ELECTRIC COOKING GUIDELINES

ENERGY EFFICIENCY DEPARTMENT

EPRA
Energy & Petroleum Regulatory Authority

INTRODUCTION

Kenya's energy sector is evolving, with significant strides in electricity access. However, the cooking energy sector remains heavily reliant on traditional biomass and fossil fuels. Most households still depend on firewood and charcoal, supplemented by liquefied petroleum gas (LPG). The use of firewood and charcoal comes at a high cost—both to human health and the environment. LPG on the other hand relies on imports.

Indoor air pollution from biomass combustion contributes to respiratory diseases. Environmentally, deforestation driven by charcoal and firewood demand threatens biodiversity, accelerates soil erosion, and weakens climate resilience. Additionally, biomass combustion and LPG use contributes to greenhouse gas emissions.

Transition to electric Cooking (eCooking) presents an opportunity to the country as it advances its sustainable development goals. The Kenya electricity generation mix is largely from renewable energy sources. eCooking therefore, offers a cleaner, safer, versatile and efficient alternative. Technologies such as induction stoves, electric pressure cookers, and electric ovens support national efforts to mitigate climate change and improve public health. However, the uptake of these technologies has some challenges. Challenges such as high upfront appliance costs, grid reliability, longer learning curve, limited capacity of the appliances, and cultural cooking preferences must be addressed to realize eCooking's full potential.

These guidelines have been developed to provide an overview of the various types of eCooking technologies in Kenya. It seeks to provide basic information on the best-use practices, energy saving tips, safety precautions and maintenance tips when using eCooking appliances in households, institutions and commercial enterprises.

ELECTRIC COOKING TECHNOLOGIES

This chapter discusses the various types of eCooking devices that are available in Kenya.

Electric Pressure Cooker (EPC)

An EPC combines an electric hotplate, a pressure cooker and an insulated hotbox with a fully automated control system. It operates by using electricity to generate heat and create a high-pressure environment within a sealed cooking pot.

The advantages of using EPCs are:

- Saves time: The high-pressure steam raises the boiling point of the water inside the cooker which together with the sealed insulated pot means food cooks fast, thoroughly and evenly.
- Uses less energy hence relatively lowering the cost of cooking
- EPCs are equipped with safety features such as sensors capable of accurately monitoring pressure and temperature.
- Ease of use: Most EPCs provide the user with pre-programmed options for common dishes with specific cooking durations. For instance, if a user wants to cook beef, the user will have an option to select the “beef” option. The EPC will cook the beef and automatically switch off once done.
- Nutritional Preservation: Shorter cooking time and sealed environments help preserve more nutrients in food compared to boiling or prolonged cooking methods.
- Consistent results: Advanced temperature and pressure controls ensure consistent outcomes, reducing undercooking or overcooking.
- Compact and saves space: Their multifunctional design reduces the need for multiple kitchen appliances, saving storage space.
- Easy to clean

While EPCs offer significant advantages, they also have some limitations. These include:

- Longer preheating and depressurizing time: While cooking is fast, the time required to build pressure at the start and release it after cooking can add to the overall cooking duration.
- Non-compatible with some recipes: Not all recipes are suitable for EPCs. Foods that require crisping or grilling may not turn out as intended

Usage tips:

- Always add enough liquid to your food, as it creates the steam needed for pressure cooking; usually, the pot should be filled within the indicated levels. Overloading the pot can affect cooking time and potentially cause damage.
- Before each use, inspect the rubber gasket (sealing ring) for damage or wear and ensure it is properly fitted on the lid.
- Follow the manufacturer’s instructions on releasing pressure.
- Wash the inner pot and lid with warm, soapy water after each use, and occasionally deep clean the appliance.
- Avoid touching the appliance during cooking to prevent accidental burns.

Induction Cooker

An induction cooker uses an electric current to create a magnetic field that heats cookware directly through magnetic induction.

The advantages of using Induction Cookers:

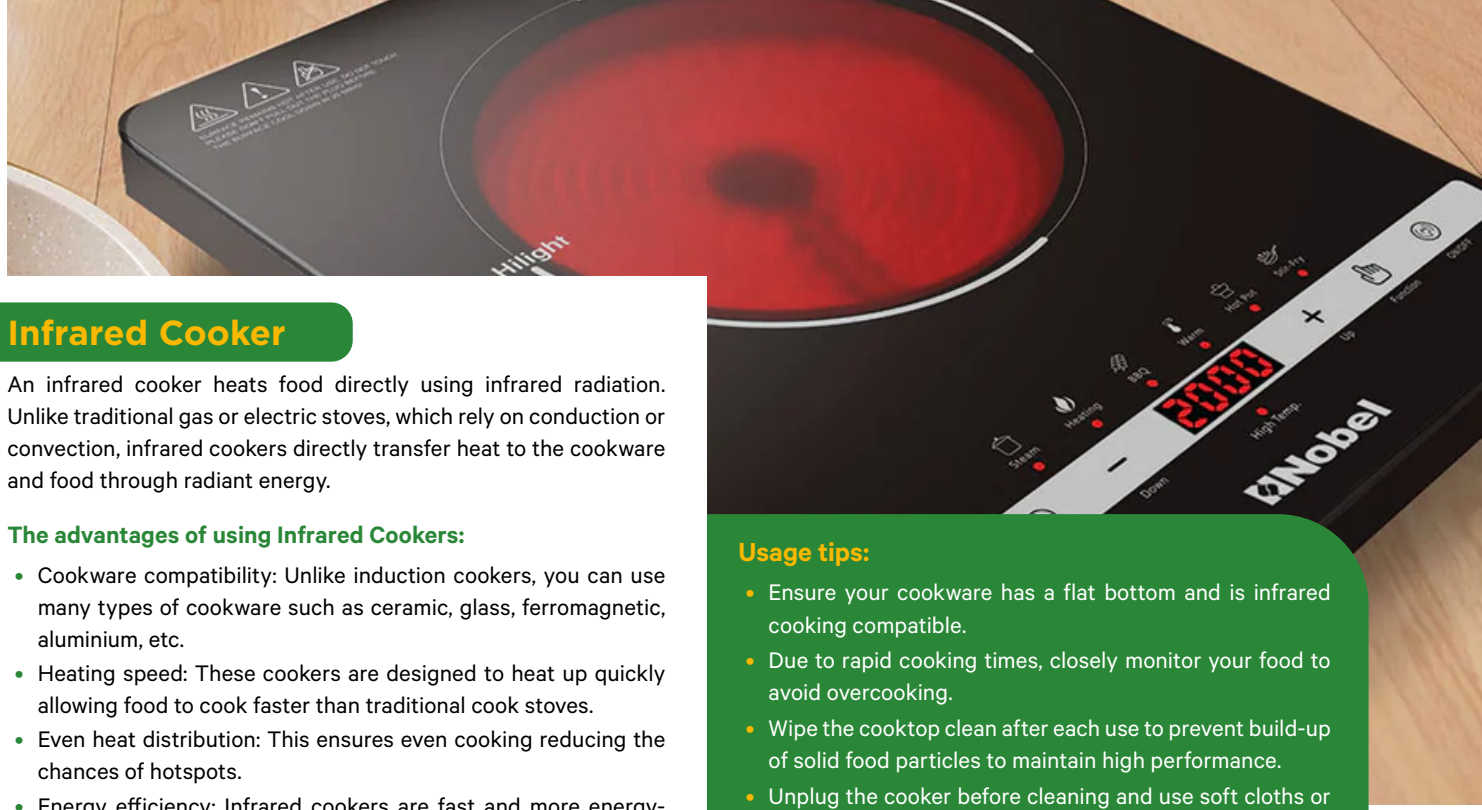
- Heating speed: They heat cookware faster and with more precision given that they are equipped with temperature control function.
- Energy Efficient: They heat cookware directly, minimizing energy loss to the surrounding environment. Some models have sensors to detect cookware presence, automatically turning off when no cookware is detected, hence saving energy further.
- Safety: The cooktop stays relatively cool to the touch hence reducing burn risks.
- Easy to clean: The smooth glass surface of induction cooktops is easy to clean, with minimal residue or spills.

While induction cookers offer significant advantages, they also have some limitations. These include:

- Cookware incompatibility: Require compatible cookware with a flat bottom and made from magnetic materials, such as cast iron, stainless steel, or certain enamelled steel.
- Not recommended for people with pace makers due to the high magnetic field.

Usage tips:

- Use induction cooker compatible cookware
- Use the appropriate size of cookware for the heating plate and position it to ensure even heat distribution.
- Lift and place cookware instead of sliding it across the cooktop to prevent scratches.
- Wipe up spills immediately to prevent them from burning onto the surface.
- Avoid placing an empty pan on an induction cooktop given that the heating process is initiated once a pan is placed on the cook top. This can lead to burns and energy wastage.



Infrared Cooker

An infrared cooker heats food directly using infrared radiation. Unlike traditional gas or electric stoves, which rely on conduction or convection, infrared cookers directly transfer heat to the cookware and food through radiant energy.

The advantages of using Infrared Cookers:

- Cookware compatibility: Unlike induction cookers, you can use many types of cookware such as ceramic, glass, ferromagnetic, aluminium, etc.
- Heating speed: These cookers are designed to heat up quickly allowing food to cook faster than traditional cook stoves.
- Even heat distribution: This ensures even cooking reducing the chances of hotspots.
- Energy efficiency: Infrared cookers are fast and more energy-efficient as compared to induction cookers and traditional cookers.

While infrared cookers offer significant advantages, one of its limitation is that the cooktop surface becomes extremely hot during and after cooking increasing the risk of accidental burns.

Usage tips:

- Ensure your cookware has a flat bottom and is infrared cooking compatible.
- Due to rapid cooking times, closely monitor your food to avoid overcooking.
- Wipe the cooktop clean after each use to prevent build-up of solid food particles to maintain high performance.
- Unplug the cooker before cleaning and use soft cloths or sponges while cleaning the surface to prevent scratches.
- Avoid turning on the cooktop without a pot on it to avoid energy wastage and damaging the heating element
- Do not touch the cooker surface right after use to prevent burns.

Rice cooker

A rice cooker is an automated kitchen appliance designed for cooking rice. It can also be used to prepare other dishes such as steamed vegetables and cakes. It typically consists of a removable inner pot, a heating element, and a thermostat.

The advantages of using Rice Cookers:

- Ease of use: Requires minimal supervision, simply add water, rice and press the button.
- Time saving: While the rice cooks, you are free to focus with other tasks without the risk of overcooking.
- Keep warm function: Keeps rice warm for hours making it convenient for meals throughout the day.
- Safety: It has a locking lid to prevent spills during cooking and thermal insulation to keep the outer surface cool.
- While rice cookers offer significant advantages, the “keep warm” function consumes electricity if left on for extended periods.

Usage tips:

- Follow the recommended rice-to-water ratio.
- Do not overfill the inner pot. Leave some space at the top of the inner pot to allow room for the rice to expand during cooking.
- Clean the inner pot and lid thoroughly after each use, and wipe down the exterior of the rice cooker.

Air fryer

An air fryer works by circulating hot air rapidly throughout its interior. It cooks food using a combination of radiation and convection. All the surface areas of the food are exposed to the hot air, making the food become crispy on all sides without having to be submerged in hot oil.

The advantages of using air fryer:

- It uses less oil as compared to deep frying to produce crispy food with desirable texture while still being healthier.
- Safer than deep frying. It eliminates the need for large amounts of oil reducing the risk of splattering or accidental burns.

One of the limitations of air fryers is the possibility of uneven cooking due to overcrowding the basket.

Usage tips:

- Preheat by turning on the air fryer a few minutes before you start cooking. Some models have a preheat setting.
- Use minimal oil by lightly spraying or brushing food with cooking oil.
- Avoid non-stick sprays as they can damage the air fryer's coating.
- Place the air fryer on a safe surface that can withstand high temperatures, like a kitchen countertop.
- Avoid touching any parts of the air fryer while it is cooking
- Air fryers cook food faster than ovens. You might need to reduce the cooking time.
- Use the perforated basket or pan that comes with your air fryer.
- Do not overcrowd the air fryer basket. The circulating air should come into contact with your food as much as possible.

Electric deep fryers

An electric deep fryer is designed for frying food by immersing it in hot oil. It provides a controlled and convenient way to prepare fried dishes such as French fries, chicken, fish and doughnuts.

Advantages of electric deep fryers:

- Consistent temperature control: It allows precise temperature settings ensuring consistent results
- Even cooking: the controlled heating mechanism ensures the food is cooked evenly with a crispy exterior and properly cooked interior
- Versatility: It can fry a variety of foods from meat and vegetables to snacks and desserts.

Disadvantages of electric deep fryers:

- High oil usage
- Risk of oil spills
- Oil disposal issue

Usage tips:

- Do not overfill
- Monitor temperature
- Clean regularly

Electric hotplate

An electric hotplate is an appliance cooktop with one or more electric heating elements. It works by converting electric energy into heat energy by passing an electric current through a resistance heating wire. The generated heat is transferred to the cooking pot through conduction.

Advantages of using electric hotplate:

- Ease of use: They are simple to operate, requiring a power connection and a temperature setting to begin cooking.
- Affordability: Compared to other cooking appliances, hotplates are relatively cheap.

Some limitations of electric hotplates include:

- Long preheating time: The heating element may take a while to heat before it achieves the desired heat levels, and the heat is controlled by the thermostat.
- Safety risk: Cooking with a pot that is smaller than the diameter of the heating element leads to heat loss during cooking, and this could also pose a safety risk.
- They are energy inefficient compared to other electric appliances.

Usage tips:

- Use flat-bottomed pots and pans that fully contact the hot plate surface for efficient heating.
- Begin cooking on a lower heat setting and gradually increase the temperature to your desired level.
- Do not leave a hot plate unattended while cooking, especially when using high heat settings.
- Place the hot plate on a stable level surface away from flammable materials.
- Always turn off the hot plate when not in use to save on energy and prevent accidents.
- Inspect the hot plate for any damage like frayed cords or a damaged heating element.
- Clean regularly by wiping down the surface of the hot plate with a soft damp cloth.

Electric Oven

The electric oven is used for baking and grilling. The oven has racks, a convection fan, heating elements, and knobs to set the temperature and cook time.

The advantages of using electric oven:

- Even cooking: A convection oven fan circulates the heat all around the oven to bake or cook the food evenly.
- Precision and temperature control: They offer precision temperature control allowing users to set exact temperature throughout the cooking process.
- Safety: With no open flames, electric ovens are safer than gas ovens.

Some limitations of electric hotplates include:

- Long preheating time: The heating element may take a while to heat before it achieves the desired heat levels
- Heat accumulation: It can generate significant amount of heat which may warm up the kitchen.
- High energy consumption: It tends to consume more electricity which may increase energy bills.

Usage tips:

- Use oven mitts or potholders when removing hot cookware from the oven.
- Use appropriate cookware - glass or ceramic dishes - as they distribute heat evenly and help prevent scorching.
- Constantly monitor your food as electric ovens can heat up quickly and overcook items easily.
- Minimise the frequency of opening the oven door when in operation as it releases heat impacting on cooking time and increasing energy consumption.
- Ensure the door seals are intact to prevent heat loss and maintain cooking efficiency.
- Clean the inside and outside of your oven regularly for proper functioning and hygiene.

Electric Stove

An electric stove or cooker is a combination of an electric oven and electric hotplate. The electric stove has an oven with both broil and baking elements. The broil element is typically found at the top of the oven cavity and provides high, direct heat to the top of food like a grill. Broiling places food close to the oven's heating element so that it can quickly cook, brown, char, or caramelize. The bake element is located towards the bottom of the oven cavity. The broil setting uses broil elements only while the bake setting uses both elements. Some of the electric stoves models include gas burner(s).

Usage tips:

- Match pot size to the burner size you are using to avoid unnecessary heat loss.
- Utilize the timer function to prevent overcooking and ensure consistent results.
- Turn off the burner a few minutes before your food is fully cooked as the residual heat will continue cooking.
- If your stove has multiple burners, prioritize using the back burners as they are less likely to be accidentally knocked over.
- Different dishes require different rack positions; consult your recipe or oven manual for guidance.

Microwave Oven

A microwave oven uses microwave radiation to heat and cook food

The advantages of using microwave oven:

- Speed: it heats food faster than conventional ovens or stove tops making them ideal for busy lifestyles and quick meals.
- Convenience: They are ideal for reheating and defrosting frozen food.
- Safe and easy to monitor: does not require constant supervision, allowing you to tend to other tasks.

Some limitations of microwave ovens include:

- Uneven heating: It can sometimes heat food unevenly leading to hotspots and cold areas. Stirring or rotating food is often necessary for even results.
- Textural issues: Food like fried items and meat can lose their crispiness as the heating process does not allow for browning or crisping.
- Overcooking risk: Microwaves cook quickly and there is a risk of overcooking or drying out food if the cooking time is not carefully monitored.

Usage tips:

- Stir food, halfway through cooking, to ensure even heating
- Cover food using microwave safe covers to prevent splattering and save moisture
- Use microwave compatible containers to prevent leaching or fire hazards
- Use recommended settings for defrosting food to avoid partially cooking them

Slow cookers (crock pots)

It is designed to cook food at low temperatures of an extended period. It is used for preparing soup, stews, braised dishes and other recipes benefitting from slow cooking

Advantages of slow cookers:

- Convenience: Once the ingredients are added, you can leave it unattended making it convenient
- Nutrient retention: Low temperature cooking helps retain nutrients in vegetables and other ingredients compared to high heat methods.

One of the main disadvantages of slower cookers is that it requires advance preparation including measuring ingredients which can be time consuming.

Usage tips:

- Layer ingredients properly by placing root vegetables like potatoes at the bottom as they take time to cook
- Avoid lifting the lid to prevent heat loss
- Adjust liquid quantities since slow cookers retain moisture better than other cooking appliances
- Choose the right size that suites your recipe needs to avoid overfilling or under filling

GENERAL GUIDELINES FOR ECOOKING

Ensuring safety, energy efficiency and proper maintenance of your kitchen appliances is essential for optimal performance. Users should refer to the instruction manuals and follow best practices for operating the appliances. The following are some of the general guidelines on safety, energy efficiency and maintenance of eCooking appliances.

3.1 Safety

The kitchen environment has a combination of electricity, water, flexible cables, open flames and hot surfaces making it potentially hazardous. Therefore, it is important that special care is taken when using electrical appliances to prevent electrical and fire hazards in the kitchen. Some of the general safety tips when using eCooking appliances include:

a) The design and installation of electrical works should be carried out by a licensed electrical worker. This will ensure that appropriately sized cables are installed while switches and sockets are well positioned for the various kitchen appliances.

b) The power sockets should not be installed near sinks and water sources to avoid contact with water.

c) Before using your electric kitchen equipment, inspect it for any visible damage, such as frayed cords, cracks, or loose connections. Damaged parts can lead to electrical accidents.

d) Ensure that the kitchen equipment that draw large currents such as electrical cookers are installed properly. They should be securely connected to a grounded outlet to avoid power surges or electric shocks.

e) The plug sockets should not be overloaded with too many electrical appliances as this can lead to overheating.

f) It is recommended to install a smoke detector to detect fires early.

g) Do not leave electric cooking appliances running unattended.

h) Do not wrap electrical cords around appliances while they are still hot.

i) Kitchen electrical appliances such as oven and grill should be thoroughly cleaned to avoid build-up of fat and grease which are major causes of fire.

j) Always operate plugs or switches with dry hands.

k) The appliances should be unplugged or switched off before cleaning.

l) The cooking area around the electric stove/oven should be clear of combustibles, such as towels, napkins, and pot holders.

m) Keep appliance cords away from hot surfaces such as hotplate or toaster.

n) The electric cooking appliances acquired should be certified by relevant authorities e.g. Kenya Bureau of Standards, to ensure that they meet safety standards.

o) Keep children away from hot surfaces.

3.2 Energy Saving Tips

There is need to ensure that we are utilizing energy efficiently while using electric cooking appliances. Some of the energy savings tips include:

a) Ensure that the electric cooking appliances acquired are energy efficient. Most electric appliances have energy efficiency rating labels.

b) Utilise an appropriate cooking appliance depending on the meal to be prepared. For example, it is more energy efficient to use an EPC to cook beef instead of using electric hotplate/ stove. Likewise, when cooking small portions, opt for the microwave whenever possible. Microwaves consume significantly less energy compared to electric ovens.

c) When using an electric oven, preheat only when necessary and avoid opening the oven door frequently. Each time you open the door, the temperature drops causing the oven to use more energy to reheat.

d) Defrost food in the refrigerator before cooking it in your oven or stove.

e) Cover cooking pans and pots while cooking. This allows you to set a lower temperature on your stove, helping to reduce the energy consumption of your electric cooking appliance.

f) Match the burner and pot size to help reduce heat loss and maximize energy-efficient cooking.

g) Do not leave the electric cooking appliances on standby power. Switching them off when not in use saves energy.

h) Utilise residual heat in some of the electric cooking appliances such as an oven by turning off the oven a few minutes before your dish is done. The residual heat will be used to complete the cooking.

i) Choose the right cookware to match the electric cooking appliance and food to be cooked. For example, when using an oven, glass or ceramic pans are typically better than metal.

3.3 Maintenance

Maintenance and servicing can help extend the lifespan of electrical cooking appliances, improve its functionality, prevent breakdowns or failures and improve on their safety. The maintenance of eCooking appliances should be guided by user manuals provided by manufacturers. It is also advisable that users purchase eCooking appliances from manufacturers who offer warranty for their products. Some of the general maintenance tips include:

a) Undertaking regular cleaning of the appliances to prevent build-up of dirt.

b) Conduct routine inspections to detect early wear and tear, malfunctions, and other potential issues in kitchen equipment.

c) When do it yourself (DIY) maintenance is not adequate, seek professional assistance from the manufacturer, authorized dealer or a qualified technician.

d) Check and replace worn out or damaged door seals to ensure proper heat retention within the cooking appliance.

e) Routine inspection of the electrical wiring and cables should be carried out by a licensed electrician to check for any insulation damage, ascertain grounding and confirm integrity of connections.

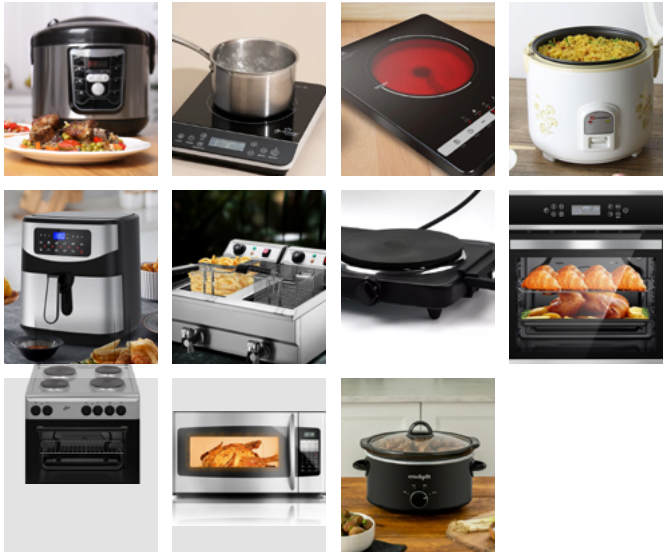
f) Prevent appliances from overheating, such as blenders or food processors, since it can damage their motors. Therefore, take breaks during extended use to allow the appliance to cool down.

g) Any faulty components such as seals and heating elements should be replaced according to instructions in the manual or by a qualified technician.

h) Regular calibration should be carried out according to instructions in the manual to ensure that the oven and stove are cooking at the correct temperatures.

i) Regularly test safety features to ensure that they are functioning correctly. Faulty safety features can lead to overheating, fires, or other hazards.

SUMMARY



Adopting these eCooking guidelines ensures a safe, efficient, and sustainable kitchen environment. By understanding various eCooking technologies and following proper usage guidelines, users can maximize the benefits of modern appliances while minimizing risks.

Safety remains a top priority, requiring careful positioning of appliances, proper handling of electrical connections, and strict adherence to manufacturer instructions.

Energy efficiency and conservation can be achieved through mindful cooking habits, such as using the right cookware, optimizing appliance settings, and reducing unnecessary power consumption.

Regular maintenance, including cleaning, servicing, and timely repairs, enhances appliance performance and longevity. Ultimately, by integrating these guidelines into daily kitchen routines, users can enjoy a seamless cooking experience that is safe, cost-effective, and environmentally friendly.

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