



Energy Tutorial: Energy Usage

Lighting and appliances

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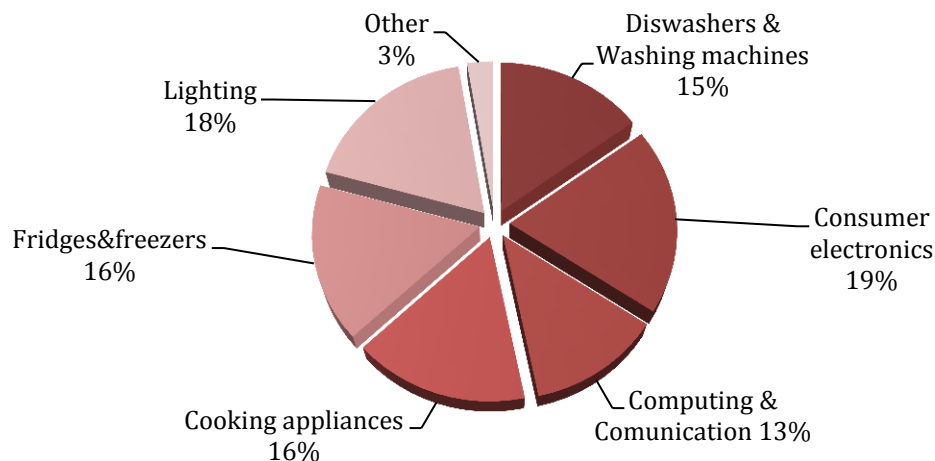
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Electricity for lights and appliances in homes can account for a significant proportion of the total household's energy demand. Figure 1 gives you an idea of electricity consumption in a typical UK home.

Figure 1: Electricity consumption in a typical UK home (excluding electric heating)

Source: Clark and Chadwick (2009), The Rough Guide to Community Energy



Here you will find information about saving energy used for lighting and appliances.

LIGHTING

On average lighting accounts for 18 % of the electricity consumption of a typical UK house. In a bulb, electricity is converted into light, but also into heat. The efficiency of the bulb depends on how well the bulb converts electricity to light. In this section we will give you an overview of all the **main types of bulbs** and information on **how to decide** which is the most appropriate.

Main types of light bulbs

- **Light Emitting Diodes (LEDs).** LEDs are extremely low wattage, tend to last a lot longer than other types and give out a bright white light. Although they tend to be more expensive than other light bulbs, they typically last twice as long as CFLs and will save you more money in the long term.
- **Compact Fluorescent Lamps (CFLs).** CFLs use 75-80% less electricity than old-fashioned tungsten bulbs and last up to 12 times longer. A CFL replacement for a 100W bulb will save up to £60 of electricity over its lifetime. If typically used for 2 hours a day a CFL will pay for itself in under a year.



SpringLamp



Floodlights



Globe



A-Bulb



Decorative

- **Halogen.** These are only suitable for spotlighting or task lighting and should not be used for general lighting. They are at least 50% more efficient than tungsten bulbs and last about 3 times as long.



- **Tungsten Filament / Incandescent / GLS.** Only about 5% of the electricity used by old-fashioned filament bulbs becomes light - the rest is lost as heat which can cause discolouration of light fittings, walls and ceilings. Dimming an ordinary filament bulb to 50% of its full output will cut its energy use by about 40% and will also extend the life of the bulb.

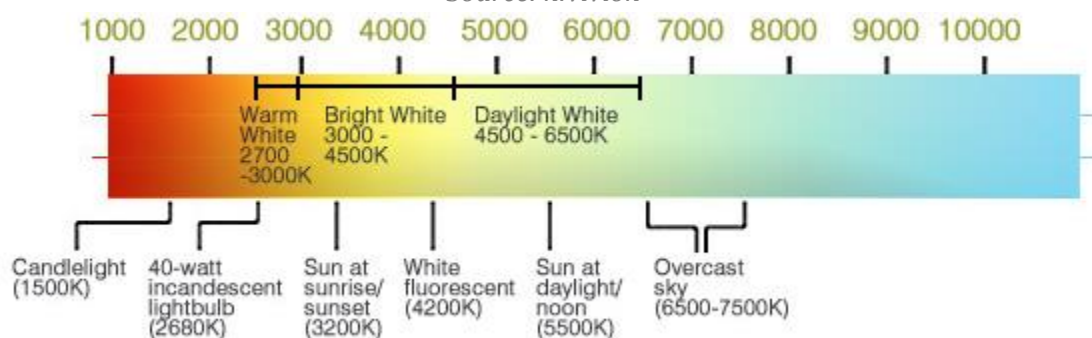
How to decide which bulb is right for you

When choosing a light bulb, there are three main things to consider:

1. **Colour temperature.** The colour of the bulb is measured as a temperature on the Kelvin scale (K). A lower K value emits a warm, yellowish light and creates a cosy mood. A higher K value means the light is bluer in appearance and creates a cooler, more energizing mood. It is recommended you choose a warmer colour for living spaces and a cooler colour for kitchens, bathrooms and outdoor spaces. Figure 2 below shows the colour temperatures you can get at different points on the Kelvin scale.

Figure 2: The Kelvin scale

Source: n:vivion



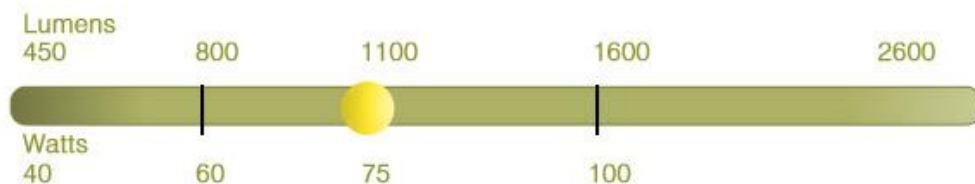
2. **Wattage.** The wattage of a bulb indicates the amount of energy used by the bulb, the higher the wattage the higher the energy used! Here you have a comparison between the wattage of the different types of lights. When buying a compact fluorescent light bulb, choose a wattage that's about one-fourth of what you usually buy (incandescent bulbs).

Figure 3 below shows some typical wattage conversions for compact fluorescent lights (CFLs).

Figure 3: Typical wattage conversions for compact fluorescent lights



3. **Lumens.** While watts measure the energy used, lumens measure the bulb's light output. More lumens, more light; less watts, less energy! So when choosing your bulb look at the lumens rather than the watts.



The table below offers a brief summary on the different types of lights.

	Energy Efficiency	Colour Temperature	Average Lumens per watt (LPW)	Life Span
LED	Best	Warm to full spectrum (high blue to white colours)	70	20+ years
CFL	Better	Warm to full spectrum (high blue to white colours)	46	4 years
Halogen	Good	Warm	26	1.5 year
Incandescent	Poor	Yellow, warm	13	8 months

Possible savings from lighting

Depending on the amount of use, replacing just one old-fashioned tungsten light bulb with a CFL bulb could save you on average around £3 a year and as much as £8 for brighter bulbs (or those used for more hours a day). Because it will last around 10 times longer than a standard bulb, on average it will save you around £55 before it needs replacing. Replacing all halogen downlighters in a home with LED alternatives could save about £30 a year in electricity costs.

If you fit all the lights in your house with energy efficient bulbs, you could save around £55 a year – £870 over the lifetime of all of the bulbs¹.

ACTIVITY

Find out what type of bulbs are currently being used in your home and see how efficient they are. Do you think it would be worth changing any of them?

CONTROLS AND TIPS

- Turn off the lights when leaving a room or when they are not needed. This is one of the easiest ways to save energy.
- Use the lowest wattage bulb that gives the light you need.
- Make use of daylight, keep windows clean and keep furniture away from windows.
- Where lights are left on for long periods, and are not on a dimmer switch, fit energy efficient light bulbs.
- A room decorated with pale colours needs a lower total lamp wattage to light it than a dark coloured room.
- When buying a light fitting or shade check what wattage and shape of bulb it will take.
- Dimming an old fashioned filament bulb usually saves energy.
- A fluorescent strip light is cheaper to run than filament bulbs giving the same light.
- CFLs use up to 80% less energy than equivalent incandescent bulbs and they also last much longer. Each one can reduce the household's electricity bills by up to £100 over its lifetime. Modern CFLs produce plenty of attractive light, and are available in most shapes, including candles and some halogen fittings. Some are dimmable too.
- Halogen floodlights should only be on for short bursts - if left on all night, they can cost a small fortune in electricity.
- LED bulbs are even more efficient than CFLs and are already available to replace halogen spotlights. The brightest models are still relatively expensive but they save money in the long run.
- Fit energy saving bulbs in outside lights that are on all night.

¹ These savings are based on replacing old fashioned GLS light bulbs with efficient compact fluorescent bulbs and replacing halogen spotlights with even more efficient LEDs. The cost of replacement bulbs has been allowed for, and a factor has been applied to account for the heat replacement effect.

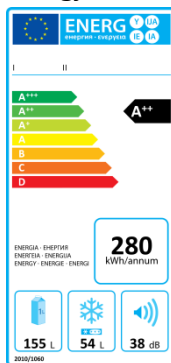
APPLIANCES

Using appliances more efficiently as well as choosing the most efficient models when it comes to buying new appliances can make a big difference (saving money in the long term and reduce carbon emissions). Fridges and freezers, for example, work harder than any other kitchen appliance and are on 24 hours a day. An energy efficient fridge freezer uses around 60% less energy to do the same job as a 10 year old model.

Energy Labelling

When buying a new appliance, there are two key energy labels to look out for:

- The **Energy Saving Trust Recommended** logo that can only be used on the most energy efficient products, usually the top 20% of those available.
- The **EU energy efficiency label**. This was introduced in 1995 and applies to light bulbs, cars and most electrical appliances (e.g. refrigerators, stoves, washing machines). The EU energy label is compulsory on the following products:



- Household fridges and freezers
- Washing machines, tumble dryers and washer-dryers
- Dishwashers
- Air conditioners
- Electric ovens
- Light bulbs
- Televisions

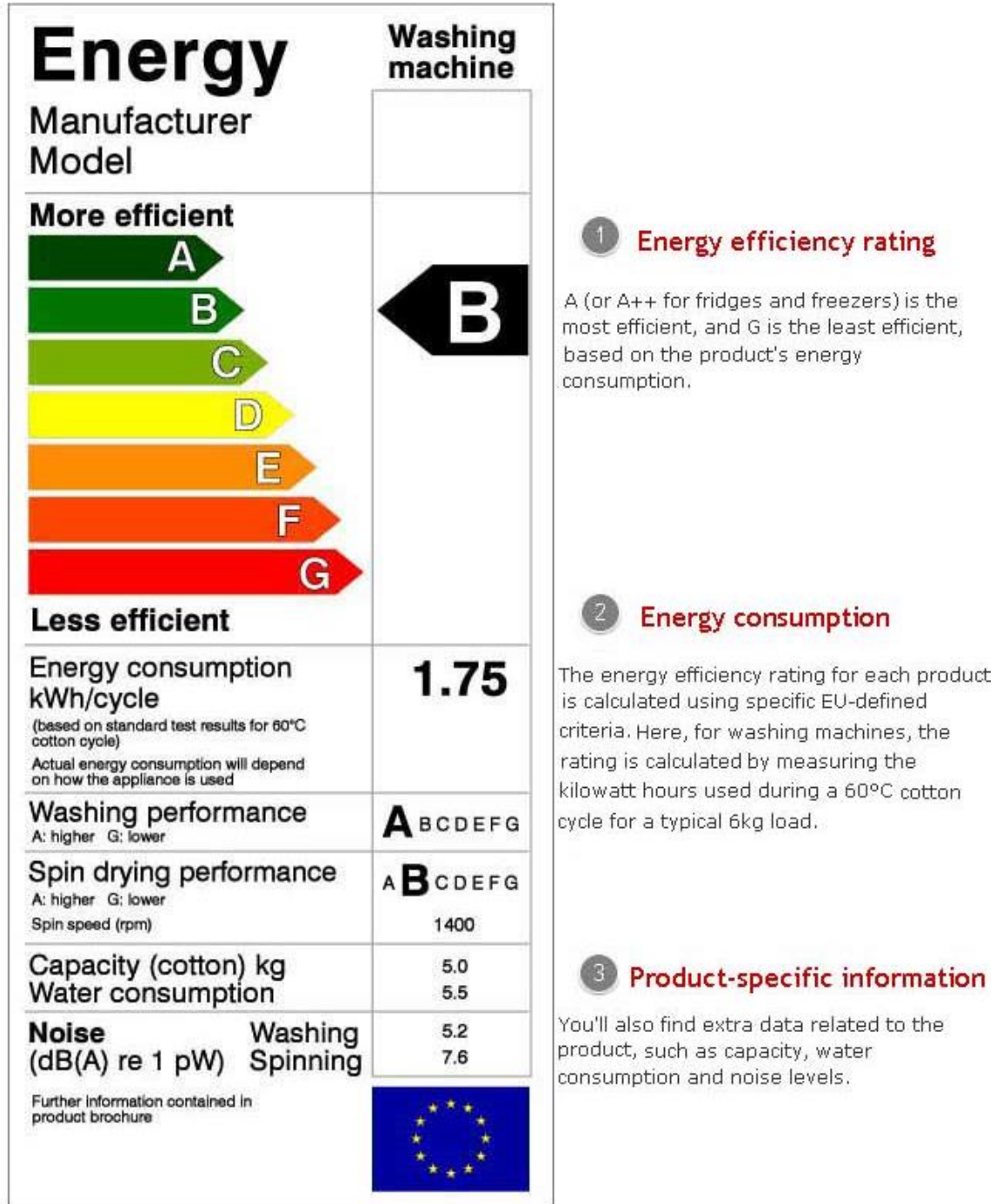
The energy efficiency of the product is rated from A to G. A is the most energy efficient rating and G is the least energy efficient rating. Apart from the color-coded classification there is also other information on the energy label. For example, for washing machines the energy efficiency scale is calculated using a cotton cycle at 60°C (140°F) with a maximum declared load. This load is typically 6kg. The energy efficiency index is in kWh per kilogramme of washing.

A washing machine energy label will also contain information on:

- Total consumption per cycle
- Washing performance – with a class from A to G
- Spin drying performance – with a class from A to G
- Maximum spin speed
- The total cotton capacity in kg
- Water consumption per cycle in litres
- Noise in the washing and spinning cycles dB(A)

Figure 4 below shows an example washing machine energy efficiency label.

Figure 4: Example washing machine energy efficiency label



For tumble dryers the energy efficiency scale is calculated using the cotton drying cycle with a maximum declared load. The energy efficiency index is in kWh per kilogramme of load. Different scales apply for condenser and vented dryers.

Recently, A+, A++ and A+++ grades were introduced for refrigerated appliances and some others in an attempt to keep up with advances in energy efficiency.

The energy label enables consumers to compare the energy efficiency of appliances and is also seen as an incentive for manufacturers to improve the energy performance of their products.

Potential Appliance Savings²

The savings below are based on replacing an average appliance purchased new in 1999 with an Energy Saving Trust Recommended model of a similar size.

Appliance	EU energy rating	Annual saving (up to)	Annual carbon dioxide saving (up to)
Fridge freezer	A+ or A++	£40	135kg
Upright or chest freezer	A+ or A++	£26	90kg
Refrigerator	A+ or A++	£17	55kg
Dishwasher	A	£7	25kg

Leaving Appliances on Standby

Although some devices in standby mode use as little as one watt (that is 3,000 times less than a modern kettle) others use almost as much in standby as they do in use. Given how many devices are left on standby in the average home, this energy “leakage” is usually estimated to add up to around 5% of the electricity consumed in the typical home. Getting into the habit of turning appliances off at the wall or using power down plugs for TVs and computers can take a small but not insignificant chunk out of a home’s electricity bills.

CONTROLS AND TIPS

→ As a general rule switching off and unplugging appliances at the wall when not in use will save the energy used by lights and displays.

² See the Energy Saving Trust website here: <http://www.energysavingtrust.org.uk/Info/Our-calculations>

Cooking

Save energy and money when cooking by following these simple tips:

- ✓ Use a small ring or low flame for small pans and use lids on pans;
- ✓ Use a pressure cooker, steamer or slow cooker instead of an ordinary pan - they are more efficient;
- ✓ Set the oven to the temperature you need and no higher;
- ✓ Don't overfill pans or kettles – you waste energy heating extra water;
- ✓ Once a pan is boiling turn the hob down low to simmer;
- ✓ For toast, use a toaster instead of the grill;
- ✓ If you have a small top oven use it instead of the main oven for smaller items;
- ✓ Avoid opening the door of the oven while it is in use and replace any damaged door seals;
- ✓ If you have an electric hob make sure the bases of your pans are flat and in contact with the rings;
- ✓ Boil water in an electric kettle rather than in a pan or kettle on an electric hob.

WHAT KIND OF COOKER?		
Electric vs. Gas	Microwaves	Fan Ovens
Cooking food costs around 33p an hour in an electric oven or 18p in a gas oven.	Microwaves use 70-90% less electricity than conventional ovens.	Fan ovens use about 20% less electricity than conventional ovens.

Fridges and Freezers

- ✓ Make sure there is plenty of ventilation space at the back and top of your fridge or freezer;
- ✓ Keep the cooling fins at the back of the appliance clean;
- ✓ Site your fridge/freezer in a cool place out of direct sun and away from the cooker and boiler;
- ✓ Check the temperature using a fridge thermometer. Fridges should be 0°C to 4°C, freezers -18°C (****) to -5°C (*);
- ✓ Use the temperature control on fridges and freezers to keep the temperature right: the higher the setting, the lower the temperature;
- ✓ Don't put warm or hot items in a fridge/freezer;
- ✓ Keep the door shut;
- ✓ Defrost regularly - the more ice, the more electricity used;
- ✓ Replace damaged door seals, they let heat in;
- ✓ Take food out of the freezer in plenty of time to allow it to defrost without using a microwave;
- ✓ Try to keep your fridge/freezer three quarters full – this is most efficient.

Washing Machines

A few simple actions can cut your energy and water use:

- ✓ When choosing a washing machine, look for a machine that uses less than 50 litres per wash;
- ✓ Washing clothes at 30°C saves energy, and today's detergents wash just as well at low temperatures;
- ✓ Run washing machines with full loads, as a half load uses more than half the energy and water of a full load;
- ✓ Cleaning filters regularly keeps appliances running efficiently;
- ✓ Use short wash cycles when clothes aren't visibly dirty;
- ✓ Use the spin function to help dry washing before using a tumble dryer.

Dishwashers

- ✓ Look for a dishwasher that uses less than 15 litres per wash;
- ✓ Run the dishwasher with a full load, as a half load uses more than half the energy and water of a full load.

Dryers

Taking steps to dry your clothes more efficiently will help save energy and money:

- ✓ When possible, dry your clothes outside or on a clothes rack;
- ✓ If you use the dryer, fill it each time, rather than putting on a number of small loads;
- ✓ Dryers use up to three times the energy to dry clothes as to wash them;
- ✓ Clean filters regularly.

FURTHER RESOURCES AND INFORMATION

- The YouGen website has lots of extra information and advice about lighting (<http://www.yougen.co.uk/energy-saving/Low+Energy+Lighting/>) and appliances (<http://www.yougen.co.uk/energy-saving/Appliances/>)
- Energy saving calculator and more information about lighting: <http://www.lightbulbs-direct.com/article/energy-saving/>
- Explanation of EU energy efficiency labels: <http://www.which.co.uk/energy/saving-money/guides/energy-labels-explained/eu-energy-efficiency-labels/>