



HANDBOOK FOR IMPLEMENTING CIRCULAR ECONOMY PRACTICES IN HOTELS AND RESTAURANTS

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This handbook was commissioned by UNDP Cambodia and authored by Knai Bang Chatt, edited by Michael Wasserman and designed by Anika Funk.

FOREWORD

Over the last decades, Cambodia's strong economic growth and increasing population has resulted in a sharp increase in the use of materials and energy and a surge in waste generation. To address the challenge, the National Council for Sustainable Development and the Ministry of Environment developed the National Circular Economy (CE) Strategy and Action Plan and CE Private Sector Platform in 2021. This work has been supported by the Embassies of Japan and Sweden and the United Nations Development Programme (UNDP).

The CE Strategy and Action Plan outlines the key vision, strategies, and roadmap for Cambodia to transition towards a circular economy, with the overarching goal to achieve a prosperous economy, a thriving and inclusive society, and a healthy environment.

The CE Strategy acknowledges the central role of the private sector in accomplishing the transition. Their active engagement is crucial in adopting more sustainable energy and resources, improving energy and resource efficiency, introducing alternatives to single-use items, promoting reuse, repair, and recycling, as well as operating Waste to Energy businesses. For this reason, **the CE Private Sector Platform** has been developed to disseminate current best CE practices in Cambodia and to share information about easy-to-implement CE measures in the country.

As part of these CE initiatives, **this handbook about the implementation of CE practices in hotels and restaurants** was developed in cooperation with the Knai Bang Chatt (KBC) Resort in Kep. In 2020, the KBC received certification of appreciation from the Ministry of Environment for their high-level environmental performance. In March 2021, KBC was accredited with the Platinum Certification by the Global Sustainable Tourism Council. Their initiatives to introduce energy efficiency measures, promote the use of sustainable energy, eliminate single-use plastic items, and implement composting and recycling of materials were central to this certification.

The present handbook documents the exemplary CE measures in hotel businesses and provides step-by-step information to promote sustainable tourism among other hotels in Cambodia. The book guides the reader on a) how to build a team and action plan (chapter 2); b) how to save energy (chapter 3); c) how to make hotel rooms, kitchen and restaurants environmentally friendly (chapter 4 and 5); d) how to sustainably manage waste (chapter 6); e) how to educate staff and communities (chapter 7); and f) how to monitor results and impacts (chapter 8).

I would like to take this opportunity to express my deep appreciation to the teams of the National Council for Sustainable Development and the Ministry of Environment, UNDP, Knai Bang Chatt, and Embassies of Japan and Sweden for their valuable contributions to this handbook.

Overall, this handbook aims to transform our tourism sector to be fully sustainable and to build back better during and in a post COVID-19 world. The National Council for Sustainable Development and the Ministry of Environment are highly committed to enhancing collaboration with all stakeholders to promote sustainable tourism and a healthy environment for all in Cambodia. *W. eay 10/26*

Phnom Penh, ... 29 June 2021



Say Samal

Chair of the National Council for Sustainable Development
Minister of Environment

PREFACE

As this handbook was written, the global tourism industry has been at a virtual standstill for nearly a year and half due to the COVID pandemic. Over 640,000 jobs and livelihoods from the tourism sector have been impacted here in Cambodia, where tourism and hospitality services accounted for 18.7% of real GDP growth in 2019.ⁱ It is likely that any recovery in this sector is going to come with significant changes and those that survive and thrive are going to be those best able to learn and adapt. We hope this handbook can make some contributions to build resilience in the sector as well as to make for a cleaner and greener tourism model.

In the pages ahead you will find practical advice about how hotels and similar facilities can move their businesses towards more sustainable directions. It covers everything from clean energy to designing a more environmentally friendly menu. This is also about creating a service that is higher quality and more deeply bedded in the rich culture and diverse environment of Cambodia. It is about anticipating and responding to a tourism market that increasingly seeks sustainability and a stronger connection to local communities and surroundings. This points to how a Cambodian tourism industry might build forward better, and recover quicker, with a more clearly differentiated and higher quality offer.

The work is based on a circular economy model and is part of a wider programme led by the Royal Government of Cambodia's National Council for Sustainable Development and support by the United Nations Development Programme (UNDP). Our circular economy programme includes, for example, bringing solar DC mini-grids to remote villages, benefiting so far 140 households and is intended to reach all 210 "hard-to-reach villages" in Cambodia in the next few years.

I am very grateful to Jef Moons the founder & CEO of Knai Bang Chatt, for picking up the vision set by H.E. Minister Say Samal, the Minister of Environment, in showing how a tourism business can take a leading role in building a more sustainable economy. He and his team have made their work open to all, and we hope to see that help others in the tourism sector find ways to make their businesses cleaner and greener, and more prosperous too.



Nick Beresford
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ⁱWTTTC 2021, 'Cambodia: 2021 Annual Research' <https://wttc.org/Research/Economic-Impact>; World Bank 2020, 'Cambodia Economic Update: Cambodia in the time of COVID-19', p. 4. <https://pubdocs.worldbank.org/en/357291590674539831/pdf/CEU-Report-May2020-Final.pdf>

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CHAPTER 1 - INTRODUCTION

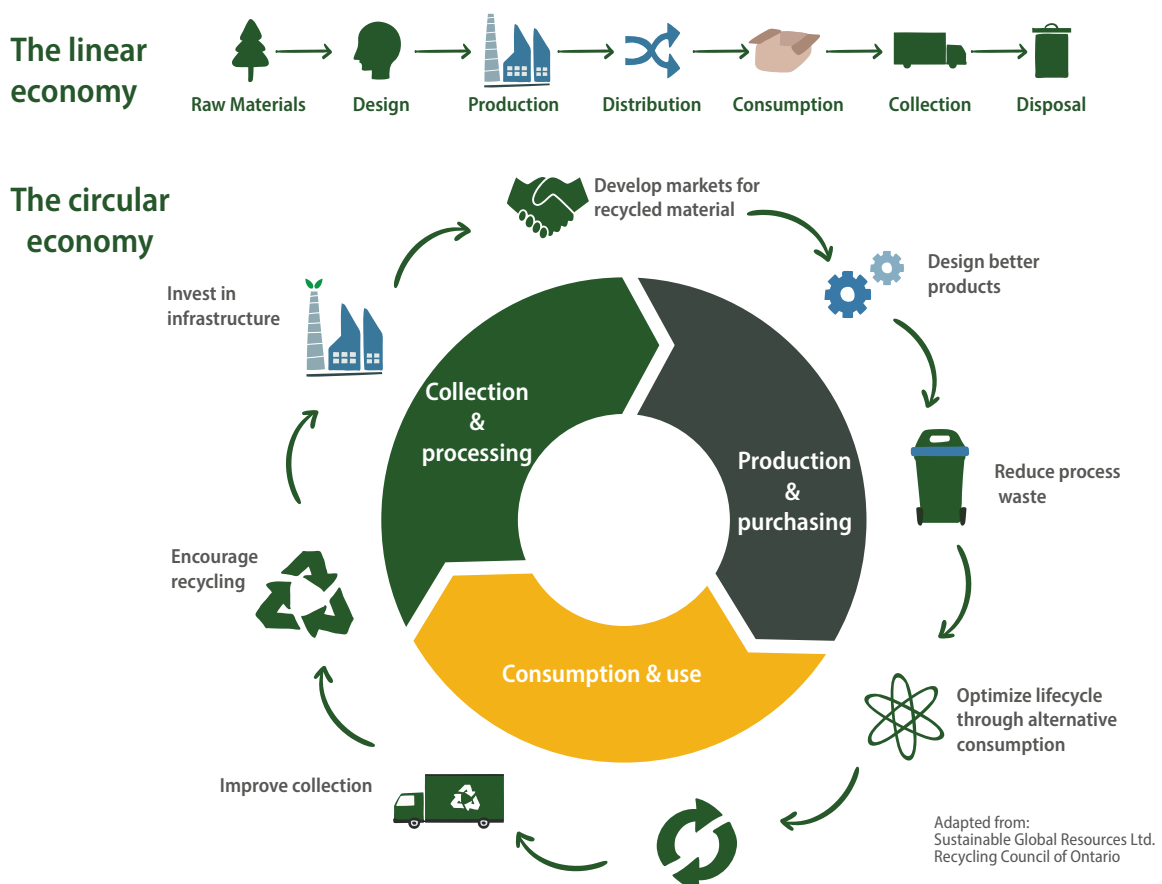
Cambodia has a fast-growing economy with rapid population growth. The hospitality industry is a key contributor to its economic growth, accounting for 21% of gross domestic product (GDP) in 2019. Tourism further comprised 25% of Cambodia’s total exports in 2017¹. With a growing population and expanding economic activities, Cambodia now faces the new challenge of a mounting volume of waste, which has surged at a rate of about 10% each year². Although awareness is growing on this immense challenge, key information on how to implement more sustainable activities within businesses is still absent.

This handbook seeks to support hospitality businesses that want to engage in more sustainable and circular economy practices by identifying key actions they can take and providing clear instructions on how to implement these actions.

1.1 WHAT IS A CIRCULAR ECONOMY?

Current economic models are linear, meaning resources are extracted so that products can be produced, consumed, and then disposed of. This prioritizes growth but relies on inefficient use of resources and large-scale waste creation.

Figure 1.1 The Linear Economy and Circular Economy



¹ The World Bank (2020).

² Ministry of Environment, MoE (2018).

A circular economy (CE) instead is defined as an economic system of closed loops in which raw materials, components and products are kept in use for as long as possible, renewable energy sources are used, and systems thinking is at the core. Definitions often focus on the use of raw materials, based on the 4-R approach³: Refuse - Reduce - Reuse - Recycle.

1.2 WASTE HIERARCHY

This handbook focuses on the hospitality sector due to its large share of waste generation and potential for transitioning to CE practices. One way to for those within the sector to identify the quality in actions is to judge them against the waste hierarchy. The waste hierarchy ranks waste management options from most preferred to least preferred from an environmental perspective. It gives highest priority to preventing waste generation and lowest priority to landfill disposal. In order of preference, the waste management options are:

Figure 1.2 Waste Hierarchy



1.3 WHY IS IT IMPORTANT FOR HOSPITALITY BUSINESSES TO MOVE TOWARDS A CIRCULAR ECONOMY?

A circular economy redirects potential waste to form new inputs and minimizes necessary resources for production. Given its basis on the 4R approach, a circular economy provides benefits for three indicator categories, including:

ENVIRONMENTAL BENEFITS	ECONOMIC BENEFITS	SOCIAL BENEFITS
<ul style="list-style-type: none"> • Reduce dependence on importation of raw materials • Reduce greenhouse gas emissions • Reduce pollution / climate change • Reduce waste generation 	<ul style="list-style-type: none"> • Reduce input costs • Create jobs and employment • Save cost on water and energy • Create value from waste • Create competitive advantage 	<ul style="list-style-type: none"> • Create modern, environmental brand • Promote gender equality • Promote social opportunities • Avoid inequalities • Promote education

³ Ellen MacArthur Foundation (2015). "Towards a Circular Economy: Business Rationale for an Accelerated Transition." Available at: <https://tinyurl.com/zt8fhxw> [accessed October 10, 2020].

1.4 HOW CAN A CIRCULAR ECONOMY SAVE COSTS?

Circular economy practices can save costs as increasing resource efficiency leads to lower resource input needs. By undertaking circular economy practices, businesses can cut costs by acquiring cheaper and recyclable products, reducing operation cost, recycling waste generated from various sectors, and using less energy and water. The details of these components will be explained in the following chapters.

1.5 HANDBOOK OUTLINE

The handbook is divided into 8 chapters.

Chapter 2 discusses building a green team and creating an action plan in addition to reviewing sustainability for procurement of supplies.

Chapter 3 examines energy options available, including renewable energy and energy efficiency.

Chapter 4 describes hotel rooms, exploring how to create a single-use plastic free hotel room among other actions.

Chapter 5 examines kitchens and restaurants, and how to create more sustainable items and less waste.

Chapter 6 discusses waste management, including types of wastes and quantities, exploring how to implement a zero-waste policy.

Chapter 7 reviews education and how to train staff to raise their awareness on sustainability.

Chapter 8 explains how to monitor the activities implemented.



CHAPTER 2 - BUILD A GREEN TEAM AND PROCUREMENT PLAN

2.1 WHAT IS A GREEN TEAM AND HOW TO CREATE ONE

A first step towards implementing more circular economy practices is to create a green team. This green team is a group of staff members who manage the responsibilities associated with implementing circular economy actions. Representatives of the green team should include all departments of your business to ensure that there is a cross-sectoral understanding of how to implement circular economy actions.

Green team responsibilities:

- Identifying the goals and objectives of the organization regarding sustainability. This includes creating a “Green Vision”
- Designing and planning programs to meet the identified goals
- Gathering support and necessary tools to implement programs
- Recognizing and rewarding successful efforts to help reach the goals
Communicating with staff and surrounding businesses
- Tracking and reporting of metrics relevant to the organization (See Chapter 8 for a full monitoring list)
- Identifying more sustainable products to use
- Continuing vitality of the program

Preparation points for building your green team

The success of a green team takes a collective effort. It is important to first assign a green team leader. The leader shall be an extension of the green vision of the business and committed to the success of the program. To create a green team, the following tips should be followed, including

- Focus on roles of each individual (Create a green team leader),
- Value each role (Full engagement by all is needed to succeed),
- Constantly communicate (Gain & transfer knowledge),
- Set small targets at the time, but never forget your final goal (Creating multiple small successes will create growth),
- Celebrate each success (“Yes we can” attitude feels good)
- Offer support to each other (No ego, no individualism, only team performance).

2.2 DEVELOP GREEN PROCUREMENT STRATEGIES

The first point of order after establishing the green team will be to source products from likeminded companies. Green purchasing is defined as the purchase of products and services that have a lesser or reduced impact on human health and the environment when compared with conventional products. The green team will need to determine which products can be replaced with more sustainable options or eliminated completely. An example of commonly used products in hotels where green versions are widely available is presented in Table 2.1.

Figure 2.1 Conventional Products and Eco Alternatives

CONVENTIONAL PRODUCTS	ECO-FRIENDLY ALTERNATIVE
Printing Paper	FSC approved paper (Forest Stewardship Council)
Envelopes	FSC approved paper (Forest Stewardship Council)
Toilet Paper/Paper Towels/Tissue	FSC approved paper (Forest Stewardship Council)
Plastic Pens	Switch to ecofriendly cardboard pens
Printer	Energy Star rated
Computer CRT Monitor	Energy Star/LED monitor
Toner/Ink Cartridge	Recyclable/Reusable supplier
Cleaning Products	Certified Environmentally Safe Company ECOLAB
Lamps and Lightbulbs	LED Lights
Company Appliances (Small)	Energy Star low wattage rated
Food and Beverage Suppliers	Certified sustainable companies
Electricity	LED lights, renewable energy
Water Supply	Wells or municipal water supply, solar water pump
Propane/Natural Gas/Fuel	Efficient stoves for cooking

When developing a green purchasing program, it is beneficial to create a policy statement to inform staff of the hotel’s purchasing preferences, guide future purchasing decisions, and to notify customers about the hotel’s purchasing practices. By posting the policy on the hotel’s website, it also sends a message to customers and staff that the hotel is taking its purchasing, and the effect it has on the environment, seriously.

The green team will have to conduct a thorough review of each practice internally to assess where changes can be positively made for impact. Each business will need to create a unique strategy based on their location, availability of products, business model, and market preferences. This handbook can be used as a guide, but it will be the responsibility of the green team to enhance the actions in this handbook for the local context.

2.3 PROMOTE SUSTAINABLE DESIGNS FOR HOTEL ROOMS

Sustainable designs need to respect the heritage value of Cambodian Modernist architecture and with reference to the era of late architect H.E. Vann Molyvann. The so-called 'Khmer ecological architecture' means that buildings need to adapt to modern materials and construction techniques – such as the effective utilization of water, natural light and ventilation – while maintaining key elements of Cambodia's unique culture, climate and building environment.

Options for enhancing sustainable architecture and design include:

- Adapt to location
- Orient buildings to create airflow and reduce temperatures
- Create green spaces and protective landscapes
- Use reflective colors on walls
- Make tiles, fixtures and curtains locally
- Use sustainably certified wood
- Decorate rooms with local antiques and artifacts
- Use local ingredients for varnishes and wax
- Less is more and can increase modern design
- Install onsite septic tank to filter grey water
- Reuse rainwater through construction of storage bins
- Install smart air conditioning controls
- Install low flow shower heads and toilets

2.4 ENSURE GENDER EQUALITY

Circular economy businesses must have respect for fundamental human rights and the sustainable development goals, which includes gender equality. For hospitality businesses there are many options for creating a more gender equal business.

Many business leaders have preconceived notions for who can fill certain roles. For example, some may believe that only men can fill maintenance roles and women can fill cleaning roles. A first step is to implement gender equal hiring to ensure that all positions are open to all genders. This includes providing equal pay and equal opportunities for all genders.

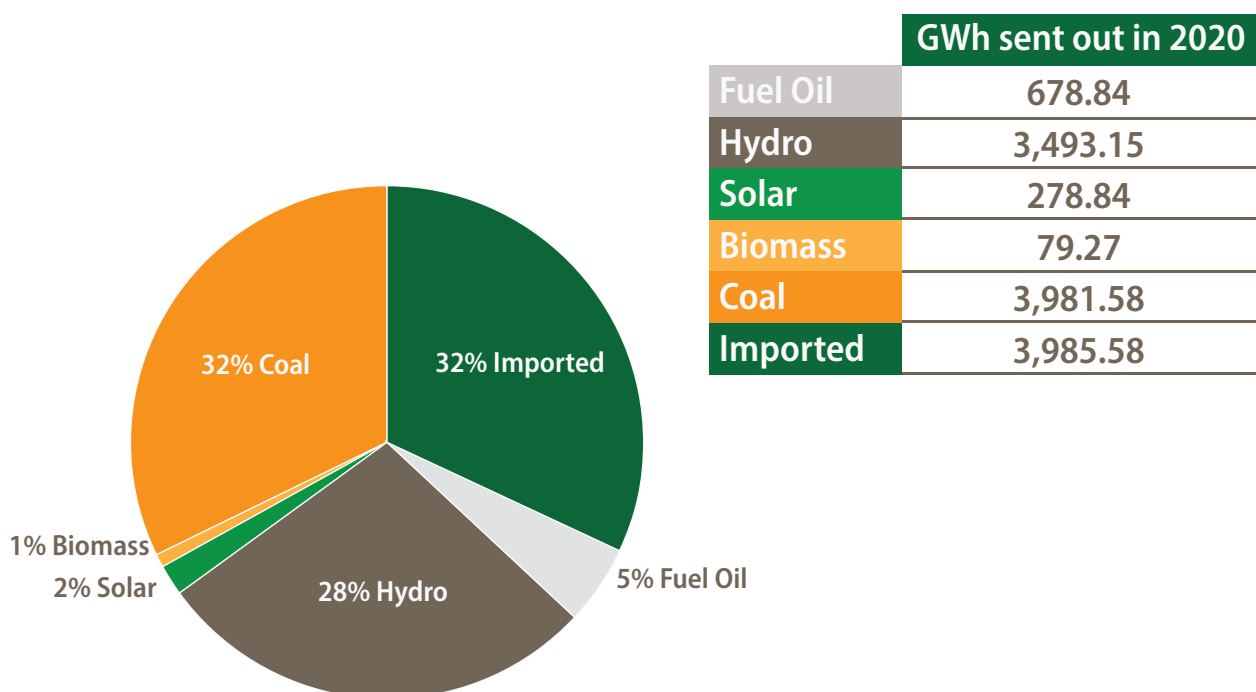
These steps are not an all-inclusive list for gender equality, but by taking these simple actions your organization will be more balanced. You will foster a positive work environment and attract more talent. You will automatically receive a richer mixture of talents and skills and you will gain more ideas on how best to find solutions that are good for all.



CHAPTER 3 - ENERGY

With a growing economy, demand for electricity in Cambodia has grown by about 10-20% per year. As of 2019, Cambodia receives most of its electricity through hydroelectricity, coal power plants, and electricity imports. By 2030 coal will become the major source of power generation in Cambodia, surging to more than 70%⁴. Coal power is a major source of GHG gas emissions and local air pollution. When connected to a state managed electricity grid, small and medium sized businesses do not have an option for selecting their electricity source, but there are many options for reducing one’s reliance on the local grid through installing variable renewable energy (VRE) sources and increasing energy efficiency.

Figure 3.1. Power sources for Cambodia in 2020⁵



3.1 OPTIONS FOR RENEWABLE ENERGY

For this handbook four renewable energy options are reviewed. They are solar electricity, solar water heaters, biodiesel, and renewable biomass.

⁴ Clean Energy Cambodia, <http://cleanenergycambodia.org>

⁵ EAC, Report on Power Sector for the Year 2020

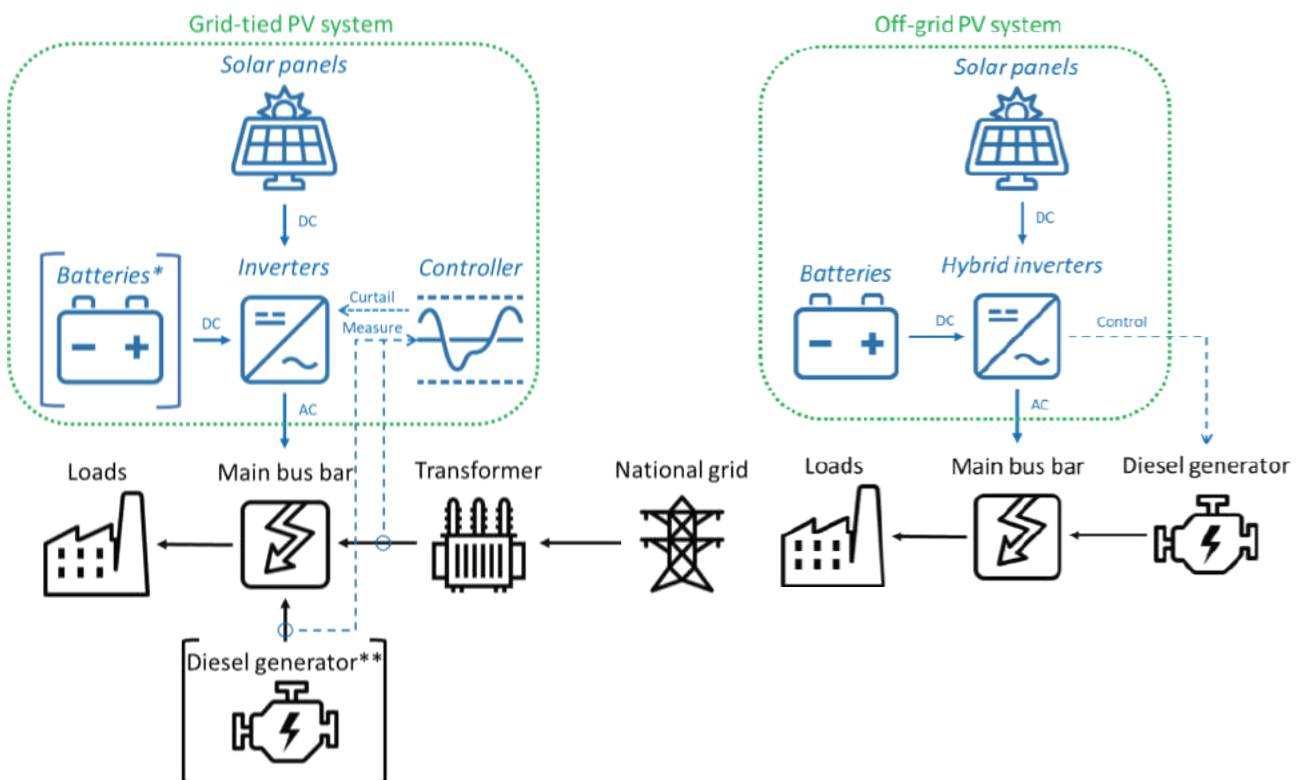
Option 1: Install solar

Solar energy is a method of turning energy from the sun into usable electricity. As Cambodia has a wealth of solar resources, installing solar panels could be a good option for a local business.

The current business environment for solar energy in Cambodia is complex and each business will need to judge their own needs when deciding if solar energy is the best option. This chapter will not provide an in-depth look at solar energy, but instead provide a brief overview of what a business may need to consider. For further information on the installation of solar panels, SMEs should consult with their local electricity enterprise to understand regulatory and safety requirements.

There are two main options for a solar panel system. They are 1) **grid-tied systems** where excess electricity is supplied to the grid, and state powered electricity is also provided to the business as normal, and 2) **off-grid systems** where the electricity generated is only used on-site and is not supplied to the grid. In all systems battery energy storage and diesel generators are options for increasing consumption time and reliability of solar energy. For the design of solar PV systems, the premise owner should consult with a solar PV installer.

Figure 3.2 Illustrations of a grid-tied system and off-grid system



Grid-tied systems

This is a potential option for business with good access to state provided electricity looking to lessen their environmental footprint. In Cambodia this requires EDC approval and should not be more than 50% of the contracted capacity.

Pros

- National grid provides a stable back up energy source so customers will have dependable electricity.
- Number of solar panels installed is flexible depending on budget and need. The grid will supply additional needed electricity.
- Environmental footprint is reduced due to lower greenhouse gas emissions from solar panels compared to coal power plants.
- Opportunities for increased marketing as an environmentally friendly business.

Cons

- Requires upfront investment depending on the supplier.
- Current regulatory framework limits incentives and long-term costs may be higher compared to 100% grid power due to capacity charges⁶.

Off-grid systems

This is a potential option for businesses in rural areas with limited access to the national grid or eco-tourism businesses that want to position themselves as environmental leaders.

Pros

- Significant reduction in environmental footprint due to lower greenhouse gas emissions from solar panels compared to coal power plants.
- Potential for long-term savings compared to a grid connected system due to low operation and maintenance cost.
- Compared to diesel generators there is no noise, air or water pollution.

Cons

- Electricity use is limited to the power generated by the system. High-powered items like air conditioning may be less feasible in this system.
- Requires high upfront investment cost depending on the supplier.

⁶ Capacity charges are fees charged to users based on the highest amount of energy they are estimated to use.

Option 2: Install a solar water heater

Businesses that may not want to invest in solar for their entire property can instead focus on just one aspect of energy generation. As many hospitality businesses have high, consistent hot water demand for showers, laundry, and restaurants then converting to a solar water heater can be an attractive option. After an initial investment, solar water heaters reduce costs as they offset the businesses electricity bill.

Businesses can work with a local supplier to determine the size of the system needed and if the building is suitable for solar water heating. In general, for the hotel sector 40 gallons of hot water per a two person room is the recommended volume.

Option 3: Use biodiesel

Biodiesel, which is produced from used cooking oil, can be purchased in Cambodia from Naga Earth. It offers a more sustainable option for powering generators. Compared to regular diesel, biodiesel creates 90% less hydrocarbon emissions and 50% less carbon dioxide emissions. It also works in any diesel engine, providing an easy switch for businesses. Businesses also have the option of donating their own used cooking oil so they can use their own waste as a resource to become a more circular business.

Option 4: Use sustainable biomass

Wood and charcoal are two main sources of biomass in Cambodia used for cooking and other purposes, but they put significant pressure on forests and ecosystems. Sustainable biomass is derived from agricultural residues or animal waste which would otherwise be thrown away. Some examples of this are charcoal made from used coconut husks or rice husk fuel. There are suppliers available in Cambodia, such as Khmer Green Charcoal.



Figure 3.3 A sustainable biomass product called Kjuongo

3.2 OPTIONS FOR ENERGY EFFICIENCY

Use efficient lighting and appliances

Modern appliances and LED lighting create opportunities for significant cost savings compared to traditional sources due to their lower energy needs.

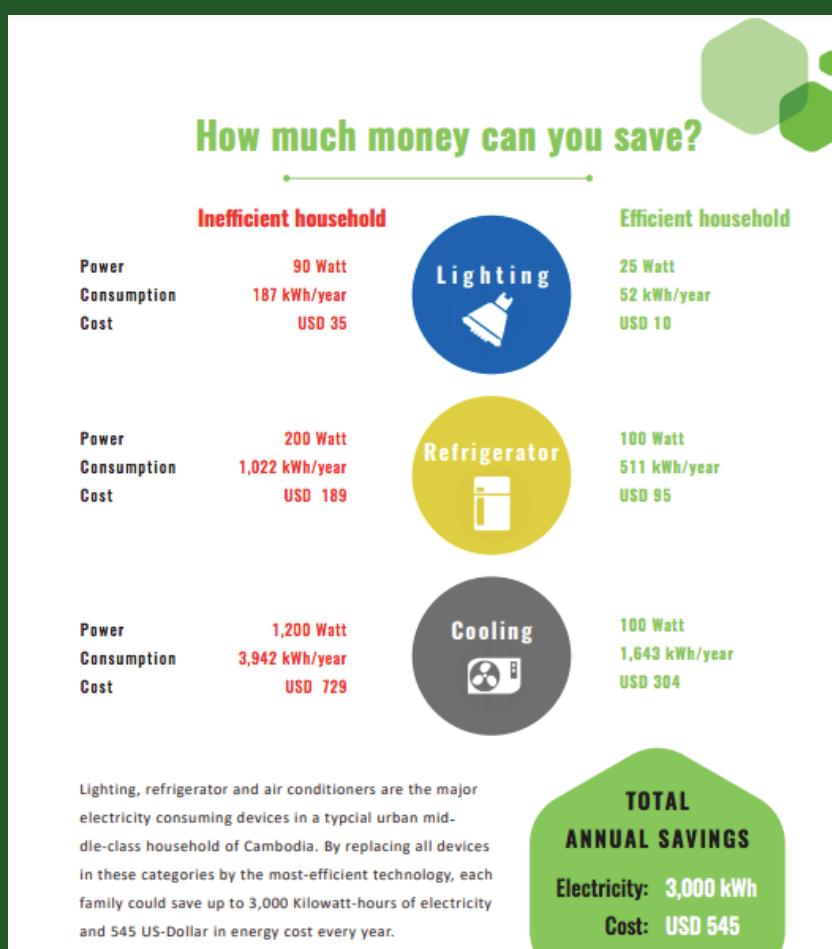
For additional information on improving energy efficiency,
please see UNDP's report at:

<https://www.kh.undp.org/content/cambodia/en/home/library/energy-efficiency-the-key-pillar-of-cambodias-energy-future0.html>

or scan the QR code below:



Figure 3.4 Potential cost savings from efficient appliances⁷



⁷UNDP (2020) <https://www.kh.undp.org/content/cambodia/en/home/library/energy-efficiency-the-key-pillar-of-cambodias-energy-future0.html>

Implement an Energy Management System (EMS)

An EMS system prevents air conditioners from running when the room is unused or the guest has gone outside, by automatically shutting the electricity off anytime the house key is not inside the room. In a hotel for example, the guest rooms can use an energy saving key card to turn electricity on and off, which is a good way to save energy.

Provide tips to customers

In each guest room, wooden notes can be used for customers to follow guidance on using energy efficiently. This guidance may include: set the AC at 24 °C, do not leave your tap running while brushing your teeth, do not leave the AC on when leaving your room, and close your bathroom door when the AC is on (see Figure 3.6). These energy efficiency tips are not only beneficial for hotels to save energy, but also useful for customers to live energy efficiently when they return to their homes.

Install automated motion sensors

Motion sensors are a solution targeted to conserve energy for lighting and other electrical devices. It is a solution that is intended for property locations such as stairwells, bathrooms, passageways, pantries and kitchens, and equipment rooms where light may only be needed for a few moments at a time. An automatic motion sensor light is defined as a system where the light will turn on when it senses there is any movement in the room or walkway⁸. It eliminates the need for manual intervention to turn the lights on and off by automating the procedure. If there is no movement in the room or walkway for a long time, the light will turn off.



Example of EMS in a hotel using a room key to control electricity



Wooden notes for customers about AC temperature



Automatic motion sensor lighting

⁸ Mouri, S.P., Sakib, S.N., Ferdous, Z. and Ferdous, M.A. (2015). Automatic Lighting and Security System Design Using PIR Motion Sensor. Journal of Institute of Information Technology, Jahangirnagar University, Vol. 14, No. 8.



Use refrigerators efficiently

Most hotels need large numbers of refrigerators and freezers for food preservation in the kitchen or mini bar in the guest rooms. Energy is wasted as a result of frequent door opening, worn door seals, and energy-use of minibars in vacant rooms. There are several measures to follow in order to conserve wasteful energy consumption:

- **Avoid external heat** - Place refrigerators away from direct sunlight and hot equipment.
- **Avoid air influx** - Keep the door properly sealed. If your existing refrigerators are old and the seal doesn't close properly, replace it with a new seal to save up to 20% of energy use.
- **Ensure proper ventilation** - Blocked condensers can increase operating cost by up to 5%, therefore be sure to place refrigerators 6 inches away from the wall to have good airflow.
- **Defrost regularly** - Defrosting the ice formed in the refrigerator can save energy.
- **Turn off when not in use** - Turn off refrigerators in unoccupied rooms particularly during low season.



Figure 3.5 Pineapple green roof at Knai Bang Chatt

Increase insulation of the business (e.g. install a green roof)

A “green” roof is a roof partially or completely covered with plants and soil or another growing medium, which can be horizontal or vertical (e.g, flat roofs, flat slope roofs, steep slope roofs, or green walls)[9] . A green roof, also known as a rooftop garden, is an efficient way to conserve energy usage and could provide several benefits to hotel owners. The benefits of a green roof include:

- **Improve stormwater management** – A green roof will reduce up to 70% of rainfall on the rooftop to nourish plants and not release the rainfall into gutters and streets.
- **Filter carbon dioxide (CO₂), air pollutants and noise** – A green roof will help reduce air and noise pollution and keep hotels quieter.
- **Reduce heating & cooling cost** - While soil naturally functions as an insulator, the plants on top can also drop the temperature through photosynthesis and transpiration.
- **Slow the transfer of heat to other buildings** - This can also reduce the cost of energy for cooling.
- **Prevent long-term damage to the existing rooftop** - The temperature fluctuations cause the rooftop to expand and contract, which leads to eventual damage of the roof.
- **Provides a habitat for plants, insects, and animals in an urban setting.**

⁹ EPA (2010). *Implementing Green Roof Projects at the Local Level*. Available at: https://19january2017snapshot.epa.gov/sites/production/files/2014-07/documents/implementing_green_roof_projects_at_the_local_level-neelampatel.pdf [Accessed Nov 17, 2020].

Reduce energy use for laundry

Laundry is a necessary but resource intensive part of running a hospitality business. There are several tips to reducing the resource and energy needs of your hotel's laundry services:

- **Only do full loads:** Wait until machines are near full capacity to start a load.
- **Determine ideal duration of washing:** It is very important to set the right duration of washing. A short duration may not clean items properly which then requires an additional load, while a long duration wastes time and energy.
- **Determine ideal temperature:** Temperature depends on both the type of linen and soap. However, if the temperature is insufficient, soap will not react to destroy any stains on towels and sheets, and consequently it will take a long time, leading to wasted use of energy and water.
- **Limit water usage:** Quantity of water can impact the dissolving efficiency of soap, leading to reduced energy efficiency.
- **Determine types and level of soap to be used:** To save energy, a standardized soap and its quantity should be properly set up since it affects duration of washing.
- **Operate washing machines properly:** Increases and decreases in energy depend on operation of the machine – high or low operation can vary the energy used.
- **Drying temperature and duration:** The best temperature to dry is between 40 to 60 Celsius for 30 minutes or longer.





CHAPTER 4 - HOTEL ROOMS

Tourism is a strong engine for Cambodia's economic growth but challenges in solid waste management may potentially limit this growth by millions of dollars per year¹⁰. Plastic is one of the largest components of municipal solid waste and with Cambodia aiming to double its number of tourists from 6 million in 2018 to 12 million in 2025, plastic waste from the hospitality sector is also expected to grow. This chapter reviews strategies to remove plastic from hotel rooms and other circular economy actions.

4.1 HOW TO CREATE A SINGLE-USE PLASTIC FREE HOTEL ROOM

One key strategy for combatting single-use plastic waste is the **4R framework (Refuse, Reduce, Reuse, Recycle)**:

- **Refuse** – eliminate unnecessary single-use plastic
- **Reduce** – use non-plastic or long-lasting products
- **Reuse** – find creative ways to reuse plastic that you are unable to avoid
- **Recycle** – separate your waste to make it easier to recycle

Figure 4.1 4R posters



¹⁰ <https://www.khmertimeskh.com/56360/trash-hurts-tourism/a>.



4.2 REPLACE SINGLE-USE WATER BOTTLES WITH REUSABLE CONTAINERS

It is common practice to provide free single-use water bottles to hotel guests for each night they spend in the hotel. Although one bottle may not seem damaging to the environment, this can add up fast. A 36-room hotel operating at full occupancy would use over 504 bottles a week, 2,016 per month and 26,280 bottles per year. Not only is this an environmental cost, but also a financial one, as these bottles cost \$3,285 per year assuming each bottle costs \$0.125¹¹.

Single-use plastic water bottles are not the only option for providing free clean drinking water to hotel guests. Another option is to provide filtered water using locally available water filters and supplying each room with refillable glass containers. The containers are then sanitized and ready to be reused. This prevents thousands of plastic water bottles from polluting the environment and also saves significant costs.

¹¹ Cost estimates based on data from Knai Bang Chatt.

Table 4.1 Supplies needed to eliminate single-use plastic water bottles

ITEM	COST FOR ONE	HOW MANY NEEDED	REPLACEMENT RATE
Glass Bottles	\$2.09	2 per room + extra	10% a year
Ceramic Filter	\$15	1 per 25 bottles	Every 18 months
Filter Base	\$22	1 per filter	N/A
Sterilizer	\$500	1 per 150 bottles	N/A

The same 36-room example hotel above would require at least 72 bottles, 3 filters, and one sterilizer and would **start saving money after just two months**, assuming full capacity.

Table 4.2 Cost of single-use plastic water bottles compared to reusable bottles

	FIRST MONTH COST	MONTHLY MAINTENANCE	FIRST YEAR COST	THIRD YEAR COST
Single-use	\$270	\$270 for plastic bottles	\$3,285	\$9,855
Refillable	\$761	\$20 for replacing bottles/ filters and electricity for sterilizer	\$1,001	\$1,481

Step 1: Purchase refillable glass bottles

Glass bottles can be purchased locally through a variety of wholesale suppliers. As this option becomes more attractive for hospitality businesses, more suppliers should enter the market.

Step 2: Purchase and set up a water filtration system¹²

Water can be filtered using locally available filtration systems. The example provided here uses **Super Tunsai (Rabbit) Filter** from Cambodia Enterprise (Figure 4.5), which is a locally produced ceramic pot-style filter and has the advantage of being relatively inexpensive, chemical free, low-maintenance, portable, effective, and easy to use¹³. To use the filter, four basic guidelines are practiced:

1. Usage

- If your water source is not clear, it is best to pour water into the ceramic pot through a cloth to filter out large pieces of dirt and debris. This will reduce the number of times the filter needs to be cleaned. It is best to use clear water when possible.

2. Storage

- Keep your filter in a shaded and cool environment as direct sunlight causes growth of algae or mold.

3. Cleaning

- Clean it with a plastic brush using clean water without soap.
- Clean the pot once per week if water is cloudy or muddy.
- Clean it once per month if water is clear.
- Clean dirty plastic parts with soap and let them air dry.

4. Hygiene

- Wash your hands with soap before use to avoid contamination.

Figure 4.2 Water filter and reusable glass bottles



¹² <https://www.supertunsai.com/en/>

Figure 4.3 Tips for using water filters (from Super Tunsai)



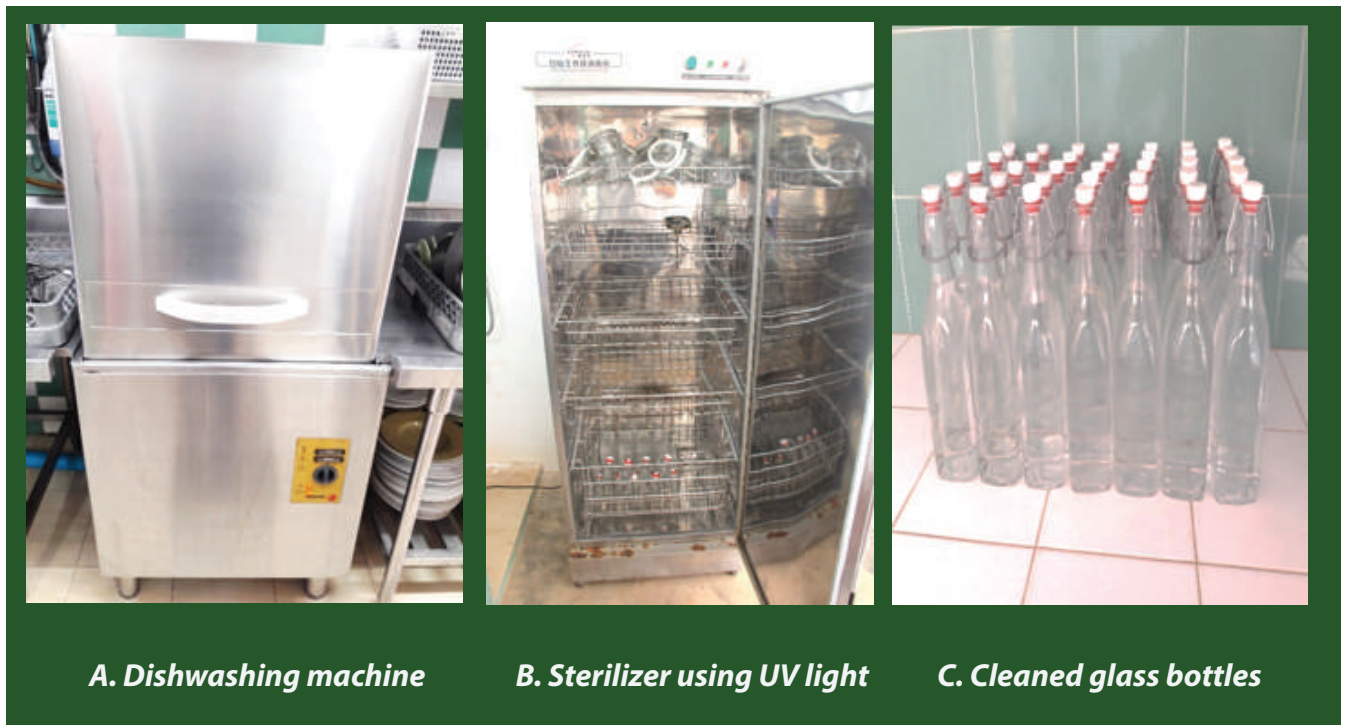
¹³ Super Tunsai: How to Use. Available at: <https://www.supertunsai.com/en/how-to-use/> [Accessed Nov 18, 2020]

Step 3: Purchase and set up a disinfection system

Cleaning or disinfecting reusable glass bottles is very important to kill pathogens, viruses, bacteria, and any other forms of contamination. As soon as the reusable glass bottles are collected from rooms, they have to be properly cleaned and stored in a safe place. Five simple steps practiced are as follows:

1. After collecting the bottles from the guest room, manually wash first with liquid soap.
2. All used glass bottles should be cleaned again in the dishwashing machine in the kitchen by using hot water and soap to kill any bacteria and contamination (Figure 4.4A).
3. Then put all disinfected bottles from the dishwasher in the sterilizer. The sterilizer uses UV light (Figure 4.4B).
4. After that, keep them cold and dry.
5. Finally, refill the water again using filtered water (Figure 4.4C). The bottles are to be filled and closed with a seal sticker placed across the top.

Figure 4.4 Steps to clean used glass bottles



4.3 REPLACE SINGLE-USE PLASTIC TOILETRIES WITH REFILLABLE CONTAINERS OR NON-PLASTIC ITEMS

Single-use plastic toiletries such as small shampoo bottles and plastic toothbrushes also contribute greatly to plastic waste. If each room in the example hotel had a guest that used 3 single-use plastic items per night (for example one shampoo bottle, one body wash bottle and one comb), nearly 40,000 single-use plastic items would be used per year.

For shampoo and body wash

Single-use containers can be replaced with reusable containers that are made from aluminum or glass. These can be found from local suppliers.

The liquid soap can then be purchased in bulk containers and the in -room dispensers can be refilled as necessary. Many local suppliers of soap will take back any empty bulk containers making this a zero plastic waste process.

The price for single-use vs bulk containers varies greatly depending on quality of product. On average purchasing bulk containers can save more than 50% on the cost of materials alone and there are also additional savings as single-use containers need to be replaced once opened, even if they are not completely used while refillable containers can be gradually refilled. The same 36-room hotel used in the examples above would save more than \$2,000 a year by switching to refillable containers based on using 1 bottle per room per night¹⁴.

	30 ml	5 liters	Cost for 1 year
Single-use	\$0.30	\$50.70	\$3,942
Bulk containers	\$0.13	\$22.00	\$1,738

For other amenities

For other amenities such as combs and toothbrushes it is best to try to reduce providing these as much as possible. If required, there are alternative products made from starch-based plastic that are mixed with cornstarch and PP (Figure 4.9). These products will biodegrade after used within 6 to 18 months in the right conditions, releasing less CO2 emissions compared to ordinary plastic products. If your business also has their own composting facility, then these products can be composted locally.

¹⁴ Cost savings estimated from data supplied by Knai Bang Chatt and (<https://kureproducts.com/cost-savings>)

4.4 ADDITIONAL MEASURES TO REDUCE PLASTIC IN HOTELS

Provide reusable bags to guests

As many travelers enjoy shopping while on vacation, an additional waste reducing action is to provide a reusable bag in each room for guests to use during their stay. When they go shopping, they are then able to easily reduce the plastic bags they need.

Print on long-lasting materials

Signs and menus which are not updated often can be printed on long-lasting materials such as wood to reduce the amount of paper and plastic waste generated.



Reusable bag provided to guests

4.5 HOW TO REDUCE WATER CONSUMPTION

In addition to reducing single-use plastic, there are other options for promoting a circular economy within hotel rooms.

Install showers instead of baths

Installing showers could save more than 30% of water consumption compared to baths. This can save a large amount of cost depending on national price rate of water per cubic meter. If the price of 1m³ is \$0.5, around \$18 per month could be saved by implementing water saving shower heads.

Minimize towel and sheet washing

Notes can be left in guest rooms showing your commitment to sustainability and asking customers to help to save water and energy. This is done with wooden notes to educate and encourage guests to reuse towels. The notes may indicate that washing towels is only done upon request from the guest, in which case they can simply leave them on the floor to signal that they would like the towels changed.

A photograph of a wooden mini bar selection menu. The menu is titled "KNAIBANG CHATT Mini Bar Selection" and lists various items and their prices. The items are arranged in two columns, with "Description" and "Price" on the left, and "Description" and "Price" on the right. The menu is printed on a piece of wood with a natural grain.

Description	Price	Description	Price
Coke	\$2	Red Jar	\$3
Sprite	\$2	Coke	\$2
Fanta	\$2	Milk	\$3
Soda	\$3	Spresso	\$5
Beer	\$3	Large Mug	\$3
Guinness	\$3	Hard Cider	\$5
Applesauce	\$2	Whiskey	\$6
White Wine	\$6	Banana Gin	\$6
Red Wine	\$6	Sour Rum	\$6
Apple Pie	\$3	Vodka	\$6

Mini bar selection printed on wood



Note on towel usage for guests



CHAPTER 5 - KITCHEN & RESTAURANTS

Kitchen and restaurants offer opportunities to reduce both plastic and organic waste within one's hospitality business. As proprietors have more control over the product value chain within a kitchen, they can create a circular economy while also providing comfort to their guests.

5.1 MENU DESIGN TO PROMOTE MORE SUSTAINABLE ITEMS AND CREATE LESS WASTE

Menus are an extension of a property, they are a tool for communication, a way to speak to guests and to share philosophy. The best way to incorporate a sustainable identity into a menu design is to share that philosophy on the actual menu.

Step 1: Reference your green philosophy and food philosophy on the menu.

This ends up being the first thing the guest reads. It informs the guests of your commitment and details your program.

//

Our menu is composed of great local ingredients, including some from our very own garden as well as some ingredients from far away that share our philosophy towards food. We wish to thank all of our suppliers and farmers for their dedication to bringing us the best sustainable and seasonal quality they can deliver. Occasionally some products throughout the seasons are not available and we thank you for your understanding. please inform us of any dietary concerns and food allergies. please note that our kitchen is not a nut free environment, and those dishes prepared with nuts will have them listed as a main ingredient.

//

- Sample food philosophy on restaurant menu from Knai Bang Chatt

Step 2: On the menu itself it is important to highlight those items you have referenced in your philosophy. This applies to both food and beverages. You can do this through one of two ways:

1. Use a key legend to indicate sustainable items to the guests

Any item on the menu you want to highlight is done using the legend. At the bottom of the menu describe the legend. The following example highlights a winery that utilizes sustainable harvesting:

*Grenache Gris / Noir / Gerard Bertrand "Gris Blanc" / Pays D'oc IGP, France >> \$4 glass/ \$19 bottle **SH***

Legend:

*V=Vegan Certified / **SH=Sustainable Harvesting** / Bio=Biodynamic Farming*

2. Work the items you wish to highlight into the actual description of the dish

*For example: Grilled local prawn with our **garden grown cilantro** & mango relish, 30 km almond milk broth >>\$12*

Step 3: Reduce waste by printing your menu twice a year

Having a menu printed on FSC approved material only twice a year will reduce the number of menus that need recycling.

Design your menu to reflect products you can consistently receive, and in your descriptions on menu items, highlight certain families of products that you know will change over the course of a year.

Salad consisting of lolla rossa, frisee, radicchio and cucumber with heirloom tomatoes

The above has very specific ingredients and will run the risk of being "out of stock" in remote areas, and areas that rely on seasonal produce. If you are reducing menu printing to two times a year, you should describe your dish as follows:

Salad composed of local lettuce, crisp leaves & bitter greens with cucumber and market tomato

Now you can maximize what your salad uses, utilize local products when available and reduce waste by not over purchasing.

5.2 HOW TO REMOVE PLASTIC FROM BOTH FRONT OF THE HOUSE AND BACK OF THE HOUSE

The success of plastic reduction relies on sourcing from like-minded suppliers. Avoid using products that are single use. Indicate to your suppliers that you need to source alternatives. Then do the research.

In a kitchen it is increasingly hard to go 100% plastic free, but you can reduce drastically. A kitchen will need plastic wrap and vacuum seal bags to preserve the life of the food, thus reducing waste. One impactful area to focus on is your suppliers. Ask them to pack items such as fruit and vegetables loosely and not in plastic bags. For storage of products, reusable containers are a must. They can be properly sterilized after every use as well.

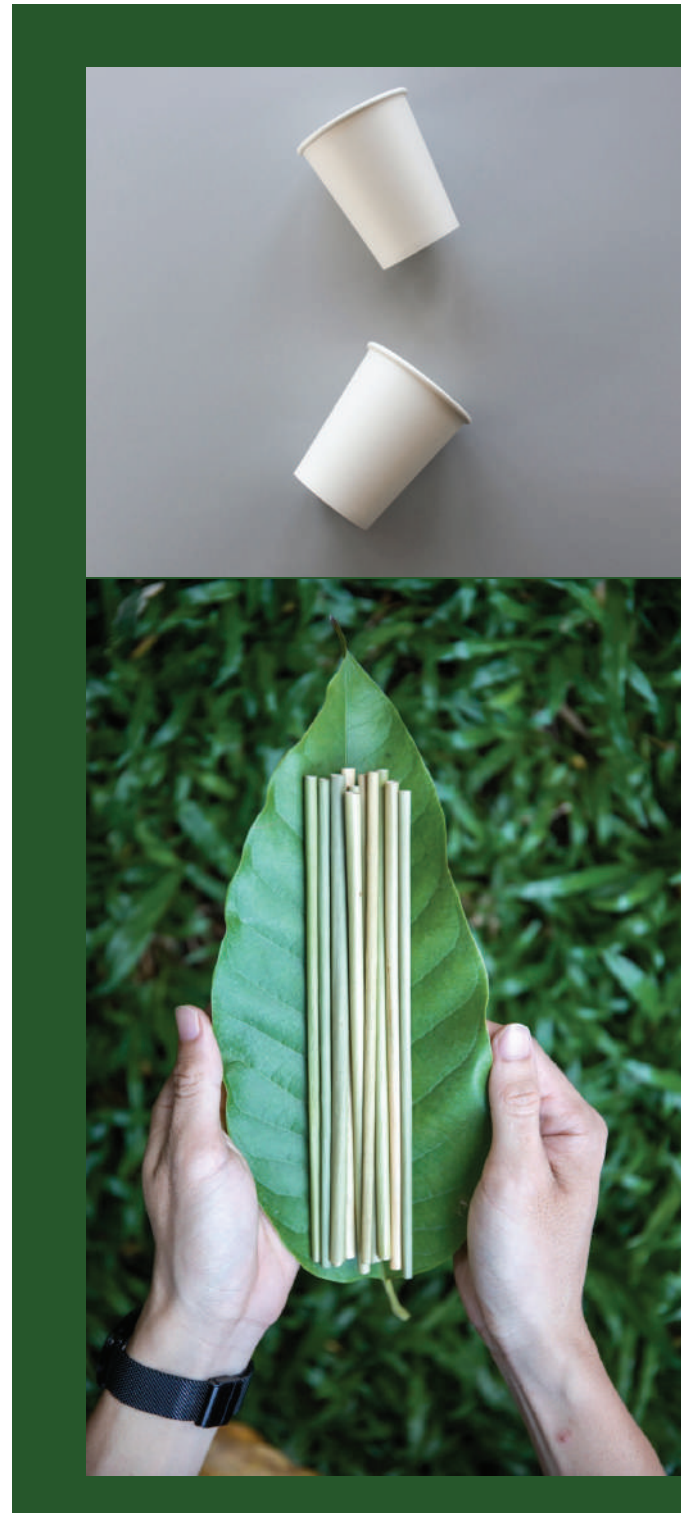
Replace single-use plastic straws with reusable straws or non-plastic straws

Options for replacing plastic straws include:

- Single-use Alternatives - Grass Straws / Rice Flour Straws / Paper Straws
- Multi-use Alternatives - Metal Straws / Bamboo Straws/ Silicon Straws
- Conduct a search in your area for ecofriendly suppliers. Establish a contact. Ensure the product meets with your program's philosophy.
- Give straws on a request only basis.

Replace single-use plastic cups with alternative materials

Recycled paper cups or cups made from bagasse (sugarcane waste) are available in Cambodia. When purchasing, the composting target time should be 6-9 months to ensure that product will break down efficiently.





Replace single-use plastic takeaway containers with non-plastic containers

There are non-plastic takeaway containers made from bagasse (sugarcane waste) available in Cambodia. These include options for clamshell boxes, bowls, and small sauce containers.

Replace rubbish bags with plant-based or reusable bags

Properly sorting and storing waste is very important for effective waste management, but not all rubbish bags are created equal. Plastic bags in guest rooms or in the kitchen can be replaced with plant-based bags or reusable cloth bags. Reusable bags can then be washed and reused as needed.

Provide staff with cloth bags to use at the local markets

When staff travel to local markets to purchase ingredients for the kitchen, they can be provided with reusable bags so they can avoid using plastic bags. In Cambodia, various sized reusable produce bags are available so ingredients can be sorted and weighed as they are purchased. These bags can then be washed as needed.

Provide food suppliers with reusable containers to send the food in

If orders are placed to suppliers on a regular basis, wooden reusable containers can be provided to them to reduce the need for plastic.

5.3 HOW TO ENSURE HYGIENE AND FOOD SAFETY

An understanding of Hazard Analysis and Critical Control Points (HACCP) procedures needs to be implemented in your kitchen to ensure food safety. HACCP focuses on "The Flow of Food" which will be highlighted throughout this section.

- | | | | |
|----|------------|----|-----------|
| 1. | Purchasing | 5. | Cooking |
| 2. | Receiving | 6. | Cooling |
| 3. | Storage | 7. | Reheating |
| 4. | Preparing | 8. | Serving |

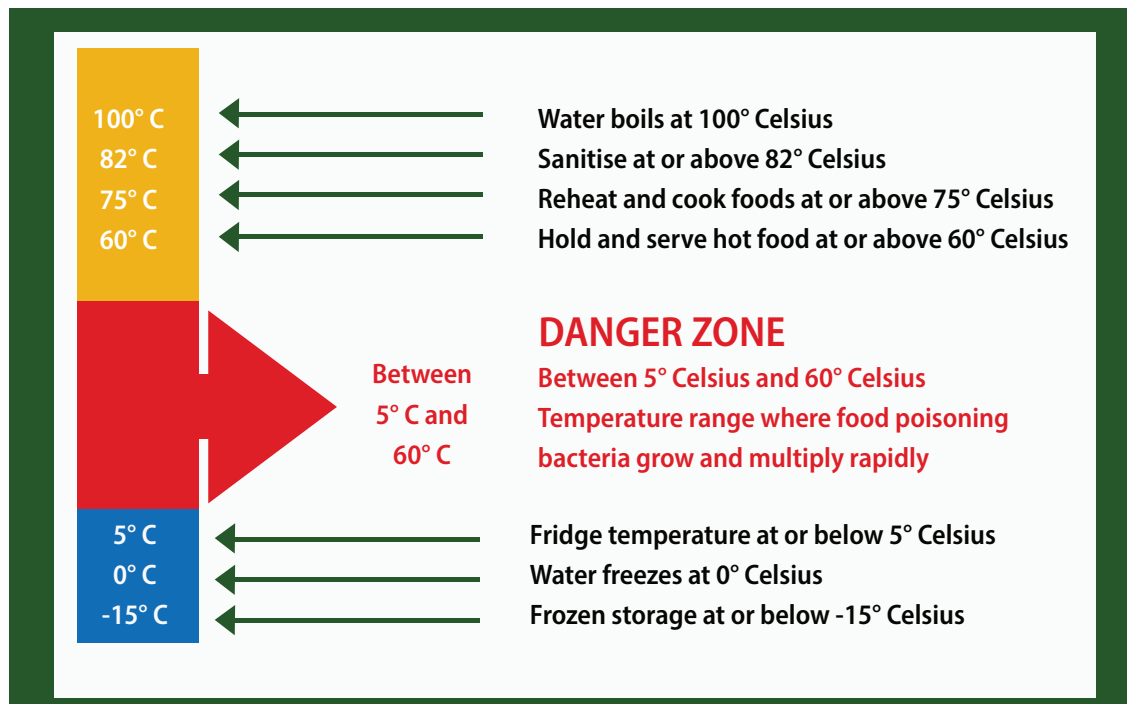
Sanitation tips within the kitchen

1. Hand washing sinks to be equipped with hand soap, sanitizer & single-use towels
2. Hands to be washed using antibacterial foaming soap and warm water (40 degrees Celsius (°C) minimum). Apply soap and rub all over hands for 30 seconds. Rinse hands and towel dry. Apply sanitizer to hands after washing
3. Work surfaces are to be cleaned and sanitized before and after each task
4. Service tool stations to be stored in a sanitizer bath and changed 3 times daily. PH test strips should be used to ensure sanitizer concentration level is at the required level.
5. Dishwashing machine to be logged for proper rinse temperature twice a day. (Wash 65 – 71°C) (Rinse 81°C). For properties that do not have a High Temperature Machine, your chemical company can supply a Low Temperature rinse, which will eliminate bacteria. If your property does not have a dishwasher, then a 3 sink system is to be used. The first sink is for hot water and soap, the second sink is for a warm water rinse, and the third sink is for a sanitizer solution.
6. Employees are to be in proper uniform prior to entering the kitchen. This should include safety shoes, apron, bandana or hair net, long pants, and chef coat.
7. All surfaces, sinks, floors, and cooking equipment should be washed with anti-bacterial soap and hot water. Once scrubbed thoroughly, spray all surfaces with sanitizer, wait 1 minute and dry all surfaces.
8. Rubbish and recycling should be removed daily and transported to designated location.
9. Rubbish bins should be washed and sanitized at the end of the working day.
10. Floor drains and baskets should be cleaned and sanitized daily.
11. Grease traps should be cleaned weekly.
12. Fridge wire racks should be cleaned weekly.

Food handling & preparation tips

1. Wash hands according to posted procedure prior to starting new preparation.
2. Gloves are to be used as single-use only and changed between tasks.
3. To ensure zero cross contamination, all preparation tasks are to be done separately.
4. Food preparation is to be done in a timely manner, avoiding the Danger Zone (Figure 5.1).
5. Cutting boards are to be changed, cleaned and sanitized after each individual task is completed.
6. All food is to be labeled and dated as follows, including: date made, expiry date, freeze date, and thaw date.

Figure 5.1 Danger zone for food preparation



Cooking & serving

1. Cook to proper temperature based on protein chart (Figure 5.2)
2. Hot food to be held and served at 60 oC or higher
3. Cold food to be held and served at 4.4 Celsius or lower
4. Perishable food should not be at room temperature (6 oC – 60 oC) for more than 1.5 hours
5. Each protein should have its own seasoning tray, to avoid cross contamination

Figure 5.2 Proper temperature to cook different types of food

TO WHAT TEMPERATURE SHOULD I COOK...		
BEEF AND LAMB	Degrees Farenheit	Degress Celsius
Rare	125 +3 Minute Rest	51 - 52
Medium Rare	130 - 135	54 - 57
Medium	136 -140	58 - 60
Medium Well	141 - 150	61 - 65
Well Done	151+	66+
Ground	160	71
POULTRY	165	73-74
PORK		
Medium Rare	145 +3 Minute Rest	62
Medium	150	65
Well Done	160	71
Ground	160	71
SEAFOOD		
Fin Fish	145 - Opaque & easily separates	62
Shrimp, Lobster & Crab	Until pearly & opaque	
Clams, Oysters & Mussels	Until shells open	
Scallops	Milky white/opaque & firm	
LEFTOVERS	165	73 - 74

Storage

1. Ensure fridge/freezer temperature logs are maintained twice a day and fridge/freezer is at proper temperature.
2. Fresh & raw proteins are to be stored in the fridge for no more than 2 days. They should be wrapped and labelled properly in food safe containers. Portions should be vacuum sealed and labelled.
3. Protein in fridges should follow the correct procedure: raw meat on the bottom, cooked meats on the top. Thawing meats are to be put into a spill proof container and receptacle to ensure condensation does not drip in the fridge
4. No cardboard or paper should be in the fridge at any time.
5. Dry good areas are to be logged for humidity temperature twice a day. All products should be stored 8" off the floor on food safe shelves. First in First Out (FIFO) is followed for all storage areas.
6. All nuts should be stored individually in airtight containers and handled with single-use gloves.



Understanding HACCP

Using the 7 HACCP principles you can minimize risks and ensure the safety of guests. The principles and examples are as follows:

- Principle 1:** The first principle is hazard analysis. At this stage, a plan is laid out to identify potential hazards in the process.
For example: At the cooking step of the production process, one of the identified hazards is the survival of pathogens due to inadequate cooking time or temperature.
- Principle 2:** The second principle is identifying critical control points. These are the points in the production process where an action can be taken to prevent, eliminate, or reduce a food safety hazard to an acceptable level.
For example: The cooking step is considered a “critical control point” because control measures are necessary to deal with the hazard of pathogens surviving the cooking process.
- Principle 3:** The third principle is establishing critical limits for each critical control point. A critical limit is the limit at which a hazard is acceptable without compromising food safety.
For example: Critical limits at the cooking stage include specific time and temperature for cooking the product.
- Principle 4:** The fourth principle is establishing monitoring procedures for critical control points. Highly detailed monitoring activities are essential to make sure the process continues to operate safely and within the critical limits at each critical control point.
For example: Monitoring procedures at a cooking critical control point could include taking the internal temperature of the product with a specialized thermometer.
- Principle 5:** The fifth principle is crucial: establishing corrective actions. These actions must be taken to bring the production process back on track if monitoring indicates that deviation from critical limits has occurred. In food production, correcting problems before end-stage production is far more effective than waiting until a product is finished to test it.
For example: If the required internal temperature has not been reached, a corrective action would require that the product be cooked further. If the cooking temperature cannot be reached, another corrective action would call for the product to be held and destroyed.
- Principle 6:** The sixth principle is establishing verification procedures. Verification means applying methods, procedures, tests, sampling and other evaluations (in addition to monitoring) to determine whether a control measure at a critical control point is or has been operating as intended. Verification activities also ensure that the monitoring and the corrective actions are done according to a company's written HACCP program.

Principle 7: The seventh principle is record keeping. Records must be kept by the company to demonstrate the effective application of the CCP as well as establishing proper records for real documentation. Verifying results and ascertaining actions taken in deviations found through monitoring.

For example: The hotel employee responsible for monitoring a cooking critical control point completes a cooking log sheet. This sheet includes the date, the start and finish time, the temperature and the employee's signature. If a deviation has occurred in the production process, the responsible hotel employee records the details in a deviation logbook.

5.4 HOW TO SORT AND TREAT KITCHEN WASTE

Sorting waste within the kitchen is the first step towards efficient waste management. Each kitchen should be set up with the following bins. The use of each material is outlined in Chapter 6.

- Fresh Food: raw fruit and vegetable trimmings
- Cooked Food: all food that was cooked, served and returned to kitchen
- Metal, Glass & Plastic: empty cans, glass bottles, plastic containers
- Cardboard and Paper: Boxes, discarded paper
- General: Landfill, single-use plastic, non-recyclable items such as plastic wrap
- Liquid Waste: Oils, soups, dressings, broths
- Bokashi Protein: Fish trim, bones, animal fat trim, crab shells

Figure 5.3 Bins for sorting waste in the kitchen





CHAPTER 6 - WASTE MANAGEMENT

For a full circular economy to be realized, the waste generated at a business needs to be properly managed through a variety of strategies.

6.1 WASTE TYPES AND DESCRIPTIONS

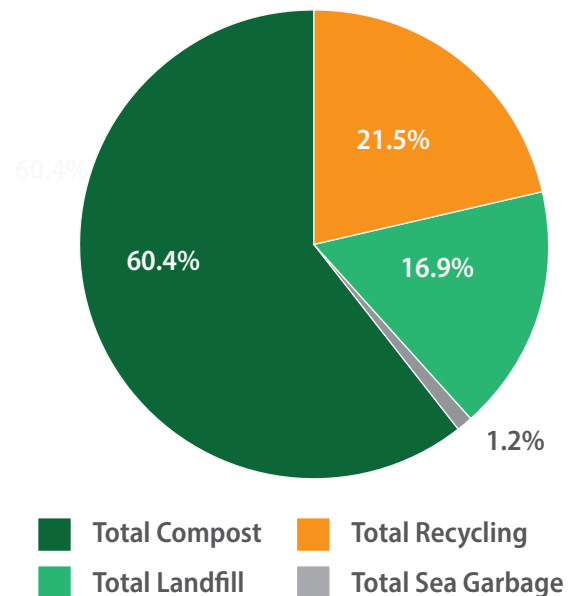
There are three main categories of waste:

- (1) **Recyclable waste** – These include plastic bottles, hard plastic containers, glass bottles, aluminum cans, cardboard, scrap metal, and used cooking oil¹⁵. These can be sold or donated to local collectors and treated offsite.
- (2) **Organic waste** – These include both cooked and uncooked food, paper, tissues, leaves and wood, and are materials which can be used for composting.
- (3) **Landfill waste** – These include items such as plastic bags, Styrofoam boxes and other materials that cannot be recycled or composted. These materials should be avoided as much as possible and ideally removed from daily use.

Table 6.1 Example of different types of waste and their quantities¹⁶

No.	Waste Type	Total Waste (kg)	Percent of Total
1	Recyclable Materials	8,197.6	21.5
1.1	Glass bottles	5,593.5	14.7
1.2	Plastic bottles	599.3	1.6
1.3	Cardboard	1,190.4	3.1
1.4	Cans	313.0	0.8
1.5	Stainless steel cans	187.4	0.5
1.6	Scrap Metal	20.0	0.1
1.7	Oil	294.0	0.8
2	General Waste	6,458.5	16.9
3	Sea Garbage¹⁷	440.0	1.2
4	Composting waste	23,068.5	60.4
4.1	Cooked food	9,357.0	24.5
4.2	Uncooked food	11,081.0	29.0
4.3	Coconuts	1,288.0	3.4
4.4	Seaweed	580.0	1.5
4.5	Paper/napkin/tissues	762.5	2.0

Figure 6.1 Main types of waste at example hotel



As can be seen in the table and figure above, the hotel used in this example was able to prevent more than 80% of their waste from going to a landfill by implementing the actions located within this handbook.

¹⁵ Although used cooking oil can be considered organic waste, it can be given to an outside organization and not composted onsite therefore it is categorized as recyclable waste

¹⁶ All data provided by Knai Bang Chatt

¹⁷ The example hotel is located on a beach where they collect washed up rubbish. As this is generated outside the property it is categorized separately

6.2 INITIAL STEPS TO ACHIEVING A ZERO-WASTE BUSINESS

- (1) **Separate all waste at source** – At all locations of the business, there should be separate bins for different types of waste so waste can be sorted at source. For example, please see Section 5.4. Each area of the property should have a designated collection schedule before sending waste to the recycling center.
- (2) **Designate a recycling center** – This is where all waste generated at the property should be brought and it is the final location where waste is stored before being treated. The recycling area should include areas for different types of waste such as aluminum cans, plastic bottles, glass bottles, compostable waste, and landfill waste.
- (3) **Monitor and record waste type and volume** – To make informed decisions it is important to keep accurate data on all waste types generated at the business. This will allow your business to know if you have met your goals or what goals you should create.

Figure 6.2 Some example of recycled products



6.3 HOW TO MANAGE RECYCLABLE WASTE

Cambodia is home to an advanced system of informal collectors who purchase recyclable waste, which is then sent to Thailand and Viet Nam for final processing. All recyclable waste should be stored at the recycling center and businesses can connect with their local collection system to set up a regular collection time. The income generated from the recyclables can be used for a variety of purposes, including supporting the green team initiative or providing a bonus to staff. Some materials can also be upcycled onsite and used for various purposes such as gardening (see Figure 6.3).

Figure 6.3 Plastics used for planting crops



6.4 HOW TO MANAGE GLASS WASTE

Glass waste is not always collected by the informal system, but there are several additional options for managing glass waste.

- (1) GAEA in Siem Reap has a machine which crushes glass into sand. This sand is then sold as a construction input. Businesses located in Siem Reap can set up collection through GAEA and businesses in Phnom Penh can work with Farm to Table to transport their glass to Siem Reap.
- (2) Local NGOs may be in need of glass bottles to use them for eco building and eco brick production.
- (3) Glass bottles can be upcycled into cups. Many how-to videos can be found online and the images in Figure 6.4 can be used as a reference.



Figure 6.4 Process for upcycling glass bottles into cups



6.5 HOW TO TREAT ORGANIC WASTE

A majority of municipal waste generated in Cambodia is organic. When organic waste sits at the landfill it creates methane, a potent greenhouse gas. Finding solutions for sustainably treating organic waste is imperative for a circular economy. There are several methods for treating organic waste including compost, vermicompost, and Bokashi.

How to make compost

Compost is decomposed organic matter which can be used as an agricultural input. The conditions that are favorable for its health include warmth, moisture, air (oxygen) and food. In the process of consuming organic matter, bacteria break it down into tiny soil-like particles¹⁸. Think of the way leaves, sticks and logs decay and decompose on the forest floor – a natural form of composting

Compost should be built in layers. Correctly layering various organic matter keeps the compost aerated (makes sure air can get in). All organic materials are either nitrogen-based or carbon-based and the N/C ratio, the balance of carbon to nitrogen, is important for the success of compost. Success in this case is the rapid breakdown / decomposition of organic material into black, rich soil. Nitrogen based organic materials are usually green, moist and 'dense', while carbon-based materials are brown and dry. The ideal ratio is 30% nitrogen and 70% carbon. This can be achieved by placing the materials for composting in layers (see Figure 6.5).

Characteristics of compost

- Aerobic process
- Putrefactive decomposition pathway
- Turning required (every 10 days) and controlling moisture (water it when dry)
- May produce foul odors and attract flies and unpleasant insects
- Nutrients turned to insoluble elements and are not readily available for plant intake
- Loss of energy - up to 80% of original nutrient content (leaching & volatilization)
- Large amounts required to meet plant nutrient needs
- Requires 2 to 3 months to complete

¹⁸ Van der Wurff, A.W.G., Fuchs, J.G., Raviv, M., Termorshuizen, A.J. (Editors) (2016). *Handbook for Composting and Compost Use in Organic Horticulture*. BioGreenhouse COST Action FA 1105, www.biogreenhouse.org.

What can you add to compost:

- Vegetable scraps and eggs shells
- Paper, newspaper and cardboard
- Leaves, banana leaves, grass and seaweed
- Cow manure or chicken manure
- Wood ash and charcoal
- Coconut husks (cut them up into small pieces)
- Leaves, tea bags and coffee grinds
- Very small amounts of soil or decomposed matter from old branches, grass or logs

What you cannot add to compost:

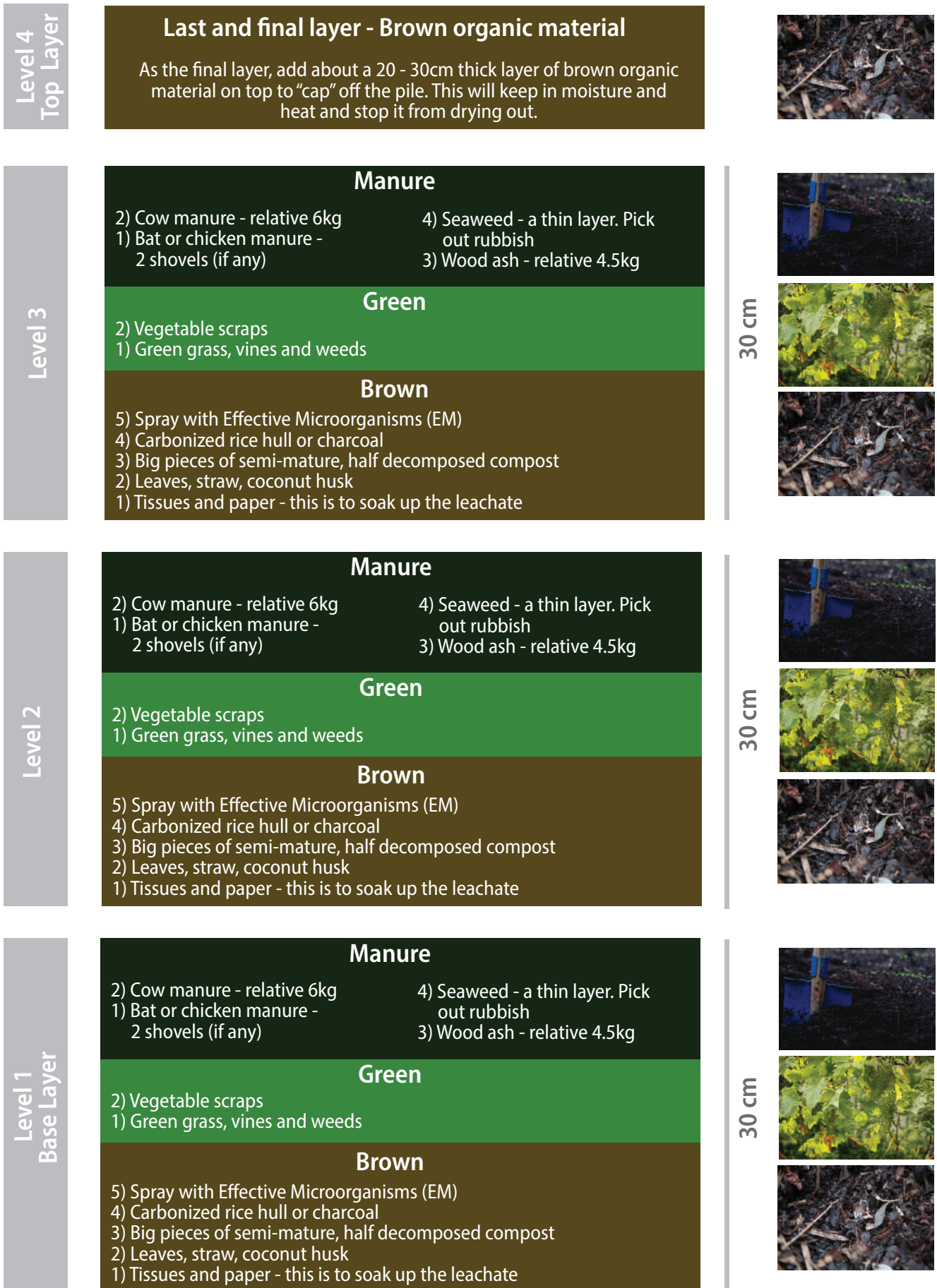
- Meat, fat or bones
- Cooked food, citrus peels
- 'Oily' things – vegetable oil or any other kind of oil is not good for compost. This is another reason why cooked foods should not be added
- Garlic and onion peels
- Large branches, sticks and wood

Additional composting tips

- **Keep it moist.** Put a tarpaulin or cardboard (or anything you can find) over it to keep the sun from drying it out. Water every week or two and if it looks dry, apply a fine mist of water so that it is evenly moist throughout.
- **Keep it covered during the wet season so that it does not get too wet** – it should be moist, but not wet.
- **Cut things up as small as possible.** The reason smaller materials decompose faster is because cutting things smaller creates a larger surface area that micro-organisms can colonize and feed on.
- **Turn the pile regularly.** Around every 10 days is best. It is important to maintain good aeration. If the pile becomes too compacted and no air can get in, the micro-organisms will die.



Figure 6.6 How to layer compost



How to make vermiculture (worm composting)

Worms love to eat:

- Raw fruits and vegetables
- Cardboard, shredded and soaked in water
- Paper
- Leaves
- Hair, eggshells
- Tea bags and coffee filters/grounds

Worms do not like:

- Cooked food, chili, garlic
- Meat, grease & fats
- Dairy products
- Large quantities of garden waste, especially lawn clippings

Steps for worm composting

Worm composting is simple – it involves keeping worms in a bin and feeding them organic scraps that you want to turn into dirt. Worms have a tremendous capacity to turn almost any kind of food source into nice, rich dirt that is ready for the garden. Worms eat almost everything. They are awesome composters!

Step 1: Purchase worms (redworm). They can be purchased from local organizations of Cambodia (CEDAC) or other local sellers (amount is based on bin size and food scraps).

Step 2: Set up bin. The bin or container needs drainage at the bottom to drain compost tea (liquid).

Figure 6.5 Redworms and vermicompost bin



Step 3: Create worm compost bedding. Mixed and wet shredded newspaper, cardboard, egg cartons; Shredded brown paper; Straw; Coco peat/coco coir (make sure it is low sodium); Peat moss; Very aged manure (vegetarian only (horse, cow, sheep, etc.)); Leaves (shredded so they do not stick together and clump and are ideally composted already).

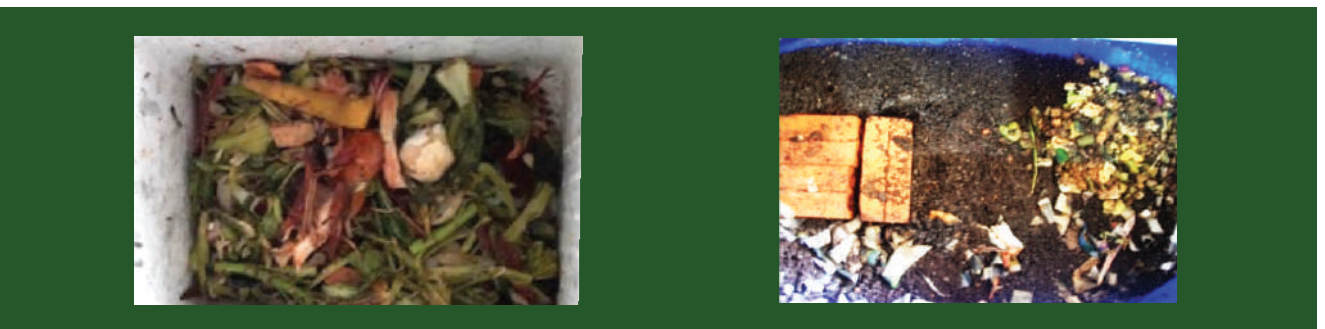
Figure 6.6 Vermicompost bedding



Step 4: Determine ideal worm bin moisture level. Moisture level should be about 70-80%. Do not overload the system with food scraps. Mist only, do not dump water on the system. Mist regularly to keep the system moist once noticing the surface is getting dry. Keep in mind the type of food you are adding – wet or dry – and add water accordingly.

Step 5: Feed worms. The worms can be fed with any kind of food scraps described above. Start with very little food initially – it is far easier to overload the system with food than to starve your worms. You can build up as you get comfortable with the setup.

Figure 6.7 Feeding vermicompost



Step 6: Harvest compost. When the castings in your worm composting system form a uniform, black mass, it's time to harvest the tray. Use worm castings in container vegetable potting mixes, houseplants, or around vegetable plants in your garden.

For compost tea (worm leachate): use the worm leachate in your garden. Pour it straight into your compost pile, or dilute it to use in the garden, using at least a 1:1 ratio but preferably 1:10 with water.

Figure 6.8 Final compost product



How to make Bokashi

Bokashi (a Japanese term for fermentation of organic matter) can decompose food waste in less than half the time of conventional composting methods, without any unpleasant odors. Bokashi is done with EM (Effective Microorganisms™)¹⁹. The EM contain naturally occurring beneficial microorganisms found in soils worldwide. When the correct conditions are provided, EM sets in motion a fermentation process to transform food waste and other organic materials into a nutrient-rich compost.

Characteristics of the EM Bokashi:

- Anaerobic process
- Fermentation pathway
- Not labor intensive - does not require turning
- Produces no foul odors and attracts beneficial insects
- Nutrients are readily available in soluble form for plants
- Beneficial substances are created and shared between aerobic & anaerobic organisms, retaining nutrients
- Requires smaller amounts to meet plant nutrient needs
- Requires only 1 month to be ready for use

Used Items:

- Fresh fruits & vegetables
- Prepared foods
- Cooked or uncooked meats/fish, cheese & eggs
- Bones - chopped into small pieces
- Coffee & tea without the filter paper or bags
- Dry leaves and wilted flowers

Practically, the recipe for making an EM Bokashi compost starter is described in the following step-by-step procedures.

Materials needed:

1. EM•1®: Concentrated Solution which can be bought in commercial stores or markets in Cambodia
2. Molasses: Available in feed stores or at your local markets
3. Rice Hull or Bran: Available at your local feed store or from local farmers
4. Water (Non-chlorinated preferred): Water may be left out overnight for the chlorine to evaporate
5. Bottles or any large receptacles to mix the ingredients
6. Sealable plastic water tanks

Procedures for making Bokashi compost

There are six main steps for making Bokashi compost:

Step 1: Prepare Solution of EM.

The standard dilution rate to make EM Bokashi is 1:1:100 or one-part EM•1®, one-part molasses, to 100 parts of non-chlorinated water. The dilution rate depends on the amount you prefer. The solution should be kept in clean plastic bottles until 7 days before use. Each morning the lids need to be removed to release the CO₂ build-up, if not the bottles may explode. Using this dilution rate will guarantee a good quality Bokashi.

¹⁹ EM Technology Network (2005). *Composting food waste at school with effective microorganisms™*. EM Bokashi Network-U.S.A. (www.emtechnologynetwork.org).



Bokashi solution of EM



Cooked food bin



Cooked food in Bokashi bin



Solution of EM into rice hull



Rice hull in Bokashi bin



Proper storage location for Bokashi

Step 2: Prepare cooked food.

Cooked food from the kitchen or restaurant is prepared in proper bins.

Step 3: Place cooked food into a container.

Prepared cooked food is placed into a container with proper and tight lid.

Step 4: Apply the solution of EM into rice hull or bran.

Mix the rice hull or bran with EM solution to reach 35% - 40% content level. To determine the content level, grab a handful of the mixture and squeeze it into a ball. No liquid should be dripping through your fingers. When you open your hand, the Bokashi ball should keep its shape but crumble slowly to the touch. If water drips through our fingers, that indicates too much liquid has been added. To correct this, add more rice hull/bran and mix thoroughly to achieve the desired moisture level.

Step 5: Apply mixed rice hull or bran into the container.

Apply over the food waste in the container by compressing and then covering the lid tightly. If the lid is not properly sealed the process will not work correctly.

Step 6: Keep it in a proper place to avoid odors:

- Mark the date and name the containers before storing them away from direct sunlight in a cool place.
- Keep it 4 weeks, depending on climate.
- Keep monitoring the smell and appearance of the containers.
- Successful Bokashi is known when the smell of fermentation is similar to apple cider coming from the containers and a white growth will appear on the surface of the Bokashi.
- After 4 weeks, take the Bokashi out from the containers and dry it.

The final product can be used to (i) enhance soil fertility, (ii) promote germination, growth, flowering, fruiting, and ripening, (iii) increase crop yield and improve crop quality, and (iv) accelerate the decomposition of organic waste from crop residues.

Additional options for urban businesses

Treating organic waste takes up space, a luxury many urban businesses do not have. There are emerging businesses in Cambodian cities working on solutions to this problem. These businesses may be able to take organic waste and treat it at their own site.



SHOUT OUTS
JASON
for taking notes
in class

SHOUT OUTS
ELOISE
Website Turnaround
& Quality

SHOUT OUTS
JACQUELYN
for taking notes
in class

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for taking notes
in class

CHAPTER 7 - EDUCATION

After a business starts to implement circular economy practices, it is important to continue to educate not only staff but also guests on the importance of sustainable practices.

7.1 STAFF TRAINING ON A SUSTAINABLE ENVIRONMENT

The business as a whole will need to follow the training regimen decided by the green leader. Cross training for all departments is necessary in order to ensure success of the program. The following are training guidelines for a hotel's infrastructure in regards to departmental training on waste management and energy savings (see Table 7.1).

Table 7.1 Training guidelines for hotel infrastructure on waste management

Department	Sustainable Training	Frequency	Recommended Responsible Head of Department (HOD)
Restaurant / Kitchen	<ul style="list-style-type: none"> - Rubbish separation - Liquid separation - Food Raw - Food Cooked - Recyclables 	Monthly / Daily	<ul style="list-style-type: none"> - Food & Beverage Director - Executive Chef - Sustainability Manager - Green Officer
Restaurant FOH	<ul style="list-style-type: none"> - Rubbish separation - Food raw - Food cooked - Recyclables 	Monthly / Daily	<ul style="list-style-type: none"> - Outlet Manager - Outlet Supervisor - Sustainability Manager - Green Officer
Housekeeping / Front Office / Spa	<ul style="list-style-type: none"> - Room rubbish - Separation - Recyclables 	Monthly / Daily	<ul style="list-style-type: none"> - Rooms Manager - Resident Manager - Sustainability Manager - Green Officer
Maintenance	<ul style="list-style-type: none"> - Recyclables - Green Waste - Chemical Removal - General Rubbish 	Monthly / Daily	<ul style="list-style-type: none"> - Maintenance Manager - Sustainability Manager - Green Officer

Waste management training

Additionally, waste management training for all staff should be conducted bi-annually and led by the sustainability manager. Senior members from each department along with the HOD will be present at the training. This training is best conducted in a large, secluded space. The sustainability manager will need to set-up the following bins for the training:

- Raw Food
- Cooked Food
- Liquid Waste
- Oil Waste
- Plastic/Can Bin
- Paper Bin
- General Landfill Bin

Prior to the start of the training, the sustainability manager will explain the rules of waste management for the hotel / resort. The remainder of the training should be conducted as follows:

1. Sustainability manager to organize 1 waste bin filled with 10kg of assorted rubbish from around the resort.
2. Select one staff member at a time, ask them to remove one piece of rubbish and place in the appropriate bins.
3. Document the data from the training.
4. Follow up with explanations and guidance on any mistakes made.
5. Provide results to HODs in order to ensure the program is working properly.

General training for new employees

For new employees, a waste management section is to be included in the employee handbook. The green team is to fill out the following information for inclusion in the handbook:

- Hotel philosophy on sustainable practices
- Why we practice and teach
- Waste bin location and description
- When to collect the rubbish by department
- Where to collect the rubbish
- Waste separation and recycling in each department
- Resort map with recycling area highlighted

7.2 GUEST INVOLVEMENT

Getting your guests involved starts with making your guests aware of your philosophy and practices. All printed material that is presented to guests should have your philosophy available for your guests to read. This includes:

- Menus
- Bills
- Room amenities including sheets and towels with wooden notes (Figure 7.1)
- Email communication with digital email signature (Figure 7.2)
- Welcome note in room
- Property information book with philosophy printed (Figure 7.3)
- Staff talking and sharing with guests the practices of the property
- Offering a chance to participate in the practices through tours

An example of the property involving the guests in sustainability practices is to create a hands-on experience for the guests to participate in. The following are examples of practices that demonstrate this:

Figure 7.1 Guest information book with philosophy, digital signature and wooden notes to inform guests of sustainability practices



Composting workshop

If your facility has onsite composting as described in the previous chapter, then including a composting workshop for guests could be a great addition to services offered. Composting is a great way to manage personal waste. With their very own compost, guests can create vegetable gardens that range from small herb balcony gardens to larger vegetable gardens that will provide their family with high nutrient content foods.

In this workshop guests can learn various methods that can be employed to compost most home waste. These range from basic and easy to manage methods through to more advanced and detailed practices for trickier waste products like meats, fats and dairy.

Figure 7.2 Harvested vegetables at composting workshop





CHAPTER 8 - MONITORING RESULTS & IMPACT

Once a business makes a commitment towards implementing circular economy practices, setting goals and monitoring results is of vital importance. This chapter aims to provide a summary of actions outlined in this handbook and examples of targets that can be set. Each business can adjust the targets and responsible person for their own unique sustainability plan.

Table 8.1 Monitoring results and impacts for a sustainable environment

Components/ Indicators	Items to Monitor (Mitigation Measures)	Example Target /Action/Goal	Frequency of Check	Reporting Method	Responsibility
Green Team	• Green team action plan	Green team action plan is drafted and approved	Yearly	• Action plan and monitoring report • Green meeting minutes	General manager Green team All departments
	• Procurements of suppliers and products for more sustainable choices	75% of products are sustainably sourced	Monthly	• Procurement report to include valid certification from suppliers	Executive chef Purchasing manager Housekeeping manager
	• Sustainable designs for hotel rooms	100% of materials are sustainable, including local cultural influence	Monthly/ Yearly	• Yearly code of conduct from suppliers used in design	Resident manager Housekeeping team Maintenance team
Energy	• Solar panels (Renewable energy source)	Solar panels installed to reduce grid energy by 20%	Yearly	• Visual confirmation that solar panels are installed and working	General manager Resident manager Maintenance team
	• Electricity/LED lights	100% of lights are LED	Monthly	• Data records • Electricity logs (Annex 1)	Resident manager Maintenance team
	• Electrical devices/facilities of rooms	100% of appliances are approved as energy efficient	Monthly	• Daily visual check and confirmation whether or not it has problems that require fixing or replacing	Housekeeping team Maintenance team
	• Refrigerators	Proper energy smart refrigerator/freezer practices and completed	Daily	• Fridge Logs Temperature (Annex 2) • Freezer Fridge Maintenance Logs (Annex 3)	Executive chef Maintenance team
	• Sensor lights	100% sensor lights used in traffic areas	Monthly	• Visual confirmation/check that sensor lights are working	Maintenance team
	• Green roof	20% reduction in energy through green roof insulation	Weekly	• Visual check and maintaining roof	Green team
Hotel Room	• Single-use water bottles	Single-use water bottles are removed from use in guest rooms	Daily	• Daily checklist	General manager Executive chef Resident manager Housekeeping team
	• Water filter and cleaning	100% of water for guests is from plastic-free filtered water	Weekly	• Daily checklist • Weekly report	Maintenance team
	• Sterilized reusable glass bottles	100% of guest rooms are provided with sterilized glass bottles	Daily	• Daily checklist	Housekeeping team
	• Refillable containers for toiletries	Shampoo and soap are provided in refillable containers in all guest rooms	Daily	• Daily checklist	Housekeeping team
	• Consumption of water and energy for washing towels and sheets	Reduced 30% of water used	Daily	• Water consumption logs (Annex 4) • Electrical logs (Annex 1) • Laundry Equipment Maintenance Log (Annex 5)	Maintenance team Laundry team Housekeeping team

Components/ Indicators	Items to Monitor (Mitigation Measures)	Example Target /Action/Goal	Frequency of Check	Reporting Method	Responsibility
Kitchen & Restaurant	• Menu designs for sustainable items	100% FSC products	Monthly	• Product menu lists • Purchasing guideline	Executive chef Purchasing manager
	• Using manufacturers/ suppliers to supply eco-friendly products	100% reduction in non-eco-friendly products	Monthly	• Supplier code of conduct	Executive chef Green team
	• Cleaning, hygiene, and food safety	Using 100% eco-safe chemicals	Daily	• Hygiene and safety report	Executive chef Kitchen staff members
	• Kitchen/restaurant waste	100% separation at source	Daily	• Waste report/logs (Annex 6)	Executive chef Green team Senior kitchen staff members
Waste Management	• Waste sorting	100% of waste is sorted into all correct bins	Daily	• Spot check on waste sorting location	Executive chef Green team Senior kitchen staff members All departments
	• Recycled products	100% of recycled products	Daily	• Selling records • Daily waste logs (Annex 7)	Green team
	• Organic waste	100% of organic waste is composted	Daily	• Compost guideline manual	Green team
	• Working towards zero landfill	0% landfill	Weekly	• Landfill logs (Annex 7)	CEO General manager Executive chef Green team
Education	• Staff training on a sustainable environment	100% awareness of sustainable program	Monthly	• Training manual report • Certification of Trained Employees • Monthly testing	CEO General manager Green team Third Party Trainers and Auditor
	• Guest involvement	100% of awareness of sustainable programs	Daily	• Guest logs • Workshop	Resident manager Front office team



ANNEXES

ANNEX 1: An example of Electricity Logs

OUTLET 1 - Room Villas									
Date	M1	KW/day	\$/day	M2	KW/day	\$/day	M3	KW/day	\$/day
28-Oct-20	39061	96	19.2	20672	81	16.2	98066	37	7.4
29-Oct-20	39157	97	19.4	20753	81	16.2	98103	37	7.4
30-Oct-20	39254	114	22.8	20834	108	21.6	98140	43	8.6
31-Oct-20	39368	105	21	20942	34	6.8	98183	66	13.2
1-Nov-20	39473	105	21	20976	34	6.8	98249	67	13.4
2-Nov-20	39578	106	21.2	21010	34	6.8	98316	66	13.2
3-Nov-20	39684	106	21.2	21044	35	7	98382	67	13.4
4-Nov-20	39790	105	21	21079	36	7.2	98449	68	13.6
5-Nov-20	39895	129	25.8	21115	45	9	98517	44	8.8
6-Nov-20	40024	133	26.6	21160	52	10.4	98561	81	16.2
7-Nov-20	40157	114	22.8	21212	78	15.6	98642	34	6.8
8-Nov-20	40271	56	11.2	21290	28	5.6	98676	9	1.8
9-Nov-20	40327	54	10.8	21318	27	5.4	98685	8	1.6
10-Nov-20	40381	50	10	21345	19	3.8	98693	9	1.8
11-Nov-20	40431	67	13.4	21364	15	3	98702	13	2.6
12-Nov-20	40498	67	13.4	21379	100	20	98715	10	2
13-Nov-20	40565	76	15.2	21479	67	13.4	98725	52	10.4
14-Nov-20	40641	81	16.2	21546	14	2.8	98777	9	1.8
15-Nov-20	40722	66	13.2	21560	11	2.2	98786	9	1.8
16-Nov-20	40788	66	13.2	21571	11	2.2	98795	12	2.4
17-Nov-20	40854	67	13.4	21582	13	2.6	98807	7	1.4
18-Nov-20	40921	73	14.6	21595	66	13.2	98814	8	1.6
19-Nov-20	40994	60	12	21661	55	11	98822	9	1.8
20-Nov-20	41054	90	18	21716	47	9.4	98831	54	10.8
21-Nov-20	41144	59	11.8	21763	39	7.8	98885	20	4
22-Nov-20	41203	85	17	21802	37	7.4	98905	10	2
23-Nov-20	41288	85	17	21839	37	7.4	98915	9	1.8
24-Nov-20	41373	84	16.8	21876	36	7.2	98924	29	5.8
25-Nov-20	41457	84	16.8	21912	36	7.2	98953	29	5.8
26-Nov-20	41541	84	16.8	21948	36	7.2	98982	29	5.8
27-Nov-20	41625	84	16.8	21984	36	7.2	99011	29	5.8
28-Nov-20	41709			22020			99040		
Total		2648	529.60		13.48	269.60		974	194.80

ANNEX 2: Fridge Temperature Logs

Fridges / Freezer Temperature Log

Month: _____ Refrigerator / Freezer ID: _____

Date	Opening Temp	Initials	Closing Temp	Initials	Corrective Action	Remark
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						
23						
24						
25						
26						
27						
28						
29						
30						
31						
Standard: Cooler temperature must be maintained at 41 F (4 C) or below Ideal freezer temperature is 0 F (-18 C) Or below.				Corrective Action Taken: "1" = Call maintenance "M" = Inform Chef / Supervisor		

Manager Signature: _____ Date Verified: _____

ANNEX 3: Freezer Fridge Maintenance Logs

Fridges / Freezer Maintenance Log

Venue: _____ Refrigerator / Freezer ID: _____

Date	Opening Temp	Initials	Closing Temp	Initials	Corrective Action	Remark
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						
23						
24						
25						
26						
27						
28						
29						
30						
31						

Standard:
 Cooler temperature must be maintained at
 41 F (4 C) or below
 Ideal freezer temperature is
 0 F (-18 C) Or below.

Corrective Action Taken:
 "1" = Call maintenance
 "M" = Inform Chef / Supervisor

Manager Signature: _____ Date Verified: _____

ANNEX 4: An example of Water Consumption Logs

OUTLET 1 - Room Villas						
Date	RESIDENT ROOM	M ³ /day	M2	M ³ /day	M4	M ³ /day
10/28/20	7837	18	841	0	866	0
10/29/20	7855	18	841	0	866	0
10/30/20	7873	17	841	1	866	0
10/31/20	7890	13	842	2	866	2
11/1/20	7903	13	844	1	868	3
11/2/20	7916	13	845	2	871	2
11/3/20	7929	13	847	1	873	3
11/4/20	7942	14	848	2	876	3
11/5/20	7956	32	850	1	879	0
11/6/20	7988	15	851	1	879	0
11/7/20	8003	15	852	1	879	3
11/8/20	8018	10	853	0	882	0
11/9/20	8028	10	853	1	882	0
11/10/20	8038	10	854	0	882	0
11/11/20	8048	11	854	0	882	0
11/12/20	8059	7	854	1	882	0
11/13/20	8066	12	855	2	882	2
11/14/20	8078	13	857	1	884	0
11/15/20	8091	21	858	1	884	0
11/16/20	8112	21	859	5	884	0
11/17/20	8133	23	864	34	884	0
11/18/20	8156	8	898	0	884	0
11/19/20	8164	9	898	0	884	0
11/20/20	8173	13	898	0	884	0
11/21/20	8186	11	898	1	884	1
11/22/20	8197	15	899	5	885	0
11/23/20	8212	15	904	4	885	0
11/24/20	8227	18	908	1	885	1
11/25/20	8245	18	909	1	886	0
11/26/20	8263	18	910	0	886	1
11/27/20	8281	18	910	1	887	1
11/28/20	8299		911		888	
Total		462		70		22

ANNEX 5: Laundry Equipment Maintenance Logs

Laundry Department

Monthly Maintenance of Washing Machine		
Specification		Completed Date
Brand Name :	Image	
Model:	HE- 20	
Serial Number:	A278912120715	
Capacity:	9.6gk /21.1 LBS	

Nº	Descriptions	Result	Remarks
1	Each month or after every 200 hours of operation, lubricate bearing and seals. See instructions on the machine. a. Use premium grade lithium based #2 grease, never mix two types of grease, such as petroleum and silicone. b. Pump the grease gun slowly, permitting only the following number of strokes: Do not pump the grease gun if grease comes out of the bearing housing. This can result in over lubrication, causing damage to bearings and seals.		
2	If the machine is provided with automatic lubricators, check that they are injecting grease. Normally they last for approximately one year. Mark new lubricators with installation date.		
3	Clean the AC drive fins: a. Remove the AC drive box cover. b. Blow the fins clean using compressed air at a pressure of 60-90 psi (4-6 Bar) or by using canned compressed air. Use care to avoid damaging cooling fan or other components.		
4	Remove back panel and check overflow hose and drain hose for leaks.		
5	Unlock hinged lid and check the supply dispenser hoses and hose connectoin		
6	Clean inlet hose filter screen		
7	Tighten motor mounting bolt lock nuts and bearing bolt lock nuts, if necessary.		
8	Use compressed air to clean lint from motor		
9	Clean external water and steam filter		

Special Note: _____

Maintenance Team	Laundry Department
Date:	Name:
time:	Position:
Name:	Comment:
Signature:	Signature:

ANNEX 6: Kitchen and Restaurant Waste Logs

Waste Report/Log
Venue:

Month/Year: _____ : _____

	Item Waste			Weight/Amount	Cost	Potential Sales LOST
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						
23						
24						
25						
26						
27						
28						
29						
30						
31						
Practice First in First Out FIFO FIFO FIFO				Total Waste for The Month: Potential Sales for The Month: All Costing provided by HOD		

Executive Chef Signature: _____ Date Verified: _____

