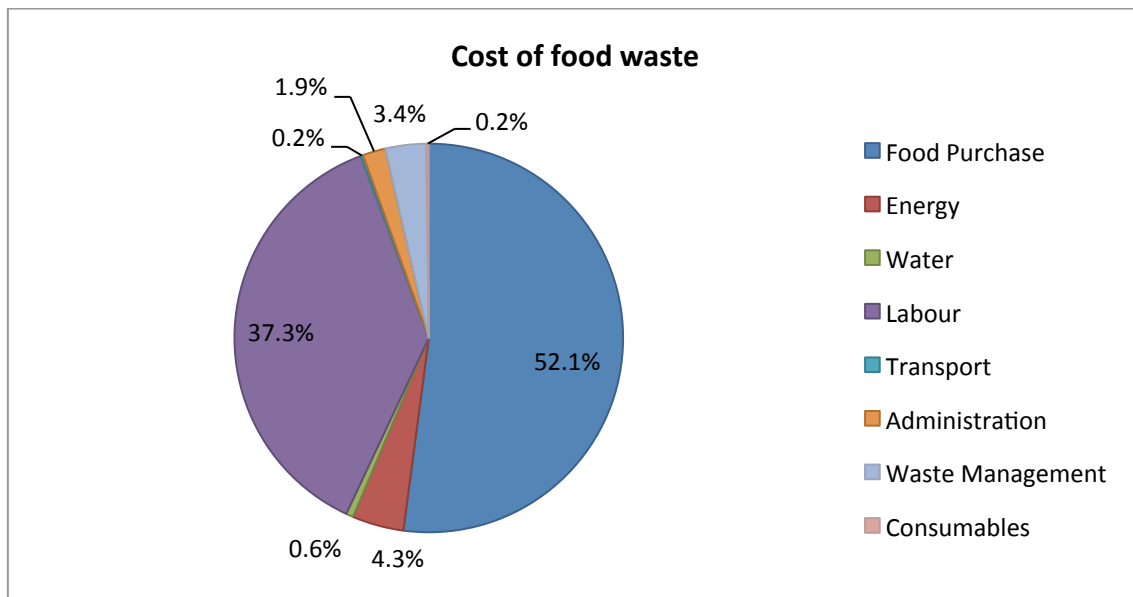


Source: UK, WRAP by LRS Consultancy and the Sustainable Restaurant Association

The impact of food wastage in terms of costs goes beyond purchase and disposal as usually work time and energy is added. The following chart shows an estimation of the distribution of the cost of food waste²⁴ and shows that only about 50% of the total cost are associated with the food purchase while nearly 40% is Labour cost.

²⁴

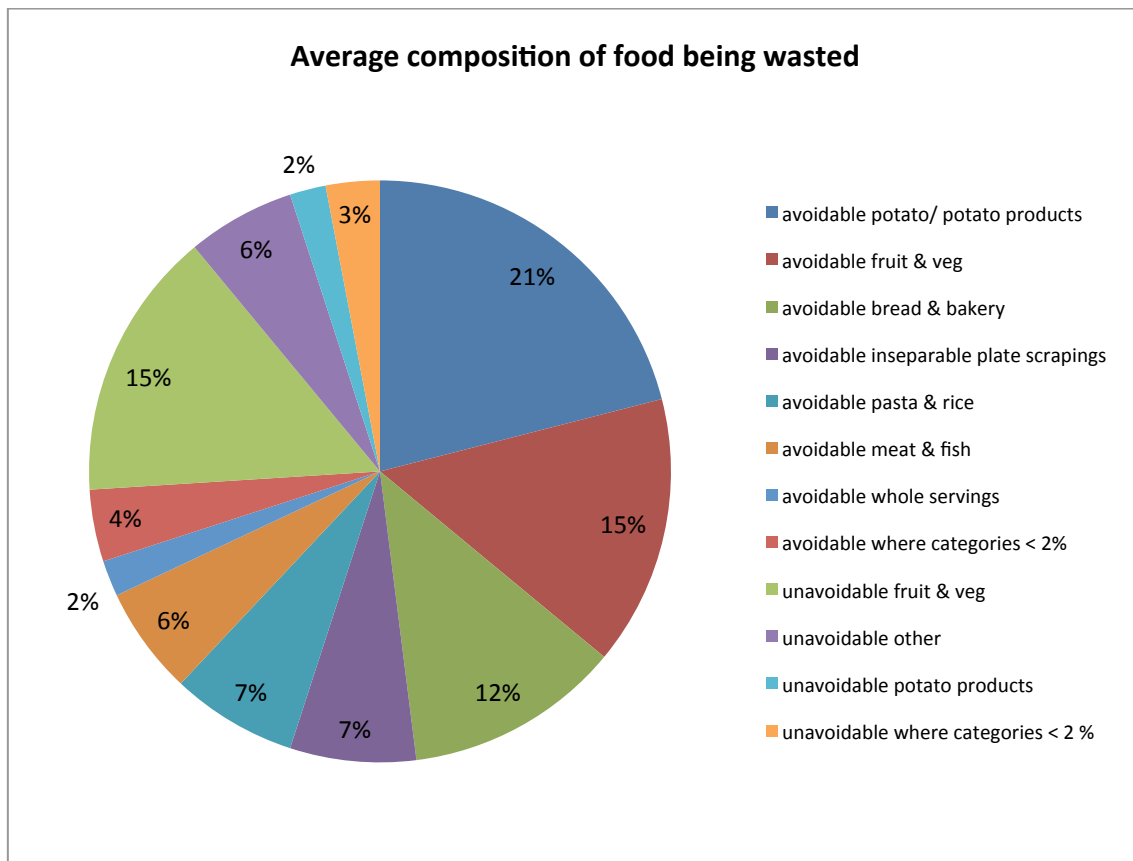
<http://www.wrap.org.uk/sites/files/wrap/The%20True%20Cost%20of%20Food%20Waste%20within%20Hospitality%20and%20Food%20Service%20Sector%20FINAL.pdf>



Source: warp.org.uk

The table below is breaking the figures down to the food waste cost per meal differentiation avoidable and unavoidable food waste:

Sector	Cost of avoidable food waste		Cost of total food waste
	Pence/meal	GBP/tonne	GBP/ tonne
Restaurants	97.29	4,775	3,447
Quick Service Restaurants	13.57	4,506	3,511
Pubs	41.48	2,896	2,090
Hotels	51.62	6,332	4,008
Leisure	45.98	5,833	4,028
Staff catering	5.25	2,980	2,208
Healthcare	22.26	2,384	1,929
Education	22.38	2,535	2,075
Services	42.97	1,971	1,656
UK industry average	38.09	3,700	2,755



Source:

http://www.wrap.org.uk/sites/files/wrap/Overview%20of%20Waste%20in%20the%20UK%20Hospitality%20and%20Food%20Service%20Sector%20FINAL_0.pdf

4.3.1. Good Practice

Good practice in food waste management covers the 3 areas where food waste is generated: ordering and storage, preparation and waste from plates. Food stock management (ordering minimum stock, rotating stock), menu planning and portion control are the most important areas for the minimisation of food waste. Following matrix may help to identify measures for an optimized waste management.

	Spoilage	Preperation	Customer Plates
Eliminate /Reduce			
Reuse			
Recycle			
Disposal			

Organisational

General food waste management

- An analysis of the amounts and origins of food waste is the basis for appropriate measures. If the team participates in this process their awareness and understanding for the issue will rise.
- Based on this, specific measures and a waste policy could be developed. Staff should be encouraged to provide suggestions on possible improvement options.
- One of the most important issues in waste prevention is the training and motivation of staff. Staff should be made aware of and trained in recognising where food waste arises, what the costs in the businesses and what they can do to reduce it.
- Staff should be made aware of improvements and savings made. By seeing the actual improvements made staff are motivated and encouraged to make further savings^.
- Implement a regular cleaning and maintenance programme for all your equipment. Regular maintenance of your refrigerators and freezers extends the life of the compressors, reduces energy costs and avoids food spoilage caused by breakdowns.

Reduce waste from spoilage

Apply careful ordering and menu planning:

- Do not over order and try to order as close to the time of use as possible. A “stock and order” form in the food storage area can help to practice accurate ordering.
- It is good practice to label and date all product upon delivery. Labels should indicate the contents and the product’s expiration date. Other necessary information, such as handling and storage instructions, may also be included.
- A back-to-front (also called a first-in first-out) policy and the monitoring of used-by-date and storage conditions helps to prevent food waste. Place the new product at the back or bottom of the shelf. The older product will be then used first.
- Products and ingredients need to be stored appropriately and their expiry date should be taken into account when planning menu. Creating daily specials may help to use remaining ingredients before they expire.

Reduce waste from preparation and cooking

- Maximise the use of any one food item on the menu: An ingredient might be waste for the preparation of one dish but a useful resource for another. Meat cuts or vegetable trimmings, for example, can be used to make broth for soup or other meals. In addition, by using the same ingredient in more than one dish you can flexibly adapt if a given meal is not sold as much as you had initially estimated.
- Avoid Over-Trimming: Over-trimming typically occurs in the preparation of bulk meats and whole vegetables. To see how much over-trimming occurs place a waste container or caddy (clear if possible) near the preparation area (2 caddies where both meat and vegetables are prepared).
- Check the contents of the caddy on a regular basis prior to emptying into the main bin. Bearing in mind the quantity of food that has been prepared - is there too large a quantity of peels or trimmings in the bin? If so, retrain your prep staff or change the

product's size or specification. Alternatively buy the product pre-prepared and portioned.

- Maximise the use of a food item for staff meals: Utilise excess preparation, and make it available for staff meals.
- Pre-portioned meat: Purchasing pre-portioned and cut meat can reduce the quantity of meat trimmings to be disposed of. Waste meat trimmings are difficult to handle and its methods of disposal are limited.
- If bigger amounts of cooking fats, oil and grease result, consider changes in cooking techniques and menu.

Reduce waste from customer plates

- Adapt portion sizes: Consider offering different portion sizes to choose from in order to reduce the waste from customer plates.
- Offer doggy bags: Where appropriate, customers may agree to take portions of their meal with them. This will help you reducing waste from customer plates.
- Identify consistently returned food items: If certain food items are consistently returned uneaten from the customer (i.e. salad, condiments) you may want to consider taking them out of the meal or even off the menu.
- Wherever possible use refillable bottles or dishes instead of individually wrapped single-use packages for condiments (ketchup, sugar, salt, etc.). These dishes are refilled from bulk containers. This step reduces both food and packaging waste.
- If you operate a buffet / salad bar consider setting up salad bar offerings in smaller containers and replenishing them more often. This reduces the quantity of food to be later discarded. Also consider providing smaller plates and allowing the customers to head back for refills. Often customers will fill up their plate because they can, only eating a portion of the food.

Reuse

- Turn Leftovers into turnover: Plan menus that use leftover food or food that is approach-ing its use-by-date. Consider promotional offers to encourage customers to buy this dish. Examples include: vegetable and meat offcuts for soup stock, garnishes and pates; excess bread and toast for breadcrumbs and croutons; main course meats in salads
- Donate food that will not be used before its use-by-date to local charities. Ensure that all food to be donated is carefully managed in line with Food Hygiene Regulations.

Treatment and disposal

- The disposal of food waste and oil down drains either in solid form (from washing) or from the use of macerators, should be avoided, as this only transfers the waste from landfill to the local wastewater treatment plant. Waste food, particularly cooking fats, oils and grease (also referred to as FOG) can cause significant blockages as they coat, congeal and accumulate on pipes.

- Collect and scrape all fats, oils and grease from ware, cooking equipment and storage containers (e.g. tuna oil). This FOG should be put into a suitable container for recycling.
-

Technical

Storing

- Ensure all storage areas are dry and clean. Clean your coolers and freezers (reach-in and walk-in) regularly to ensure that food has not fallen behind the shelving and spoiled. Arrange your storage areas to allow easy access to product. Place all dry goods off the ground on pallets or shelving. These steps will help to minimise waste due to spills, breakages and spoilage.
- Storage Temperature: Microbial growth generally occurs at temperatures between 5° and 63° C (danger zone). To prevent spoilage store perishable fresh food at temperatures below 5°C (refrigerator, chill room or freezer) and hot food above 63°C.
- Storing Fruit & Vegetables: Vegetables, particularly leafy vegetables should be stored as far as possible from cooler condenser units to prevent freezing. Store all soft fruit (except bananas) and salad items in the refrigerator. Store all other fruit and vegetables in wire baskets. This allows air to circulate around the food, reducing microbial growth.

Disposal

- Separate waste streams and implement a collection service: This will help to single out different waste streams for recycling or composting.
- Consider the use of grease traps to reduce the amounts of FAG to enter the main sewers. This allows you also to dispose them properly.
-

4.3.2. Initiatives

- <http://www.united-against-waste.de/de/>
- <http://www.wrap.org.uk/food-waste-reduction>
- <https://www.zugutfuerdietonne.de//>
-

Sources:

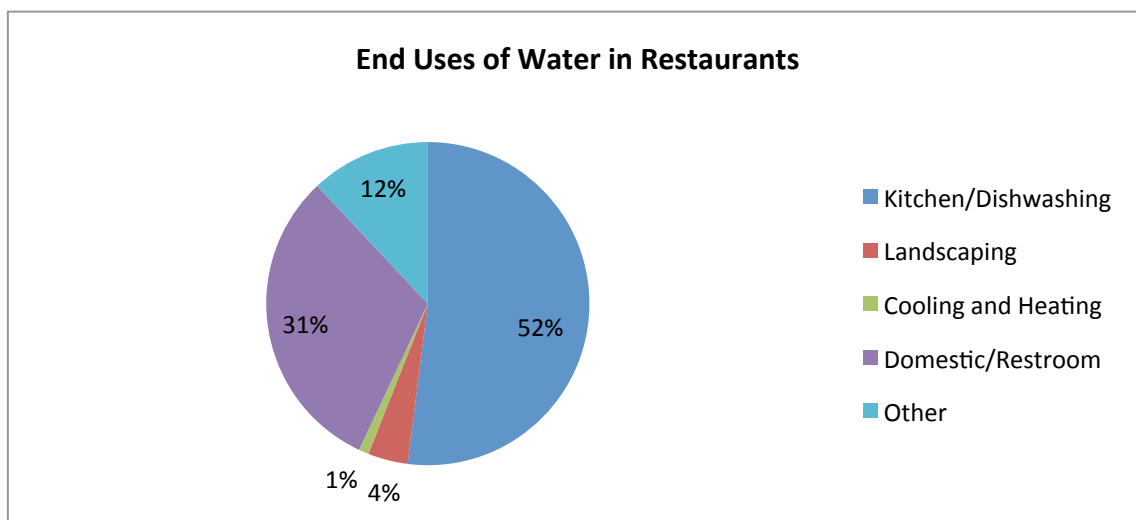
- https://www.instituteofhospitality.org/info_services/business_climate
- <http://www.wrap.org.uk/content/hospitality-and-food-service-agreement-3>
- <http://www.wrap.org.uk/content/overview-waste-hospitality-and-food-service-sector>
- App: <http://www.unileverfoodsolutions.co.uk/our-services/your-kitchen/wise-waste-app>

- Waste general
<http://www.preventandsave.ie/documents/Best%20Practice/Waste%20Management%20for%20Hotels.pdf>
- http://www.wrap.org.uk/sites/files/wrap/Overview%20of%20Waste%20in%20the%20UK%20Hospitality%20and%20Food%20Service%20Sector%20FINAL_0.pdf

4.4. Water use

The amount of water consumed in hotels and its usage in different areas varies considerably by age, size, class, facilities (e.g. on-site laundry, restaurant), irrigation needs, swimming pools, location. Beside this, water consumption also depends on season and occupancy. The range starts at about 50 Liter per guest night in a simple town hotel and goes up to 1400 Liter per guest night in a 5 star tourist hotels with pools in hot climate.

According to <http://www.epa.gov/watersense/commercial/types.html> about half of the water usage in restaurant is used for dishwashing and food preparation. DEHOGA published figures for an average water consumption of 55 Liter per Meal.



A study by the Austrian Lebensministerium²⁵ on water usage and demands gives an detailed insight in the patterns and amounts of of water usage in hotels, swimming pools and a holiday homes. *Good Practice*

4.4.1. Good practice

Water saving in the kitchen

²⁵

http://www.lebensministerium.at/publikationen/wasser/wasserwirtschaft_wasserpolitik/wasser_verbrauch_stud.html

- Awareness stuff
- Maintenance (leaking toilet, taps)
- ensuring dishwashers are full
- cleaning of dishwasher filter
- remove food scraps from the plates
- Usage of tap aerator, flow reducers in basins
- Maintenance (leaking toilet, taps)
- washing food in a bowl rather than under a running tap

Water saving in the bathroom

- Awareness guests
- Usage of tap aerator, flow reducers in basins
- Efficient showerheads
- Maintenance (leaking toilet, taps)
- Dual Flush system in toilets
- Waterless Urinals???
- water-flow sensors on taps and urinals
- foot-operated taps
- Grey water collection and usage
- Maintenance (leaking toilet, taps)
- water-flow sensors on taps and urinals

Water saving in the guest rooms

- Awareness guests
- Usage of tap aerator, flow reducers in basins
- Dual Flush system in toilets
- Maintenance (leaking toilet, taps)

Water saving the laundry

- Awareness guests
- Awareness stuff
- Efficient towel/linen laundry policy

4.4.2. Initiatives

Sources:

- <http://www.hunterwater.com.au/Resources/Documents/Fact-Sheets/Saving-Water/tips-for-hospitality-industry.pdf>
- <http://www.greenhotelier.org/know-how-guides/water-management-and-responsibility-in-hotels/>
- https://www.capetown.gov.za/en/GreenGoal/Documents/Water_Use_and_Management.pdf
-

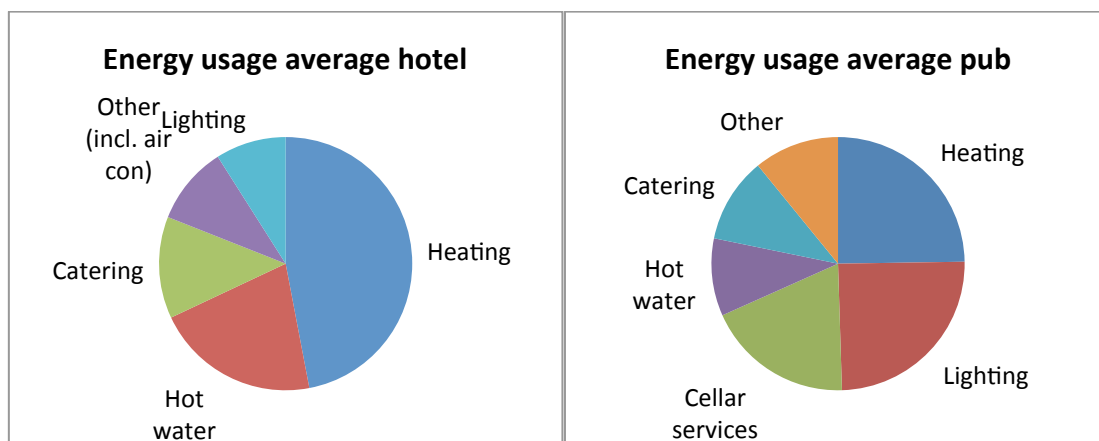
4.5. Energy efficiency, energy management and renewable energies

Energy costs in hotels usually make up about 3 to 6 % of revenue. In historic or luxury properties the share may be up to 10%. With this the energy cost is within the range of profit.

Following parameters influence the energy consumption in hotels:

- hotel standard,
- building specifications and area,
- heating and cooling degree days,
- guest-nights (occupancy),
- (warm) food covers sold,
- presence of facilities like heated swimming pool, wellness area,
- presence of food preparation facilities,
- comfort level,
- chain affiliation,
- corporate (management and staff) and customer awareness.

The diagrams below illustrate where energy is used in average British hotels and pubs.



Quelle: Carbon Trust – Energy efficiency

“Various studies have estimated that hotels have the potential to save at least 10 - 15 per cent of the energy they consume, depending on the age and size of the hotel, as well as type of equipment installed and the maintenance and operating procedures in use. An assessment of potential energy conservation in southern European hotels revealed that there is a potential for 25 - 30 per cent energy savings, especially in hotels with high annual energy consumption. European studies have estimated savings of 15 - 20 per cent for heating, 5 - 30 per cent for cooling, 40 - 70 per cent for hot water and 7 - 60 per cent for lighting.”

Source: “Hotel Energy Solutions”

(<http://hes.unwto.org/sites/all/files/docpdf/analysisonenergyusebyeuropeanhotelsonlinesurveyanddeskresearch2382011-1.pdf>)

4.5.1. Good Practice energy efficiency

Organizational measures

Simple non-investment measures to save energy:

- Turn of unused devices
- Don't use standby functions, especially in unused rooms
- Proper airing
- Avoid peak loads
- Keep cooling fins of refrigerators, fridges, minibars clean
- Only used rooms need to be heated
- Control temperature settings
- Cooking:
 - Usage of fitting lids
 - Heat only as much water as required
- Washing:
 - Connect washing machine to warm water supply
 - Full loads in dryer and wash machines
 - Use Saving programs wash less and wash at low heat.

Simple technical measures

- Proof sealing in fridges, minibars, windows and doors
- Replacement of outdated illuminants
- Usage of movement/dimmer sensors in public areas
- Insulation of pipes in unheated rooms
- Prevent airing and heating at the same time
- Use flow restrictors in showers and sinks (not in kitchen and bathtub)

Energy saving in the kitchen

- Energy efficient cooling devices
- Proper setting of cooling temperatures
- Place cooling devices cool and well ventilated and not next to oven or radiators. Minimal space between wall and cooling fins is 5 cm!
- Use few and good filled cooling devices. If devices are too big, placeholder (PUR) can help to reduce energy consumption. Do not put warm food in. Ice on cooling elements decreases efficiency – defrost!
- If possible do not put deep frozen food in oven or pots.
- Gas or induction?
- Damper
 - Try to use the capacity of the damper
 - Use the right temperatures
 - Clean regularly
 - Control sealing of doors
- Dish washing
 - Turn dish washer on when needed, prevent stand-by

- Keep washer closed in pause
- Turn of when ready
- Connect to warm water supply
- Wash dishes before they dry to prevent additional washes
- Soak cutlery if dried
- Pre clean dishes to allow longer usage of the hot water
- Cleaning, especially lime coatings on heating elements. Better/Additionally: effective water treatment
- Glass washing: Temperature settings, heat recovery, warm water connection

Energy saving in Restaurant and Bar

- Ice cube machines – use air cooled devices and turn of at night
- Beer cooling: For small amounts beer could be stored in fridge. For higher amounts dry cooling is recommended. Water cooled systems are not recommended.
- Pre-heating of dishes. Hotplates use a lot of energy. Proper setting of temperature and turn off if not required (timer-clock)
- Air conditioning: Turn of if not needed
- Ventilation: Make use of multistage devices.
- Sanitary area:
 - Paper towels instead of hand dryer. If hand dryer double jet.
 - Flow restrictors in taps
 - Water saving switches

Investment measures

The energy efficiency of technologies should always be considered if old systems are replaced or new facilities are built. In several cases the operational expenses over the lifetime of equipment are much higher than the initial cost. Energy efficiency labels on common technologies like refrigerators, washing machines and TVs help to compare products.

For bigger and long-lasting investments in the building envelope or systems engineering it is strongly recommended to consult experts in the particular field. Some states offer programmes for subsidised energy efficiency audits and consulting.

- http://www.dehoga-bundesverband.de/fileadmin/Inhaltsbilder/Publikationen/Broschuere_Energiesparen_1_eicht_gemacht_Okt_2012_final.pdf
- https://www.carbontrust.com/media/39220/ctv013_hospitality.pdf
- <http://hes.unwto.org/sites/all/files/docpdf/analysisonenergyusebyeuropeanhotelsonlinesurveyanddeskresearch2382011-1.pdf>
- “Best Environmental Practices for the Hotel Industry”: <http://www.sba-int.ch/spec/sba/download/BGH/SBABGEHOTELLERIEENG2008.pdf>
- “Key energy efficiency solutions for SME hotels” <http://hes.unwto.org/sites/all/files/docpdf/keyenergyefficiencysolutionsaugustfinalversion.pdf>

- **Case studies:**
[http://hes.unwto.org/sites/all/files/docpdf/bestpracticesguidesuccessfuleetintegratio
ninsmehotelsaugustfinalversion2.pdf](http://hes.unwto.org/sites/all/files/docpdf/bestpracticesguidesuccessfuleetintegratio
ninsmehotelsaugustfinalversion2.pdf)
- **Guide and case studies “Save energy, save money”:**
http://www.tianz.org.nz/content/library/Tourism_Energy_Efficiency_Guide.pdf
- **“Understanding the barriers and drivers of energy efficiency use in SME hotels”:**
[http://hes.unwto.org/sites/all/files/docpdf/factorsandinitiativesaffectingeeuseintheho
telindustryd42final1stjuly.pdf](http://hes.unwto.org/sites/all/files/docpdf/factorsandinitiativesaffectingeeuseintheho
telindustryd42final1stjuly.pdf)
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4.5.2. Initiatives

- Energy campaign for the hotel and restaurant industry, DEHOGA, Germany
- Hotel Energy solutions, UNWTO, Europe

4.6. Renewable energies and cogeneration

Renewable energies are generated from natural resources that are renewable (naturally replenished). Unlike fossil fuels, the usage of renewable energy sources does not emit CO₂ into the atmosphere and therefore has no effect on global warming. The usage of renewable energies has to be planned carefully to make economically sense and meet the demands.

Solar thermal water heating

Solar thermal systems utilize the heat of the sun for heating purposes. Solar collectors capture the sun radiation and turn them into useful heat. In hotel business it is used for water heating. Due to the large demand of hot water in hotel business, this system can fit perfectly especially if the hot water demand has regular patterns or even has some seasonal relation to the sunshine hours/day.

Photovoltaic electricity generation

Solar cells convert the solar radiation directly into electricity by using the photoelectric effect. The photovoltaic effect refers to photons of light knocking electrons into a higher state of energy to create electricity. These systems are well proven. Depending on the region and country this systems provide energy which is cheaper than from the main grid.

Heating with biomass

In some regions the heating with sustainable produced biomass is an option to reduce greenhouse gas emissions and dependence on fossil fuels. Additionally the local economy could often be supported.

Geothermal energy

Heat pumps could use the more or less constant temperature of ground water or the earth in the ground.

Cogeneration

Cogeneration enables a better usage of fuels to produce electricity as well as heat. The usage of cogeneration units is recommended and economically feasible if facilities have a high and comparable regular heat demand.

Sources:

- **Case studies:** <http://hes.unwto.org/sites/all/files/docpdf/bestpracticesguide-successfulrenewableenergytechnologiesintegrationinsmehotels2282011.pdf>
- **“Key renewable energy solutions for SME Hotels”**
<http://hes.unwto.org/sites/all/files/docpdf/keyrenewableenergyresolutionsforsmehotelspublication24aug2011.pdf>

5. Framework for Training through Serious Games

5.1. The Pedagogy of Games based Learning

Games are often touted for their potential to facilitate both formal and informal learning due to their implicit educational merits. Characteristics of digital games are intrinsically similar to the characteristics that are recommended to facilitate learning. Digital games, regardless of their intended use, can be seen to aid in the development of a range of specific competencies, social skills, cognitive abilities, motivation, strategic thinking, problem solving skills, hand-eye coordination, motor skills and memory. Shaffer[1] notes that games build situated understandings, effective social practices, powerful identities and shared values and ways of thinking.

Many game-based learning researchers, and indeed instructors, have noted the link between general game characteristics and learning. Whitton [2] opines, “good learning activities are intrinsically challenging – but achievable – and stretch and engage the learners through gradually increasing levels of difficulty”. Flow Theory [3], as proposed by Mihaly Csikszentmihalyi, refers to a focused state of motivation, a balance between frustration and boredom. This theory claims that learners can remain motivated to facilitate effective learning when tasks are suitable enough for their skillset yet also retain a challenging element. The pedagogical model and methods used within serious games environments are based on authentic constructivist approaches of promoting collaborative learning and active participation in order to build meaning. One characteristic of an educational game is the manner by which instructional content can be blurred with general game characteristics. With repeated use of a game, the learner is expected to elicit desirable behaviours based on emotional or cognitive reactions which result from interaction with and feedback from game play, in particular constant evaluation and assessment, evidenced in the progression in difficulty in games, and feedback which is elicited by interactions & actions taken in the game. Game-based learning helps to facilitate learning through authentic activities and environments, a concept that forms the basis of the theory of Cognitive Apprenticeship.

While theory provides an extremely good basis for learning and indeed practical experience is vital, situation or context-based experience is where authentic learning can be implemented and higher-level metacognitive activities such as planning and evaluation, and critical and creative thinking can take place and can help to facilitate the application of knowledge and skills. The movement towards this reflective and focused utilisation of knowledge and skills, as a goal of the learning process, can be seen in learning theories such as Blooms Taxonomy [4] and Sternberg’s Developing Expertise [8] Models.

An additional key factor in the use of an educational game is motivation. The game environment is motivating, so that the learner repeats cycles within a game context. As noted in “Intelligence as Developing Expertise” (1999), by Robert J. Sternberg [5]: “Motivation drives metacognitive skills, which in turn activate learning and thinking skills, which then provide feedback to the metacognitive skills, enabling one’s level of expertise to increase” (see also Sternberg, 1985) [6].

6. Summary and Conclusions

As noted in this report, a widespread issue in Europe relates to the focus on regulations, particularly with regard to food and water waste, and the need for educational courses on the topics. The report highlights a lack of education on environmental matters in VET generally, which would help people to develop skills to deal with these issues.

A key aspect of this report, of course, is the inclusion of policies and procedures from various perspectives throughout Europe with input from subject matter experts who have highlighted important elements for consideration from their own countries as well as from the EU as a whole. Tourism is an enormous industry in Europe and offers a large economic contribution to most countries. This sector sees increasing focus on sustainability and waste management in particular and strategies are constantly evolving and in need of revision due to changes in technology, habits and naturally, the environment.

The report highlights the differences from country to country in approaches to education in the sector, with some countries not focusing on such issues until third level. By developing an educational game with engaging and accessible content, in a format that is widely utilized, one would hope the potential to use such a tool in earlier years is quite high.

The strategies offered in this report are crucial in the context of the game content and indeed the game mechanics, with a view to identifying the most suitable training requirements and the most effective style of game for the Tourism and Hospitality and Environmental sector.

7. References

- [1] Shaffer, D. W. (2007). *How Computer Games Help Children Learn*. New York: Palgrave
- [2] Whitton, N. (2010) *Learning with Digital Games: A Practical Guide to Engaging Students in Higher Education*. New York: Routledge
- [3] Csikszentmihalyi, M. (2002). *Flow: The Psychology of Happiness*. London: Random House
- [4] Bloom, B., Englehart, M. Furst, E., Hill, W., & Krathwohl, D. (1956). *Taxonomy of educational objectives: The classification of educational goals. Handbook I: Cognitive domain*. New York, Toronto: Longmans, Green.
- [5] Sternberg, RJ (1999) *Intelligence as Developing Expertise*. *Contemporary Educational Psychology*, 24(4): 359-375
- [6] Sternberg, R. J. (1985): *Beyond IQ: A triarchic theory of human intelligence*. New York: Cambridge University Press.