

LET'S CLEAR THE AIR



Air glossary

A guide for use of terms in cleartheair.nsw.gov.au and in the Air Education Resource Kit

Air NEPM

National Environment Protection Measure for Ambient Air Quality.

air pollutant

Chemicals or substances in the atmosphere, including odours, resulting from man-made activities or natural processes that cause adverse effects to human health, property and the environment. They can be in the form of solid *particles*, liquid droplets, gases or a combination thereof and can be directly emitted or formed by secondary reaction in the atmosphere.

Air pollutants monitored by DECCW and used in the calculation of the AQI include *ozone*, *carbon monoxide*, *sulfur dioxide*, *nitrogen dioxide* and *air particles*.

air pollution

The presence of contaminants or *pollutant* substances (including odours) in the air in high enough concentrations to interfere with human health or welfare or produce other harmful environmental effects.

air quality index (AQI)

A value derived from air quality data readings, which allows for more meaningful comparison of *pollutants* affecting air quality. The index is derived using the following formula:

$$\text{AQI}_{\text{pollutant}} = \frac{\text{Pollutant data reading}}{\text{Standard}} \times 100$$

AQI

See *air quality index*

airshed

A volume of air confined to a geographic region and within which *pollutants* are contained.

An area in which air quality is subject to common influences from *emissions*, meteorology and topography.

air toxics

Gaseous, aerosol or particulate *pollutants* present in the atmosphere in trace amounts with characteristics such as toxicity and persistence making them a hazard to human health, plant and animal life.

A class of *pollutants* including dioxins and furans, polycyclic aromatic hydrocarbons (PAHs), heavy metals and aldehydes, as well as *VOCs*.



Environment,
Climate Change
& Water



our environment *it's a living thing*

ambient air

The external air environment (does not include indoor air).

anthropogenic

Human-made or related to human activity.

benzene

A type of VOC known to cause cancer at very low levels of exposure.

biodiesel

A type of biofuel made from oilseed crops, recycled cooking oil or waste animal fat.

Available at some service stations in NSW.

biogenic

Of natural origin.

biomass

The total mass of living matter in a given area.

carbon

An element which is the basis of all organic compounds or substances.

Often used to broadly refer to all *greenhouse gases*.

carbon footprint

A measure of the *greenhouse gas emissions* that can be attributed to an activity, an individual, a household or a business.

carbon dioxide (CO₂)

A colourless, odourless, non-poisonous gas that is a normal part of the *ambient air*. Although it does not directly impair human health, it is a *greenhouse gas* that traps infrared radiation and contributes to *global warming*.

A naturally occurring gas that is also a by-product of burning *fossil fuels* and *biomass*, other industrial processes and land-use changes.

The principal *anthropogenic greenhouse gas* that affects the earth's temperature.

Trees breathe in CO₂ and breathe out O₂.

carbon monoxide (CO)

An odourless, colourless, poisonous gas produced by incomplete oxidation (burning) of *carbon*-based fuels including petrol and diesel, oil and wood.

Natural sources: wildfires, oxidation in the oceans and air of methane produced from organic decomposition.

Human-made sources: the motor vehicle is by far the largest human source although any combustion process can produce it.

Enters the bloodstream through the lungs and prevents the normal transport of oxygen by blood to reduce the amount of oxygen reaching the body's organs and tissues, especially the heart.

People suffering from heart disease are most at risk; they may experience chest pain if they are exposed to carbon monoxide, particularly while exercising.

carbon neutral

Describes an activity which produces zero net *carbon emissions*.

carbon offset

Represent reductions in *greenhouse gases* relative to a business-as-usual baseline that are tradeable and often used to counteract all or part of another entity's *emissions*.

carcinogen

A cancer-causing substance.

climate change

A change of weather patterns that is attributed directly or indirectly to human activity which alters the composition of the global atmosphere and that is in addition to natural climate variability over comparable time periods (UNFCCC).

CSIRO

Commonwealth Scientific and Industrial Research Organisation (now known just as CSIRO).

DECCW

Department of Environment, Climate Change and Water NSW.

emissions

The release of *pollutants* into the atmosphere.

exceedence

An instance where the levels of a *pollutant* is above the *goal* or *standard*.

extreme pollution events

Infrequent events like bushfires and dust storms which generate extreme levels of *air pollution*. It is anticipated that the frequency of these will continue to rise as drought conditions continue due to *climate change*.

fossil fuels

A general term for buried combustible geologic deposits of organic materials, formed by decayed plants and animals that have been converted to crude oil, coal, natural gas or heavy oils by exposure to heat and pressure in the earth's crust over hundreds of millions of years.

Coal, oil or gas.

GHGs

See *greenhouse gases*

global warming

A rise in the Earth's overall temperature caused by an increase in heat-retaining gases in the atmosphere and responsible for changes in global climate patterns.

GMR

See *greater metropolitan region*.

goal

In relation to the achievement of the Air Quality Standards set by the *Air NEPM*, means the extent to which the *standards* are complied with (eg. maximum allowable *exceedences*).

See *standard*.

greater metropolitan region

Includes Sydney, the Central Coast, Lower Hunter and Illawarra regions.

Home to around 70 per cent of the NSW population.

greenhouse effect

The trapping of heat by heat-retaining atmospheric gases (including water vapour, *carbon dioxide*, *nitrous oxide*, methane and *ozone*) that keeps the earth about 30°C (60°F) warmer than if these gases did not exist.

greenhouse gases (GHGs)

Any gas that absorbs infrared radiation in the atmosphere.

Gases that cause *global warming* and *climate change*.

The major *GHGs* are *carbon dioxide* (CO₂), methane (CH₄), *nitrous oxide* (N₂O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulfur hexafluoride (SF₆).

ground-level ozone

A colourless, gaseous *secondary pollutant* which can form at ground-level when *VOCs* react with *NOx* in warm, sunny conditions.

Ozone is one of the key chemicals in *photochemical smog* and is often used as a measure of it.

Breathing *ozone* can affect lung function and worsen asthma.

health alerts

Issued at 4 pm in NSW if the *AQI* is likely to be above 100 the next day, a level at which people sensitive to the effects of *air pollution* are likely to feel its impacts.

Kyoto Protocol

An international treaty negotiated under the auspices of the *UNFCCC* entered into force in 2005.

Sets, among other things, binding targets for the reduction of *greenhouse gas emissions* by individual developed countries to be met within the first commitment period of 2008–12.

lead

A naturally occurring metal. Exposure can affect intellectual development in children.

Prohibition of the sale of leaded petrol since 2002 has eliminated the major source of lead in *ambient air*.

load-based fees

Licence fees that are based on the amount of particular *pollutants* that are discharged by industrial activity.

micrometres (µm)

A unit of length equal to one thousandth of a millimetre or one millionth of a metre.

nitric oxide (NO)

Is a colourless gas predominantly formed through combustion of *fossil fuels* (90 per cent nitric oxide and 10 per cent *nitrogen dioxide*) and is a *precursor* to *nitrogen dioxide* and is also an active compound in *photochemical smog* (*ground-level ozone*) formation.

Measured at certain monitoring sites, but not used in reporting the *air quality index* (*AQI*).

nitrogen dioxide (NO₂)

Is a reddish brown gas produced as a result of fuel combustion of *fossil fuels*, emitted directly and also as a result of the oxidation of *nitric oxide* in the atmosphere.

A respiratory irritant which can make existing respiratory illness symptoms worse.

Makes people with asthma more susceptible to lung infections and asthma triggers like pollen and exercise.

Nitrogen dioxide levels can be high near busy roads and also indoors when *unflued* gas appliances are used.

NO_x

Is the generic term for a group of oxidised nitrogen (N) compounds, expressed as the sum of NO and NO₂. Both man-made and natural (*biogenic*) processes emit NO_x.

In the atmosphere, *oxides of nitrogen* can contribute to the formation of *photochemical smog* (ground-level *ozone*), can impair visibility and have health consequences.

Oxides of nitrogen; includes *nitrogen oxide* (NO) and *nitrogen dioxide* (NO₂); an *ozone precursor*.

oxides of nitrogen

See *NO_x*.

ozone (O₃)

Is found in the *upper atmosphere* to protect the earth against the sun's damaging UV rays.

It is also a colourless, gaseous *secondary pollutant* formed by chemical reactions between *VOCs* and *NO_x* in warm, sunny conditions.

One of the key chemicals in *photochemical smog* and is often used as a measure of it.

Breathing ozone can affect lung function and worsen asthma.

ozone layer

Absorbs most of the harmful ultraviolet B (UV-B) radiation from the sun, which can cause skin cancer, cataracts, suppression of the immune system, etc and damage to agricultural crops, livestock, and industrial and domestic materials.

particles

Includes both solid particles and liquid droplets in a wide range of sizes that are suspended in the air and adversely impact health. Many *anthropogenic* and natural sources emit particles directly or emit other *pollutants* that react in the atmosphere to form particles.

The size of a particle determines its potential impact on human health. Particles 10 *micrometres* in diameter and less pose a health concern because they can be inhaled and accumulate in the respiratory system. Particles 2.5 *micrometres* in diameter and less ('fine' particles) are believed to pose the largest health risks as they can lodge deeply into the lungs.

particulates

See *particles*.

photochemical

Relating to the chemical reaction of light, including sunlight, see *smog*.

PM

Particulate matter.

PM₁₀

Particles with an equivalent aerodynamic diameter of 10 *micrometres* (µm) or less.

PM_{2.5}

Particles with an equivalent aerodynamic diameter of 2.5 *micrometres* (µm) or less.

pollutant

A contaminating substance or chemical, resulting from man-made activities or from natural processes that causes adverse effects to human health, property and the environment.

precursor

A chemical that is required for another compound to form, as in the course of a chemical reaction eg. *VOCs* and *NO_x* are *ozone* precursors, where they need to first be present to then react with each other in the presence of strong sunlight to form *ozone*.

primary pollutant

Emitted directly from a source.

radon

An inert gas produced when elements in soil and rocks decay.

Its decay produces alpha *particles* which damage lung tissue when inhaled.

Classified as a class 1 *carcinogen*.

RTA

Roads and Traffic Authority NSW.

secondary pollutant

Formed by the reactions of other *pollutants*.

smog

A complex mixture of *pollutants*, principally *ground-level ozone*, produced by chemical reactions in air involving smog-forming chemicals mainly *VOCs* and *NOx*.

Major *photochemical* smog occurrences are often linked to heavy traffic, sunshine, high temperatures and calm winds or temperature inversion. Smog is often worse away from the source of smog-forming chemicals (*precursors*), since the chemical reactions forming smog occur in the atmosphere while the *precursors* are being blown away from their sources by winds.

A complex mixture of chemicals – mainly *ozone* and *nitrogen dioxide* – which appears as a white haze in urban areas during warm, sunny conditions.

SO₂

See *sulfur dioxide*.

solvent

In this context means any liquid containing a *volatile organic compound* (or combinations) which is used as a diluents, thinner, dissolver, viscosity reducer, cleaning agent or for similar uses. These organic liquids are principally derived from petroleum.

A substance used to dissolve another substance, for example bleach and methylated spirits.

standard

In relation to the *Air NEPM* means the maximum concentration of *pollutant* allowable for the averaging period specified based on health effects.

The standards for *ozone*, *carbon monoxide*, *sulfur dioxide*, *nitrogen dioxide* and *air particles* were set in 1998 by the National Environment Protection Council.

stratosphere

The lower major layer of the Earth's atmosphere, between 10 and 50 kilometres above the earth's surface.

Contains the *ozone* layer.

sulfur dioxide (SO₂)

Is emitted into the atmosphere through natural processes such as volcanic eruptions and *anthropogenic* activities such as the smelting of mineral ores containing sulfur and the combustion of *fossil fuels*.

The main human-made sources are the smelting of mineral ores containing sulfur and the combustion of *fossil fuels*.

A respiratory irritant which can worsen existing respiratory illness.

toxic

In relation to air *pollutants* means those *pollutants* that are known or suspected to cause cancer or other serious health effects, such as reproductive effects or birth defects, or adverse environmental effects.

Poisonous.

UNFCCC

United Nations Framework Convention on Climate Change.

unflued

Not externally vented.

VOCs

Organic compounds that evaporate readily at room temperature and normal pressure and include petrol, industrial chemicals such as *benzene*, *solvents* such as toluene and xylene, degreasers and paint thinners. *VOCs* contribute to *ground-level ozone* production and some are also *air toxics* (eg. *benzene*).

Volatile and semi-volatile *organic compounds* (mainly hydrocarbons).

An ozone precursor.

volatile organic compounds

See *VOCs*.