

Black Carbon Campaign Briefing Sheet 3

Reducing UK Black Carbon Emissions

A guide to the main UK sources of black carbon, and technical and policy measures that can be used to cut emissions



What Are The Main UK Sources of Black Carbon?

The main source of UK black carbon emissions is diesel engines. These engines are used to power cars, trucks and buses, as well as equipment such as agricultural machinery, construction equipment and generators. Diesel engines are the pre-eminent source of black carbon for two main reasons:

There are a huge amount of diesel vehicles and other equipment in the use in the UK. Many of these are relatively old and therefore have high emissions of particulate matter and black carbon

Particulate matter from diesel exhaust is relatively high in black carbon when compared to particulate matter from other sources

Diesel engines are also the biggest source of black carbon in most other developed countries. In developing countries other sources may be more important, such as residential coal burning and heavy industry.

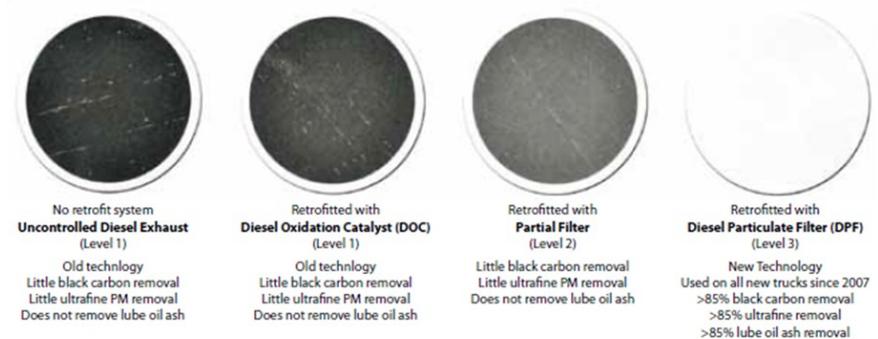
Can Black Carbon Emissions From Diesel Engines be Reduced?

Modern diesel engines emit far less particulate matter and black carbon than older models. They achieve this by carefully controlling combustion in the engine and by filtering the exhaust gases before they exit the exhaust pipe.

For several years now diesel vehicles and equipment have been constructed to meet emission limits set by the European Union. For vehicles these are known as 'Euro Standards' whilst for non road diesel equipment they are known as 'Non Road Mobile Machinery' standards. They both set legal limits on the quantity of several pollutants that can be emitted, including particulate matter. The standards have become increasingly strict over time and the technology used to meet them has advanced to ensure ever lower emissions.

Effectiveness of different types of diesel particulate matter abatement technologies

Source—Integrated Assessment of Black Carbon and Tropospheric Ozone, United Nations Environment Programme 2011



Some of the largest emission reductions are obtained using diesel particle filters on high emitting vehicles. The exhibits above are actual particulate matter (PM) collection samples from an engine testing laboratory (International Council of Clean Transportation (ICCT)).

Emissions limits are set for particulate matter, not for black carbon, and the technology used on older diesel vehicles and equipment can be largely ineffective in removing black carbon. The 'gold standard' for black carbon emission reduction is a full diesel particulate filter, which removes the majority of black carbon emissions from the exhaust over a wide range of engine operating conditions. This is shown in the diagram above.

Newly manufactured diesel vehicles and equipment are now required to have a filter as standard. However, this is a relatively recent requirement - new diesel buses and lorries have needed a filter since 2006 and cars since 2011. Similar requirements for new diesel powered non-road equipment are only entering into force now. As filter requirements are relatively new, and vehicles and equipment commonly have lifespans of 10 to 20 years, there are a huge number of unfiltered diesel engines in use that will be with us for some time to come.

Emissions from existing diesel engines can, however, be drastically cut by fitting additional equipment into the exhaust system in a process known as 'retrofit'. For particulate matter emissions this commonly involves fitting a full diesel particulate filter. These can cut emissions to the same level as newly manufactured vehicles and equipment.

How Can Operators of Diesel Vehicles and Equipment be Encouraged to Retrofit?

Retrofit can cost several thousand pounds, and operators of diesel vehicles and equipment normally need to be incentivised to make the investment. Encouragements to retrofit generally involve 'stick' or 'carrot' measures, or better still a combination of the two.

'Carrot' measures common involve tax breaks for retrofitted vehicles and equipment and/ or grants from central or local Government to cover the full or partial cost of retrofit. 'Stick' measures generally involve excluding high emission vehicles or equipment from a geographical area or from being used for certain activities. Examples of how this can be achieved include Low Emission Zones and planning conditions.

A *Low Emission Zone* is an area where only vehicles that meet ascertain emission standard are allowed to enter. Vehicles caught driving in the zone that do not meet the emission standard are typically punished with a large fine. In the UK the biggest Low Emission Zone covers all of Greater London and sets particulate matter standards for larger vehicles entering the city. In London compliance is monitored using automatic number plate recognition cameras, however in several other countries enforcement is carried out by traffic wardens.

New developments can be subject to *planning conditions* set by the local planning authority. These may set emission limits on vehicles and equipment used on construction sites or, if the

development in question is a commercial one, the type of vehicles allowed to be used at the finished development (for example lorries delivering supplies to a supermarket). Typically these conditions will specify a minimum emissions standard for vehicles (or a percentage of vehicles) accessing the site and/or filter requirements for construction equipment.

What About Other Sources of Black Carbon?

Diesel engines are not the only source of black carbon emissions. Other, smaller sources include electricity generation and boilers used in industry, homes and commercial premises. Whilst these are sources are less significant than diesel engines it is still important that they are addressed. Technical measures that can reduce emissions include:

- Energy efficiency – using less energy generally results in lower emissions
- Fuel substitution – changing the fuel used can reduce emissions, for example if solid fuels are replaced by natural gas black carbon emissions will generally fall
- Retrofit equipment – filters and other equipment can be added to chimney stacks to cut emissions

More Information

More information about emission standards can be found at :

www.dieselnet.com/standards/

Details of UK and European Low Emission Zones can be found at:

<http://lowemissionzones.eu/>

About The Black Carbon Campaign



The Black Carbon Campaign is raising awareness of the need to reduce black carbon emissions to help achieve rapid climate change mitigation and slow the rate of Arctic melting. In the UK it is headed by the NGO ClientEarth and forms part of the wider European Soot Free for the Climate alliance.

www.clientearth.org