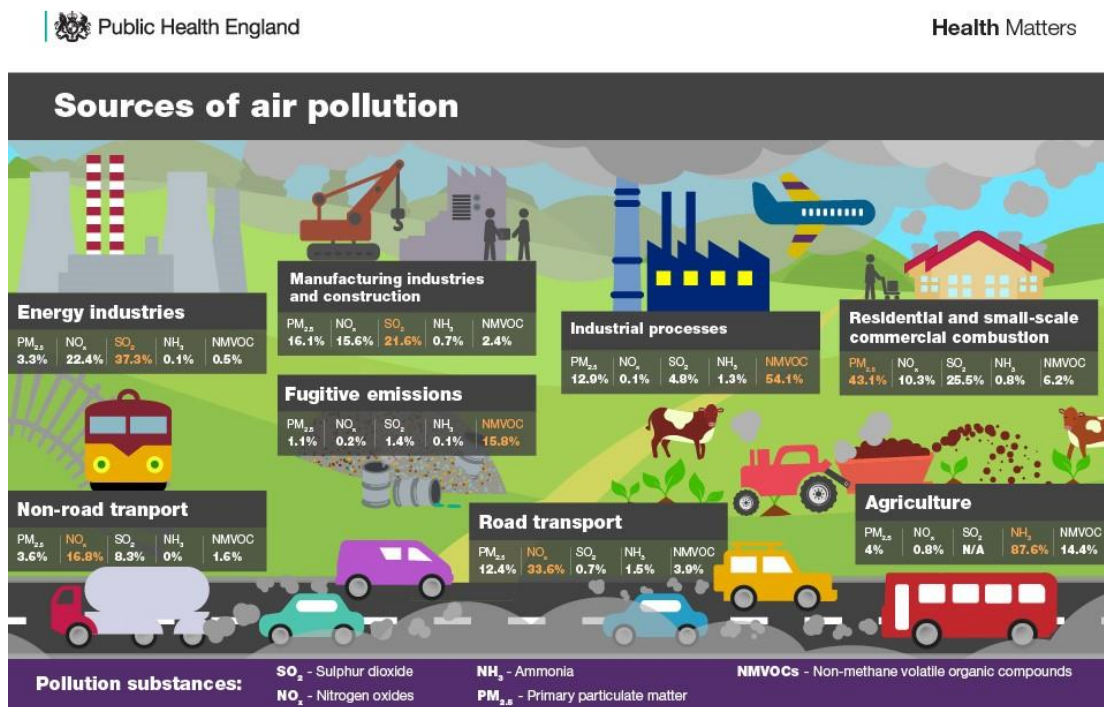


Catalytic After-Treatment in More Detail:

Many industrial facilities release emissions as a by-product of their activities: power plants, concrete manufacture, mineral processing, refineries, and the incineration of waste. Each industry creates different emissions as a result of chemical reactions that take place during their activities. The extent to which this pollution is permitted varies regionally depending on local and national governments - and the willingness of industry to tackle the issue. There is also the added problem of “trans-boundary” pollution where emissions travel far away from their source, even across oceans. This requires international co-operation in order to mitigate.

We are all aware that chemicals such as nitrogen oxides, mercury, methane and ammonia (amongst many others) are harmful, yet do not realise the vast quantities of pollutants that are *legally* allowed to be released into the atmosphere - harming humans and the environment. And most people also know our vehicles contain a “catalytic converter” in the exhaust system to remove harmful gases like Nitrogen Oxides (NOx) Carbon Monoxide. Our towns and cities are much healthier as a result of governmental regulation of vehicle emissions over the past 50 years, yet many non-vehicular industries remain much less regulated. This diagram from the UK government shows the various sources of emissions and the main pollutants. At accessa we focus on large *stationary* sources of emissions such as power plants, factories and waste incineration. In fact, transportation only represents 15% of global greenhouses gases*.



Our partner companies provide industrial-scale catalytic treatments for dozens of different types of facility, and they work in a similar way to vehicle catalysts: filtering or neutralising harmful emissions. A variety of solutions is available depending on the chemical composition of the emissions. And, for some of our industrial and household waste, the best option is to recover the energy they contain is by incineration in a modern Energy-from-Waste plant. More and more industries also look to capture carbon from their emissions.

Scrubbing CO₂ from an off-gas first demands a very low level of other contaminants in the gas *before* you can remove the CO₂. Our technologies can help to reduce particulates or NOx to a safe level that then allows carbon capture to take place.

There are three main types of catalytic after-treatment depending on the industry:

Selective Catalytic Reduction SCR:

Selective Catalytic Reduction is used to reduce emissions from power generation – from facilities such as coal-fired power plants, gas turbines, diesel engines, and waste/biomass incinerators. SCR can neutralise over 90% of its target pollutants, acidic nitrogen oxides (NOx) and helps control mercury emissions. In an SCR system, the exhaust gas is mixed with ammonia and this then passes through a catalyst honeycomb structure which allows the harmful emissions to be neutralised before they are released into the air.

Oxidation Catalysts:

This is the most versatile form of mitigation as it can be used in all stationary industrial processes (see the chart <https://accessa.uk/industries>). It is the most similar process to that used in car exhausts and usually involves no moving parts. The gases are passed through complex honeycombs/matrixes of specially formatted precious metals or ceramics causing a natural reaction which neutralises the harmful chemicals.

Catalytic Particulate Filters CPF:

Catalytic Particulate Filters are used to mitigate harmful gases created at waste incineration, cement plants, and biomass fired boilers by as much as 95% or more. Catalytic filter bags are installed in 'baghouses' to convert toxic or hazardous components such as dioxins, volatile organic compounds, and nitrogen oxides from waste gas streams into harmless substances. The filter bags are composed of an outer microporous membrane which captures fine particles and an inner felt/fabric liner infused with a catalyst which neutralises harmful emissions as they pass through the bag.

Example of CPF in Waste Incineration:

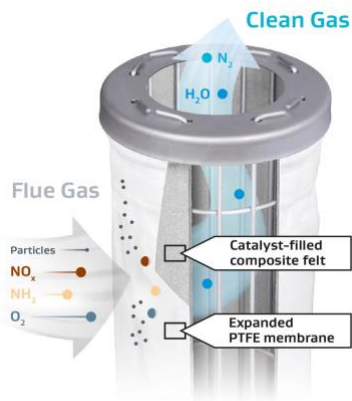


Catalytically active filter bags are placed in 'baghouses'. It is a relatively simple process yet represents decades of research and development. Starting with the development of Polytetrafluoroethylene (PTFE), also known as Teflon® in 1938. It is now the key component of Gore-Tex® clothing.

That same fibre technology is now used by accessa partner Gore to create highly efficient industrial filter bags made of expanded ePTFE. They not only capture the finest particulates but also include an inner layer of catalyst-infused felt fabric that almost completely destroys harmful pollutants like Dioxins or Nitrogen Oxides...

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A Catalyst for Clean Air



The ePTFE membrane is so incredibly fine that virtually all harmful particulates are captured as the emissions pass through the bags on their way to the chimney.

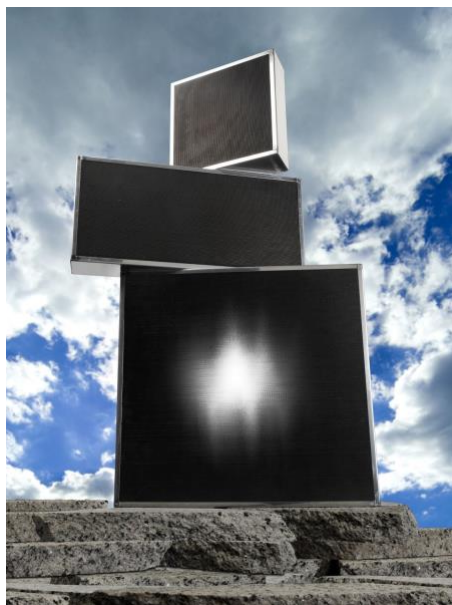
In France, for example, the government offers tax incentives for facilities to install such systems - meaning the cost (as well as the emissions) is totally mitigated. The actual savings to the environment, human health and quality of life is of course exponentially more. Filter bags can also be used in waste-to-energy generation; chemical and metal processing; and cement manufacture. You can read how this works and the results in more detail [HERE](#).

Technical Case Studies for Each of our Partner Companies:

- <https://www.clariant.com/en/Business-Units/Catalysts/Emissions-Control-Catalysts>
- <https://matthey.com/products-and-markets/other-markets/stationary-emissions-control>
- <https://fcs.umicore.com/en/stationary-catalysts/>
- <https://www.gore.com/products/filter-bags-for-waste-to-energy-industry>

*Source: <https://www.climatecentral.org/climate-matters/peak-co2-heat-trapping-emissions>

Oxidation Catalyst Example:



SCR Example:

