



PRESS RELEASE

Is your microwave SAVING the environment?

A recent article in The Daily Express newspaper entitled :

“Is your microwave KILLING the environment?

Study claims they emit THIS much carbon dioxide. MICROWAVE ovens could be as bad for the environment as cars, new research suggested”. The article can be found here:

<https://www.express.co.uk/news/uk/906018/microwave-global-warming-climate-change-University-of-Manchester-research-emissions-cars>

This is a response to the article which takes the electricity used and the carbon dioxide associated with the production, use and disposal of microwave ovens completely out of context, preferring to report the results from a scientific study as negative rather than positive.

For a start, the title is misleading – microwave ovens don’t actually emit any carbon dioxide! The energy used in making, running and disposing of the microwave oven has an energy footprint associated with it. I presume it is this to what they are referring.

Almost all foods need cooking (heating), traditionally this has involved using gas, electric or fan-assisted hot ovens to heat air. The heat energy in the hot air is then passed to the food product. In theory this involves several steps; a heating element (or gas flame) heats the air inside the oven, this then heats the oven itself and the outside of the food, finally this heat energy is then conducted to the centre of the food. Compared to microwave heating hot air heating is a relatively inefficient process, since in microwave ovens electricity is converted to microwave energy and this then directly penetrates and heats the food itself, meaning much less energy is wasted heating the oven itself or the air inside or the packaging. So although the article draws attention to the energy and emissions associated with microwave ovens, this is far less than the energy used and associated emissions from using conventional hot air ovens.

To investigate the potential energy saving of using a microwave oven compared to a conventional hot air oven, trials were performed using an energy meter to measure the electrical energy consumed during the heating of a frozen ready meal product.

The heating times developed to safely cook a c.400g chicken and vegetable ready meal were used for both a 900W microwave oven and a fan-assisted electric oven set at 180°C. Note that a fan-assisted oven was used for the trials, rather than a standard electric oven. Fan ovens are more energy efficient as they have much better heat transfer from the hot air to the product caused by the rapidly moving (fanned) air inside the oven.

The results were interesting and summarised below:

- The fan-assisted electric oven used 0.43 kilowatt hours (KWh) in a 15 minute pre-heat.
- In cooking the product for the recommended 51 minutes the oven used an additional 0.67 KWh, giving a total of 1.10 KWh.
- In microwaving for 12 minutes on full power the microwave used just 0.25 KWh.

What was surprising was that the fan-assisted electric oven used almost twice as much energy as the microwave oven in just the pre-heat! Over the whole cooking process the microwave oven used over four times less electrical energy compared to the fan-assisted oven and also cooked the meal over four times faster.

Granted, there were a limited range of tests performed and a much more in depth research project could also compare other products, with longer and shorter cook times, different sized and type of products and different oven types and perhaps other cooking methods etc. But the results from these limited tests indicate the energy (and time!) saving convenience of microwave cooking compared to using a fan-assisted oven.

Furthermore (using the figures above) a shorter heating time e.g. for a product requiring 20 minutes in a fan-assisted oven at 180°C compared with say 4 minutes in the microwave on full power could result in the microwave using 8 times less energy than the fan-assisted oven!

Some of the points of interest in the article in the Express newspaper were:

- The use of microwave across the European Union (EU) emits as much carbon dioxide as almost 7 million cars – 7.7 million tonnes of CO₂.
- Microwaves across the EU consume an estimated 9.4 terawatt hours (TWh) of electricity per year (this is incorrectly stated as 9.4 terawatts per hour in the article!). This is equivalent to annual power generated by three large gas power plants.
- An individual microwave uses 573 kilowatt hours (KWh) over a lifetime of 8 years.

Using a bit of ‘bucket science’ and applying the relative efficiency figures measured for the microwave oven versus fan-assisted electric oven, we arrive at the following conclusions (note that the manufacturing and disposal of the ovens was not taken into account– but since microwave ovens are far smaller than fan-assisted ovens, it might be presumed that the energy required to make and dispose of microwave ovens is less anyway).

Since the microwave versus fan-assisted oven trials indicated a four times greater energy efficiency for the microwave, then applying this to the figures in the article the conclusions (based on limited trials) would be:

- Using microwave ovens rather than a conventional fan-assisted electric oven would SAVE 23 million tonnes of carbon dioxide, equivalent to almost 21 million cars!
- Using microwave ovens rather than a conventional fan-assisted electric oven would SAVE 28 terawatt hours (TWh) of electricity per year! This is equivalent to the annual power generated by nine large gas power stations!
- Using microwave ovens rather than a conventional fan-assisted electric oven would SAVE 1719 kilowatt hours (KWh) over a lifetime of 8 years!

So, if you want to help the environment (and your pocket) with a reduction in energy use and reduction in carbon dioxide emissions then use your microwave instead of conventional fan-assisted hot air ovens (or gas and electric ovens for that matter)!

If you want to help reduce the energy and emission lifetime footprint of your microwave oven, then make it last longer! Much of the energy use of appliances actually comes from manufacturing and disposing of them when their useful life is over. Making your microwave last longer is relatively simple:

1. **Keep it clean inside** – especially the mica window where the microwave energy passes into the cavity. A dirty mica window (coated in grease, oil, burnt food deposits etc) stops some of the microwave energy passing into the cavity; this puts stress on the microwave generating components.
2. **Allow it to dry inside after use.** Rust is also a killer of microwave ovens. Drying the inside of the oven after use will reduce the risk of rust formation. Keeping it clean will also help this!
3. **Ensure the oven is well ventilated.** This allows moving air to cool the oven’s components. Overheating the oven components is a microwave killer! Don’t allow the oven to operate empty. This is sure way to shorten the life of your microwave oven.

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