Chapter 5: Energy

Introduction

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

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Objectives

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

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

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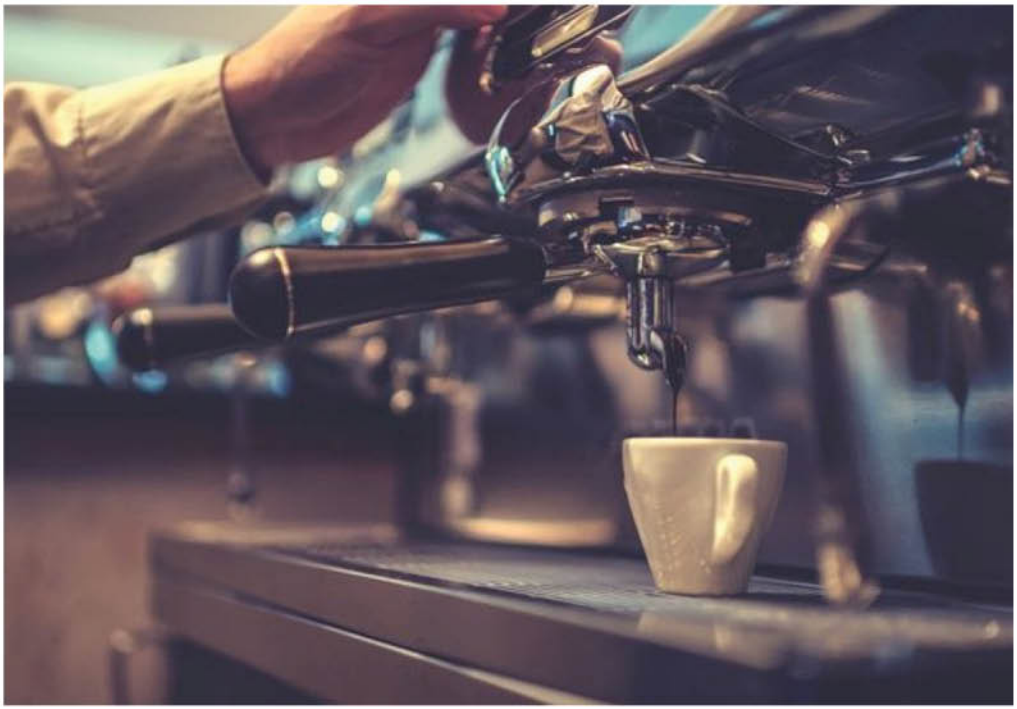
Unit 5.1 - Energy consumption in HoReCa

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



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

(Carbon Trust, 2018)

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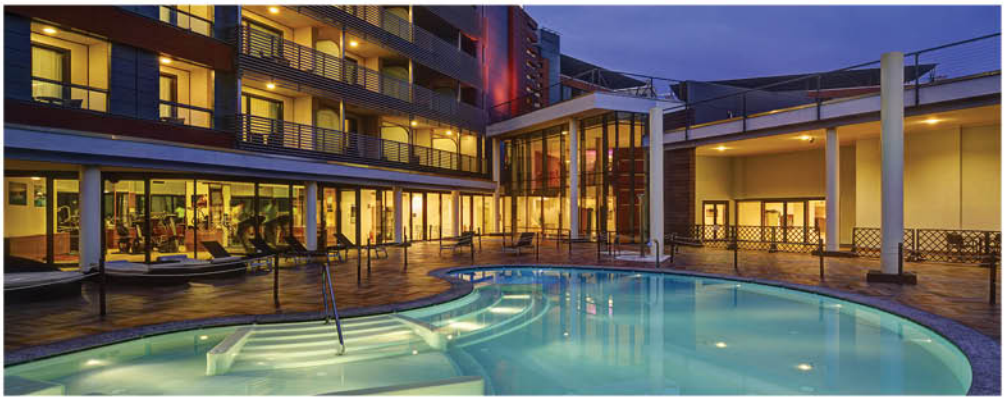
Unit 5.1.1 - Areas of consumption in HoReCa

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

Hotels

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

(European Commission, 2013)



Kitchens and Catering

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

(Mudie et al., 2016)

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Unit 5.2 - Energy management practices

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

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Unit 5.2.1 - Kitchen practices

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

Kitchen Layout

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

(Mudie et al., 2016)

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

(Mudie et al., 2016)

Operational Behaviours

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

(Carbon Trust, 2012)

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

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Unit 5.2 - Energy management practices

Unit 5.2.1 - Kitchen practices

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

(Carbon Trust, 2018)

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Unit 5.2.2 - Laundry Processes

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

(European Commission, 2013)

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

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

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Reducing Volume

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

(The European Commission, 2013)

Efficient Laundry Management

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

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

(The European Commission, 2013)

Drying

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

(The European Commission, 2013)

Unit 5.2.3 - Heating and Ventilation

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

(European Commission, 2013)

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Timing and Zoning Controls

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

(Carbon Trust, 2017)

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

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Unit 5.2.4 - Lighting

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

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Lighting Policies

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

(Carbon Trust, 2017a)

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Efficient Lighting Technology

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

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

Figure 5.2 – Lighting hours and efficiency of lighting lamps

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

Intelligent Lighting Systems

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

(European Commission, 2013)

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Unit 5.3 - Advanced energy efficiency measures

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

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Unit 5.3.1 - Maintenance

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

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

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Lighting

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

(Carbon Trust, 2018)

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

(Carbon Trust, 2012)

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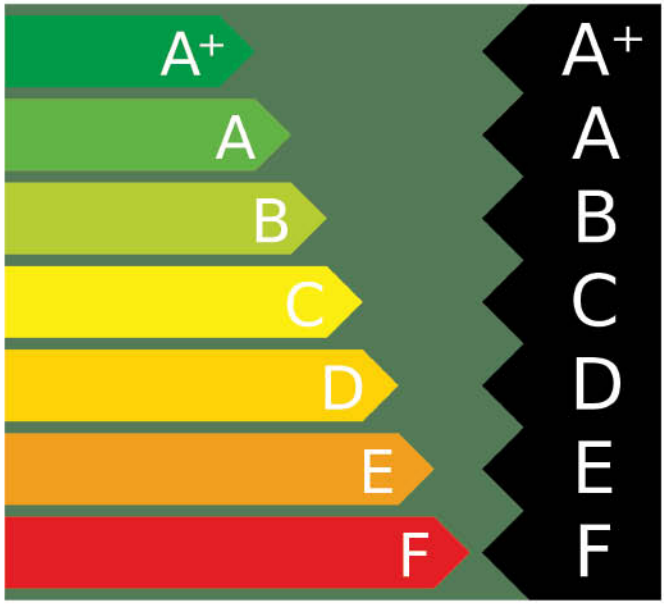
Unit 5.3.2 - Appliance Efficiency

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



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(Carbon Trust, 2012)

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Unit 5.3 - Advanced energy efficiency measures

Unit 5.3.2 - Appliance Efficiency

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

(European Commission, 2013)

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

(Carbon Trust, 2012)

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

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

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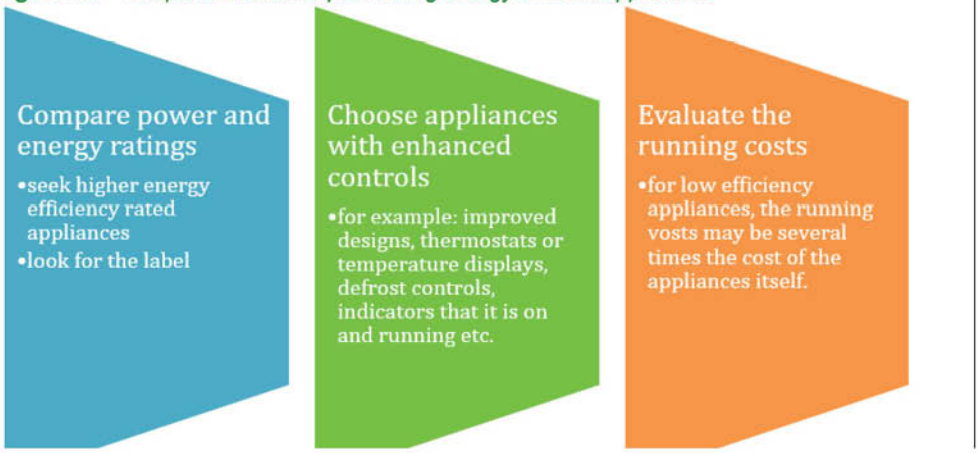
Other things to note when purchasing new kitchen appliances include: triple glazed doors on conventional ovens can reduce energy use by 3%, combi-ovens that absorb the steam and moisture generated through cooking can reduce energy by 16-30%, thermostat controlled grills and heat lamps can reduce heat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

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

(Carbon Trust, 2012)

Figure 5.3 – Simple checklist for purchasing energy efficient appliances



Unit 5.3.3 - Premises efficiency

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

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

(European Commission, 2013)

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

(European Commission, 2013)

Unit 5.4 - Energy audit and monitoring

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

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

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Unit 5.4 - Energy audit and monitoring

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

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Unit 5.4.1 - Energy consumption audit

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

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

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Unit 5.4 - Energy audit and monitoring

Unit 5.4.1 - Energy consumption audit

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

(European Commission, 2013)

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

(European Commission, 2013)

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

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Unit 5.4.2 - Action checklist

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

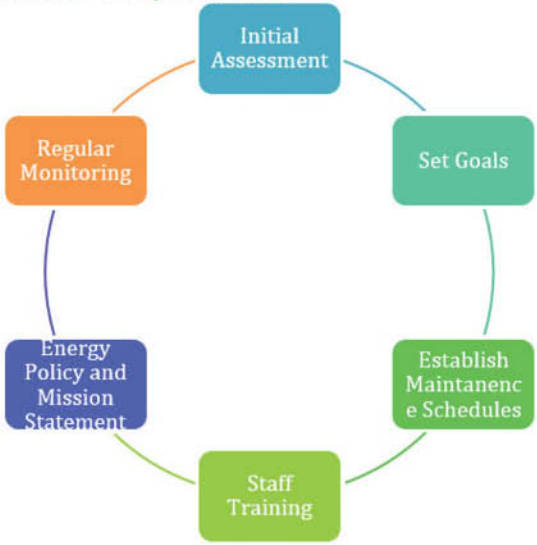
Unit 5.4.3 - Energy manager or energy management team

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

(Carbon Trust, 2011)

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

Figure 5.5 – Responsibilities



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Unit 5.5 - Renewable energy

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

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Unit 5.5.1 - Renewable energy in HoReCa

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

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Unit 5.5 - Renewable energy

Unit 5.5.1 - Renewable energy in HoReCa

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

(Hotel Energy Solutions, 2011)

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

(Hotel Energy Solutions, 2011)

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

(European Commission, 2013)

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Unit 5.5 - Renewable energy

Unit 5.5.1 - Renewable energy in HoReCa

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

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Unit 5.5.2 - Considerations for choosing renewable energy

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

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

(Karabuga et al., 2015)

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Unit 5.5 - Renewable energy

Unit 5.5.2 - Considerations for choosing renewable energy

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

(European Commission, 2013)

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Appendices

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

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

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

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

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

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

Photo or logo of the organisation

Details of the organisation:

Energy Source Before Change to RE	Renewable Energy Source Use

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Appendices

Change of Practice to Reduce Energy Consumption

Comments and Recommendations on moving to Renewable Energy

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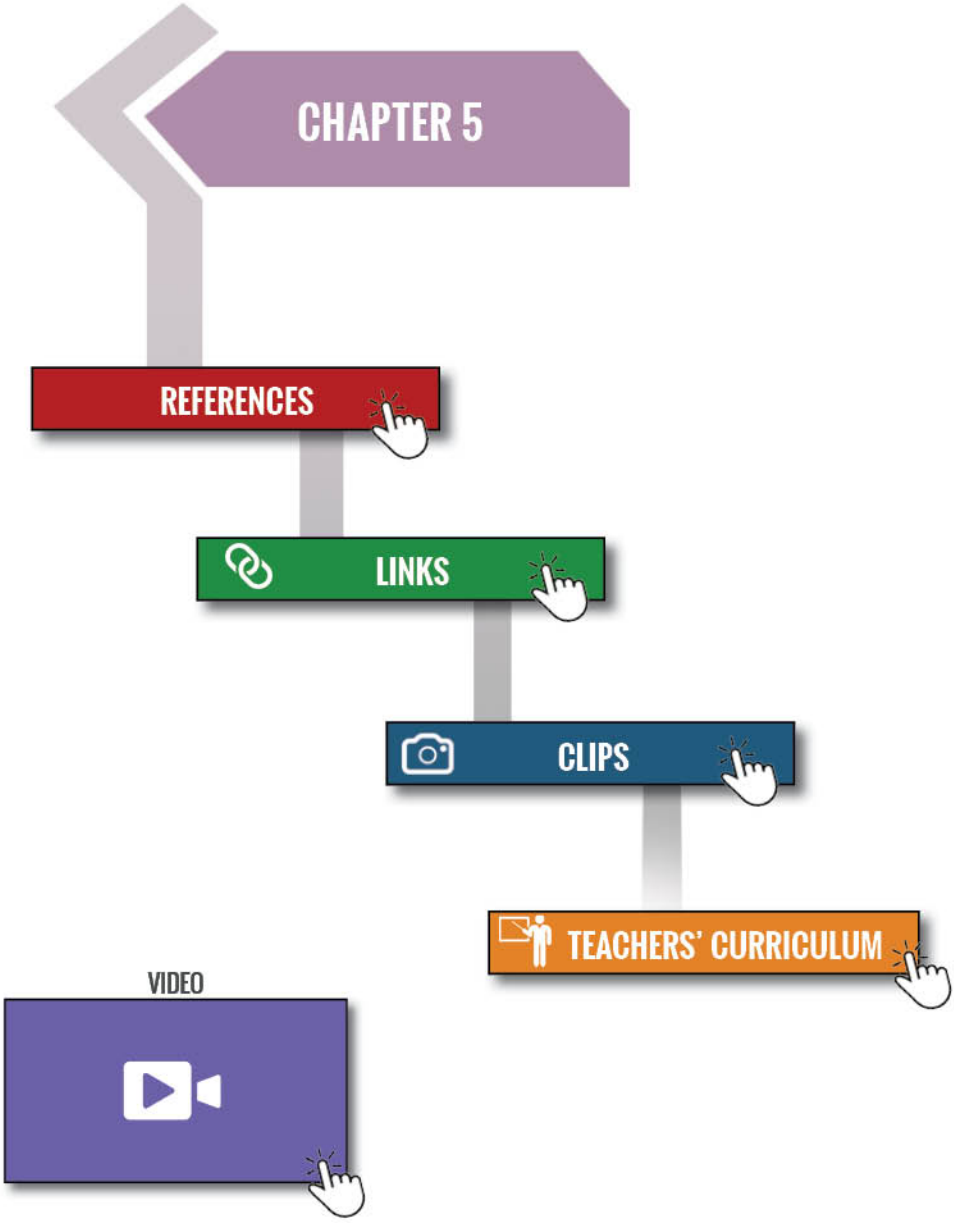

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