

Briefing

Food and climate change

It is becoming increasingly clear that the food system has a major impact on climate change. This is not surprising considering how complicated it is to get food onto our plates.

Fields are sprayed with fertiliser, animals have to be fed and food is flown across the world to be processed in factories. The combined effects of all the stages of the food system mean that food and drink (and tobacco) are the single largest source of greenhouse gas emissions from consumption by UK households (1). But despite this there aren't any firm Government plans to reduce the climate impact of the food we eat.

The food industry also causes indirect greenhouse gas emissions. Most importantly it is the primary cause of global deforestation (2) which is responsible for more emissions than all transport worldwide (3). Even though our forests aren't the ones being cut down, the food we eat in the UK plays a part in this.

If both direct and indirect emissions are taken into account, including those from the food we import, over 30 per cent of the European Union's greenhouse gas emissions come from the food and drink sector (4).

Food is an indispensable part of our lives, but it is time to make sure that what is on our plates has as little impact on climate change as possible.

This briefing outlines the key areas of the food system that have an impact on climate change and briefly discusses their underlying causes.

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1. The impact of agriculture

Growing crops and rearing livestock have the largest impact on climate change of all the parts of the food system. If clearing forest to create farmland is included, agriculture is estimated to be responsible for nearly a third of global greenhouse gas emissions (5). The chart below illustrates just how important agriculture's role is.

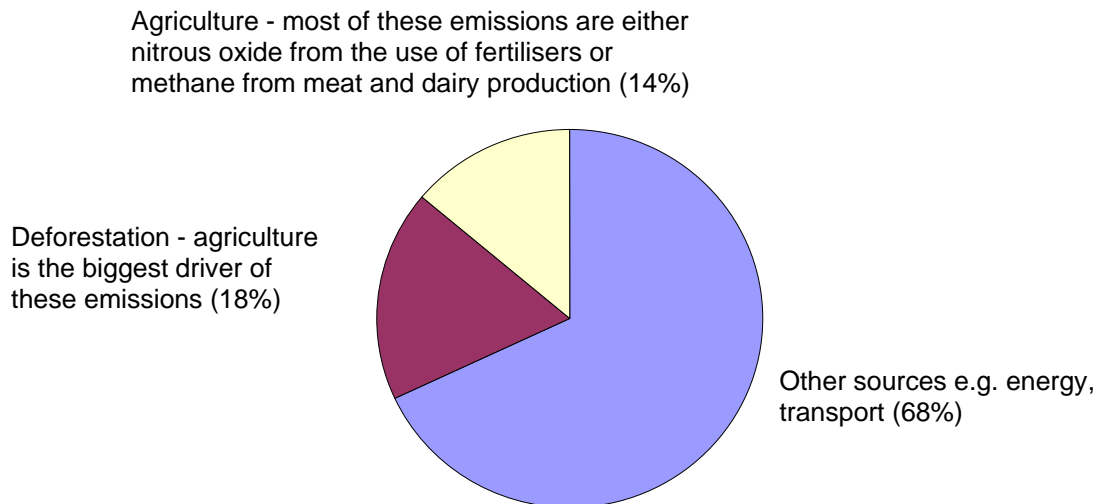


Chart 1 showing how much agriculture contributes to total global greenhouse gas emissions, based upon 2000 figures. Source: Greenhouse Gases and Where They Come From, WRI (3)

Apart from deforestation, the biggest causes of agricultural greenhouse gas emissions are the use of fertilisers (38 per cent) and rearing livestock (31 per cent), in the form of methane and nitrous oxide (2). Both of these gases are released in much smaller quantities than carbon dioxide, but they have a much greater global warming potential i.e. one tonne of nitrous oxide or methane would have a far greater impact on climate change than a tonne of carbon dioxide.

Taking this higher global warming potential into account, nitrous oxide from agriculture makes up about six per cent of global greenhouse gas emissions. The application of fertiliser is responsible for three quarters of this (3), with smaller amounts coming from the production of fertiliser and animal waste. Methane from agriculture, accounts for around 7 per cent of total global emissions. Because the majority of methane produced from agriculture is from livestock farming, this will be addressed in the next section.

Together, the production of nitrous oxide and methane by agricultural practices are thought to have roughly the same impact on climate change as the transport sector (3).

Emissions of both nitrous oxide and methane are predicted to rise dramatically – driven by further intensification of farming, increasing use of fertilizer and massive rises in livestock numbers. The human population is set to soar, and meat and dairy consumption in the developing world is rising towards the high levels that already exist in the developed world (2). This means more fertiliser, more animals and more emissions.

2. The impact of meat and dairy production

Meat and dairy production has a huge impact on climate change. It is estimated to be responsible for 18 per cent of global emissions (6). There are three main reasons for this:

- It is a major driver of deforestation to create pasture and to grow feed;
- Huge amounts of fertiliser is used to grow the animal feed;
- The animals themselves release high levels of greenhouse gases by enteric fermentation - i.e. belching and passing wind.

“A kilogram of beef is responsible for more greenhouse gas emissions and other pollution than driving for 3 hours while leaving all the lights on back home.”

New Scientist, 2007 (7)

With increased prosperity, people are consuming more meat and dairy products. Globally, meat production is set to more than double from 2001 to 2050, predominantly in the developing world as their diets become more like our own. One of the effects of this will be that more forest will be cleared to grow feed and provide pasture – activities already thought to be responsible for around 7% of global greenhouse gas emissions (6).

The production of meat and dairy is also responsible for the majority of agricultural methane emissions (5). And as meat consumption increases methane emissions from livestock are predicted to rise by up to 60 per cent by 2030 (6). The animals themselves release most of the methane by enteric fermentation during digestion, and the rest comes from the manure they produce. There are indications that as agricultural methods becomes more intensive, such as moving cows from fields to sheds, methane emissions from livestock usually increase too (8).

Livestock also accounts for over half of man-made nitrous oxide emissions (6). Intensification of livestock production is partly responsible for this. One of the major trends in livestock intensification is the use of animal feed instead of allowing animals to graze (8). Nitrous oxide is released by the fertiliser used to grow the feed, by the manure and urine produced by the animals, and from the storage of manure in intensive rearing systems. Intensive farming techniques increase emissions from all of these sources (6).

In contrast, one study has shown that organic beef production has the potential to produce over a third less greenhouse gas emissions than other rearing methods (9). Although some studies assessing the contribution of organic livestock to greenhouse gas emissions are contradictory, there is significant evidence that organic and more extensive livestock systems have lower emissions than more intensive conventional systems mostly due to lower use of concentrate feeds, lower stocking densities and reduced fertilizer use (10).

3. UK and Europe – what impact do our agricultural practices have?

Ten per cent of the European Union's greenhouse gases come from agricultural emissions of methane and nitrous oxide (11). This figure is slightly lower for the UK, but is still a significant proportion of our overall emissions.

In contrast to much of the rest of the world the actual quantities being emitted have fallen over the past 15 years (11), and levels are now stable.

A major reason for the reduction in nitrous oxide emissions is because of reduced use of nitrogenous fertiliser. However, we must remember that fertiliser is used when growing the crops and animal feed that we import from outside the EU. And studies have shown the crops we import from outside of Europe can have particularly large impacts on climate. For example, soya cultivation – a crop which is regularly used as animal feed in the EU – has been closely linked to rainforest clearance (12), and therefore makes up part of the emissions from deforestation shown in Chart 1.

The major reason for the drop in methane emissions is because of reduced emissions from landfill sites in the UK. But reduced livestock numbers have also contributed to this – fewer animals means less emissions. But despite this drop, a number of studies have shown that meat and dairy products are currently responsible for over half of total food chain greenhouse gas emissions in Europe (13,14).

Also, although livestock numbers have declined in the UK and Europe, consumption of meat and dairy products has not (11,15). This suggests that more of the meat and dairy we are consuming is coming from outside of the Europe. Our food is therefore partly responsible for increasing methane emissions overseas.

The meat and dairy we consume has an impact on climate change both within the UK and EU and beyond. When we eat a Lincolnshire sausage from a pig fed on Brazilian soya we're adding to greenhouse gas emissions in South America as well as our own. Therefore measures to tackle our livestock production and consumption can have far-reaching benefits as well.

4. Non-agricultural emissions from energy use in the food system

Producing and processing food uses a lot of energy - it accounts for around 14% of energy consumption by UK businesses (16).

If we look beyond greenhouse gas emissions from agriculture and deforestation, the food system continues to produce greenhouse gases during processing and manufacturing. Most of these emissions come from energy use. Using energy causes the release of the greenhouse gas carbon dioxide. This gas is emitted when fossil fuels are burnt to produce energy.

The chart below shows how much each stage of food production contributes to the **total energy** used – and therefore carbon dioxide emitted - by the food industry. This includes the energy used in our homes but not in transportation.

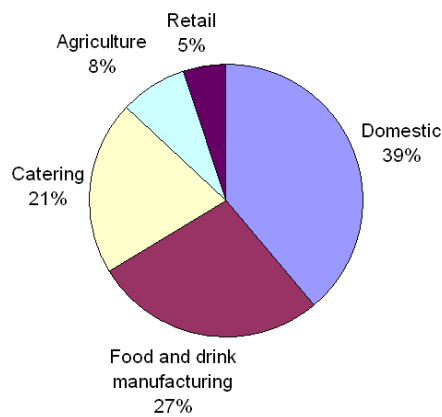


Chart 2 showing the proportion of primary energy used during the different stages of food production (excluding transportation) in the UK. Source: Food Industry Sustainability Strategy (16)

Changes in the way we cook and preserve our food can have a significant impact on emissions as a large proportion of emissions are from energy we use in our homes when cooking and refrigerating food. But the food and drink manufacturing, food retail and catering sectors are currently responsible for approximately 4% of the UK’s annual greenhouse gas emissions, so it is vital that industry plays its part too (17).

Food and drink manufacturing

In the UK, food, drink and tobacco manufacturers use more energy than is used in iron and steel production (18)

Food and drink manufacturers can help curb carbon dioxide emissions by reducing the amount of energy they use. So far food manufacturers are having mixed success at doing so. They have managed substantial cuts in energy use by improving efficiency, although some of their progress has been cancelled out by the drive to increase productivity (18). But they will still have to increase their efforts if they are to reach their carbon dioxide emission reduction targets – currently set at 20 per cent from 1990 levels by 2020 by the Government’s Food Industry Sustainability Strategy.

To achieve this it has been suggested that more research is needed to determine which areas of manufacturing are most wasteful, although some sectors such as meat and dairy processing have already been identified as using high amounts of energy (19). Some processed food such as ready-meals are also particularly damaging because they have to be cooked and cooled more than once, therefore adding to both the manufacturing and domestic emissions shown in Chart 2.

Food refrigeration

Refrigeration has been identified as an area where dramatic emission cuts could be made relatively easily, by using and maintaining energy-efficient equipment correctly (20). This would be an important step to make because food refrigeration is estimated to account for up to 3.5 per cent of the UK’s greenhouse gas emissions (21). One of the reasons for this being so high is the shift in our food culture and tastes.

For example, increased consumption of processed foods and chilled drinks has increased refrigeration needs. So too has our desire to eat large amounts of meat and dairy – the food products that require the most refrigeration throughout their lifecycle, and therefore generate the most carbon dioxide emissions through energy use.

Retail

The Government has identified that retailers could do much more to reduce the energy they use (18). And some retailers have much further to go than others.

Large, shed-like supermarkets tend not to be very energy-efficient. A survey by Sheffield Hallam University found that large superstores are the least energy efficient buildings in the retail/light industrial sector. Per square foot they are responsible for three times more carbon dioxide than greengrocers, and it would take more than sixty greengrocers to match the carbon dioxide emissions from a single average superstore (22).

Some supermarket chains are starting to tackle energy efficiency. However, they are still planning on expanding which will wipe out any overall emission cuts. For example, Friends of the Earth calculated in 2005 that energy-use resulting from Tesco's expansion is actually likely to outweigh its proposed energy saving measures (23).

Shops - and supermarkets in particular - are also responsible for a lot of the traffic on our roads, which also has an impact on climate change. This will be discussed in the next section.

5. Transportation

Food miles are now talked about by everyone from shoppers to retailers and the media. Crops and animals are shipped, driven and flown to factories, food is transported to shops and then we drive to the supermarket to buy it – but what impact does this actually have?

This is a tricky question to answer because of all the different stages of transportation. The range of journeys and vehicles involved mean that estimates of the impact are extremely varied: estimates of emissions range from 1.8 per cent of the UK's carbon dioxide (24), to at least 3.5 per cent of our total greenhouse gases (25). Although the current impact of food transport on climate change is low in comparison to other parts of the food system, the system is currently growing in a way that will increase food miles. It is therefore important that we curb this trend.

What is clear is that the food industry makes up a significant proportion of the UK's total transport emissions, as show by the following figures:

- Food transport accounts for one quarter of all heavy-goods vehicle miles in the UK (24).
- Around one in ten car journeys are for food shopping (26).
- Even though most of us could walk to the shops to buy basics like bread and milk, many of us don't. The food miles 'wasted' on unnecessary car journeys

are thought to be the equivalent of over half a million transatlantic flights a year (27).

- The average number of miles that our food travels has doubled in 30 years (24).
- Air freight is the fastest growing mode of food transport – it accounts for 11 per cent of the food industry's transport emissions despite only carrying 1 per cent of the food and making up just 0.1 per cent of the food miles (24). The rise in air freight is a symptom of increasing globalisation of agriculture, promoted by the world trade system – large-scale agricultural business gain strength, but local British farmers lose out.

The Government have identified some of the causes for the massive increase in food miles (24). First, food and feed is being imported and exported all over the world much more than ever before. The fact that fewer, larger companies are supplying is also contributing to the problem.

Changes in retail are also responsible. The rise of the supermarkets means that more food has to go through regional distribution centres, mainly travelling by heavy-goods vehicle. We have also changed our shopping patterns. We have gone from making frequent trips on foot to local shops to weekly car trips to out-of-town supermarkets, topped up by further car trips for essentials like bread and milk throughout the week.

The issue of food miles has implications other than greenhouse gas emissions. Wider social and development concerns play a part in our need and ability to reduce food miles. Organic and fair trade food is imported into the UK which can have positive benefits for farmers in developing countries that export these foods. But exporting food can have an impact on resources and food available for communities in those countries.

Farmers and the environment can benefit from relying on local and regional markets rather than on global markets where rules are not always fair and parameters not under their control. To ensure this we need fairer trade rules and national and international food policies that benefit developing countries and small farmers.ⁱ But we can all play our part by supporting our local shops, eating seasonal produce and buying local produce whenever possible.

6. Our vision – what needs to change?

The food system has a major impact on climate change at every stage of production, and this must be tackled. A lot of the solutions already exist – good livestock management techniques, organic farming and local food economies. But to reach our Government's goal of 60 per cent reductions in Greenhouse gases by 2050 further changes are needed. Relying on technological solutions alone is not enough because this often means that damaging activities are allowed to continue. Instead we need to confront the root causes of the food system's huge climate impact.

ⁱ For more information on Food and Trade rules see 'In Whose Hands?'
http://www.foe.co.uk/resource/briefing_notes/food_sovereignty.pdf

Addressing root causes would also provide us with a range of benefits for biodiversity, health, pollution and natural resource use. This would lead to a more sustainable, robust and dynamic food system where farmers benefit and receive a fair price for their produce, where local industries thrive all over the world and consumers are provided with healthier food and a better living environment.

So what would contribute to this change? Friends of the Earth is researching some of the above areas in detail in order to provide possible long term solutions and interventions needed by Government and Industry. But in the meantime there are some easy ways for everyone to do their bit.

Consumers can:

- Buy better quality meat – organic, locally produced, free range and from your local butcher. They're much more likely to be able to tell you where the meat is sourced from than the supermarket.
- Buy organically produced dairy products.
- Check where your food has come from – the further away, the less likely you are to be able to verify how it is produced. And it will have clocked up more food miles.
- Shop local! Local shops tend to be within walking distance, reducing car travel and helps local food producers survive.
- Seek out seasonal produce.
- Watch out for processed food such as ready meals, sauces etc. Buy fresh produce as much as possible.
- Try and buy foods with less packaging.
- Try and reduce food wastage – if you're not going to be able to eat a whole bag of apples, just buy a few.
- Change the balance of what you eat. Generally, eating lower down in the food chain has less climate impacts i.e. more cereals and vegetables and less meat and dairy.
- Accept more variability in the appearance of your food. Imperfectly round tomatoes can still taste perfect!
- Write to your supermarket asking them to stop sourcing meat that uses GM and imported animal feed.

We can urge the **Government** to:

- Put in place changes needed to address the emissions of methane and nitrous oxide in the Government's Climate Change Bill.
- Halt and reverse the trend towards more intensive rearing of livestock by promoting organic and extensive farming systems, which limit intensive inputs like inorganic fertilizer and intensively produced animal feed.
- Identify sustainability criteria and regulate areas of UK consumption of food products that have a high impact on deforestation such as animal feed and soy.
- Promote better quality meat with adequate, transparent and informative labelling.
- Support planning laws that promote diversity in the food system and enable local communities to choose local shops and produce.
- Support national and international agricultural and food policies that prioritise local economies and markets.
- Ensure that the all new Common Agricultural policy (CAP) subsidies favour healthy and ecologically sustainable production.

- Put in place regulations and policies that go beyond current energy efficiency targets in the food industry and enable small food businesses to tackle their carbon emissions – such as providing green energy sources and on site generation.
- Encourage investment in efficient refrigeration technologies and widespread uptake of best available technology.
- Promote local food economies by encouraging local farmers markets, shops and box schemes.
- Establish independent regulators that ensure high standards of ethical and environmental practise from large food businesses.
- Regulate the monopoly control of big supermarket chains that promote centralised sourcing and global procurement and over reliance of consumers on cheap food produced to low environmental standards.

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