

For the latest news and more information, please see our website

Sustainable Blewbury news

Annual General Meeting

Monday, 23 April at Winding Way Cottage, South Street, 8.00 pm

We will summarise our activities in the past year and elect officers, followed by informal discussion and refreshments. Please join us if you'd like to find out more about what we are doing – everyone will be very welcome.

Blewbury Garden Market

Our ninth season will start on **Saturday, 12th May at Blewbury Garage** and will run every Saturday morning from **9.30 to 11.30 am** (unless we sell out earlier).

Note that on **19th May**, to mark the Royal Wedding and FA Cup Final, we'll have special cakes and other items for sale. The stall buys and sells fresh, local garden fruit and vegetable, flowers, bedding plants and seedlings, home-made bread, cakes and preserves, and (hopefully) local honey and free-range eggs. Producers please bring items to sell from 9.15 am. For more information and sales forms see:

www.sustainable-blewbury.org.uk/food.htm, or email us at bgm@sustainable-blewbury.org.uk.



25th Anniversary Celebration!

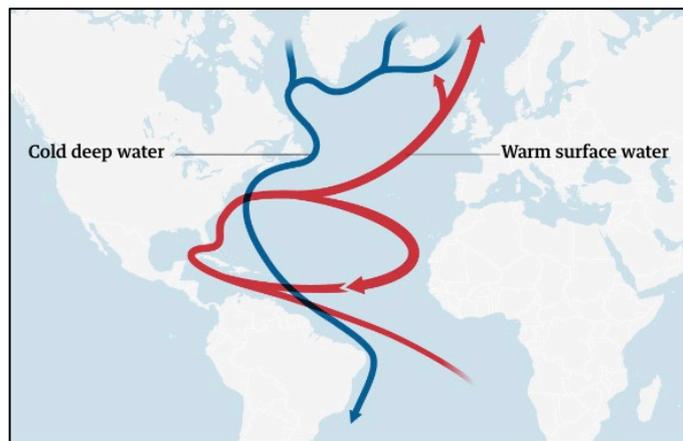
Sustainable Blewbury has a big anniversary this year. In 1993, the Blewbury Village Society started an Environment Group because of an increasing interest in the appearance of the village and its environment. This interest widened under Mike Edmunds' chairmanship, and the Environment Group evolved into Sustainable Blewbury in 2009, becoming independent of the BVS in 2012.

We are planning a celebration event on September 30th. If you have any memories or stories about the early days of the Environment Group we would like to hear from you. Please email info@sustainable-blewbury.org.uk or ring Jo Lakeland on 850490.

Interesting web links

- **Electric cars:** The government often announces admirable aims, but then sets target dates very far in the future. For example, ending sales of new cars with petrol and diesel engines by 2040. Why can't this be done sooner? The National Grid says it can have infrastructure in place to deal with a huge increase in electric cars by 2030 rather than 2040. See bit.ly/2I4ZX00.

- **Climate change could make us much colder, not warmer:** North-western Europe is kept relatively warm by the Gulf Stream, a warm-water current in the Atlantic Ocean that is part of a large and complex system of currents. The UK, for example, is as far north as northern Canada, and without the Gulf Stream we would have a very cold climate. The Gulf Stream has turned off in the past, and climate change could disrupt the currents in the Atlantic and do that again. There is now evidence that the currents are weakening, due to ice melting surprisingly quickly in Greenland, and scientists are concerned that this could turn off the Gulf Stream as well as causing big changes elsewhere. See bit.ly/2GRjLUx and bit.ly/2IRVKxo.



Reducing our use of plastics

By Jo Lakeland

Plastics are featuring heavily in the news, as they should, but we must not lose sight of the fact that the most important thing to do to reduce plastic pollution is to REFUSE single-use plastic, and if we do use plastic then we should REDUCE the amount we use, REUSE it *if it is safe to do so*, and RECYCLE it *if this is possible*.

Top tips for reducing our plastic footprint

These are taken largely from Abingdon Carbon Cutters' excellent Eco-Action Newsletter: bit.ly/2HNoyHU. This includes a very useful and detailed table showing what goes into which rubbish bin, including some information about plastics.

REFUSE

Plastic straws, plastic bags, single-serving plastic sachets; excess packaging on fruit and vegetables – buy them loose; ready meals – make food from scratch; tea bags (they contain plastic) – go back to using loose tea or find plastic-free ones; liquid soap – use a bar of soap and a soap saver (Soap in the Air magnetic hanging bar soap-saver).



REDUCE

Fairphone have created the world's first ethical, modular smart phone, built to last: www.fairphone.com.

Natracare sanitary products are biodegradable, organic & natural. Plastic, perfume and chlorine free. Take your own bags to buy bread, vegetables and fruit from the market or local shops, where products are sold loose or without plastic packaging.

REUSE

Refillable water bottles: Oxfam sell good ones, but the safest ones to use long-term are aluminium.

Reusable coffee mugs: Some coffee shops, e.g. Costa, give you a discount for bringing your own take-away mug.

A sandwich box for your packed lunch or sandwiches.

Use old milk containers, tops cut off and holes in base, as tomato seedling pots, or make one small hole in the handle and 5 to 10 in the screw-on lid to use as a watering can that won't drown seeds or seedlings (ideal for children).

Empty plastic bottles with bases removed as cloches to protect tender new plants from cold and slugs.

Experiment – take your own food and detergent containers to shops where you would normally have your purchase in a plastic container or bag:

e.g. Lush products, food from a supermarket delicatessen, butchers, bakers.

“Researchers make plastic-eating mutant enzyme better...”

From a hopeful article in the Guardian on April 17th: An enzyme that broke down plastic (PET – polyethylene terephthalate) drink bottles was discovered in a Japanese waste dump in 2016. An international team tweaked the enzyme to try to find out how it had evolved, and inadvertently made it work much faster. About 1 million PET drinks bottles are sold around the globe every *minute*, and only 14% are recycled. This is a story worth following! Local interest note: the detailed molecular structure of the enzyme was worked out using the Diamond Light Source, at the Harwell Campus. See bit.ly/2HCCZOX.

Untangling air pollution

By Eric Eisenhandler

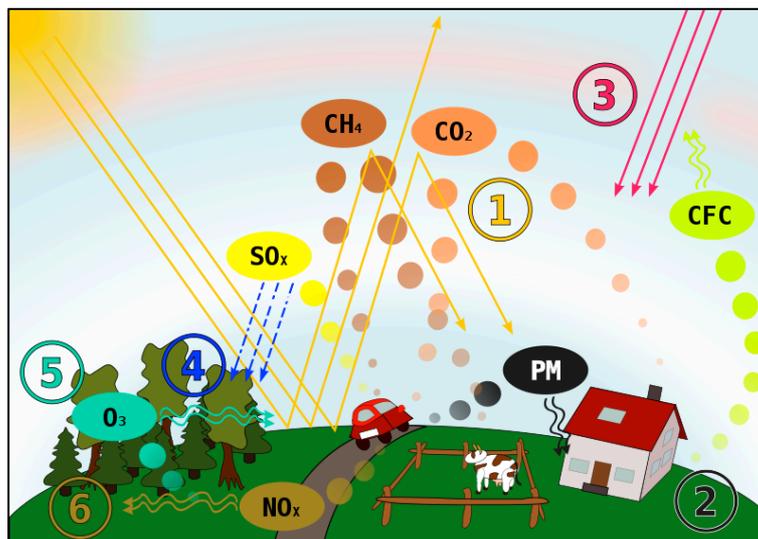
Introduction

Air pollution has been in the news a great deal, partly triggered by the unexpected effects of a big increase in the number of diesel-powered cars in Europe and the scandal, revealed in 2015, of diesels evading the emissions regulations. But air pollution takes in a very wide variety of problems, and much of the news coverage confusingly mixes different types of pollution and their effects. In this article I'll try to remedy that.

In the UK, many cities and large towns are frequently above both legal and recommended levels of air pollution, which causes or exacerbates diseases such as asthma, lung disease, stroke and heart disease. That can't be ignored, even though many places in other countries have even worse pollution problems.

Air pollution tends to affect the elderly, the young, people already ill, and the poor. The World Health Organisation estimates that air pollution causes the premature deaths of about 7 million people worldwide per year. For the UK, the widely publicised estimate from the Royal College of Physicians is 40,000 premature deaths per year. However, these estimates are not actual counts – death certificates do not give air pollution as a cause. So these are very approximate statistical estimates, and the numbers may actually be much lower or much higher. Also, 'premature' means that although some of the deaths are due to healthy people developing conditions directly as a result of air pollution, many of the people affected were already ill or weak and their condition was worsened by air pollution. This is not to minimise such a serious problem, but rather to understand the uncertainties.

The diagram below illustrates some of the main types of air pollution and their effects:



(By chris 論 CC Share-alike license 3.0 via Wikimedia Commons)

1. Carbon dioxide and methane cause global warming and climate change
2. Particulates, including soot, affect respiratory systems
3. CFCs destroy the ozone layer, removing protection from the sun's ultraviolet radiation
4. Sulphur dioxide causes acid rain
5. Ground-level ozone affects respiratory systems
6. Nitrogen oxides affect respiratory systems

Particulates

Particulate matter (PM) is a complex mixture of dust, dirt, soot and smoke in the air. Some of it is natural, from volcanoes and dust storms. But the main concern is particles small enough to inhale, from burning fossil fuels and biomass, in vehicles, power stations, heating systems and industrial processes. High levels of such particles in the air are linked to health hazards such as heart disease and lung cancer, and are harmful to people already suffering from conditions like asthma.

Particulates are usually monitored by measuring the amounts in the air of PM10, which means particles less than 10 microns in diameter, and PM2.5, less than 2.5 microns in diameter. (A micron is a thousandth of a millimetre; for comparison human hairs are about 50–70 microns in diameter.)

A notorious example of this sort of pollution was the London Great Smog. In December 1952, cold fog was trapped over London by an inversion layer of cold air. Most heating at the time used open coal fires, and due to the cold the amount of coal smoke and dirt increased dramatically, along with other pollutants such as nitrogen oxides, sulphur oxides and ozone. The problem was worsened by use of low-quality, high-sulphur coal for home heating. The 'fog' was so thick that driving became difficult, transport was delayed and the city was virtually shut down. During that four-day period at least 4,000 people died as a result of the pollution. The Clean Air Act of 1956 and later acts cleaned up the UK's urban air, but many other cities (Delhi is one example) currently have similar pollution problems.



Nelson's Column, Dec. 1952
(CC Share-alike license 2.0)

A current, major source of particulates is soot from unburnt fuel emitted by diesel engines, especially older ones. Clouds of black smoke from diesel engines used to be widespread in the UK, and was often far worse in poorer countries due to old engine designs, bad fuel and poor maintenance. In Europe, recent diesel engines are fitted with particulate filters, satisfying the Euro 5 standard that became mandatory in 2009. These filters largely eliminate diesel particulate pollution, although there are some problems. The filters can clog if the vehicle is used for frequent short runs starting with a cold engine combined with too few longer runs, and some owners remove the filters (illegally) to improve engine performance. But on the whole the filters seem to work.

Logically, burning wood for heating ought to help with climate change, since trees absorb carbon dioxide from the air to compensate for carbon emissions when they are burned. Wood-fired heating boilers don't emit a lot of particulates, but log stoves and especially open fires do. A 2016 government survey found that 7.5% of UK homes burned wood, and 2.3% used no other heating. However, that produced about 30% of UK particulate emissions.

Nitrogen oxides

Nitrogen has several oxides, jointly referred to as NO_x. Nitrogen oxides, particularly nitrogen dioxide (NO₂), are emitted in particularly large amounts by the high temperature combustion of diesel engines. Nitrogen dioxide is a reddish-brown, toxic gas that has a characteristic sharp, biting odour and can often be seen as a brown haze above cities. These gases contribute to the formation of ground-level ozone, photochemical smog and acid rain (see below).



VW Golf 'clean diesel'
(Mario Roberto Duran Ortiz, CC Share-alike license 3.0)

In the UK, NO_x is now believed to cause more than half the premature deaths from air pollution: strokes, heart disease, lung cancer and other lung disease.

Especially in Europe, in the years leading up to 2015 people were encouraged (often by generous tax breaks) to buy diesel cars. This was because diesel engine fuel consumption is as much as 30–40% less than comparable petrol engines, and this means that carbon dioxide emissions (the main cause of climate change) are lower. At the same time, although diesels were known to emit far more NO_x and particulates than petrol, the EU pollution regulations were tightening up and new 'clean', high-tech diesel engines were to add particulate filters (see above) and by Euro 6 in 2014 emit only slightly more NO_x than petrol engines. Sales of diesels took off, for example reaching more than half the new cars in the UK.

But something was wrong. Despite the 'cleaner' engines, levels of NO_x pollution in cities and towns kept increasing. To make matters worse, work to study the health effects of NO_x showed that they were much more serious than previously believed.

In the autumn of 2015 the Volkswagen diesel scandal was revealed, soon followed by data showing that in real-world operation virtually all diesel cars emitted many times more NO_x than permitted by the EU regulations.

The problem was that the car manufacturers had found legal ways to set up their test cars so they could pass the EU emissions test even though in real conditions they weren't even close to acceptable. They could do that because the EU tests for NO_x emissions were very artificial: done in a laboratory, at an ambient temperature of 20°C (hardly typical of most of Europe for much of the year), and using a test cycle that was not at all realistic.

But Volkswagen had gone one step further. Wanting to sell a lot of 'clean' diesels in the US, which has both tighter requirements and more realistic tests, they set up the car's management software to detect the characteristics of a test (e.g. steering wheel not moving) and alter the engine performance so it would pass, with performance that would not be desirable in actual use.

The cars affected were mainly of the Euro 5 and early Euro 6 generations. In the EU, from September 2017 all new car models, and from September 2019 all cars on sale, must comply with a new and more realistic testing regime. This is still not perfect – the test procedures have been diluted by the manufacturers lobbying – but it's a step in the right direction.

It is certainly possible to build diesel cars that really do conform to Euro 6 in actual use, and some cars do seem to achieve that now. The technology dealing with NO_x emissions is more expensive and complex, but it is already used in lorries and buses, which have always had to pass more realistic tests for the same limits.

Photochemical smog and ground-level ozone

The word 'smog' comes from a combination of smoke and fog. Originally it referred to 'pea soup' fog, such as in London (see above). That has partially changed – 'modern' smog, as found for example in Los Angeles, is caused by nitrogen oxides, carbon monoxide (emitted in surprisingly large amounts by some petrol engines) and volatile organic compounds from vehicular emissions and industrial fumes that react in the atmosphere with sunlight to form other pollutants including 'ground-level' ozone, other nitrogen oxides and airborne particles. The smog is exacerbated by atmospheric inversions that trap the pollution close to the ground.



Beijing after rain, and on a 'sunny' day
(Bobak: CC Share alike 2.5 Generic license)

In the UK, photochemical smog often forms in sunny weather, building up day by day when the weather is relatively windless and stable. It is mainly caused by vehicular emissions and is not limited to urban areas.

Ground-level ozone, sulphur dioxide (see below), nitrogen dioxide and carbon monoxide are especially harmful for children, the elderly, and people with conditions such as emphysema, bronchitis and asthma. Hospital admissions and respiratory deaths often increase during periods when ozone levels are high.

Sulphur dioxide

Sulphur dioxide is emitted by volcanoes and in some industrial processes. It is also created when coal or petroleum containing sulphur is burned, for example by vehicles, ships and power stations. Once emitted, it is converted to sulphuric acid and causes acid rain. Acid rain damages forests, soils, and lakes and rivers, killing insect and aquatic life. It also causes paint to peel, corrodes steel structures and weathers stone.

That's why the fuel you put in your car is now low in sulphur. Industrial smoke can be cleaned of sulphur dioxide, but the cost is high. Ships still use



Didcot A (coal-fired) power station, shown before
Didcot B (gas fired) was built.
(Dave Price: CC Share-alike license 2.0)

high-sulphur fuels as shipping is very lightly regulated for emissions of various pollutants, not only sulphur dioxide but also nitrogen oxides and carbon dioxide.

Didcot A power station was closed because it had reached its EU limit of permitted sulphur dioxide emissions, and the operator did not think retro-fitting equipment to clean up its sulphur dioxide emissions would be cost effective. (While it was operating, its high chimney meant that the acid rain produced by Didcot A fell in Scandinavia rather than the UK. They were not happy about that.

Chlorofluorocarbons

Chlorofluorocarbons (CFCs) used to be widely used in refrigeration, air conditioners and aerosol spray cans. When released they rose up in the atmosphere. In the 1970s it became clear that CFCs were starting to destroy the ozone layer, high in the Earth's atmosphere. Ozone is a form of oxygen with three, rather than the usual two, atoms per molecule. The ozone layer absorbs most of the harmful ultraviolet (UV) radiation from the sun. At low levels UV causes sunburn and skin cancer as well as damaging eyesight and at higher levels it damages life.

The 1986 Montreal Protocol effectively banned the use of CFCs. It has been signed by all 197 of the world's countries, and there is now evidence that the ozone layer, and particularly the Antarctic hole in the ozone layer that was the most serious damage, is slowly recovering.

Carbon dioxide, methane and other greenhouse gases

Greenhouse gases (most notably carbon dioxide) were already in the atmosphere long before humans appeared and are crucial for life on earth. Without them the global average temperature would be about -18°C rather than $+14^{\circ}\text{C}$, and in addition carbon dioxide is necessary for plant life. But in the past few years, massive emissions of carbon dioxide and methane by humans have significantly increased the amounts of greenhouse gases and are causing climate change due to global warming. Unless greenhouse gas emissions are reduced to zero quite rapidly the likely outcome will be a variety of serious problems for human civilisation.

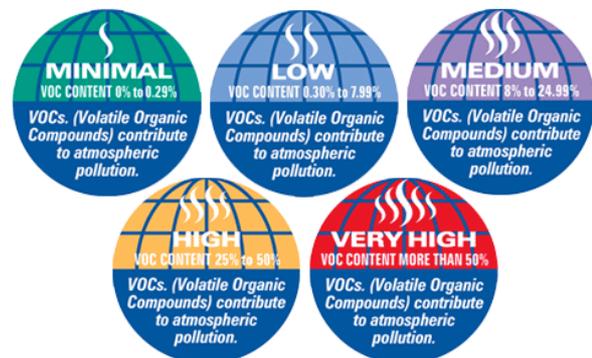
Some other pollutants

Some **volatile organic compounds (VOCs)** can lead to additional methane, a potent greenhouse gas, in the atmosphere. Vapour from others, such as benzene, toluene and xylene are suspected of causing cancers.

Toxic metals, notably **lead** and **mercury**, are hazardous if released into the atmosphere. **Lead** compounds used to be added to petrol in order to improve its performance, but the lead caused many health problems and lead in petrol is now widely banned, though not everywhere.

Mercury from burning some fuels and from mining is released into the air, causing widespread pollution. Eventually washed by rain, it builds up in fish and shellfish – eating these results in most human exposure to mercury. In humans, mercury damages the nervous system in many ways.

Pollution from **radioactive materials** can also be a problem. In the past, radioactive isotopes were spread worldwide by the testing of nuclear weapons in the atmosphere, which is now banned. Accidents at nuclear power stations, most notably Chernobyl, spread low-level radioactivity over much of Europe. In areas where the rock contains some uranium or thorium, one step in their radioactive decay chain is the radioactive gas radon. Although the concentrations are very low, inhaling radon over long periods can cause lung cancer.



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***We have a substantial programme of activities in and around the village.
Getting involved is fun and can make a very positive contribution to village life and local environment. If you'd like to get involved in what we do, or to receive our free Newsletter, email us at info@sustainable-blewbury.org.uk or phone John Ogden at 01235 850372.***