Abbreviations and glossary

Abbreviations

AC10  The ten Accession Member States that joined the EU in May 2004
ADMS  Atmospheric Dispersion Modelling System
AMS   Aerosol mass spectrometer
APEG  Airborne Particles Expert Group
APHEA Air Pollution and Health, a European Approach
AQEG  Air Quality Expert Group
AQMA  Air quality management area
AQS   Air Quality Strategy
ATOFMS Aerosol time-of-flight mass spectrometer
AURN  Automatic Urban and Rural Network (air quality monitoring)
BAM   Met One Beta Attenuation Monitor or BAM 1020
BaP   Benzo(a)pyrene
BAT   Best available techniques
BATNEEC Best available techniques not entailing excessive cost
BS    Black smoke
BSI   British Standards Institute
BST   British Summer Time
CAFE  Clean Air For Europe
CALINE California Line Source Model
CAP   Common Agricultural Policy
CCGT  Combined cycle gas turbines
CCS   Congestion Charging Scheme
CEH   Centre for Ecology and Hydrology
CEN   European Committee for Standardisation
CEPMEIP Coordinated European Programme on Particulate Matter Emission Inventories, Projections and Guidance
CERC  Cambridge Environmental Research Consultants
CI    Confidence interval
CL    Confidence limit
CLRTAP Convention on long-range transboundary air pollution
CNG   Compressed natural gas
CO    Carbon monoxide
CO₂   Carbon dioxide
COMEAP Committee on the Medical Effects of Air Pollutants
COPERT III Computer Programme to Calculate Emissions from Road Transport (version III)
CORINAIR The air emissions section of CORINE
CORINE CoOoRdination d’Information Environmentale
CPC   Condensation particle counter
CRT   Continuously regenerating traps
CVS   Constant volume sampler
DA    Devolved Administration
DAPPLE Dispersion of Air Pollution and Penetration into the Local Environment
Defra Department for Environment, Food and Rural Affairs
DfT    Department for Transport
DL    Detection limit
DMA   Differential mobility analyser
DMPS  Differential mobility particle sizer
DMRB  Design Manual for Roads and Bridges
DMS  Dimethyl sulphide
DPF  Diesel particulate filter
DTI  Department for Trade and Industry
EA  Environment Agency
EAF  Electric Arc Furnace
EC  European Community
EEA  European Environment Agency
EFTA4  European Fair Trade Agreement countries
ELR  European load response
EMEP  Cooperative Programme for Monitoring and Evaluation of the Long-Range Transmission of Air Pollutants in Europe
EPAQS  Expert Panel on Air Quality Standards
EPEFE  European Programme on Emissions, Fuels and Engine technologies
EPER  European Pollutant Emissions Register
EPSRC  Engineering and Physical Sciences Research Council
ERG  Environmental Research Group, King's College London
ESI  Electricity supply industry
ESP  Electrostatic precipitators
ETC-ACC  European Topic Centre on Air and Climate Change
EU  European Union
EU15  The 15 countries that were members of the European Union before May 2004
FAS  Free acceleration smoke
FDMS  Filter dynamics measurement system
FGD  Flue gas desulphurisation
FRAME  Fine Resolution Atmospheric Multi-pollutant Exchange
GDI  Gasoline direct injection
GIA  Global irradiation amount
GIS  Geographical information system
GLA  Greater London Authority
GMT  Greenwich Mean Time
HARM  Hull Acid Rain Model
HBAPMN  Hertfordshire and Bedfordshire Air Pollution Monitoring Network
HDV  Heavy duty vehicles – road vehicles greater than 3.5 tonnes weight (GVW)
HGV  Heavy goods vehicles – road vehicle greater than 7.5 tonnes (GVW), where GVW is the gross vehicle weight, i.e. the combined weight of the vehicle and the goods
HIRLAM  High Resolution Limited Area Model
HNO₃  Nitric acid
H₂SO₄  Sulphuric acid
HVS  High volume sampler
ICAO  International Civil Aviation Organisation
ICP-MS  Inductively coupled plasma – mass spectrometry
IGCB  Interdepartmental Group on Costs and Benefits
IIASA  International Institute for Applied Systems Analysis
INAA  Instrumental neutron activation analysis
IPC  Integrated pollution control
IPCC  Intergovernmental Panel on Climate Change
IPPC  Integrated Pollution Prevention and Control
JEP  Electricity Supply Industry Joint Supply Programme
KAQN  Kent Air Quality Network
KFG  Kleinfiltergerat (low volume sampler specified as a reference sampler for PM₁₀)
kt  Kilotonne
LAEI  London Atmospheric Emissions Inventory
LAPC  Local air pollution control
LAQM  Local air quality management
LAQN  London Air Quality Network
LCPD  Large Combustion Plant Directive
LDV  Light Duty Vehicles – road vehicles less than 3.5 tonnes weight
LEZ  Low emission zone – a specific type of ‘clear zone’
LGV  Light goods vehicles – goods vehicles less than 3.5 tonnes in weight
LNG  Liquid natural gas
LPG  Liquefied petroleum gas
LT  London Transport
LV  Limit value
LVS  Low volume sampler
MAQS  Mayor’s Air Quality Strategy
MARPOL  Marine Pollution Convention
MODIS  Moderate resolution imaging spectroradiometer
MSW  Municipal solid waste
mg m⁻³  Milligrams per cubic metre of air
µm  Micrometres
µg m⁻³  Micrograms per cubic metre of air
NAAEI  National Atmospheric Emissions Inventory
NAME  Numerical Atmospheric Dispersion Modelling Environment
Netcen  National environmental technology centre, part of AEA Technology plc
NH₃  Ammonia
NH₄⁺  Ammonium
Nm  Nanometres
NMMAAPS  National Morbidity, Mortality and Air Pollution Study
NMVOC  Non-methane volatile organic compound
NO  Nitrogen monoxide, also termed nitric oxide
NO₂  Nitrogen dioxide
NO₃⁻  Nitrate
NOₓ  Nitrogen oxides (NO + NO₂)
NPL  National Physical Laboratory
NRTF  National road traffic forecasts
O₂  Oxygen
O₃  Ozone
OEF  Oxford economic forecasting
OH  Hydroxyl radical
OPG  Other petroleum gas
OSPM  Operational Street Pollution Model
PAH  Polycyclic aromatic hydrocarbon
PAN  Peroxyacetyl nitrate
PCB  Polychlorinated biphenyl
PI  Pollution Inventory
PIXE  Particle-induced X-ray emission
PM  Particulate matter
PM₁₀  Airborne particulate matter passing a sampling inlet with a 50% efficiency cut-off at 10 µm aerodynamic diameter and which transmits particles of below this size
PM₂.₅  Airborne particulate matter passing a sampling inlet with a 50% efficiency cut-off at 2.5 µm aerodynamic diameter and which transmits particles of below this size
PM₁  Airborne particulate matter passing a sampling inlet with a 50% efficiency cut-off at 1 µm aerodynamic diameter and which transmits particles of below this size
efficiency cut-off at 1 µm aerodynamic diameter and which transmits particles of below this size

**PM$_{0.1}$**  
Airborne particulate matter passing a sampling inlet with a 50% efficiency cut-off at 0.1 µm aerodynamic diameter and which transmits particles of below this size

**PM$_{\text{coarse}}$**  
Fraction of the measured particle mass concentration determined from PM$_{10}$ minus PM$_{2.5}$.

Ppb  
Parts per billion (1,000,000,000)

PPC  
Pollution Prevention and Control

Ppm  
Parts per million

PSA  
Particle surface area

QUARG  
Quality of Urban Air Review Group

R&P  
Rupprecht & Patashnick Co., Inc.

RGAR  
Review Group on Acid Rain

RMA  
Reduced major axis

RMS  
Root mean square

ROS  
Reactive oxygen species

SAQSG  
Sussex Air Quality Steering Group

SCC  
Sharp-cut cyclone

SEPA  
Scottish Environment Protection Agency

SES  
Sequential equilibrium system

SI  
Spark ignition

SIA  
Secondary inorganic aerosols

SJAC  
Steam-jet aerosol collector

SMMT  
Society of Motor Manufacturers and Traders Limited

SMPS  
Scanning mobility particle sizer

SO$_2$  
Sulphur dioxide

SO$_4$  
Sulphate

SOA  
Secondary organic aerosol

SSF  
Solid smokeless fuel

TCA  
Total cloud amount

TEOM  
Tapered Element Oscillating Microbalance

TfL  
Transport for London

TRAMAQ  
DfT funded, Traffic management and air quality research programme.  
http://www.roads.dft.gov.uk/roadnetwork/tramaq/

TRL  
Transport Research Laboratory

TSP  
Total suspended particles

TYP  
Ten Year Plan

WHO  
World Health Organisation

UK  
United Kingdom

UKAS  
United Kingdom Accreditation Service

UKIAM  
United Kingdom Integrated Assessment Model

UKOOA  
United Kingdom Offshore Operations Association

ULSD  
Ultra-low sulphur diesel

ULSP  
Ultra-low sulphur petrol

UM  
Unified model

UNECE  
United Nations Economic Commission for Europe

USA  
United States of America

USEPA  
United States Environmental Protection Agency

VOC  
Volatile organic compound

WRAC  
Wide range aerosol classifier

WS  
Wind speed

XRF  
X-ray fluorescence
### Glossary

**Accumulation mode**
Particles from around 0.5 to 1 µm diameter, resulting from primary emissions, condensation of secondary sulphates, nitrates and organics from the gas phase and coagulation of smaller particles. Particles can have a long atmospheric lifetime, typically 7–30 days.

**Accuracy**
A measure of the closeness of the agreement between the result of a measurement and the true value (see also Uncertainty and Precision).

**Acute health effect**
Short-lasting or short-term in reference to either duration of exposure or effect of exposure to a pollutant.

**Aerosol**
A mixture of suspended particulate matter and its gaseous suspended medium.

**Air quality objective**
Policy targets generally expressed as a maximum ambient concentration to be achieved, either without exception or with a permitted number of exceedences within a specified timescale (see also air quality standard).

**Air quality standard**
The concentration of a pollutant, and associated averaging period, which is without significant effect on human health at a population level.

**Ambient air**
Outdoor air in the troposphere, excluding workplace air.

**Annual mean**
The average of the concentrations measured for each pollutant for one year. In the case of the air quality objectives this is for a calendar year.

**AQMA**
Air quality management area, an area which a local authority has designated for action, based upon predicted exceedences of air quality objectives.

**Atmospheric dispersion model**
A mathematical, often computer-based method for calculating pollutant concentrations from emissions data and specified meteorological conditions. Models vary from screening models to detailed 'new-generation' types.

**AURN**
Automatic Urban and Rural Network of air pollution measurement sites, managed by contractors on behalf of Defra and the Devolved Administrations.

**Black Smoke**
Non-reflective (dark) particulate matter associated with the smoke stain measurement method (BS 1747 pt 2: BSI 1969).

**Brownian motion**
Constant small movement of suspended particles due to bombardment by surrounding molecules.

**Calibration (modelling)**
The process of multiplying the output of a model by a fixed correction factor to give, on average, a 1:1 relationship with measured data.

**Calibration (monitoring)**
The process of reducing the uncertainty of monitoring data by controlled tests on the analyser, normally traceable to internationally accepted measurements standards.

**Carcinogenic**
Known or believed to cause cancer in humans.

**Cardiopulmonary**
Pertaining to the heart and lungs.

**Cardiovascular**
Pertaining to the heart and blood vessel (circulatory) system.

**Chronic health effect**
Long-lasting or long-term in reference to either duration of exposure or effect of exposure to a pollutant.

**Coagulation**
Process by which particles collide and coalesce together.

**Coarse particle mode**
Particles greater than 1 µm diameter, typically generated mechanically rather than through nucleation and condensation processes. Atmospheric lifetimes are much shorter than for the accumulation mode.
Cohort study | Study in which a group or cohort of people are followed over time to see whether they develop a disease in response to exposure to the factor of interest.

Concentration | The amount of a (polluting) substance in a volume (of air), typically expressed as a mass of pollutant per unit volume of air at standard conditions of temperature and pressure (e.g. micrograms per cubic metre, \( \mu g \, m^{-3} \)) or as the ratio of the number of molecules of the pollutant to the total number of molecules in the volume of air (for example, parts per billion, ppb).

Condensation | A physical process with more vapour molecules arriving at particle's surface than leaving the surface, resulting in a net growth of the particle.

Confounding factor | A condition or variable that is both a risk factor for disease and associated with an exposure of interest. This association between the exposure of interest and the confounder may make it falsely appear that the exposure of interest is associated with the disease.

Correction factor | See scaling factor.

Correlation | The fraction of the variability in one set of data that is proportional to the value of some other set of data.

Data capture | The percentage of all the possible measurements for a given period that were validly measured.

Elemental carbon | Black, graphitic carbon formed in the high temperature combustion of fossil and contemporary biomass fuels.

Emission | The amount of a (polluting) substance emitted in a certain amount of time, typically expressed as a mass of pollutant per unit time (e.g., grams per second or tonnes per year for a single source). May also be expressed per unit length of a road (e.g., g s\(^{-1}\) m\(^{-1}\)), or per unit area of an urban area (e.g., t a\(^{-1}\) km\(^{-2}\)).

Emissions inventory | A quantification and compilation of emission sources by geography and time, usually including data covering one or more years.

Epidemiology | The study of the distribution and determinants of health and disease in populations.

EURO I | Europe-wide vehicle standard that required vehicles manufactured after 1992 to achieve set emissions limits. For petrol cars this was achieved by the fitting of three-way catalysts.

EURO II, III, IV and V | Europe-wide vehicle standards that are progressively stricter for the years 1996, 2000, 2006 and 2008, respectively.

Exceedence | A period of time where the concentration of a pollutant is greater than the appropriate air quality objective.

Endotoxin | Potent inflammatory agents present primarily in the cell walls of Gram-negative bacteria.

Genotoxic | A term used to describe carcinogens that act either directly or after transformation in the body on the genetic material (DNA) of cells.

Heterogeneous nucleation | Process in which newly formed low-volatility substances condense onto existing particles causing the growth of those particles.

Homogeneous nucleation | Process by which newly formed molecules of extremely low vapour pressure condense with one another to form wholly new particles.

In vitro | Taking place in isolation from a living organism.

In vivo | Taking place within a living biological organism.

Mass closure | The concept that sum of the individual chemical components equals the measured mass of particles.
Microgram (µg)

One millionth of a gram.

Milligrams per cubic metre of air. A unit for describing the concentration of air pollutants in the atmosphere as a mass of pollutant per unit volume of air. This unit is one thousand-times larger than the µg m⁻³ unit listed below.

µg m⁻³

Micrograms per cubic metre of air. A unit for describing the concentration of air pollutants in the atmosphere, as a mass of pollutant per unit volume of air. A concentration of 1 µg m⁻³ means that one cubic metre of air contains one microgram of pollutant.

Micrometre (µm)

One millionth of a metre, also referred to as a micron.

Minor roads

Non A roads or motorways.

Morbidity

Illness.

Mutagenic

Capable of increasing the rate of genetic mutation in living organisms.

Nanometre (nm)

10⁻⁹ metres.

Nanoparticle

Particle smaller than 50 nm diameter.

Nucleation

Process by which secondary particles are formed: molecules of low volatility condense to form solid or liquid matter (see also heterogeneous nucleation and homogeneous nucleation).

Nucleation mode

Particles smaller than around 50 nm and usually consisting of fresh aerosols created in situ from the gas-phase by nucleation. Such particles have a relatively short lifetime in the atmosphere.

Organic carbon

Carbon in the form of organic compounds, either primary from automotive or industrial sources or secondary from the oxidation of VOCs.

Particulate matter

Suspended particulate matter is any non-gaseous material (liquid or solid) that, owing to its small gravitational settling rate, remains suspended in the atmosphere for appreciable time periods.

PM₁₀

Airborne particulate matter passing a sampling inlet with a 50% efficiency cut-off at 10 µm aerodynamic diameter and which transmits particles of below this size.

PM₂.₅

Airborne particulate matter passing a sampling inlet with a 50% efficiency cut-off at 2.5 µm aerodynamic diameter and which transmits particles of below this size.

PMcoarse

Fraction of the measured particle mass concentration determined from PM₁₀ minus PM₂.₅.

ppb

Parts per billion. The concentration of a pollutant in air in terms of molar ratio. A concentration of 1 ppb means that for every billion (10⁹) molecules in a volume of air, there is one molecule of the specified pollutant present. For practical purposes in ambient air, the molar ratio and volume ratio (the volume occupied by the pollutant gas within a given volume of air) are identical.

ppm

Parts per million. The concentration of a pollutant in air in terms of molar ratio. A concentration of 1 ppm means that for every million (10⁶) molecules in a volume of air, there is one molecule of the specified pollutant present. For practical purposes in ambient air, the molar ratio and volume ratio (the volume occupied by the pollutant gas within a given volume of air) are identical.

Precision

A measure of the closeness of the agreement between the results of successive measurements where the true value remains constant (see also Accuracy and Uncertainty).
<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
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<tbody>
<tr>
<td><strong>Primary particles</strong></td>
<td>Particles emitted directly into the environment. This includes particles from both natural sources, such as the entrainment of soils by the wind, and anthropogenic sources, such as particles arising directly from processes such as combustion and quarrying.</td>
</tr>
<tr>
<td><strong>Residual component</strong></td>
<td>A component that is commonly incorporated into both semi-empirical and dispersion models to account for primary particulate matter that is not accounted for in the emissions inventory or otherwise included in the calculations. For predictions of PM$<em>{10}$ concentrations, the residual component will usually be dominated by particles within the PM$</em>{coarse}$ fraction and will comprise emissions from various sources including sea salt, wind and blown dust and any fraction of non-exhaust road vehicle emissions not otherwise included in the modelling.</td>
</tr>
<tr>
<td><strong>Scaling factor</strong></td>
<td>Due to the need to eliminate the effect of changing humidity on the mass measurement of PM, TEOMs must maintain the sample filter at an elevated temperature. This has led to reported differences in concentrations of PM between the TEOM and the European reference sampler that is largely attributed to the loss of volatile species such as ammonium nitrate. As an interim measure, a default 'scaling factor' (also known as correction factor) of 1.3 is currently applied to all nationally reported TEOM PM$_{10}$ data in the UK as recommended by the EC Working Group on Particulate Matter.</td>
</tr>
<tr>
<td><strong>Secondary particles</strong></td>
<td>Particles formed in the atmosphere as a result of chemical reactions leading to the formation of substances of low volatility that consequently condense into the solid or liquid phase.</td>
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<tr>
<td><strong>Stage II indicative limit values</strong></td>
<td>The First Air Quality Daughter Directive (1999/30/EC) sets Stage II indicative limit values for both 24 h and annual average PM$_{10}$ to be achieved by 1 January 2010. These Stage II limit values are only indicative and will be reviewed by the EC in light of further information on health and environmental effects, technical feasibility and experience gained in the application of Stage I limit values by Member States. They have no legal standing.</td>
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<tr>
<td><strong>Susceptible group</strong></td>
<td>A group of people who, as a result of genetic predisposition, illness or unusual exposure, are more affected by toxic substances than other people.</td>
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<tr>
<td><strong>TEOM</strong></td>
<td>Tapered element oscillating microbalance. Equipment used for measuring fine particulate matter such as PM$_{10}$.</td>
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<tr>
<td><strong>Total suspended particles (TSP)</strong></td>
<td>A term describing the mass of airborne particles, usually determined with a high-volume air sampler, which draws air through a filter membrane over a 24-hour period. Includes particles with a wide range of sizes.</td>
</tr>
<tr>
<td><strong>True value</strong></td>
<td>The value of a concentration, for example, which is entirely consistent with the definition of the units in which it is given. This is the value that would be obtained by a perfect measurement.</td>
</tr>
<tr>
<td><strong>Ultrafine particles</strong></td>
<td>Particles smaller than 100 nm diameter.</td>
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<tr>
<td><strong>Uncertainty</strong></td>
<td>A measure, associated with the result of a measurement, that characterizes the range of values within which the true value is expected to lie. Uncertainty is usually expressed as the range within which the true value is expected to lie with a 95% probability, where standard statistical and other procedures have been used to evaluate this figure. Uncertainty is more clearly defined than the closely related parameter accuracy, and has replaced it on recent European legislation.</td>
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</tbody>
</table>