Cooking appliances and energy

In isolation, cooking comprises a relatively small proportion of energy use in most households but it is still an area where savings can be made. People often have strong personal views on the type of cooker they like to use. This factsheet explains some of the energy efficiency differences between options available in a rural community off the gas grid, such as Barningham. For this reason, the factsheet only covers electrical, solid fuel, fuel-oil and biomass-fired options. Gas-fired cookers are not considered.

Also check out Factsheet No. 2, *Managing Energy in the Home*, which has a section on how to save energy in the kitchen.

❖ Cookers – the basics

In terms of energy efficiency, the objective is always to focus the energy consumption towards the required use, while minimizing as far as possible any energy use that doesn't end up where you want it.

- Conventional cookers minimise energy losses via an insulated oven and the use of hobs and grills for stove-top cooking and grilling. Apart from a short period of warming up, the cooker is only used when required, maximising the energy efficiency.
- Range-type cookers, such as an Aga or Rayburn, also provide room heat and, sometimes, serve a central heating and hot water system. They are significantly less energy efficient than conventional cookers for cooking but, as they also provide heat, it may be argued that the same efficiency calculations aren't appropriate.
- For those using electrical cooking appliances, the easiest and cheapest way to improve the sustainability of cooking is to buy your electricity from a supplier that is building renewable capacity or has 100% power purchase agreements with renewable generators. This will ensure that the electrical use associated with your heating system is contributing to de-carbonisation of the national supply.
- If your cooker if it is not working properly or is over 10 years old, you should consider replacement. Further advice is provided at the end of this factsheet.

❖ Conventional electric hobs

- Conventional electric hobs produce heat, which is then transferred to the pan by conduction.

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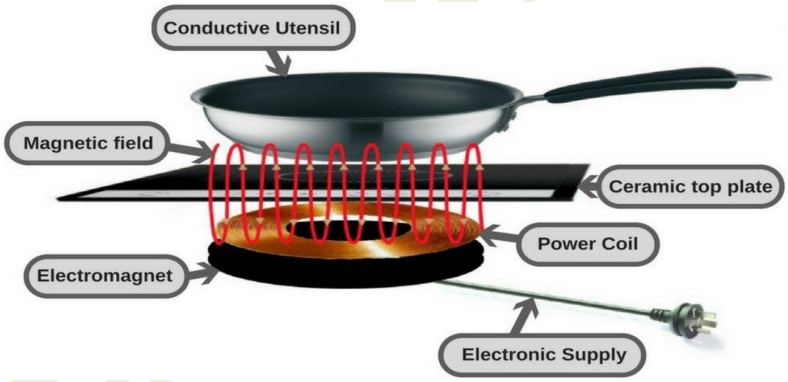
This means that any energy that is used to heat the hob element (and any ceramic surface, if so equipped) is wasted.

- Typically, conventional electric hobs are around 65% efficient. The average energy consumption per use is about 0.72 kWh.

❖ Induction hobs

- Electric induction hobs set up a magnetic field which flows through the base of the pan to create heat via a magnetic flux within the pan itself.
- Heating only works within the pan while it is on the hob, thus, induction hobs can be up to 90% efficient. The average energy consumption per use is about 0.50 kWh.
- Induction hobs only work on pans with a magnetic base, so switching hobs could mean buying new pans. Pans can be checked by applying a magnet – if it sticks to the pan, they should be suitable.



How an induction hob works
Reproduced from https://saffroninteriors.co.uk/a-comprehensive-guide-to-induction-hobs/

- Induction hobs are more expensive to purchase than conventional electric hobs, typically a few hundred pounds more. Although more energy efficient to use, the annual savings may only be around £20. If pans need to be replaced as well, the payback time will be prolonged.

❖ Conventional electric ovens

- A conventional oven uses radiant heat from heating elements, usually in the base of the oven, which heat the air above. The heat rises and food cooks from underneath.
- Conventional ovens are considered best for baking bread, cakes and delicate foods, such as flans and soufflés.
- Grilling functions are available to provide direct overhead heating when needed.

❖ Fan ovens

- A fan or convection oven, has the heating element and a fan at the back of the compartment. This circulates heat around the food as it cooks, providing quicker and more even cooking. It is ideal for cooking

multiple items at the same time. This is a more energy-efficient way of cooking than a conventional oven.

- In a fan oven, the recipe temperature can be reduced by 20 °C and the cooking time reduced by about 25%. Food is also cooked more crisply.
- Pre-heating is also faster.
- The greater air circulation can cause drying out and the outside may be cooked before the inside is finished rising. Bread may not rise as well an in a conventional oven.

❖ Fan-assisted ovens

- Fan-assisted ovens also have a fan at the back of the compartment but with additional heating elements at the top and bottom of the oven. This provides the option of cooking with or without the fan.
- Fan-assisted ovens offer the greatest flexibility for oven cooking, giving the ability to benefit from speed and more energy efficient fan mode when appropriate.

❖ Range cookers

- Range cookers can operate on electricity, oil, gas or solid fuel, with multiple options for cooking, heating and hot water. They are heat storage devices, usually left on all the time. Heat from the core is transferred to ovens and hotplates, which provide a range of hot and less hot areas for cooking.
- Whilst a normal electric cooker may use around 10kWh of electricity per week, a four-oven Aga gets through 15 gallons of oil or 270kWh of electricity per week according to Aga's own figures, i.e. more than 25 times more energy-hungry and polluting.
- The primary benefit of the additional energy consumption in a range is the provision of a constant source of heat which may be considered beneficial in an old stone house. However, the technology is old and does not compare favourably with other heating and cooking options, due to its inefficiency and lack of flexibility.

- Generally, range cookers have less controllability than conventional cookers and the temperature in different parts of the unit will vary according to the cooker use. For example, if the top hotplates are in use, the oven temperature may drop.
- Ranges are generally larger and more expensive to purchase than conventional cookers.

- Within the last ten years, Aga has introduced more controllable electric range cookers, where ovens and hot plates can be switched on and off as needed. There are even models that can be controlled remotely via a smartphone, PC, laptop or tablet or even by sending a text message to your Aga. However, as the range takes several hours to heat up fully, it is very inefficient if only used for cooking.

❖ Sustainable fuel options

Fuel choice is important for sustainability and burning oil or solid fuel (coal) on a range is one of the least sustainable options.

- Wood-fired range cookers are available and in recent years, wood pellet cookers (and space-heaters and boilers) have also become available. Some of these have an appearance similar to an Aga-type range cooker. There are also options that combine pellet-fired ovens with electric induction hobs.
- Some wood pellet fuelled devices provide hot water and heating together with cooking. These qualify for the Renewable Heat Incentive (RHI) (see Factsheet No. 6, *Government schemes to help keep you warm*, for more details on the RHI scheme).
- Unlike traditional log stoves, pellet stoves have the advantage that they can provide automatic firing and thermostat control, with only periodic stoking of a pellet hopper and less frequent ash disposal required. You do need space for pellet storage, roughly equivalent to the space occupied by an oil storage tank.

Modern wood pellet combination boiler and cooker (Klover Smart 120)
Reproduced from https://www.klover.co.uk

- Wood-fired cookers without space and water heating are significantly more expensive than conventional cookers or combined cooker / central heating boilers. Also, such units do not qualify for RHI support.

❖ Other cooking appliances

- A microwave is the most energy efficient way to heat up and cook food. It only needs to operate for a short time and its smaller size means that the heat is more focused on whatever is being cooked. Opt for this appliance whenever possible.

- Slow cookers are also very energy-efficient. They use just a little more energy than a traditional light bulb, and you can leave your food to cook slowly throughout the day.

❖ Cookers – buying new

- Common faults are deterioration of door seals, faulty thermostats or fan malfunction. These all reduce the energy efficiency but may be repairable and worth consideration before buying new.
- At present, energy efficiency rates are only available for ovens not hobs. From 1st March 2021, the new UK and EU energy labelling scheme added an A++ rating for cookers. Avoid purchase of an appliance with a rating below "A". The most efficient appliances also carry the Energy Saving Recommended badge, which is awarded by the Energy Saving Trust.
- The smallest size of cooker consistent with your actual use requirements will be the most energy efficient option for you.
- Avoid purchase of ovens with pyrolytic cleaning, as this process is very energy intensive and wasteful. Anecdotal evidence suggests that it generates up to 3 kg of CO_2 per cleaning cycle.

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